**Chapter 10 Appendix B**

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*;

\* Use ODS output statements to store ;

\* parameter estimates and covariance ;

\* matrix from PROC NLP in a data set ;

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*;

ods output "Resulting Parameters"= lib1.NLPestimates;

ods output "Covariances"=lib1.NLProbustvarcov;

title "NLP Analysis, data=coffman.all\_weight\_data, covariance=2

&sysdate. ";

**proc nlp** data=Coffman.all\_weight\_data vardef=n covariance=**2** sigsq=**1**;

max loglik;

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*;

\* Starting values for parameters ;

\* from 2 stage models ;

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*;

PARMS sig2=**17.18**,sig2\_vit4=**15.99**,sig2\_vit8=**11.96**, sig2\_vit0=**18.23**,

gamma11\_0= **0.0**,

gamma12\_0= **0.405**,

gamma13\_0= **59.87**,

gamma21\_0= -**0.2502** ,

gamma21\_1= **0.8204** ,

gamma21\_2= -**0.736** ,

gamma21\_3= -**0.0929** ,

gamma22\_0= **1.213** ,

gamma22\_1= **1.1849** ,

gamma23\_0= **20.26176227** ,

gamma23\_1= **0.78232267** ,

gamma23\_2= -**2.20983446** ,

gamma23\_3= **0.03465106** ,

gamma31\_0= -**2.4376** ,

gamma31\_1= **2.3763** ,

gamma31\_2= -**0.2975** ,

gamma32\_0= **0.1178** ,

gamma32\_1= **1.8171** ,

gamma33\_0= **21.94588492** ,

gamma33\_1= **0.7197243** ,

eta14\_res14\_DIET= -**6.14788684**,

eta15\_res15\_EXER20= -**1.62651224**,

eta16\_res16\_VIT0= **0.55882648**,

Beta0= **65.44918016** ,

Beta10\_D1= -**0.65772698** ,

Beta14\_D1Diet= -**0.2536632** ,

Beta15\_D1exer20= -**0.53823094** ,

Beta16\_D1VIT0= **0.0129085** ,

eta21\_res21\_COMPLY4= -**12.87304274** ,

eta22\_res22\_EXER24= **0.58517074**,

eta23\_res23\_VIT4= **0.4379589** ,

Beta20\_D2= -**0.30852128** ,

Beta21\_D2comply4= -**1.71415978** ,

Beta22\_D2exer24= -**1.24239297** ,

Beta23\_D2VIT4= **0.02440274**,

eta31\_res31\_COMPLY8= -**2.75818127**,

eta32\_res32\_EXER28= -**0.55345255** ,

eta33\_res33\_VIT8= **0.11863987** ,

Beta30\_D3= **1.73649321** ,

Beta31\_D3comply8= -**0.48168742**,

Beta32\_D3exer28= **0.03547696**,

Beta33\_D3VIT8= -**0.02095646**

;

bounds sig2 > **1e-12**, sig2\_vit0 > **1e-12**, sig2\_vit4 > **1e-12**,

sig2\_vit8 > **1e-12**;

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*;

\* Baseline DIET - Intercept only ;

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*;

dietlin1=gamma11\_0;

dietp=exp(dietlin1)/(**1**+exp(dietlin1));

fdiet=diet\*dietp+(**1**-diet)\*(**1**-dietp);

ddiet=diet-dietp;

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*;

\* Baseline EXER20 - Intercept only ;

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*;

exer20lin1=gamma12\_0;

exer20p=exp(exer20lin1)/(**1**+exp(exer20lin1));

fexer20=exer20\*exer20p+(**1**-exer20)\*(**1**-exer20p);

dexer20=exer20-exer20p;

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*;

\* Baseline VIT0 - Intercept only ;

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*;

dvit0=VIT0-(gamma13\_0);

\*\*\*\*\*\*\*\*\*\*\*\*;

\* COMPLY4 ;

\*\*\*\*\*\*\*\*\*\*\*\*;

comply4lin1=gamma21\_0 + gamma21\_1\*DIET + gamma21\_2\*EXER20 +

gamma21\_3\*D1;

comply4p=exp(comply4lin1)/(**1**+exp(comply4lin1));

fcomply4=comply4\*comply4p+(**1**-comply4)\*(**1**-comply4p);

dcomply4=comply4-comply4p;

\*\*\*\*\*\*\*\*\*\*\*\*;

\* EXER24 ;

\*\*\*\*\*\*\*\*\*\*\*\*;

exer24lin1=gamma22\_0 + gamma22\_1\*EXER20;

exer24p=exp(exer24lin1)/(**1**+exp(exer24lin1));

fexer24=exer24\*exer24p+(**1**-exer24)\*(**1**-exer24p);

dexer24=exer24-exer24p;

\*\*\*\*\*\*\*\*\*\*;

\* VIT4 ;

\*\*\*\*\*\*\*\*\*\*;

dvit4=VIT4-(gamma23\_0 + gamma23\_1\*VIT0 + gamma23\_2\*D1 +

gamma23\_3\*VIT0\*D1);

\*\*\*\*\*\*\*\*\*\*\*\*\*;

\* COMPLY8 ;

\*\*\*\*\*\*\*\*\*\*\*\*\*;

comply8lin1=gamma31\_0 + gamma31\_1\*COMPLY4+ gamma31\_2\*D2;

comply8p=exp(comply8lin1)/(**1**+exp(comply8lin1));

fcomply8=comply8\*comply8p+(**1**-comply8)\*(**1**-comply8p);

dcomply8=comply8-comply8p;

\*\*\*\*\*\*\*\*\*\*\*\*;

\* EXER28 ;

\*\*\*\*\*\*\*\*\*\*\*\*;

exer28lin1=gamma32\_0 + gamma32\_1\*EXER24;

exer28p=exp(exer28lin1)/(**1**+exp(exer28lin1));

fexer28=exer28\*exer28p+(**1**-exer28)\*(**1**-exer28p);

dexer28=exer28-exer28p;

\*\*\*\*\*\*\*\*\*\*;

\* VIT8 ;

\*\*\*\*\*\*\*\*\*\*;

dvit8=VIT8-(gamma33\_0 + gamma33\_1\*VIT4);

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*;

\* Outcome - VIT16 ;

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*;

epsilon= VIT16 -( beta0 + eta14\_res14\_DIET\*ddiet +

eta15\_res15\_EXER20\*dexer20

+ eta16\_res16\_VIT0\*dvit0

+ beta10\_D1\*D1

+ beta14\_D1DIET\*D1\*DIET + beta15\_D1EXER20\*D1\*EXER20 +

beta16\_D1VIT0\*D1\*VIT0

+ eta21\_res21\_COMPLY4\*dCOMPLY4 + eta22\_res22\_EXER24\*dEXER24

+ eta23\_res23\_VIT4\*dVIT4

+ beta20\_D2\*D2 + beta21\_D2COMPLY4\*D2\*COMPLY4 +

beta22\_D2EXER24\*D2\*EXER24

+ beta23\_D2VIT4\*D2\*VIT4

+ eta31\_res31\_COMPLY8\*dCOMPLY8 + eta32\_res32\_EXER28\*dEXER28

+ eta33\_res33\_VIT8\*dVIT8

+ beta30\_D3\*D3 + beta31\_D3COMPLY8\*D3\*COMPLY8 +

beta32\_D3EXER28\*D3\*EXER28

+ beta33\_D3VIT8\*D3\*VIT8);

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*;

\* SNMM - Likelihood ;

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*;

loglik = log(fdiet)+log(fexer20)-log(sig2\_vit0)-

(dvit0\*\***2**/(**2**\*sig2\_vit0\*\***2**))

+ log(fcomply4) + log(fexer24)- log(sig2\_vit4)-

(dvit4\*\***2**/(**2**\*sig2\_vit4\*\***2**))

+ log(fcomply8)+ +log(fexer28)- log(sig2\_vit8)-

(dvit8\*\***2**/(**2**\*sig2\_vit8\*\***2**))

- log(sig2)-(epsilon\*\***2**/(**2**\*sig2\*\***2**));

**run**;