Problem Set 6 for Econometrics

due on next lecture

EC 310
Junhui Qian

1. Consider the simple regression model

$$y = \beta_0 + \beta_1 x + u,$$

and let z be a binary instrumental variable for x. Show that the IV estimator of β_1 can be written as

$$\hat{\beta}_1 = \frac{\bar{y}_1 - \bar{y}_0}{\bar{x}_1 - \bar{x}_0},$$

where $\bar{y}_0$ and $\bar{x}_0$ are the sample averages of y_i and x_i over the part of the sample with $z_i = 0$, and where $\bar{y}_1$ and $\bar{x}_1$ are the sample averages of y_i and x_i over the part of the sample with $z = 1$. This estimator is known as a grouping estimator.

2. Consider the problem of estimating the effect of cigarette smoking on body weight using the following regression,

$$log(weight) = \beta_0 + \beta_1 packs + \beta_2 height + u,$$

where packs is the number of packs smoked by the mother per day. We might worry that packs is correlated with other health factors that affect *weight*, so that *packs* and u might be correlated.

- Argue for or against the use of cigarette price in each county as instrument for *packs*.
- Can you think of other alternatives?