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Tutorial for Microeconometrics
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Problem Set 1
OLS and Probit Repetition

Exercise 1. Estimation of a Human Capital Earnings Function

The German Socio-economic Panel (SOEP) is a longitudinal survey of private households and persons in the Federal Republic of Germany. The central aim of this panel study is to collect representative micro-data on persons, households and families in order to measure stability and change in living conditions by following principally a micro-economic approach enriched with sociology and political science variables. (More information on the data set can be found here: www.diw.de/soep)

In the following, we use data from the 2004 survey which can be found in the file „verdienst04.raw“on the L-drive. It contains variables on earnings, education, and work experience for people living in West Germany with completed education under the age of 65 who work full time. Read in the data file and answer the following questions.

The data set contains the following variables in the given order:

Variable name	Variable description
sex	Dummy for sex: 1=woman, 0=man
age	Age in years
educ	Years of education
exper	Work experience in years
noschool	Dummy for no school degree
medschool	Dummy for low or medium school degree
highschool	Dummy for high schoool degree
notrain	Dummy for no training degree
appren	Dummy for apprenticeship
uni	Dummy for university degree
earn	Gross monthly earnings

1. A simple Mincer equation

Regress earnings on the years of education and on work experience and interpret your results. What are the marginal effects? Are the variables individually and/or jointly significant? (t-test and F-test)

2. Extension of the Mincer earnings function (dummy variables)

(a) Do women earn less than men? By how much? In order to estimate this, add a sex dummy to the regression and interpret the results. What does the coefficient on the dummy variable mean?

(b) Does the effect of an extra year of schooling differ between women and men? In order to check that, include an appropriate interaction term in the specification. What is the marginal effect of education on earnings?
Hint: Generate a new variable in TSP and use: genr z = expression.

(c) A criticism of the Mincer's earnings function states that earnings do not depend that much on years of education but instead on the highest obtained degree. Which assumption is implicitly included in a linear specification of years of schooling? How can this assumption be loosened? And how can it be tested?
Include appropriate dummy variables in the specification and interpret the results. Moreover, test the hypotheses that these newly added variables are relevant.

3. Quadratic experience

(a) Estimate the earnings function with a second order polynomial in the work experience. What is the rationale for including a quadratic function in years of experience in workforce? Based on hypothesis tests, explain which specification should be preferred here.
Hint: You have first to generate the second order polynomial in work experience.

(b) Based on the quadratic specification in work experience, what is the marginal effect of work experience on earnings
   i. after 1 year on the job?
   ii. after 10 years of work experience?

4. A log earnings Mincer equation

(a) The most widely used version of the Mincer equation relates log earnings to a linear function of years of education and a quadratic function of years of potential experience. What explains the usage of log earnings instead of earnings? What is the correct interpretation of the estimated coefficients?

(b) Using the same data as before estimate the log earnings function and include the gender dummy. Does the return to education have a causal interpretation? Explain.

Exercise 2. Married Women's Labor Force Participation

Read in the data set *motherswork.raw* into TSP from the L-drive. It contains selected variables of the German Socio-Economic Panel (SOEP) for German mothers for the year 2004. The data set contains the following variables in the given order:

Variable name	**Variable description**
ifwork	Dummy=1 if mother working
hours	Working hours (0 if not working)
manearn	Partner's labor earnings
married	Dummy=1 if married
kids	Number of children

(a) Probit estimation

Estimate the influence of partner's earnings, marriage and the number of children on the probability of working. In order to do so, use a probit model with labor force participation as the dependent variable.

(b) Marginal Effects

- **Marginal effect at the mean for a continuous variable**
  What is the marginal effect of partner's earnings on the probability of working for an average individual?
- **Marginal effect at the mean for a dummy variable**
  What is the marginal effect of marriage on the probability of working for an average individual?
- **Average marginal effect of a continuous variable**
  What is the average marginal effect of partner's earnings on the probability of working?
- **Average marginal effect of a dummy variable**
  What is the average marginal effect of marriage on the probability of working? Keep in mind that a dummy variable only takes on values 0 and 1.