ECON3360 Causal Inference for Microeconometrics

Tutorial 10: Quantile regression

Instructor: Julie Moschion

Problem I: OLS and quantile regression

Background The objective of this exercise is to estimate the returns to education using Mincer equations. To do so, we use a quasi-random sample of individuals from the British household survey each year between 1996 and 2005. Our sample consists of employed individuals between 18 and 50 years old. For this exercise, we use the dataset "PS1incomes.dta".

(1) Describe the data. Show descriptive statistics for the income variable in each year: mean, standard deviation, and quantiles (0.1, 0.25, 0.5, 0.75 and 0.9). What is the interpretation of quantile 0.25 in 1996?

(2) Estimate the returns to education by OLS and quantile regressions (for quantiles 0.1, 0.25, 0.5, 0.75 and 0.9) over all years together controlling for experience and experience squared. Use robust standard errors. Interpret the OLS and QR 0.25 estimates.

(3) Estimate the returns to education by OLS separately for years 1996, 1999, 2002 and 2005. Use robust standard errors. Are the returns to education the same over time?

(4) Is the following affirmation true: from 1996 to 2005, the mean returns to education and the returns at the studied quantiles (0.10, 0.25, 0.5, 0.75 and 0.9) changed in a similar way. Use robust standard errors.

(5) Re-run the same quantile regressions as in question 4 but now use the command "bsqreg" which is the equivalent of "qreg" but uses bootstrapped standard errors. To bootstrap the standard errors use 10 repetitions. Are your results similar to those in question 4?

(6) Based on this evidence, is income inequality increasing or decreasing over time?

Problem II: RCT and quantile regression

Background Poor student performance at University is a major concern for policy makers and an active area of research in economics. Many possible explanations have been proposed among which the lack of information and support and the lack of motivation. In a 2009 paper, Angrist, Lang and Oreopoulos (AEJ Applied) use the randomised Student Achievement and Retention Project (Project STAR) to evaluate the impact of offering academic services and financial incentives on students' outcomes. The experiment was conducted in a Canadian university where most students are from the local area and have a common secondary school background. For the purpose of the evaluation, all first-year students entering in September 2005 were randomly assigned to one of three treatment groups or a control group (except those with a high school grade point average (GPA) in the upper quartile). One treatment group was offered an array of support services including access to mentoring by and supplemental instruction (SSP). A second group was offered substantial cash awards, up to the equivalent of a full year's tuition, for meeting a target GPA (SFP). A third treatment group was offered a combination of support services and financial incentives (SFSP). The control group was eligible for standard university support services

but received nothing extra.
Use the dataset "STAR_public_use".

(1) Remember that in a RCT there is often non-perfect compliance, i.e. not all students offered a program will actually join the program. Using OLS, estimate the effect of being offered the treatments (ssp,sfp and sfsp) on the following: i) the probability of signing up for the STAR program (variable names signup) , ii)the probability of receiving SSP services (variable names $used\_ssp$) , iii) the probability of meeting/emailing the advisor (variable names $used\_adv$) and iv) the probability of attending an FSG meeting (variable names $used\_fsg$) (FSGs are class-specific sessions designed to improve students' study habits without focusing on specific course content). Interpret the results.

(2) Are boys or girls more likely to get offered SSP? sign up for SSP? Use SSP services? Interact with an advisor? Attend the FSG meeting?

(3) Did any of the three treatments (ssp,sfp and sfsp) affect students' GPA in year 1? Did they affect boys' and girls' GPA in year 1? What about GPA in year 2? Interpret the results.

(4) Estimate the effect of the three treatments on GPA in year 2 separately for boys and girls using quantile regressions for the following quantiles: 0.1, 0.25, 0.5, 0.75 and 0.9. Do you find any statistically significant effect of the treatments on GPA scores?