

## **More General Conversion Formulas from Item Factor Analysis Parameters to Item Response Parameters (IFA to IRT)**

The formulas you were given in the lecture for IRT Part 1: Binary Responses were simplified versions of the general formulas. Here are the more general formulas, as programmed for you in the excel workbook:

Under ML, you can choose a LOGIT link or a PROBIT link. LOGIT is the default.

### **LOGIT transformation:**

$$a = \frac{\text{loading} * \sqrt{\text{ThetaVariance}}}{1.7}$$

$$b = \frac{\text{threshold} - (\text{loading} * \text{ThetaMean})}{\text{loading} * \sqrt{\text{ThetaVariance}}}$$

### **PROBIT transformation:**

$$a = \frac{\text{loading} * \sqrt{\text{ThetaVariance}}}{1}$$

$$b = \frac{\text{threshold} - (\text{loading} * \text{ThetaMean})}{\text{loading} * \sqrt{\text{ThetaVariance}}}$$

Under WLSMV, you have to have a PROBIT link, but there are 2 parameterizations, DELTA and THETA. DELTA is the default, but THETA is the easier one because the error variance is 1 (instead of the total pretend Y\* variance as 1 in DELTA).

### **WLSMV THETA PROBIT**

$$a = \frac{\text{loading} * \sqrt{\text{ThetaVariance}}}{1}$$

$$b = \frac{\text{threshold} - (\text{loading} * \text{ThetaMean})}{\text{loading} * \sqrt{\text{ThetaVariance}}}$$