

Answers to questions (Lab session 10)

a) Compare the coefficients produced by the “logit” and the “ologit” STATA command.

The coefficients and their standard errors are exactly the same. The only difference is that the logistic regression intercept (_cons) and the ordinal regression cutoff (_cut1) have opposite signs

b) Use hand calculations in order to obtain the predicted probability of contraceptive use among women 25-29 years old desiring more children. Verify your result using the listing below.

$$P(Y = 1 | \mathbf{x}) = 1 - \gamma(X_1 = x_1, \dots, X_4 = x_4) = \frac{\exp(\beta_1 x_1 + \dots + \beta_4 x_4 - \kappa)}{1 + \exp(\beta_1 x_1 + \dots + \beta_4 x_4 - \kappa)}$$

$$\pi = P(Y = 1) = 1 - \gamma(1, 1, 0, 0) = \frac{\exp[-.824092 + 0.3678306 - .8698414]}{1 + \exp[-.824092 + 0.3678306 - .8698414]} = 0.20980474$$

The result is exactly the same with the one shown in the relevant listing.

c) Compare the results of the probit and the logit model. Recall however that the logit coefficients are not standardized but must be divided $\pi/\sqrt{3}$.

The probit coefficients are close to the logit coefficients divided by $\pi/\sqrt{3}$
For example (Iage_2) :

Logit coefficient : .3678306

```
. di 3.141/sqrt(3)
1.8134572
. di .3678306/1.8134572
.2028339
```

Probit coefficient : .2086109

```
. di 100*(.2086109-.2028339)/.2086109
2.7692704
```

Relative difference : 2.8%

d) What is the interpretation of the model coefficients?

The model coefficients can be interpreted as Odds Ratios. For example the “therapy” coefficient is 0.581. This means that the (adjusted for gender) Odds Ratio between two treatment arms equals $\exp(0.581)=0.56$. In other words subjects receiving alternating therapy are almost half as likely as subjects receiving sequential therapy to experience full remission versus at most a

partial remission. By the assumptions of the model this Odds Ratio is the same even if we consider the Odds calculated by dividing the probability of at least partial response by the probability of at most no change.

e) *Compare the results of the previous two approaches.*

Using the same procedure as in question c) we can see that the differences are very small.

For example (Ithera_1)

Logit coefficient : -.580685

```
. di -.580685/1.8134572  
-.32020883
```

Probit coefficient : -.3344764

```
. di 100*(-.3344764 +.32020883 )/-.3344764  
4.2656433
```

Relative difference : 4.3%