APPENDIX E

SAS PROGRAMS

The input file for the SAS Proc Calis procedure contains SAS codes that specify the location of the data file and the model to be analyzed. It asks the program to conduct the analysis based on the covariance matrix (the COV option). The CORR option requests the program to print out the correlation or covariance matrix that is analyzed together with the predicted covariance or correlation matrix. The RESIDUAL option specifies the output to include residuals and normalized residuals, and the modification option asks for modification indices if the model does not fit the data. The LINEQS option specifies the model under analysis in forms of equations.

The SAS Program for the Initial CFA Model

```
PROC CALIS DATA = XIA.SURVEY COV CORR RESIDUAL
MODIFICATION;
LINEQS
     EP = LEPF1 F1 + E1,
     A1 = LA1F2 F2 + E2,
     A2 = LA2F2 F2 + E3,
     SP1 = LSP1F3 F3 + E4,
     SP2 = LSP2F3 F3 + E5,
     EU1 = LEU1F4 F4 + E6,
     EU2 = LEU2F4 F4 + E7,
     I1 = LI1F5 F5 + E8,
     I2 = LI2F5 F5 + E9,
     I3 = LI3F5 F5 + E10,
     T1 = LTIF6 F6 + E11,
     T2 = LT2F6 F6 + E12,
     C = LCF7 F7 + E13,
     SK1 = LSK1F8 F8 + E14,
     SK2 = LSK2F8 F8 + E15,
     FL1 = LFL1F9 F9 + E16,
     FL2 = LFL2F9 F9 + E17,
     LP1 = LLP1F10 F10 + E18,
     LP2 = LLP2F10 F10 + E19,
     CA1 = LCA1F11 F11 + E20,
     CA2 = LCA2F11 F11 + E21,
     CA3 = LCA3F11 F11 + E22;
STD
     F1=1,
     F2=1,
     F3=1,
     F4=1,
     F5=1,
     F6=1,
     F7=1,
     F8=1,
     F9=1,
     F10=1,
     F11=1,
     E1-E22 = VARE1-VARE22;
COV
     F1 F2 = CF1F2,
     F1 F3 = CF1F3,
     F1 F4 = CF1F4,
     F1 F5 = CF1F5,
     F1 F6 = CF1F6,
     F1 F7 = CF1F7,
```

```
F1 F8 = CF1F8,
F1 F9 = CF1F9,
F1 F10 = CF1F10,
F1 F11 = CF1F11,
F2 F3 = CF2F3,
F2 F4 = CF2F4,
F2 F5 = CF2F5,
F2 F6 = CF2F6,
F2 F7 = CF2F7,
F2 F8 = CF2F8,
F2 F9 = CF2F9,
F2 F10 = CF2F10,
F2 F11 = CF2F11,
F3 F4 = CF3F4,
F3 F5 = CF3F5,
F3 F6 = CF3F6,
F3 F7 = CF3F7,
F3 F8 = CF3F8,
F3 F9 = CF3F9,
F3 F10 = CF3F10,
F3 F11 = CF3F11,
F4 F5 = CF4F5,
F4 F6 = CF4F6,
F4 F7 = CF4F7,
F4 F8 = CF4F8,
F4 F9 = CF4F9,
F4 F10 = CF4F10,
F4 F11 = CF4F11,
F5 F6 = CF5F6,
F5 F7 = CF5F7,
F5 F8 = CF5F8,
F5 F9 = CF5F9,
F5 F10 = CF5F10,
F5 F11 = CF5F11,
F6 F7 = CF6F7,
F6 F8 = CF6F8,
F6 F9 = CF6F9,
F6 F10 = CF6F10,
F6 F11 = CF6F11,
F7 F8 = CF7F8,
F7 F9 = CF7F9,
F7 F10 = CF7F10,
F7 F11 = CF7F11,
F8 F9 = CF8F9,
F8 F10 = CF8F10,
F8 F11 = CF8F11,
F9 F10 = CF9F10,
```

```
      F9 F11 = CF9F11,
      F10 F11 = CF10F11;

RUN;
```

SAS Program for CFA of Revised Measurement Model A

```
PROC CALIS DATA = XIA.SURVEY COV RESIDUAL MODIFICATION;
LINEQS
     EP = LEPF1 F1 + E1,
     A1 = LA1F2 F2 + E2,
     A2 = LA2F2 F2 + E3,
     SP2 = LSP2F3 F3 + E5,
     EU1 = LEU1F4 F4 + E6,
     EU2 = LEU2F4 F4 + E7,
     I1 = LI1F5 F5 + E8,
     I2 = LI2F5 F5 + E9,
     T2 = LT2F6 F6 + E12,
     C = LCF7 F7 + E13,
     SK1 = LSK1F8 F8 + E14,
     SK2 = LSK2F8 F8 + E15,
     FL1 = LFL1F9 F9 + E16,
     FL2 = LFL2F9 F9 + E17,
     LP1 = LLP1F10 F10 + E18,
     LP2 = LLP2F10 F10 + E19,
     CA1 = LCA1F11 F11 + E20,
     CA2 = LCA2F11 F11 + E21,
     CA3 = LCA3F11 F11 + E22;
STD
     F1=1,
     F2=1,
     F3=1,
     F4=1,
     F5=1,
     F6=1,
     F7=1,
     F8=1,
     F9=1,
     F10=1,
     F11=1,
     E1-E3 = VARE1-VARE3,
     E5-E9 = VARE5-VARE9,
     E12-E22 = VARE12-VARE22;
COV
     F1 F2 = CF1F2,
     F1 F3 = CF1F3,
     F1 F4 = CF1F4,
     F1 F5 = CF1F5,
     F1 F6 = CF1F6,
     F1 F7 = CF1F7,
     F1 F8 = CF1F8,
     F1 F9 = CF1F9,
```

```
      F1 F10 = CF1F10,
      F1 F11 = CF1F11,
      F2 F3 = CF2F3,
      F2 F4 = CF2F4,
      F2 F5 = CF2F5,
      F2 F6 = CF2F6,
      F2 F7 = CF2F7,
      F2 F8 = CF2F8,
      F2 F9 = CF2F9,
      F2 F10 = CF2F10,
      F2 F11 = CF2F11,
      F3 F4 = CF3F4,
      F3 F5 = CF3F5,
      F3 F6 = CF3F6,
      F3 F7 = CF3F7,
      F3 F8 = CF3F8,
      F3 F9 = CF3F9,
      F3 F10 = CF3F10,
      F3 F11 = CF3F11,
      F4 F5 = CF4F5,
      F4 F6 = CF4F6,
      F4 F7 = CF4F7,
      F4 F8 = CF4F8,
      F4 F9 = CF4F9,
      F4 F10 = CF4F10,
      F4 F11 = CF4F11,
      F5 F6 = CF5F6,
      F5 F7 = CF5F7,
      F5 F8 = CF5F8,
      F5 F9 = CF5F9,
      F5 F10 = CF5F10,
      F5 F11 = CF5F11,
      F6 F8 = CF6F8,
      F6 F10 = CF6F10,
      F6 F11 = CF6F11,
      F7 F8 = CF7F8,
      F7 F9 = CF7F9,
      F7 F10 = CF7F10,
      F7 F11 = CF7F11,
      F8 F9 = CF8F9,
      F8 F10 = CF8F10,
      F8 F11 = CF8F11,
      F9 F10 = CF9F10,
      F9 F11 = CF9F11,
      F10 F11 = CF10F11;
RUN;
```

The SAS Program for the Path Analysis of the Initial Structural Model

```
PROC CALIS DATA = XIA.SURVEY COV CORR RESIDUAL
MODIFICATION;
LINEQS
     EP =      F1 + E1,
     A1 =      F2 + E2,
     A2 = LA2F2 F2 + E3,
     SP2 = LSP2F3 F3 + E5,
     EU1 =      F4 + E6,
     EU2 = LEU2F4 F4 + E7,
     I1 =      F5 + E8,
     I2 = LI2F5 F5 + E9,
     T2 = LT2F6 F6 + E12,
     C =       F7 + E13,
     SK1 =     F8 + E14,
     SK2 = LSK2F8 F8 + E15,
     FL1 =     F9 + E16,
     FL2 = LFL2F9 F9 + E17,
     LP1 =      F10 + E18,
     LP2 = LLP2F10 F10 + E19,
     CA1 =      F11 + E20,
     CA2 = LCA2F11 F11 + E21,
     CA3 = LCA3F11 F11 + E22,
     F2 = PF1F2 F1 + D2,
     F4 = PF1F4 F1 + D4,
     F5 = PF3F5 F3 + PF4F5 F4 + D5,
     F6 = PF2F6 F2 + PF5F6 F5 + D6,
     F9 = PF6F9 F6 + PF7F9 F7 + PF8F9 F8 + D9,
     F10 = PF9F10 F9 + D10,
     F11 = PF10F11 F10 + D11;
STD
     F1 = VARF1,
     F3 = VARF3,
     F7 = VARF7,
     F8 = VARF8,
     E1-E3 = VARE1-VARE3,
     E5-E9 = VARE5-VARE9,
     E12-E22 = VARE12-VARE22,
     D2 = VARD2,
     D4 = VARD4,
     D5 = VARD5,
     D6 = VARD6,
     D9 = VARD9,
     D10 = VARD10,
     D11 = VARD11;
```

```
COV
     F1 F3 = CF1F3,
     F1 F7 = CF1F7,
     F1 F8 = CF1F8,
     F3 F7 = CF3F7,
     F3 F8 = CF3F8,
     F7 F8 = CF7F8;
RUN;
```

SAS Program for Revised Structural Model A

```
PROC CALIS DATA = XIA.SURVEY COV CORR RESIDUAL
MODIFICATION;
LINEQS
     A1 =      F2 + E2,
     A2 = LA2F2 F2 + E3,
     SP2 = LSP2F3 F3 + E5,
     EU1 =      F4 + E6,
     EU2 = LEU2F4 F4 + E7,
     I1 =      F5 + E8,
     I2 = LI2F5 F5 + E9,
     T2 = LT2F6 F6 + E12,
     C =       F7 + E13,
     SK1 =     F8 + E14,
     SK2 = LSK2F8 F8 + E15,
     FL1 =     F9 + E16,
     FL2 = LFL2F9 F9 + E17,
     LP1 =      F10 + E18,
     LP2 = LLP2F10 F10 + E19,
     CA1 =      F11 + E20,
     CA2 = LCA2F11 F11 + E21,
     CA3 = LCA3F11 F11 + E22,
     F4 = PF2F4 F2 + D4,
     F5 = PF4F5 F4 + D5,
     F6 = PF2F6 F2 + PF5F6 F5 + D6,
     F9 = PF6F9 F6 + D9,
     F10 = PF7F10 F7 + PF9F10 F9 + D10,
     F11 = PF8F11 F8 + PF10F11 F10 + D11;
STD
     F2 = VARF2,
     F3 = VARF3,
     F7 = VARF7,
     F8 = VARF8,
     E2-E3 = VARE2-VARE3,
     E5-E9 = VARE5-VARE9,
     E12-E22 = VARE12-VARE22,
     D4 = VARD4,
     D5 = VARD5,
     D6 = VARD6,
     D9 = VARD9,
     D10 = VARD10,
     D11 = VARD11;
COV
     F2 F3 = CF2F3,
     F2 F7 = CF2F7,
```

```
      F2 F8 = CF2F8,
      F3 F7 = CF3F7,
      F3 F8 = CF3F8,
      F7 F8 = CF7F8;
RUN;
```

The SAS Program for RevisedStructural Model B

```
PROC CALIS DATA = XIA.MEGANSURVEY COV CORR RESIDUAL
MODIFICATION;
LINEQS
     A1 =      F2 + E2,
     A2 = LA2F2 F2 + E3,
     SP2 = LSP2F3 F3 + E5,
     EU1 =      F4 + E6,
     EU2 = LEU2F4 F4 + E7,
     I1 =      F5 + E8,
     I2 = LI2F5 F5 + E9,
     T2 = LT2F6 F6 + E12,
     C =       F7 + E13,
     SK1 =     F8 + E14,
     SK2 = LSK2F8 F8 + E15,
     FL1 =     F9 + E16,
     FL2 = LFL2F9 F9 + E17,
     LP1 =      F10 + E18,
     LP2 = LLP2F10 F10 + E19,
     CA1 =      F11 + E20,
     CA2 = LCA2F11 F11 + E21,
     CA3 = LCA3F11 F11 + E22,
     F4 = PF2F4 F2 + D4,
     F5 = PF4F5 F4 + D5,
     F6 = PF2F6 F2 + PF5F6 F5 + D6,
     F9 = PF6F9 F6 + D9,
     F10 = PF7F10 F7 + PF9F10 F9 + D10,
     F11 = PF2F11 F2 + PF7F11 F7 + PF8F11 F8 + PF10F11 F10
     + D11;
STD
     F2 = VARF2,
     F3 = VARF3,
     F7 = VARF7,
     F8 = VARF8,
     E2-E3 = VARE2-VARE3,
     E5-E9 = VARE5-VARE9,
     E12-E22 = VARE12-VARE22,
     D4 = VARD4,
     D5 = VARD5,
     D6 = VARD6,
     D9 = VARD9,
     D10 = VARD10,
     D11 = VARD11;
COV
     F2 F3 = CF2F3,
     F2 F7 = CF2F7,
```

```
    F2 F8 = CF2F8,
    F3 F7 = CF3F7,
    F3 F8 = CF3F8,
    F7 F8 = CF7F8;
RUN;
```

SAS Program for Revised Structural Model C

```
PROC CALIS DATA = XIA. SURVEY COV CORR RESIDUAL
MODIFICATION;
LINEQS
     A1 =      F2 + E2,
     A2 = LA2F2 F2 + E3,
     SP2 = LSP2F3 F3 + E5,
     EU1 =      F4 + E6,
     EU2 = LEU2F4 F4 + E7,
     I1 =      F5 + E8,
     I2 = LI2F5 F5 + E9,
     T2 = LT2F6 F6 + E12,
     C =       F7 + E13,
     SK1 =     F8 + E14,
     SK2 = LSK2F8 F8 + E15,
     FL1 =     F9 + E16,
     FL2 = LFL2F9 F9 + E17,
     LP1 =      F10 + E18,
     LP2 = LLP2F10 F10 + E19,
     CA1 =      F11 + E20,
     CA2 = LCA2F11 F11 + E21,
     CA3 = LCA3F11 F11 + E22,
     F4 = PF2F4 F2 + D4,
     F5 = PF4F5 F4 + D5,
     F6 = PF2F6 F2 + PF5F6 F5 + D6,
     F9 = PF6F9 F6 + D9,
     F10 = PF7F10 F7 + PF9F10 F9 + D10,
     F11 = PF2F11 F2 + PF8F11 F8 + PF10F11 F10 + D11;
STD
     F2 = VARF2,
     F3 = VARF3,
     F7 = VARF7,
     F8 = VARF8,
     E2-E3 = VARE2-VARE3,
     E5-E9 = VARE5-VARE9,
     E12-E22 = VARE12-VARE22,
     D4 = VARD4,
     D5 = VARD5,
     D6 = VARD6,
     D9 = VARD9,
     D10 = VARD10,
     D11 = VARD11;
COV
     F2 F3 = CF2F3,
     F2 F7 = CF2F7,
     F2 F8 = CF2F8,
```

```
     F3 F7 = CF3F7,
     F3 F8 = CF3F8,
     F7 F8 = CF7F8;
RUN;
```

SAS Program for Confirmative Analysis of Revised Measurement Model B

```
PROC CALIS DATA = XIA.SURVEY COV CORR RESIDUAL
MODIFICATION;
LINEQS
     A1 = LA1F2 F2 + E2,
     A2 = LA2F2 F2 + E3,
     SP2 = LSP2F3 F3 + E5,
     EU1 = LEU1F4 F4 + E6,
     EU2 = LEU2F4 F4 + E7,
     I1 = LI1F5 F5 + E8,
     I2 = LI2F5 F5 + E9,
     T2 = LT2F9 F9 + E12,
     C = LCF7 F7 + E13,
     SK1 = LSK1F8 F8 + E14,
     SK2 = LSK2F8 F8 + E15,
     FL1 = LFL1F9 F9 + E16,
     FL2 = LFL2F9 F9 + E17,
     LP1 = LLP1F10 F10 + E18,
     LP2 = LLP2F10 F10 + E19,
     CA1 = LCA1F11 F11 + E20,
     CA2 = LCA2F11 F11 + E21,
     CA3 = LCA3F11 F11 + E22;
STD
     F2=1,
     F3=1,
     F4=1,
     F5=1,
     F7=1,
     F8=1,
     F9=1,
     F10=1,
     F11=1,
     E2-E3= VARE2-VARE3,
     E5-E9=VARE5-VARE9,
     E12-E22 = VARE12-VARE22;
COV
     F2 F3 = CF2F3,
     F2 F4 = CF2F4,
     F2 F5 = CF2F5,
     F2 F7 = CF2F7,
     F2 F8 = CF2F8,
     F2 F9 = CF2F9,
     F2 F10 = CF2F10,
     F2 F11 = CF2F11,
     F3 F4 = CF3F4,
     F3 F5 = CF3F5,
```

```
    F3 F7 = CF3F7,
    F3 F8 = CF3F8,
    F3 F9 = CF3F9,
    F3 F10 = CF3F10,
    F3 F11 = CF3F11,
    F4 F5 = CF4F5,
    F4 F7 = CF4F7,
    F4 F8 = CF4F8,
    F4 F9 = CF4F9,
    F4 F10 = CF4F10,
    F4 F11 = CF4F11,
    F5 F7 = CF5F7,
    F5 F8 = CF5F8,
    F5 F9 = CF5F9,
    F5 F10 = CF5F10,
    F5 F11 = CF5F11,
    F7 F8 = CF7F8,
    F7 F9 = CF7F9,
    F7 F10 = CF7F10,
    F7 F11 = CF7F11,
    F8 F9 = CF8F9,
    F8 F10 = CF8F10,
    F8 F11 = CF8F11,
    F9 F10 = CF9F10,
    F9 F11 = CF9F11,
    F10 F11 = CF10F11;
RUN;
```

SAS Program for Revised Measurement Model C

```
PROC CALIS DATA = XIA.SURVEY COV CORR RESIDUAL
   MODIFICATION;
LINEQS
     A1 = LA1F2 F2 + E2,
     A2 = LA2F2 F2 + E3,
     SP2 = LSP2F3 F3 + E5,
     EU1 = LEU1F4 F4 + E6,
     EU2 = LEU2F4 F4 + E7,
     I1 = LI1F5 F5 + E8,
     I2 = LI2F5 F5 + E9,
     T2 = LT2F9 F9 + E12,
     C = LCF7 F7 + E13,
     SK1 = LSK1F8 F8 + E14,
     SK2 = LSK2F8 F8 + E15,
     FL1 = LFL1F9 F9 + E16,
     FL2 = LFL2F9 F9 + E17,
     LP1 = LLP1F10 F10 + E18,
     LP2 = LLP2F10 F10 + E19,
     CA1 = LCA1F11 F11 + E20,
     CA2 = LCA2F11 F11 + E21,
     CA3 = LCA3F11 F11 + E22;
STD
     F2=1,
     F3=1,
     F4=1,
     F5=1,
     F7=1,
     F8=1,
     F9=1,
     F10=1,
     F11=1,
     E2-E3= VARE2-VARE3,
     E5-E9=VARE5-VARE9,
     E12-E22 = VARE12-VARE22;
COV
     F2 F3 = CF2F3,
     F2 F4 = CF2F4,
     F2 F5 = CF2F5,
     F2 F7 = CF2F7,
     F2 F8 = CF2F8,
     F2 F9 = CF2F9,
     F2 F10 = CF2F10,
     F2 F11 = CF2F11,
     F3 F4 = CF3F4,
     F3 F5 = CF3F5,
```

```
    F3 F7 = CF3F7,
    F3 F8 = CF3F8,
    F3 F9 = CF3F9,
    F3 F10 = CF3F10,
    F3 F11 = CF3F11,
    F4 F5 = CF4F5,
    F4 F7 = CF4F7,
    F4 F8 = CF4F8,
    F4 F9 = CF4F9,
    F4 F10 = CF4F10,
    F4 F11 = CF4F11,
    F5 F7 = CF5F7,
    F5 F8 = CF5F8,
    F5 F9 = CF5F9,
    F5 F10 = CF5F10,
    F5 F11 = CF5F11,
    F7 F8 = CF7F8,
    F7 F9 = CF7F9,
    F7 F10 = CF7F10,
    F7 F11 = CF7F11,
    F8 F9 = CF8F9,
    F8 F10 = CF8F10,
    F8 F11 = CF8F11,
    F9 F10 = CF9F10,
    F9 F11 = CF9F11,
    F10 F11 = CF10F11,
    E12 E16 = CE12E16;
RUN;
```

SAS Program for Revised Structural Mode D

```
PROC CALIS DATA = XIA.SURVEY COV CORR RESIDUAL
MODIFICATION;
LINEQS
     A1 =      F2 + E2,
     A2 = LA2F2 F2 + E3,
     SP2 = LSP2F3 F3 + E5,
     EU1 =      F4 + E6,
     EU2 = LEU2F4 F4 + E7,
     I1 =      F5 + E8,
     I2 = LI2F5 F5 + E9,
     T2 = LT2F9 F9 + E12,
     C =       F7 + E13,
     SK1 =     F8 + E14,
     SK2 = LSK2F8 F8 + E15,
     FL1 = LFL1F9 F9 + E16,
     FL2 = LFL2F9 F9 + E17,
     LP1 =      F10 + E18,
     LP2 = LLP2F10 F10 + E19,
     CA1 =      F11 + E20,
     CA2 = LCA2F11 F11 + E21,
     CA3 = LCA3F11 F11 + E22,
     F2 = PF3F2 F3 + D2,
     F4 = PF2F4 F2 + D4,
     F5 = PF4F5 F4 + D5,
     F9 = PF2F9 F2 + PF5F9 F5 + D9,
     F10 = PF7F10 F7 + PF9F10 F9 + D10,
     F11 = PF2F11 F2 + PF8F11 F8 + PF10F11 F10 + D11;
STD
     F3 = VARF3,
     F7 = VARF7,
     F8 = VARF8,
     E2-E3 = VARE2-VARE3,
     E5-E9 = VARE5-VARE9,
     E12-E15 = VARE12-VARE15,
     E16-E22 = VARE16-VARE22,
     D2 = VARD2,
     D4 = VARD4,
     D5 = VARD5,
     D9 = VARD9,
     D10 = VARD10,
     D11 = VARD11;
COV
     F3 F7 = CF3F7,
     F3 F8 = CF3F8,
     F7 F8 = CF7F8,
```

```
      E12 E16 = CE12E16;
RUN;
```