労働経済Ⅰ期末レポート

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1.
2. (1)
3. (1)
   - Ability bias
   - Selection bias

   (2)
   - Ability bias

     Optimal wage depending on the worker's ability θ is :

     $$w(\theta) = Ah_0 e^{\theta x(\theta)}$$

     where

     h_0 : initial human capital

     $x(.)$: optimal length of education as a function of θ

     When θ goes up, there are two different effects : direct effect on $w(\theta)$ and indirect effect, that raises $x(\theta)$, and then affect on $w(\theta)$.

     Then, assume simplified form regression on loggarithm wage w_i by education length t_i,

     $$\ln w_i = \beta_0 + \beta_1 t_i + \epsilon_i$$

     t_i and error term ϵ_i are positively correlated, which causes bias by OLS.
   - Selection bias

     Consider decision-making whether to go to college or not.

     Define B^i be the education effect for type $i \in \{C, H\}$ individual, then we would like to specify

     $$B^C = E_C^C - E_H^C$$
     $$B^H = E_C^H - E_H^H$$

Note that E is return of education, superscript standing for the type of individual, and subscript denoting her/his actual choice (: C is to go to college, while H not).
By observed sample, however, the "appeared" effect B is :

$$B = E_C^C - E_H^H$$

since type C individual usually go to school and vice versa.
Again, assume the wage regression

$$\ln w_i = \beta_0 + \beta_1 t_i + \epsilon_i$$

If $E_H^C < E_H^H$, where the earnings of job for high school would have been lower for type C than for type H, then t_i and ϵ_i are negatively correlated, and so B^C is underestimated.
Similarly, if $E_C^H < E_C^C$, then t_i and ϵ_i are positively correlated, so B^H is overestimated.

(3)
Exclusive instruments should have explanatory power to the independent variable you are interested in, but be independent of the error term of the original regression model.
Consider the regression model

$$\ln y_i = \beta_0 + \beta_1 t_i + \beta_2 + x_i + \epsilon_i$$

Then, excluded variable Z_i is introduced to the following regression :

$$t_i = \gamma_0 + \gamma_1 Z_i + \gamma_2 + e_i$$

For the excluded variable being valid, two conditions below are required :

- γ_1 is statistically significant, and not close to zero.
- Z_i is independent of any variables that determines y_i, except for t_i.
  : $Cov(Z_i, \epsilon_i) = 0$.

In order to find a valid instruments, we should pay attention to legal engagement that make individuals to apply some choice, regardless of charactaristics of each individual.

(4)
In this paper, they utilized birth-month of the students, to identify the effect of compulsory school attendance on their ability and wages.

In the U.S., those who were born early in the calender year receive compulsory education for shorter duration than those who were born late. This law is guaranteed by legal regulation about compulsory education, and there is no correlation between birth-month and their ability. Thus, using this as an instrument variable, they can limit the estimation bias.
(5)