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
```

```
#>
#>  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-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:
#> -0.545410822968464,0.655791720204795,-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/