```
#define nv 5                ! number of variables
#define nq 100              ! number of nodes and weights
#ngroups 2                  ! number of groups in run
G1: Calculate stacked cov. and means
Calculation
BEGIN MATRICES;
E full 1 1 fi               ! Shape parameter, ζη
F diag nv nv fr             ! residual variances, baseline parameters βj0
G diag nv nv fi             ! residual variances, heteroscedasticity parameters βj1
U full nv 1 fi              ! factor loadings, baseline parameters γj0
V full nv 1 fi              ! factor loadings, level dependency parameters γj1

T full nv 1 fr              ! intercepts, νj
K full 1 1 fi               ! factor variance, ση2
N full 1 1 fi               ! factor mean, μη

A full nq 1                 ! Gauss Hermite Quadrature, Nodes
H unit 1 1                  ! matrix containing '1'
I unit nq 1                 ! (nq by 1) row vector containing1's
J iden nv nv fi             ! identity matrix
P full 1 1                  ! pi
Y unit nv 1                 ! (nv by 1) row vector containing1's,

END MATRICES;
ma P
3.141593
ma A            ! specify the Nodes
-18.9596362 -18.1355915 -17.4555874 -16.8504422 -16.2937419 -15.7718815
-15.2767037 -14.8028356 -14.3465035 -13.9049293 -13.4759927 -13.0580291
-12.6497008 -12.2499125 -11.8577521 -11.4724502 -11.0933491 -10.7198814
-10.3515523  -9.9879272  -9.6286212  -9.2732911  -8.9216290  -8.5733569
 -8.2282228  -7.8859966  -7.5464675  -7.2094417  -6.8747397  -6.5421953
 -6.2116532  -5.8829684  -5.5560048  -5.2306341  -4.9067351  -4.5841926
 -4.2628973  -3.9427446  -3.6236343  -3.3054703  -2.9881597  -2.6716128
 -2.3557425  -2.0404641  -1.7256947  -1.4113532  -1.0973601  -0.7836367
 -0.4701054  -0.1566890   0.1566890   0.4701054   0.7836367   1.0973601
  1.4113532   1.7256947   2.0404641   2.3557425   2.6716128   2.9881597
  3.3054703   3.6236343   3.9427446   4.2628973   4.5841926   4.9067351
  5.2306341   5.5560048   5.8829684   6.2116532   6.5421953   6.8747397
  7.2094417   7.5464675   7.8859966   8.2282228   8.5733569   8.9216290
  9.2732911   9.6286212   9.9879272  10.3515523  10.7198814  11.0933491
 11.4724502  11.8577521  12.2499125  12.6497008  13.0580291  13.4759927
 13.9049293  14.3465035  14.8028356  15.2767037  15.7718815  16.2937419
 16.8504422  17.4555874  18.1355915  18.9596362
pa E            !the shape parameter ζη is estimated
1
Ma E            ! the starting value for the shape parameter is set to 2
2
pa U            ! the model is identified by fixed γ10 to equal 1
0 1 1 1 1
ma U
1 1 1 1 1
pa V            ! the γj1's are not estimated
0 0 0 0 0
pa F
1 1 1 1 1
pa G            ! the heteroskedastic parameters, βj1, are estimated
1 1 1 1 1
pa K            ! ση2 is estimated
```

```
1
ma K
1
ma N                ! μη is fixed to 0
0
BEGIN ALGEBRA;
R=\sqrt(\sqrt(K*K)%(H-(H+H)*E*E%(H+E*E)*H%P));
B=N-R*\sqrt((H+H)%P)*E%\sqrt(H+E*E);
C= A@R+B@I;
L=I@U'+C@V';                        !linear function between λ and η
!L=(I@U').(\exp(C@V'));             !exponential function between λ and η
!L=I@U'+V'@(\exp(C)%(I+\exp(C)));   !logistic function between λ and η
M = L.(C@Y') + T'@I;                ! conditional means
S = \exp(I@F + C@G).(I@J);          ! stacked 40 conditional cov. matrices
END ALGEBRA;
END;
G2: data group
da ni=5 Nmodel=100                  ! Nmodel=100 corresponds to 100 quadrature points
Rec File =data.dat                  ! 'data.dat' is the data file
la
y1 y2 y3 y4 y5
BEGIN MATRICES;
C comp =C1
M comp = M1
S comp = S1
B comp = B1
R comp = R1
F diag nv nv = F(1)
G diag nv nv = G(1)
T full nv 1 = T(1)
U full nv 1 = U(1)
V full nv 1 = V(1)
K full 1 1 = K(1)
N full 1 1= N(1)
E full 1 1 = E(1)
H unit 1 1 fi
I unit nq 1
W full nq 1                 ! Gauss Hermite Quadrature, Weights
END MATRICES;
Matrix W                    ! Specify the Weights
3.333270e-79 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
 0.000000e+00 0.000000e+00 2.886525e-36 4.104238e-34 4.551562e-32
 4.006768e-30 2.842269e-28 1.645939e-26 7.869551e-25 3.137473e-23
 1.052212e-21 2.991512e-20 7.260177e-19 1.513434e-17 2.724943e-16
 4.259009e-15 5.804805e-14 6.927563e-13 7.266219e-12 6.721194e-11
 5.499676e-10 3.992125e-09 2.577290e-08 1.483309e-07 7.626699e-07
 3.510119e-06 1.448622e-05 5.369484e-05 1.790128e-04 5.374990e-04
 1.455199e-03 3.556087e-03 7.851073e-03 1.567269e-02 2.830867e-02
 4.629279e-02 6.857047e-02 9.203626e-02 1.119707e-01 1.234969e-01
 1.234969e-01 1.119707e-01 9.203626e-02 6.857047e-02 4.629279e-02
 2.830867e-02 1.567269e-02 7.851073e-03 3.556087e-03 1.455199e-03
 5.374990e-04 1.790128e-04 5.369484e-05 1.448622e-05 3.510119e-06
 7.626699e-07 1.483309e-07 2.577290e-08 3.992125e-09 5.499676e-10
 6.721194e-11 7.266219e-12 6.927563e-13 5.804805e-14 4.259009e-15
 2.724943e-16 1.513434e-17 7.260177e-19 2.991512e-20 1.052212e-21
 3.137473e-23 7.869551e-25 1.645939e-26 2.842269e-28 4.006768e-30
 4.551562e-32 4.104238e-34 2.886525e-36 0.000000e+00 0.000000e+00
 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00
 0.000000e+00 0.000000e+00 0.000000e+00 0.000000e+00 3.333270e-79
```

```
Begin algebra;
Z=(H+H)@\cumnor((E%R)@(C-B@I));
D=(Z.W);
end algebra;
Mean M;
Covariance S;
Weight D;
Option
END;
```