

Microeconometrics

Problem set 3

Note. Upload a copy of your solutions on Moodle. The solutions should include a .pdf document with the answers to each one of the questions **including the screenshot of command used to generate the output and the screenshot of results or the output** generated from the statistical software (feel free to use STATA or R, or other softwares). Please check the submission deadline on moodle, late problem sets will not be accepted.

1. (50%) **Discrete choice models.** Suppose you wish to predict productivity of new workers in a large manufacturing firm. Consider the dataset **weco** that contains the following variables: y_i is a physical productivity measure for worker i after the initial training period, sex_i is a dummy variable equal to 1 for male workers, dex_i is a score in a physical dexterity exam administered before the worker was hired, lex_i is the number of years of education of the worker, and $quit_i$ is a dummy variable equal to 1 if the worker quit within the first six months. The variables job_tenure and $censored$ provide the actual duration of employment and a censoring indicator, respectively. If the censored indicator is 0 then the corresponding duration is censored. You won't need job_tenure and $censored$ in this exercise. Consider the following model for quits:

$$quit = \alpha_0 + \alpha_1 sex + \alpha_2 dex + \alpha_3 lex + \alpha_4 lex^2 + u$$

- (a) Estimate the model by OLS. Interpret the regression coefficients.
 - (b) Estimate the model by probit or logit (motivating your choice) and interpret the results.
2. (50%) **Tobit model.** Consider the dataset **PENSION** containing cross-sectional family data on pension benefits.
 - (a) Create a histogram for the variable pension. This variable is the value in dollars of an employee's pension. Why a Tobit model is appropriate for modeling pension benefits? Provide a detailed description of the model including the distributional assumptions and the corresponding likelihood function.
 - (b) Estimate a Tobit model explaining pension in terms of exper, age, tenure, educ, depends, married, white, and male. Do white and male individuals have statistically significant higher expected pension benefits?
 - (c) Compute the marginal effects from the Tobit model. Compute also the marginal effects for the censored conditional mean evaluated at the mean. How does the pension (evaluated at the mean) change with one more year of experience? [HINT: the option **atmeans** used with the command **margins** in STATA allows to evaluate partial effects at the mean.]
 - (d) Write the general expression for the expected value of y conditional on the covariate x , $E(y|x)$, in the Tobit model. Use the results from part (b) to estimate the difference in expected pension benefits for a white male and a non-white female, both of whom are 35 years old, are single with no dependents, have 16 years of education, and have 10 years of experience. [HINT: you don't need any command for this, you can compute it using the expression for $E(y|x)$ and estimates in point b)]