Tutorial 2 Instrumental variables

Exercise 1 : Estimating the returns to education (Angrist and Krueger, 1991

Using data from the 1980 US Census, this Angrist and Krueger' study (1991) aims at estimating the returns to education, that is the effect of one supplementary year of schooling on earnings observed among people aged 41-50 years old in 1980. Their idea is to use the quarter of birth as an instrument for education.

They claim that given compulsory schooling laws in US, children have to enter school in the calendar year in which they turn 6 and have to remain in school until their 16th birthday. They expect that children born in the first quarter of year have a slightly lower average level of education than those born later in the year.

a. Why using an OLS model by regressing log weekly earnings on the number of years of education yields a biased estimate of returns to education ?

b. Estimate the effect of educational attainment on log weekly earnings earnings by a two-stage least squares estimator using quarters of birth as excluded instruments and the age, the age squared and year of birth dummies as included ones.

c. Look at the first-stage. Is there an issue of weak instruments ? Justify.

d. In that case, is the model over-identified ? Why is it interesting ? Test the validity of instruments.

e. Considering a dummy indicating whether the individual is born in the first or second quarter as the excluded instrument for years of education, compute the Wald estimator. Compare with your TSLS estimates.

Exercise 2 : Estimating Average Treatment effect on the Treated in a randomized experiment in a case of non-compliance

The Job Training Partnership Act (JTPA hereafter) began funding training in 1983 in US and continued to fund training programs into the late 1990's. The

largest JTPA component aims at supporting training for the economically disadvantaged. This program included a mandate for the largest randomized training evaluation undertaken in US.

JTPA services were delivered at 649 sites and in 16 selected sites, applicants were randomly selected for JTPA treatment.

Although the offer of services was randomly assigned, only 60% of those offered training actually received JTPA services.

a. Why an OLS estimator is not a consistent estimator of the Average Treatment effect on the Treated in that case ?

b. Estimate the Average Treatment effect on the Treated.

c. Explain with words who are the never-takers, the always-takers and the compliers.

d. Are the compliers more likely to be high-school graduate ?