fitCTVARMx: Internal Tests

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Tests

```
#> test-fitCTVARMx-fit-ct-var-id-mx-sigma-diag
#> 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:
#> -0.2139001517700005,0.861186849501166,-0.405561461480421,-0.131907517647472,-0.523808720935904,0.8
#>
#> Means of the estimated paramaters per individual.
#>      phi_11      phi_21      phi_31      phi_12      phi_22      phi_32
#> -0.37965548  0.75848928 -0.41873978 -0.03171808 -0.35951595  0.86221607
```

```
#>      phi_13      phi_23      phi_33    sigma_11    sigma_22    sigma_33
#>  0.02195558 -0.08616503 -0.86629112  0.09721581  0.10211013  0.10053139
#>
#> Estimated paramaters per individual.
#>          phi_11    phi_21     phi_31      phi_12     phi_22    phi_32
#> [1,] -0.5454108 0.6557917 -0.4319181  0.06847136 -0.1952232 0.8591364
#> [2,] -0.2139002 0.8611868 -0.4055615 -0.13190752 -0.5238087 0.8652957
#>           phi_13      phi_23     phi_33   sigma_11   sigma_22   sigma_33
#> [1,] -0.05178730 -0.25075038 -0.7402852 0.10027176 0.10763468 0.09333226
#> [2,]  0.09569846  0.07842031 -0.9922970 0.09415987 0.09658558 0.10773053
#> Test passed
```

```
#> 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 -2692.6342)  (1 attempt(s):  1
valid, 0 errors)
#>  Start values from best fit:
#> -0.54541082296846 4,0.655791720204795,-0.431918099282865,0.0684713331800128,-0.195223149243982,0.8
#> Running CTVAR with 12 parameters
#>
#> Beginning initial fit attempt
#> Running CTVAR with 12 parameters
#>
#>  Lowest minimum so far:   -2726.62588111983
#>
#> Solution found
```

```
#>
#>  Retry limit reached; Best fit=-5432.9994 (started at 102.88353)  (1001 attempt(s):
57 valid, 944 errors)
#>  Start values from best fit:
#> -0.37198151538964 7,0.729727474752637,-0.393839796633512,0.000521151981413194,-0.336579186523244,0
#> Running CTVAR with 21 parameters
#>
#> Beginning initial fit attempt
#> Running CTVAR with 21 parameters
```

```
#>
#>  Lowest minimum so far:   -5502.14537928613
#>  Not all eigenvalues of the Hessian are positive:  64425699.2941988, 59817985.617954,
54175713.0520213, 221219.730527014, 209633.884743752, 205294.656290626, 38107.7400541623,
37400.787973331, 34187.2677928127, 1478.56858659102, 1455.48492832389, 1360.83685549981,
364.553818165709, 354.508943407482, 328.528617908045, 153.613498452961, 148.721984709815,
142.713491101121, 1.99353973850305e-11, 6.45717653238645e-12, -1.18413292253069e-11
#>
#> Beginning fit attempt 1 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>  Not all eigenvalues of the Hessian are positive:  64425699.2941988, 59817985.617954,
54175713.0520213, 221219.730527014, 209633.884743752, 205294.656290626, 38107.7400541623,
37400.787973331, 34187.2677928127, 1478.56858659102, 1455.48492832389, 1360.83685549981,
364.553818165709, 354.508943407482, 328.528617908045, 153.613498452961, 148.721984709815,
142.713491101121, 1.99353973850305e-11, 6.45717653238645e-12, -1.18413292253069e-11
#>
#> Beginning fit attempt 2 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 3 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 4 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>  Not all eigenvalues of the Hessian are positive:  64424511.0005292, 59818157.7263696,
54176083.1599329, 221223.522307343, 209635.434085937, 205297.530420658, 38109.9406571988,
37400.8056818566, 34187.9544317051, 1478.34666955218, 1455.59687119384, 1360.7821296793,
364.546141317971, 354.367753593648, 328.552751178994, 153.424770662909, 148.51155690273,
142.547665234689, 5.12771404323614e-12, 4.70257041976418e-12, -3.15834873606368e-12
#>
#> Beginning fit attempt 5 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 6 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 7 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
```

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#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 8 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 9 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 10 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 11 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 12 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 13 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 14 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 15 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 16 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
```

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#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 17 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 18 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 19 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 20 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 21 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 22 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 23 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 24 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 25 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
```

```
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 26 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 27 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 28 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 29 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 30 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 31 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 32 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 33 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 34 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
```

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#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 35 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 36 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 37 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 38 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 39 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 40 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 41 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 42 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 43 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
```

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#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 44 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 45 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 46 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 47 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>  Not all eigenvalues of the Hessian are positive:  64424636.4442554, 59818045.1703476,
54175728.4827759, 221223.571236553, 209635.101335698, 205297.001328288, 38110.0846574416,
37400.857744271, 34188.1211196982, 1478.66679239543, 1455.61026946689, 1360.61684694983,
364.582642132089, 354.392272784955, 328.84424083041, 153.884983823328, 148.671836741596,
142.906194350037, 9.53541975174388e-12, 1.48195387923563e-12, -8.67260227778161e-12
#>
#> Beginning fit attempt 48 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 49 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 50 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 51 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
```

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#>
#> Beginning fit attempt 52 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 53 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 54 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 55 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 56 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 57 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 58 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 59 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 60 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>  Not all eigenvalues of the Hessian are positive:  64425024.7562679, 59817235.819108,
54175540.7659451, 221224.294473306, 209634.322934733, 205297.934937767, 38110.1917980345,
37400.7831091635, 34188.3700731644, 1478.4638813708, 1455.55869684394, 1360.74502948845,
```

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364.534217322805, 354.35111254602, 328.697846240185, 153.651902810754, 148.718537088958,
142.658846100976, 6.25685319993447e-13, -1.30940714228247e-11, -3.6722625634966e-11
#>
#> Beginning fit attempt 61 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 62 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 63 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 64 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 65 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 66 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 67 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 68 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 69 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
```

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#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 70 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 71 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 72 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 73 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 74 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 75 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 76 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 77 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 78 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
```

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#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 79 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 80 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 81 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 82 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 83 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>  Not all eigenvalues of the Hessian are positive:  64424774.7079755, 59818535.5898545,
54176115.83778, 221223.993180492, 209635.732889439, 205298.302473035, 38109.9089905919,
37401.0087529359, 34188.1344738108, 1478.60079165814, 1455.5989733554, 1360.68600307971,
364.523732990441, 354.371270886706, 328.712676232462, 153.830699368321, 148.668243134143,
142.818777082529, 5.64803714886831e-12, 2.61130095792454e-12, -1.78801697300382e-11
#>
#> Beginning fit attempt 84 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 85 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 86 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
```

```
#>
#> Beginning fit attempt 87 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 88 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 89 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 90 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 91 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 92 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 93 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 94 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 95 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
```

```
#>
#> Beginning fit attempt 96 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 97 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 98 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 99 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 100 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>  Not all eigenvalues of the Hessian are positive:  64424577.3877614, 59818248.9820842,
54176069.7526044, 221223.857846759, 209635.469899439, 205298.017067547, 38109.9313316399,
37400.9932488341, 34187.9858918662, 1478.55734035553, 1455.58021540378, 1360.72543230677,
364.453423123889, 354.480291284888, 328.636494925064, 153.631953790364, 148.563796269198,
142.824114845286, 2.6058176782566e-11, -5.54657364255715e-12, -1.63834871865183e-11
#>
#> Beginning fit attempt 101 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 102 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 103 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 104 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
```

```
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 105 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 106 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 107 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 108 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 109 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 110 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 111 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 112 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 113 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
```

```
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 114 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 115 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 116 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 117 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 118 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 119 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 120 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 121 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 122 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
```

```
#>
#> Solution found
```

```
#>
#>  Retry limit reached; Best fit=-5432.9994 (started at -75.52606)  (1001 attempt(s):
55 valid, 946 errors)
#>  Start values from best fit:
#> -0.371981438016807,0.7297277778413989,-0.393840211145935,0.000520710079599381,-0.336579957446349,0
#> Running CTVAR with 21 parameters
#>
#> Beginning initial fit attempt
#> Running CTVAR with 21 parameters
#>
#>  Lowest minimum so far:   -5502.14537925701
#>
#> Solution found
```

```
#>
#>  Retry limit reached; Best fit=-5432.9994 (started at 102.88353)  (1001 attempt(s):
55 valid, 946 errors)
#>  Start values from best fit:
#> -0.372105946998558,0.729715440445703,-0.393864255727337,0.000624032441140173,-0.336650996742335,0
#> Running CTVAR with 21 parameters
#>
#> Beginning initial fit attempt
#> Running CTVAR with 21 parameters
#>
#>  Lowest minimum so far:   -5502.14537928613
#>  Not all eigenvalues of the Hessian are positive:  64425699.2941988, 59817985.617954,
54175713.0520213, 221219.730527014, 209633.884743752, 205294.656290626, 38107.7400541623,
37400.787973331, 34187.2677928127, 1478.56858659102, 1455.48492832389, 1360.83685549981,
364.553818165709, 354.508943407482, 328.528617908045, 153.613498452961, 148.721984709815,
142.713491101121, 1.99353973850305e-11, 6.45717653238645e-12, -1.18413292253069e-11
#>
#> Beginning fit attempt 1 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>  Not all eigenvalues of the Hessian are positive:  64425699.2941988, 59817985.617954,
54175713.0520213, 221219.730527014, 209633.884743752, 205294.656290626, 38107.7400541623,
37400.787973331, 34187.2677928127, 1478.56858659102, 1455.48492832389, 1360.83685549981,
364.553818165709, 354.508943407482, 328.528617908045, 153.613498452961, 148.721984709815,
142.713491101121, 1.99353973850305e-11, 6.45717653238645e-12, -1.18413292253069e-11
```

```
#>
#> Beginning fit attempt 2 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 3 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 4 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 5 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 6 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 7 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 8 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 9 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 10 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
```

```
#>
#> Beginning fit attempt 11 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 12 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 13 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 14 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 15 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 16 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 17 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 18 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 19 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
```

```
#>
#> Beginning fit attempt 20 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 21 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 22 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 23 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 24 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 25 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#>  Fit attempt generated errors
#>
#> Beginning fit attempt 26 of at maximum 1000 extra tries
#> Running CTVAR with 21 parameters
#>
#> Solution found
```

```
#>
#>  Solution found!  Final fit=-5502.1454 (started at 76.95661)  (27 attempt(s):  3
valid, 24 errors)
#>  Start values from best fit:
#> -0.23081583530325,0.741669318026835,-0.203391422774756,0.0818537717486326,-0.533602209483083,0.5
#> test-fitCTVARMx-fit-ct-var-id-mx-sigma-full
#> Running CTVAR with 15 parameters
#>
#> Beginning initial fit attempt
```

```
#> Running CTVAR with 15 parameters
#>
#>  Lowest minimum so far:   -2708.30352549539
#>
#> Solution found
```

```
#>
#>  Solution found!   Final fit=-2708.3035 (started at -2583.5637)  (1 attempt(s):
1 valid, 0 errors)
#>  Start values from best fit:
#> -0.534241206420914,0.62797339469317,-0.434553823990626,0.0533435092912926,-0.189553489184932,0.8
#> Running CTVAR with 15 parameters
#>
#> Beginning initial fit attempt
#> Running CTVAR with 15 parameters
#>
#>  Lowest minimum so far:   -2729.43541395449
#>
#> Solution found
```

```
#>
#>  Solution found!   Final fit=-2729.4354 (started at -2584.9163)  (1 attempt(s):
1 valid, 0 errors)
#>  Start values from best fit:
#> -0.205071078209191,0.881043673677791,-0.376750228145059,-0.147028539743142,-0.542917489941515,0.85

#>
#> Means of the estimated paramaters per individual.
#>        phi_11        phi_21        phi_31        phi_12        phi_22
#> -0.3696561423  0.7545085342 -0.4056520261 -0.0468425152 -0.3662354896
#>        phi_32        phi_13        phi_23        phi_33      sigma_11
#>  0.8612711545  0.0388481598 -0.0747622926 -0.8654204220  0.0971285185
#>      sigma_21      sigma_22      sigma_31      sigma_32      sigma_33
#>  0.0009342611  0.1021725684 -0.0035821148 -0.0026620320  0.1005236058
#>
#> Estimated paramaters per individual.
#>          phi_11    phi_21     phi_31      phi_12     phi_22    phi_32
#> [1,] -0.5342412 0.6279734 -0.4345538  0.05334351 -0.1895535 0.8656379
#> [2,] -0.2050711 0.8810437 -0.3767502 -0.14702854 -0.5429175 0.8569044
#>           phi_13      phi_23     phi_33   sigma_11     sigma_21   sigma_22
#> [1,] -0.04057728 -0.24885244 -0.7448651 0.10016898  0.004029849 0.10757830
#> [2,]  0.11827360  0.09932785 -0.9859757 0.09408806 -0.002161327 0.09676684
#>           sigma_31     sigma_32   sigma_33
#> [1,] -0.0005085985 -0.002368596 0.09337775
#> [2,] -0.0066556310 -0.002955468 0.10766946
#> Test passed
```

```
#> Running CTVAR with 15 parameters
#>
#> Beginning initial fit attempt
#> Running CTVAR with 15 parameters
#>
#>  Lowest minimum so far:   -2708.30352549542
#>
#> Solution found
```

```
#>
#>  Solution found!   Final fit=-2708.3035 (started at -2692.6342)  (1 attempt(s):
1 valid, 0 errors)
#>  Start values from best fit:
#> -0.534241439090794,0.627973836182731,-0.434554104324778,0.0533436206892379,-0.189553553245162,0.8
#> Running CTVAR with 15 parameters
#>
#> Beginning initial fit attempt
#> Running CTVAR with 15 parameters
#>
#>  Lowest minimum so far:   -2729.43541395448
#>
#> Solution found
```

```
#>
#>  Solution found!   Final fit=-2729.4354 (started at -2715.8485)  (1 attempt(s):
1 valid, 0 errors)
#>  Start values from best fit:
#> -0.205071165693674,0.881043783235328,-0.376750185855582,-0.147028678756531,-0.542917492518065,0.8

#>
#> Means of the estimated paramaters per individual.
#>        phi_11        phi_21        phi_31        phi_12        phi_22
#> -0.3696563024  0.7545088097 -0.4056521451 -0.0468425290 -0.3662355229
#>        phi_32        phi_13        phi_23        phi_33      sigma_11
#>  0.8612712273  0.0388481828 -0.0747623322 -0.8654204659  0.0971285260
#>      sigma_21      sigma_22      sigma_31      sigma_32      sigma_33
#>  0.0009342544  0.1021725758 -0.0035821156 -0.0026620324  0.1005236009
#>
#> Estimated paramaters per individual.
#>          phi_11    phi_21     phi_31      phi_12     phi_22    phi_32
#> [1,] -0.5342414 0.6279738 -0.4345541  0.05334362 -0.1895536 0.8656381
#> [2,] -0.2050712 0.8810438 -0.3767502 -0.14702868 -0.5429175 0.8569043
#>           phi_13      phi_23     phi_33   sigma_11     sigma_21   sigma_22
#> [1,] -0.04057732 -0.24885250 -0.7448653 0.10016898  0.004029840 0.10757833
#> [2,]  0.11827368  0.09932784 -0.9859756 0.09408807 -0.002161331 0.09676682
#>           sigma_31     sigma_32   sigma_33
```

```
#> [1,] -0.0005085965 -0.002368602 0.09337775
#> [2,] -0.0066556348 -0.002955463 0.10766945
#> Test passed
```

```
#> test-fitCTVARMx-fit-ct-var-id-mx-theta-diag
#> Running CTVAR with 15 parameters
#>
#> Beginning initial fit attempt
#> Running CTVAR with 15 parameters
#>
#>  Lowest minimum so far:   -2707.31197420096
#>
#> Solution found
```

```
#>
#>  Solution found!   Final fit=-2707.312 (started at 59.80475)  (1 attempt(s):  1
valid, 0 errors)
#>  Start values from best fit:
#> -0.545403553270473,0.655780191333924,-0.431937927519135,0.068469691036237,-0.195215180793901,0.85
#> Running CTVAR with 15 parameters
#>
#> Beginning initial fit attempt
#> Running CTVAR with 15 parameters
#>
#>  Lowest minimum so far:   -2726.62588111855
#>
#> Solution found
```

```
#>
#>  Solution found!   Final fit=-2726.6259 (started at 84.166179)  (1 attempt(s):  1
valid, 0 errors)
#>  Start values from best fit:
#> -0.213899106730518,0.861185478973193,-0.405561987990989,-0.131907351800459,-0.523808434338325,0.8

#>
#> Means of the estimated paramaters per individual.
#>         phi_11         phi_21         phi_31         phi_12         phi_22
#>  -3.796513e-01   7.584828e-01  -4.187500e-01  -3.171883e-02  -3.595118e-01
#>         phi_32         phi_13         phi_23         phi_33       sigma_11
#>   8.622209e-01   2.195191e-02  -8.616802e-02  -8.662899e-01   9.721588e-02
#>       sigma_22       sigma_33       theta_11       theta_22       theta_33
#>   1.021101e-01   1.005314e-01  2.225074e-308   1.424465e-12   2.395002e-13
#>
#> Estimated paramaters per individual.
#>          phi_11    phi_21     phi_31      phi_12     phi_22    phi_32
#> [1,] -0.5454036 0.6557802 -0.4319379  0.06846969 -0.1952152 0.8591466
```

```
#> [2,] -0.2138991 0.8611855 -0.4055620 -0.13190735 -0.5238084 0.8652951
#>           phi_13      phi_23     phi_33   sigma_11   sigma_22   sigma_33
#> [1,] -0.05179217 -0.25075666 -0.7402836 0.10027194 0.10763471 0.09333229
#> [2,]  0.09569600  0.07842062 -0.9922962 0.09415982 0.09658557 0.10773048
#>           theta_11     theta_22     theta_33
#> [1,] 2.225074e-308 2.848888e-12 4.787923e-13
#> [2,] 2.225074e-308 4.055903e-17 2.080635e-16
#> Test passed

#> Running CTVAR with 15 parameters
#>
#> Beginning initial fit attempt
#> Running CTVAR with 15 parameters
#>
#>  Lowest minimum so far:   -2707.31197426421
#>
#> Solution found
```

```
#>
#>  Solution found!   Final fit=-2707.312 (started at -34.74447)  (1 attempt(s):  1
valid, 0 errors)
#>  Start values from best fit:
#> -0.545411047455776,0.655791769968899,-0.431918087958712,0.0684714732476686,-0.195223148449835,0.8
#> Running CTVAR with 15 parameters
#>
#> Beginning initial fit attempt
#> Running CTVAR with 15 parameters
#>
#>  Lowest minimum so far:   -2726.62588111983
#>
#> Solution found
```

```
#>
#>  Solution found!   Final fit=-2726.6259 (started at -26.856599)  (1 attempt(s):
1 valid, 0 errors)
#>  Start values from best fit:
#> -0.213900157034642,0.861186935515007,-0.405561579767654,-0.131907487288541,-0.523808807245147,0.8

#>
#> Means of the estimated paramaters per individual.
#>        phi_11        phi_21        phi_31        phi_12        phi_22
#> -3.796556e-01  7.584894e-01 -4.187398e-01 -3.171801e-02 -3.595160e-01
#>        phi_32        phi_13        phi_23        phi_33      sigma_11
#>  8.622161e-01  2.195551e-02 -8.616503e-02 -8.662912e-01  9.721582e-02
#>      sigma_22      sigma_33      theta_11      theta_22      theta_33
#>  1.021101e-01  1.005314e-01  1.583135e-17  1.049599e-17  4.394859e-18
```

```
#>
#> Estimated paramaters per individual.
#>          phi_11    phi_21     phi_31      phi_12     phi_22    phi_32
#> [1,] -0.5454110 0.6557918 -0.4319181  0.06847147 -0.1952231 0.8591365
#> [2,] -0.2139002 0.8611869 -0.4055616 -0.13190749 -0.5238088 0.8652957
#>           phi_13      phi_23     phi_33   sigma_11  sigma_22   sigma_33
#> [1,] -0.05178742 -0.25075041 -0.7402854 0.10027177 0.1076347 0.09333225
#> [2,]  0.09569844  0.07842035 -0.9922970 0.09415987 0.0965856 0.10773052
#>          theta_11      theta_22      theta_33
#> [1,] 8.404687e-20 2.225074e-308 2.225074e-308
#> [2,] 3.157865e-17  2.099199e-17  8.789718e-18
#> Test passed
```

```
#> test-fitCTVARMx-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

#>
#> Means of the estimated paramaters per individual.
#>      phi_11      phi_21      phi_31      phi_12      phi_22      phi_32
```

```
#> -0.37965548  0.75848928 -0.41873978 -0.03171808 -0.35951595  0.86221607
#>      phi_13      phi_23      phi_33    sigma_11    sigma_22    sigma_33
#>  0.02195558 -0.08616503 -0.86629112  0.09721581  0.10211013  0.10053139
#>
#> Estimated paramaters per individual.
#>          phi_11    phi_21     phi_31      phi_12     phi_22    phi_32
#> [1,] -0.5454108 0.6557917 -0.4319181  0.06847136 -0.1952232 0.8591364
#> [2,] -0.2139002 0.8611868 -0.4055615 -0.13190752 -0.5238087 0.8652957
#>           phi_13      phi_23     phi_33   sigma_11   sigma_22   sigma_33
#> [1,] -0.05178730 -0.25075038 -0.7402852 0.10027176 0.10763468 0.09333226
#> [2,]  0.09569846  0.07842031 -0.9922970 0.09415987 0.09658558 0.10773053
#> Test passed

#> 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 -2692.6342)  (1 attempt(s):  1
valid, 0 errors)
#>  Start values from best fit:
#> -0.54541082296846 4,0.655791720204795,-0.431918099282865,0.0684713331800128,-0.195223149243982,0.8
#> 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 -2715.8485)  (1 attempt(s):
1 valid, 0 errors)
#>  Start values from best fit:
#> -0.213900127082883,0.861186936784289,-0.405561515713572,-0.131907503993629,-0.523808771434401,0.8

#>
#> Means of the estimated paramaters per individual.
#>      phi_11      phi_21      phi_31      phi_12      phi_22      phi_32
#> -0.37965548  0.75848933 -0.41873981 -0.03171809 -0.35951596  0.86221611
```

```
#>      phi_13      phi_23      phi_33    sigma_11    sigma_22    sigma_33
#>  0.02195557 -0.08616504 -0.86629114  0.09721581  0.10211014  0.10053139
#>
#> Estimated paramaters per individual.
#>          phi_11    phi_21     phi_31      phi_12     phi_22    phi_32
#> [1,] -0.5454108 0.6557917 -0.4319181  0.06847133 -0.1952231 0.8591364
#> [2,] -0.2139001 0.8611869 -0.4055615 -0.13190750 -0.5238088 0.8652958
#>           phi_13      phi_23     phi_33   sigma_11   sigma_22   sigma_33
#> [1,] -0.05178729 -0.25075041 -0.7402852 0.10027176 0.10763469 0.09333226
#> [2,]  0.09569843  0.07842032 -0.9922971 0.09415987 0.09658559 0.10773052
#> Test passed

#> test-fitCTVARMx-fit-ct-var-mx-theta-null
#> Error in mxFitFunctionMultigroup(paste0("CTVAR", "_", ids)):  could not find function
"mxFitFunctionMultigroup"
```

Environment

```
ls()

#> [1] "root"
```

Class

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

References

R Core Team. (2024). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing. Vienna, Austria. https://www.R-project.org/