

## Practice Set 6: Probit Estimation

1. **Extramarital Sexual Affairs:** In this exercise we are going to apply probit estimation to test a theory on the economic determinants of extramarital sexual affairs. The original research on which the exercise is based was first published in *The Journal of Political Economy* in 1978 by Ray C. Fair. This paper has had many follow ups in many journals. The basic insight in the paper springs from a leisure-work model: higher wages (the opportunity cost of leisure) induce both to work more (substitution effect) and to work less (income effect) so that the net effect is not clear. Since extramarital affairs are a type of leisure, the theory predicts that wages generally have an effect on the probability of extramarital affairs, but the sign is not clear. The file Fair1978.dta contains data from a survey on sexual activity conducted in the US in 1969 by *Psychology Today*. The sample includes individuals from both sexes who (1) have been married only once, (2) are still married, and (3) are currently working (this is the population for which the theory is relevant). The dataset includes information on whether the individual has had an extramarital sexual affair in the last year (*affair*), the age of the respondent (*age*), the years she/he has been married (*years\_marriage*), how religious she/he is (*religious*), whether the marriage is happy (*happy\_marriage*), and a proxy for her/his wage (in thousand dollars) (*wage*). Consider the following model:

$$\Pr(\text{affair} = 1) = \Phi(\beta_0 + \beta x)$$

where  $x = \{\text{age}, \text{years\_marriage}, \text{religious}, \text{happy\_marriage}, \text{wage}, \text{wagesq}\}$  and  $\text{wagesq} = \frac{\text{wage}^2}{20}$

- (a) Estimate the model by Maximum Likelihood. Comment the sign and significance of the coefficients for *happy\_marriage* and *religious*.
- (b) Does the coefficient on *age* admit a ceteris paribus interpretation?
- (c) Consider the effect of time on the probability of an extramarital affair. Are *age* and *years\_marriage* individually significantly different from zero? Are they jointly significant? Looking at the probit estimates, can you say something on the effect of time on the probability that one of the two spouses has an affair?
- (d) Estimate the average change in the probability of an affair of the passing of 30 years of time from age 25 to age 55 if you marry when 25 if both spouses claim to have a happy marriage. Taking into account this result, what would be the probability of the existence of at least one affair in a happy couple of the same age who have been living together for 30 years and married when they were 25.
- (e) Consider now the effect of wages. Interpret the coefficients for *wage* and for *wagesq*. Looking at the probit estimates, can you say something on the effect of wages on the probability that one of the two spouses has an affair?
- (f) Estimate the average change in the probability of an affair of a salary increase of eight thousand dollars in the wage of the respondent starting from 17,000 dollars (*wage* = 17).