CHAPTER 12: MULTILEVEL MODELLING OF EUROPEAN HEDONISM DATA

1. Data Description

The data are from the 2002-03 European Social Survey (ESS). The dependent variable for the analyses presented in the book is a measure of hedonism, one of ten measures of human values. These measures have been constructed for 20 countries in the European Union. Further details on value theory and how it is operationalised in the ESS can be found at http://essedunet.nsd.uib.no/cms/topics/1/

The data are in files *hedonism.wsz*, *hedonism.sav* and *hedonism.txt*. The files contain the following 7 variables:

COUNTRY	Country (level 2) identifier
IND	Individual (level 1) identifier
HEDSCORE	Hedonism score, where higher positive scores indicate that an individual places relatively more importance on hedonism in their whole value system
AGE	Age in years (centred at 46)
FEMALE	Sex (1=female, 0=male)
INCOME	Monthly household income in 12 bands (less than 150 Euros, 150-300, 300-500, 500-1000, 1000-1500, 1500-2000, 2000-2500, 2500-3000, 3000-5000, 5000-7500, 7500-10000, 10000+)
EDUYRS	Years of education

2. MLwiN Resources

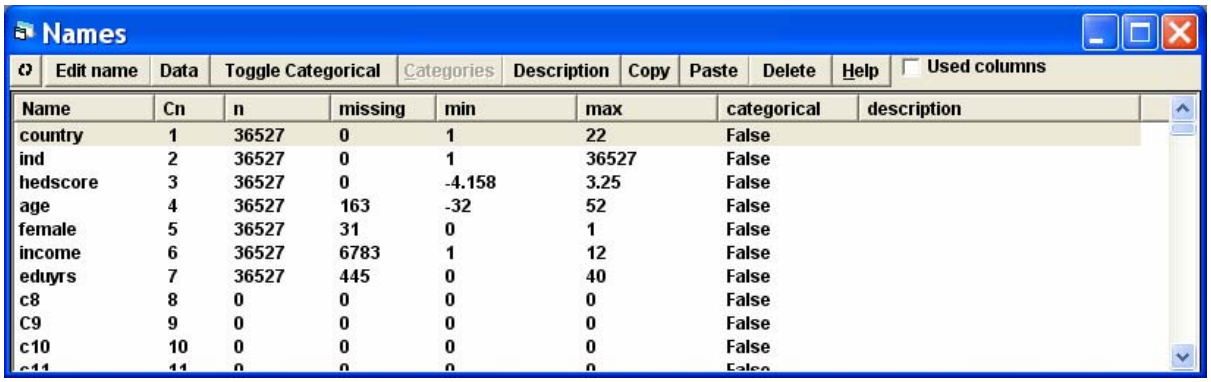
This document contains instructions for reproducing the analysis of the hedonism data presented in Chapter 12 using MLwiN v2.10. More detailed accounts of how to use MLwiN (including how to interpret the results) can be found in the MLwiN User Guides and the online course developed by the Centre for Multilevel Modelling, University of Bristol.

- Rasbash, J., Steele, F., Browne, W.J. and Prosser, B. (2005) *A User's Guide to MLwiN*. Centre for Multilevel Modelling, University of Bristol. Download free of charge from http://www.cmm.bris.ac.uk/MLwiN/download/
- *LEMMA: Learning Environment for Multilevel Modelling and Applications*. A freely accessible online course at http://www.cmm.bris.ac.uk/learning-training/course.shtml. Multiple regression and further multilevel analyses of the hedonism data can be found in Modules 3 and 5 ('Concepts').

3. Country Differences in Hedonism (Section 12.3)

- Start MLwiN and from the **File** menu select **Open worksheet**
- Open the file **hedonism.wsz**

When the worksheet is opened, the filename will appear in the title bar of the main window. The **Names** window will also appear, giving a summary of the data in the worksheet:

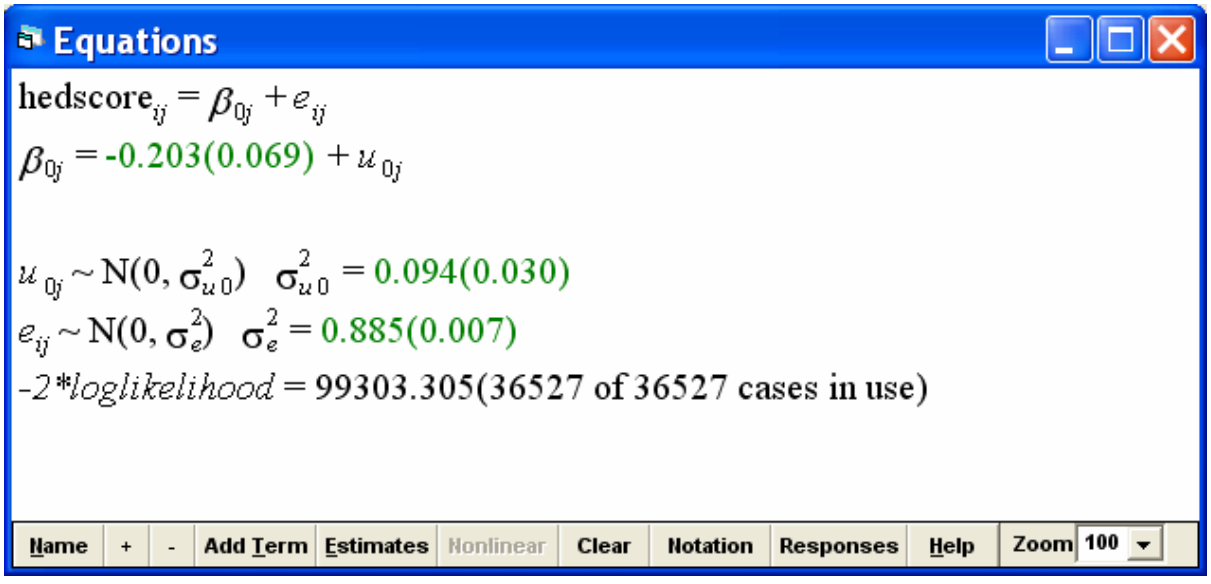


Name	Cn	n	missing	min	max	categorical	description
country	1	36527	0	1	22	False	
ind	2	36527	0	1	36527	False	
hedscore	3	36527	0	-4.158	3.25	False	
age	4	36527	163	-32	52	False	
female	5	36527	31	0	1	False	
income	6	36527	6783	1	12	False	
eduyrs	7	36527	445	0	40	False	
c8	8	0	0	0	0	False	
C9	9	0	0	0	0	False	
c10	10	0	0	0	0	False	

We start in Section 12.3 with the simplest multilevel model which allows for country differences in hedonism, but without explanatory variables. To set up this model in MLwiN:

- From the **Model** menu, select **Equations**
- Click **Notation** at the bottom of the **Equations** window, clear the **general** tick box, and click **Done**
- Click on **y** and select **HEDSCORE** from the drop-down list
- Click on **N Levels** and select **2-ij**
- For **level 2(j)**, select **COUNTRY**
- For **level 1(i)**, select **IND**
- Click **Done**
- Click on β_0 , and check **j(country)** to introduce a random country effect, and click **Done**. Click **+** and notice that this step leads to the addition of u_{0j} to the model
- Click **+** again to see the full model specification
- Click **Start** to fit the model
- Click **Estimates** twice to see the parameter estimates

You should get the following results (shown in Table 12.1):

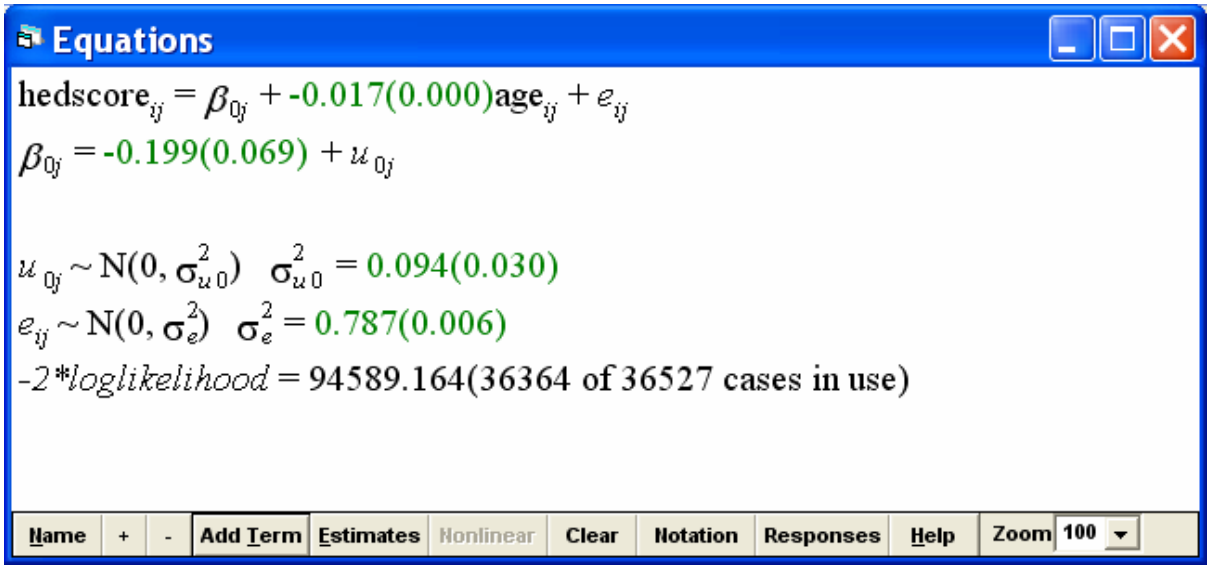


4. Relationship between Hedonism and Age: a Random Intercept Model (Section 12.4)

To include age as an explanatory variable:

- In the **Equations** window, click **Add Term**
- Select **AGE** from the variable list and click **Done**
- Click **Start** to fit the new model

You should obtain the following results (shown in Table 12.2):

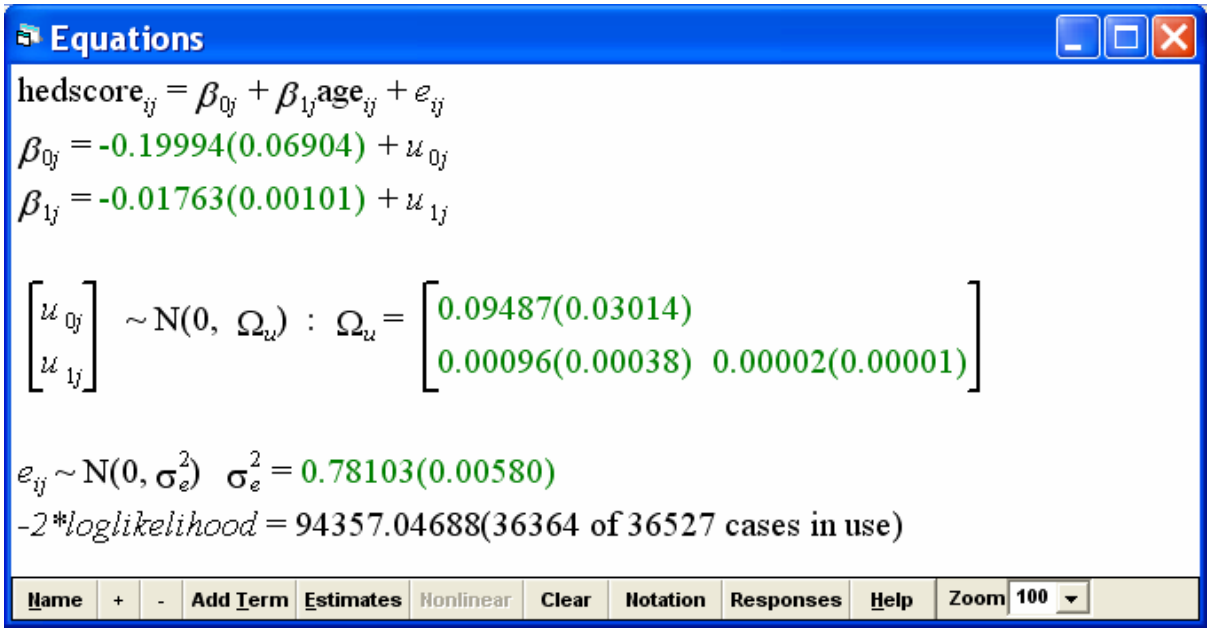


5. Allowing the Relationship between Hedonism and Age to Differ Across Countries: a Random Slope Model (Section 12.5)

To fit a random slope model to the relationship between hedonism and age:

- In the **Equations** window, click on the coefficient of AGE (β_1, estimated as -0.017)
- Check **j(country)** then click **Done**
- Click on **Estimates** to see the equation with mathematical symbols rather than numeric values
- Note that a new term u_{1j} has been added to the model, so that β_1 has become $\beta_{1j} = \beta_1 + u_{1j}$, and the country-level variance has been replaced by a matrix with two new parameters
- Click on **Estimates** twice so that we can see the parameter estimates when the model has been fitted
- Click **Start** to fit this model
- To increase the number of decimal places displayed, go to the **Options** menu, select **Numbers (Display precision and missing value code)** and change **# digits after decimal point** to 5. Click **Apply** then **Done**.

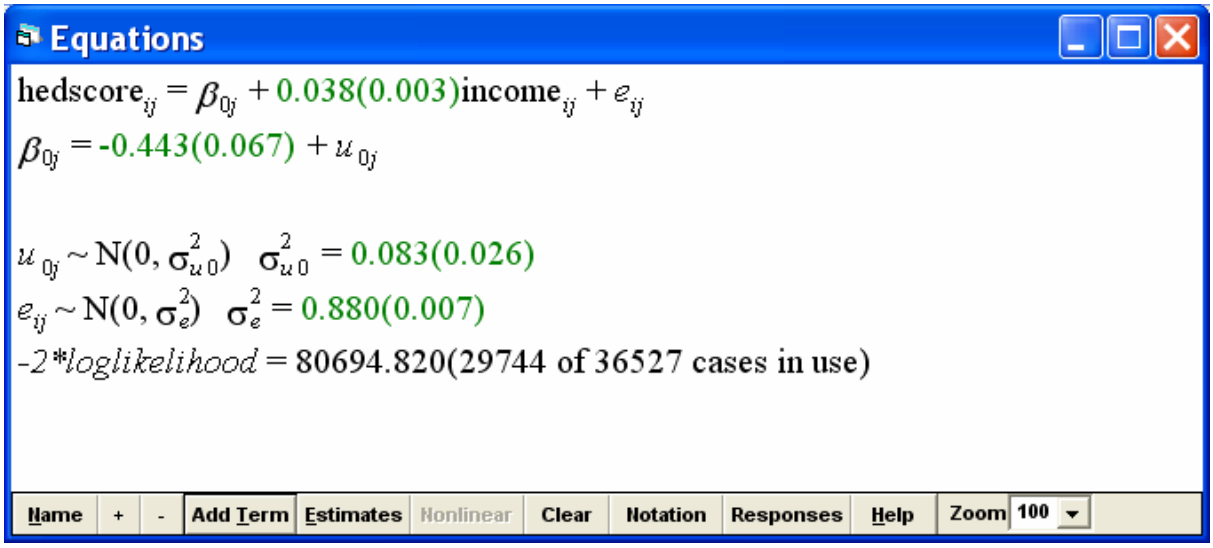
The results are as follows (see Table 12.3).



6. Within and Between Country Relationships between Hedonism and Income: Contextual Effects (Section 12.6)

Model 1 of Table 12.4 is a random intercept model with INCOME rather than AGE as a single explanatory variable. To fit this model:

- In the **Equations** window, click on **AGE** followed by **Delete term**
- Now click **Add Term**, select **INCOME** and click **Done**
- Click **Start** to fit the model
- We will go back to displaying only 3 decimal places. So go to the **Options** menu, select **Numbers (Display precision and missing value code)** and change # **digits after decimal point** back to 3. Click **Apply** then **Done**.



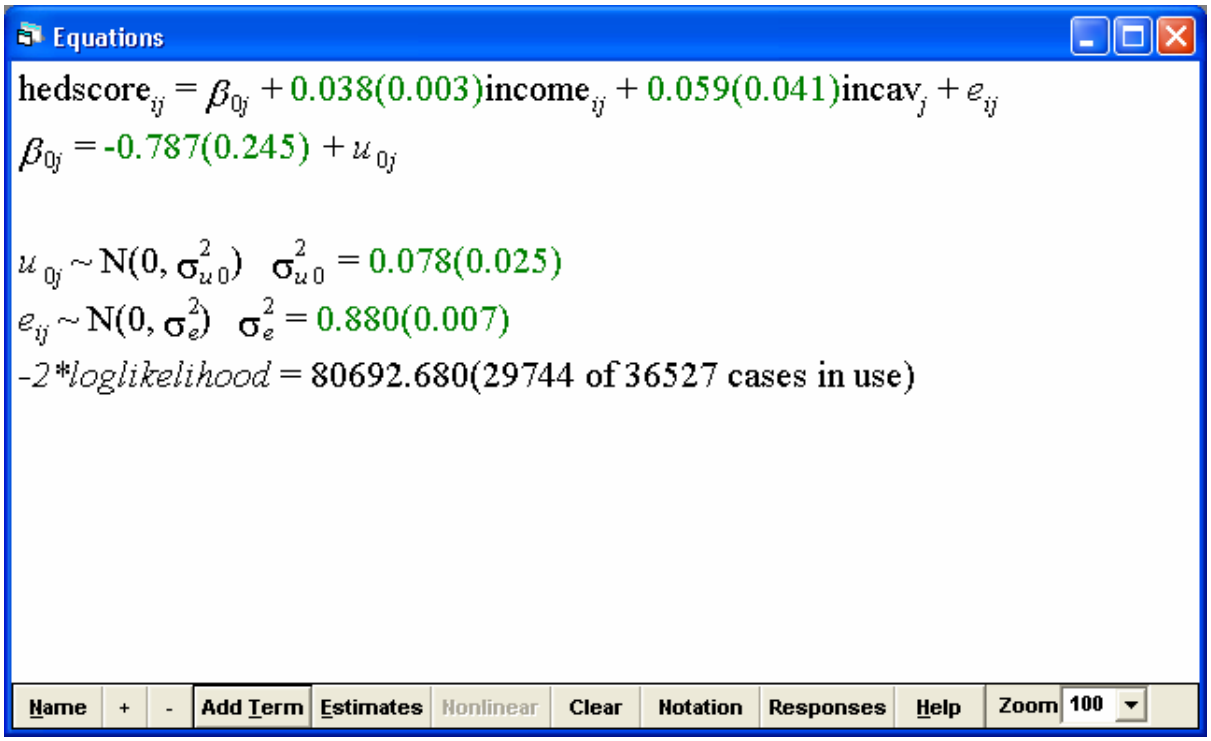
We will next add the country mean income as an additional explanatory variable (Model 2A of Table 12.4). To calculate the mean income for each country:

- From the **Data Manipulation** menu, select **Multilevel data manipulations**
- Under **Operation** retain the default **Averages**
- Under **On blocks defined by** retain **COUNTRY** (the first column is selected by default)
- For **Input columns** select **INCOME**
- For **Output columns** select **C9**
- Click **Add to action list** followed by **Execute**
- Go to the **Names** window, highlight **C9** and click **Edit name**. Name the new variable **INCAV**

Now add the country mean average to the model:

- In the **Equations** window, click **Add Term**, select **INCAV** and click **Done**
- Click **Start** to fit the model

You should the following results (Model 2A in Table 12.4).



Finally, we will replace individual income by the difference between individual income and the country mean ($x_{ij} - \bar{x}_j$). This model corresponds to Model 2B of Table 12.4, which is equivalent to Model 2A. To calculate the difference between individual and country income:

- From the **Data Manipulation** menu, select **Calculate**
- Build the following equation (or type directly into the box): **`C10='income'-'incav'`**
- Click **Calculate**
- Go to the **Names** window and call the new variable (in C10) **INCDIFF**

Now replace INCOME by INDIFF in the model:

- In the **Equations** window, click on **INCOME** followed by **Delete term**
- Now click **Add Term**, select **INCDIFF** and click **Done**
- Click **Start** to fit the model

You should the following results (Model 2B in Table 12.4).