# Supplementary Material to "A likelihood-based two-part marginal model for longitudinal semicontinuous data"

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## 1 SAS Program for the HAQ Analysis

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title 'Marginally specified two-part model for the HAQ data';


PROC NLMIXED DATA=haq.haq_final;


*INITIAL VALUES;
PARMS  theta0=0.60,theta1=0.50,theta2=-0.20, theta3=-0.50,
theta4=0.80,theta5=0.40,theta6=0.20, theta7=1.20,
beta0=0.50, beta1=0.20, beta2=0.10, beta3=0.00, beta4=0.00,
beta5=0.10,beta6=0.05, beta7=0.35,
sigmae=0.08,sigmav=0.25,logsigmab=2.25, r=0.97;


*SET BOUNDS FOR VARIANCE COMPONENTS
BOUNDS sigmae sigmav  > 0,-1<=r<=1;


*BRIDGE DISTRIBUTION FOR RANDOM INTERCEPT IN BINARY PART;
sigmab=exp(logsigmab);
uni=probnorm(U);
pi=4*ATAN(1);
phi=1/sqrt(1+3*sigmab/(pi*pi));
```

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```
Bl=1/phi*log(sin(pi*uni*phi)/sin(phi*pi*(1-uni)));

* LOGIT LINK FOR  BINARY PART;
LOGITP=(theta0+theta1*B27+theta2*DQW3+theta3*DR7+theta4*DQW3*DR7+
theta5*AGEPSA2+theta6*ARTHDUR3+theta7*SEX)/phi+B1;

* PROBABILITY OF NON-ZERO HAQ;
P=1/(1+exp(-LOGITP));

* IDENTITY LINK FOR CONTINUOUS PART;
MU=beta0+beta1*B27+beta2*DQW3+beta3*DR7+beta4*DQW3*DR7+
beta5*AGEPSA2+beta6*ARTHDUR3+beta7*SEX*DEFORMED2+V;

*LOG LIKELIHOOD;
LOGLIKE=(1-HAQBIN)*log(1-P)+(HAQBIN)*(log(P)-0.5*((HAQ-MU)/sqrt(sigmae))**2
- log(sqrt(sigmae)*SQRT(2*pi)));

MODEL HAQ ~ GENERAL(LOGLIKE);
RANDOM U V ~ NORMAL([0,0],[1,r*(sigmav)**0.50,sigmav]) SUBJECT=PTNO;

* ESTIMATE ATTENUATION FACTOR;
ESTIMATE 'phi' phi;
* VARIANCE FOR BRIDGE DISTRIBUTION;
ESTIMATE 'sigb2' exp(logsigmab);
* SUBJECT-SPECIFIC COVARIATE EFFECTS;
ESTIMATE 'intercept' theta0/phi;
ESTIMATE 'b27' theta1/phi;
ESTIMATE 'dqw3' theta2/phi;
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ESTIMATE 'dr7' theta3/phi;

ESTIMATE 'dqw3:dr7' theta4/phi;

ESTIMATE 'Onset age of PsA' theta5/phi;

ESTIMATE 'Arthritis duration' theta6/phi;

ESTIMATE 'Sex' theta7/phi;

RUN;
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