**Program 18.7** SAS Code for Two-Group Comparision of Repeated Binary Measurement

%macro SS\_RepeatedBinaryMeasurement(

missingPattern = , /\* 1: independent missing 2: monotone missing \*/

corrStructure = , /\* 1: compound symetric , 2: AR(1) \*/

rho = , /\* associated correlation parameter \*/

m = , /\* number of measurement time points \*/

inP1 = , /\* proportion of subjects for control group \*/

inP2 = , /\* proportion of subjects \*/

inR = , /\* group allocation proportion(r1, r2) \*/

inDelta = , /\* proportion of observed measurements \*/

alpha = , /\* alpha \*/

power = , /\* power \*/

sides = /\* 1: one-sided test 2: two-sided test \*/

);

proc iml;

start g(p); gp = log(p/(1-p)); return (gp); finish g;

start prob(a,b,t); p = 1/(1+exp(-a-b\*t)); return (p); finish prob;

start rho(i,j,r,c);

if c=1 then do; /\* CS \*/ if i=j then rho\_ij =1; else rho\_ij = r; end;

else if c = 2 then do; /\* AR(1) \*/ dist = abs(i-j); rho\_ij = r\*\*dist; end;

return (rho\_ij);

finish rho;

%let K = 2;

P1=&inP1; P2=&inP2; r =&inR; a=J(&K,1,0); b=J(&K,1,0); t=J(&m,1,0);

tau = J(&K,1,0); s\_sq = J(&K,1,0); v = J(&K,1,0); c\_sq = J(&K,1,0);

do j=1 to &m; t[j] = j-1; end;

%if &inDelta eq %then %do;

delta = J(&m,1,0);

do j=1 to &m; delta[j] = 1-(j-1)/20; end;

%end;

b[1] = (g(P1[&m])-g(P1[1]))/(t[&m]-t[1]); a[1] = g(P1[1])-B[1]\*t[1];

b[2] = (g(P2[&m])-g(P2[1]))/(t[&m]-t[1]); a[2] = g(P2[1])-B[1]\*t[1];

d = b[2]-b[1];

do j=1 to &m;

T[j] = j-1; P1[j]= prob(a[1], b[1], t[j]); P2[j]= prob(a[2], b[2], t[j]);

end;

tau1\_num =0; tau1\_denum = 0; tau2\_num =0; tau2\_denum = 0;

do j=1 to &m;

tau1\_num = tau1\_num+delta[j]\*P1[j]\*(1-P1[j])\*t[j];

tau1\_denum = tau1\_denum+delta[j]\*P1[j]\*(1-P1[j]);

tau2\_num = tau2\_num+delta[j]\*P2[j]\*(1-P2[j])\*t[j];

tau2\_denum = tau2\_denum+delta[j]\*P2[j]\*(1-P2[j]);

end;

tau[1]= tau1\_num/tau1\_denum; tau[2]= tau2\_num/tau2\_denum;

s1=0;s2=0;

do j=1 to &m;

s1 = s1+delta[j]\*P1[j]\*(1-P1[j])\*((t[j]-tau[1])\*\*2);

s2 = s2+delta[j]\*P2[j]\*(1-P2[j])\*((t[j]-tau[2])\*\*2);

end;

s\_sq[1]=s1; s\_sq[2]=s2; c1=0; c2=0; c12=0;

do i=1 to &m;

do j=1 to &m;

if i ^= j then do;

if &missingPattern = 1 then do;

delta\_ij = delta[i]\*delta[j];

end;else do;

if j > i then max\_ij = j; else max\_ij = i; delta\_ij = delta[max\_ij];

end;

c1=c1+delta\_ij\*rho(i,j,&rho,&corrStructure)\*

sqrt(P1[i]\*(1-P1[i])\*P1[j]\*(1-P1[j]))\*((t[i]-tau[1])\*(t[j]-tau[1]));

c2=c2+delta\_ij\*rho(i,j,&rho,&corrStructure)\*

sqrt(P2[i]\*(1-P2[i])\*P2[j]\*(1-P2[j]))\*((t[i]-tau[2])\*(t[j]-tau[2]));

end;

end;

end;

c\_sq[1]=c1; c\_sq[2]=c2;

do k =1 to &K; v[k] = (s\_sq[k]+c\_sq[k])/(s\_sq[k]\*\*2); end;

z\_p1=1-&alpha/&sides; z\_alpha = probit(z\_p1);

z\_p2=&power; z\_beta = probit(z\_p2);

n = int((z\_alpha+z\_beta)\*\*2\*(v[1]/r[1]+v[2]/r[2])/d\*\*2)+1;

print 'Sample Size Calculation for a Two-Group Comparision';

print ' of Repeated Binary Measurements';

alpha =&alpha; power=&power; rho=&rho; sides=&sides;

print alpha power rho sides;

if &missingPattern = 1 then do; print ' Missing Pattern: Independent '; end;

else if &missingPattern = 2 then do;print ' Missing Pattern: Monotone '; end;

if &corrStructure = 1 then do; print ' Correlation Structure : Compound Symetric ';

end; else if &corrStructure = 2 then do; print ' Correlation Structure : AR(1) ';

end;

print P1 P2 delta v ; print d; print n;

quit;

run;

%mend SS\_RepeatedBinaryMeasurement;

/\*--------------- Run the macro for Example 18.7 ------------------------------\*/

%SS\_RepeatedBinaryMeasurement(

missingPattern = 1, /\* 1: independent missing 2: monotone missing \*/

corrStructure = 2, /\* 1: compound symetric , 2: AR(1) \*/

rho = 0.8, /\* associated correlation parameter \*/

m = 6, /\* number of measurement time points \*/

inP1 = %str({0.75, 0, 0, 0, 0, 0.5}),

/\* proportion of subjects for control group \*/

inP2 = %str({0.75, 0.75, 0.75, 0.75, 0.75, 0.75}),

/\* proportion of subjects \*/

inR = %str({0.5, 0.5}), /\* group allocation proportion(r1, r2) \*/

inDelta = , /\* delta[j] = 1-(j-1)/20, proportion of observed measurements \*/

alpha = 0.05, /\* alpha \*/

power = 0.8, /\* power \*/

sides = 2 /\* 1: one-sided test 2: two-sided test \*/

);

%SS\_RepeatedBinaryMeasurement(

missingPattern = 2, /\* monotone missing \*/

corrStructure = 2, /\* AR(1) \*/

rho = 0.8, /\* associated correlation parameter \*/

m = 6, /\* number of measurement time points \*/

inP1 = %str({0.75, 0, 0, 0, 0, 0.5}),

/\* proportion of subjects for control group \*/

inP2 = %str({0.75, 0.75, 0.75, 0.75, 0.75, 0.75}),

/\* proportion of subjects \*/

inR = %str({0.5, 0.5}), /\* group allocation proportion(r1, r2) \*/

inDelta = , /\* delta[j] = 1-(j-1)/20, proportion of observed measurements \*/

alpha = 0.05, /\* alpha \*/

power = 0.8, /\* power \*/

sides = 2 /\* 1: one-sided test 2: two-sided test \*/

);