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| Program: | HLM 7 Hierarchical Linear and Nonlinear Modeling |
| Authors: | Stephen Raudenbush, Tony Bryk, & Richard Congdon |
| Publisher: | Scientific Software International, Inc. (c) 2010 |
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| Module: | HMLM2.EXE (7.00.21105.10001) |
| Date: | 17 May 2013, Friday |
| Time: | 13:39:40 |

## Specifications for this HMLM2 run

Problem Title: no title  
  
The data source for this run = Ind\_Growth.mdm  
The command file for this run = C:\Users\NSOE-CTC\Desktop\DATIC Madura\Indist\_Growth.hlm  
Output file name = C:\Users\NSOE-CTC\Desktop\DATIC Madura\hmlm2.html  
The maximum number of level-1 units = 2866  
The maximum number of level-2 units = 1438  
The maximum number of level-3 units = 103  
The maximum number of iterations = 100  
  
The outcome variable is ASATISF   
  
The model specified for the fixed effects was:

#### The model specified for the fixed effects

|  |  |  |
| --- | --- | --- |
| Level-1 | Level-2 | Level-3 |
| INTRCPT1, *π0* | INTRCPT2, B00 | INTRCPT3 ,*γ000* |
|  | TIME, B01 | INTRCPT3 ,*γ010* |

## Output for the Unrestricted Model

### Summary of the model specified

#### Level-1 Model

*ASATISFmij* = (*WOMANmij*)\**ASATISF1ij*\* + (*MANmij*)\**ASATISF2ij*\*  
  
    *ASATISFtij*\* = *π0ij* + *εtij*

#### Level-2 Model

*π0ij* = *β00j* + *β01j*\*(*TIMEij*)

#### Level-3 Model

*β*<small*00j* = *γ*<small*000* + *u00j*  
        *β*<small*01j* = *γ*<small*010* + *u01j*  
  
  
Var(*εij*) = **Δ**  
  
**Δ***(0)*

|  |  |  |
| --- | --- | --- |
| WOMAN | 0.41579 | 0.06533 |
| MAN | 0.06533 | 0.35175 |

τβ*(0)*

|  |  |
| --- | --- |
| INTRCPT1 | INTRCPT1 |
| INTRCPT2 ,*β00* | TIME ,*β01* |
| 0.36554 | 0.00082 |
| 0.00082 | 0.00287 |

The value of the log-likelihood function at iteration 1 = -2.992958E+003  
The value of the log-likelihood function at iteration 2 = -2.983698E+003  
The value of the log-likelihood function at iteration 3 = -2.982999E+003  
The value of the log-likelihood function at iteration 4 = -2.982809E+003  
The value of the log-likelihood function at iteration 5 = -2.982742E+003  
**Iterations stopped due to small change in likelihood function**

### Final Results - Iteration 7

**Δ**

|  |  |  |
| --- | --- | --- |
| WOMAN | 0.46800 | 0.10343 |
| MAN | 0.10343 | 0.37760 |

Standard errors of **Δ**

|  |  |  |
| --- | --- | --- |
| WOMAN | 0.01844 | 0.01213 |
| MAN | 0.01213 | 0.01503 |

**Δ** (as correlations)

|  |  |  |
| --- | --- | --- |
| WOMAN ,*π0* | 1.000 | 0.246 |
| MAN ,*π1* | 0.246 | 1.000 |

τβ

|  |  |
| --- | --- |
| INTRCPT1 | INTRCPT1 |
| INTRCPT2 ,*β00* | TIME ,*β01* |
| 0.35944 | 0.00037 |
| 0.00037 | 0.00174 |

Standard Errors of τβ

|  |  |
| --- | --- |
| INTRCPT1 | INTRCPT1 |
| INTRCPT2 ,*β00* | TIME ,*β01* |
| 0.05270 | 0.00326 |
| 0.00326 | 0.00041 |

τβ (as correlations)

|  |  |  |
| --- | --- | --- |
| INTRCPT1/INTRCPT2,*β00* | 1.000 | 0.015 |
| INTRCPT1/ TIME,*β01* | 0.015 | 1.000 |

The value of the log-likelihood function at iteration 7 = -2.982701E+003

#### Final estimation of fixed effects:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Fixed Effect | Coefficient | Standard error | *t*-ratio | Approx. *d.f.* | *p*-value |
| For INTRCPT1, *π0* | | | | | |
| For INTRCPT2, B00 | | | | | |
| INTRCPT3 ,*γ000* | 6.315248 | 0.060593 | 104.224 | 102 | <0.001 |
| For TIME, B01 | | | | | |
| INTRCPT3 ,*γ010* | 0.015043 | 0.005308 | 2.834 | 102 | 0.005 |

#### Statistics for the current model

Deviance = 5965.401282  
Number of estimated parameters = 8

## Output for Random Effects Model with Homogeneous Level-1 Variance

### Summary of the model specified

#### Level-1 Model

*ASATISFmij* = (*WOMANmij*)\**ASATISF1ij*\* + (*MANmij*)\**ASATISF2ij*\*  
  
    *ASATISFtij*\* = *π0ij* + *εtij*

#### Level-2 Model

*π0ij* = *β00j* + *β01j*\*(*TIMEij*) + *r0ij*

#### Level-3 Model

*β*<small*00j* = *γ*<small*000* + *u00j*  
        *β*<small*01j* = *γ*<small*010* + *u01j*  
  
  
Var(*εij*) = Var(**A*r****ij* + e*ij*) = **Δ** = **AτπA'** + σ2**I**  
  
**A**

|  |  |
| --- | --- |
| WOMAN | 1.00000 |
| MAN | 1.00000 |

The value of the log-likelihood function at iteration 1 = -2.982701E+003  
The value of the log-likelihood function at iteration 2 = -3.032303E+003  
The value of the log-likelihood function at iteration 3 = -2.988090E+003  
The value of the log-likelihood function at iteration 4 = -2.988090E+003  
**Iterations stopped due to small change in likelihood function**

### Final Results - Iteration 5

|  |  |  |
| --- | --- | --- |
|  | Parameter | Standard Error |
| σ2 | 0.31937 | 0.011947 |

τπ

|  |  |
| --- | --- |
| INTRCPT1,*r0* | 0.10343 |

Standard error of τπ

|  |  |
| --- | --- |
| INTRCPT1,*r0* | 0.01220 |

**Δ**

|  |  |  |
| --- | --- | --- |
| WOMAN | 0.42280 | 0.10343 |
| MAN | 0.10343 | 0.42280 |

**Δ** (as correlations)

|  |  |  |
| --- | --- | --- |
| WOMAN ,*π0* | 1.000 | 0.245 |
| MAN ,*π1* | 0.245 | 1.000 |

τβ

|  |  |
| --- | --- |
| INTRCPT1 | INTRCPT1 |
| INTRCPT2 ,*β00* | TIME ,*β01* |
| 0.34695 | 0.00077 |
| 0.00077 | 0.00172 |

Standard Errors of τβ

|  |  |
| --- | --- |
| INTRCPT1 | INTRCPT1 |
| INTRCPT2 ,*β00* | TIME ,*β01* |
| 0.05099 | 0.00320 |
| 0.00320 | 0.00041 |

τβ (as correlations)

|  |  |  |
| --- | --- | --- |
| INTRCPT1/INTRCPT2,*β00* | 1.000 | 0.031 |
| INTRCPT1/ TIME,*β01* | 0.031 | 1.000 |

The value of the log-likelihood function at iteration 5 = -2.988090E+003

#### Final estimation of fixed effects:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Fixed Effect | Coefficient | Standard error | *t*-ratio | Approx. *d.f.* | *p*-value |
| For INTRCPT1, *π0* | | | | | |
| For INTRCPT2, B00 | | | | | |
| INTRCPT3 ,*γ000* | 6.324347 | 0.059601 | 106.111 | 102 | <0.001 |
| For TIME, B01 | | | | | |
| INTRCPT3 ,*γ010* | 0.014385 | 0.005297 | 2.716 | 102 | 0.007 |

#### Statistics for the current model

Deviance = 5976.179988  
Number of estimated parameters = 7

### Summary of Model Fit

|  |  |  |
| --- | --- | --- |
| Model | Number of Parameters | Deviance |
| 1. Unrestricted | 8 | 5965.40128 |
| 2. Homogeneous σ2 | 7 | 5976.17999 |

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| --- | --- | --- | --- |
| Model Comparison | χ2 | *d.f.* | *p*-value |
| Model 1 vs Model 2 | 10.77871 | 1 | 0.001 |