

Geneva Graduate Institute (IHEID)

Econometrics I (EI035), Fall 2024

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Problem Set 3

Due: Sunday, 27 October, 23:59

- Prepare concise answers.
- State clearly any additional assumptions, if needed.
- Submit your solutions, along with any code (if applicable), in a **single pdf file** through **Moodle**. If you choose to write your solutions by hand, please make sure your scanned answers are legible.
- Grading scale:

5.5	default grade
6	absolutely no mistakes and particularly appealing write-up (clear and concise answers, decent formatting, etc.)
5	more than a few mistakes, or single mistake and particularly long, wordy answers
4	numerous mistakes, or clear lack of effort (e.g. parts not solved or not really attempted)
1	no submission by due date

Problem 1

You can find the data set for this question and a description of the variables on Moodle. The data spreadsheet contains four variables: average hourly earnings *ahe*, age *age*, gender *female*, and education *bachelor*. To answer the questions, use the asymptotic distribution of the OLS/ML estimator to conduct hypothesis tests or generate 95% confidence intervals. In your quantitative statements, be mindful of the units (e.g. dollars vs. percentages).

- (a) Do males on average earn more than females? Do individuals with a college degree earn on average more than individuals without? How large are the wage differentials?
- (b) Run a regression of earnings on age, gender, and education. If age increases from 28 to 29, how are earnings expected to change? If age increases from 37 to 38, how are earnings expected to change?
- (c) Run a regression of the logarithm of earnings on age, gender, and education. If age increases from 28 to 29, how are earnings expected to change? If age increases from 37 to 38, how are earnings expected to change?
- (d) Run a regression of the logarithm of earnings on gender, education, and the logarithm of age. If age increases from 28 to 29, how are earnings expected to change? If age increases from 37 to 38, how are earnings expected to change?
- (e) Run a regression of the logarithm of earnings on age, age^2 , gender, and education. If age increases from 28 to 29, how are earnings expected to change? If age increases from 37 to 38, how are earnings expected to change?
- (f) Plot the regression relation (the so-called age-earnings profile) between *age* (on the x-axis) and $\log ahe$ (on the y-axis) for the age range 20-65 using the estimates from (e) for males with a bachelor degree. At what age does the age-earnings profile peak?
- (g) Is the effect of age on earnings different for males than for females? Specify and estimate a regression that you can use to answer this question. You can suppose that the relationship between age and log-earnings is linear for both males and females.

*Hint: construct a covariate as the interaction $female * age$.*