Instrumental Variables

Discussion 9

Reminders and Announcements

- Problem Set 4 due tomorrow at 5pm
- Office hours (as usual!)

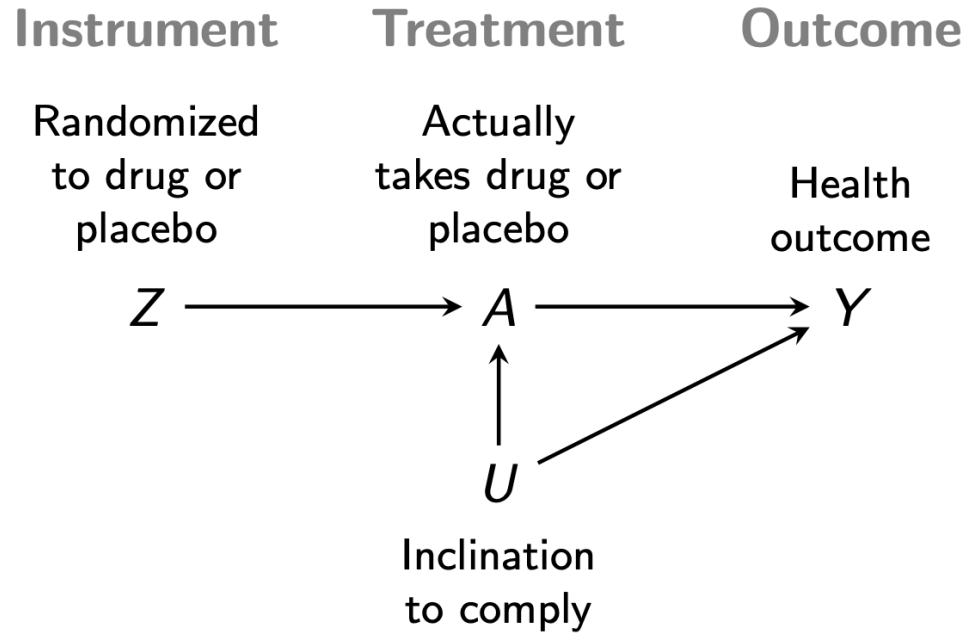
Questions about course/final project logistics?

Ice-Breaker

- Greet/meet 3-4 people next to you!

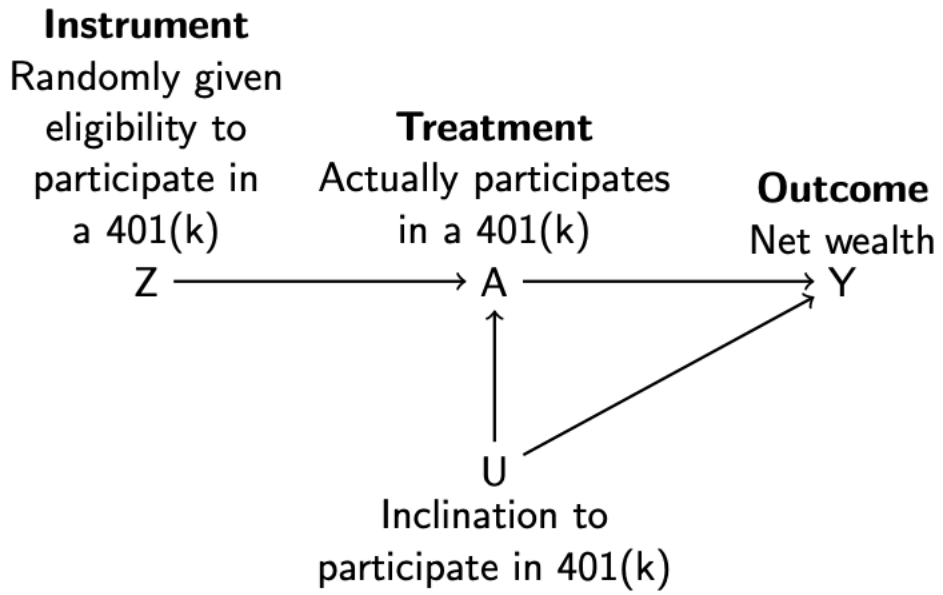
In your groups discuss (using the example from class):

- What is the key assumption of IV?
- What is the intent to treat effect?
- What is the local average treatment effect?



401(k) Example

- Does participating in a 401(k) increase an individual's wealth?
- Participating in a 401(k) is not a random thing!
- However, being eligible for a 401(k) is arguably random.
- 401(k) eligibility affects net wealth *only* through participation.



401(k) Example

In your groups discuss:

- Describe what the intent to treat effect effect is?
- Describe who are the always-takers? Never-takers? Compliers?
- What would it look like in this context if someone was a defier?
- Why does it matter that our instrument (Z) is assigned randomly? (In other words, what assumption becomes credible because (Z) is random?)

Estimation (Two-stage least squares)

- Since Z is assigned randomly, the intent to treat effect is β_i in the following regression: $wealth_i = \alpha_i + \beta_i * eligibility + \epsilon_i$
- The average effect among compliers isn't quite so simple.
  - First estimate the treatment as a function of the instrument
    $$treatment_i = \alpha_i + \beta_i * eligibility_i + \epsilon_i$$
  - Then replace binary treatment (0, 1, 1, 0, …) with predicted probabilities from this model (0.2, 0.8, 0.9, 0.1, …)
  - Finally, estimate the regression: $wealth_i = \alpha_i + \beta_i * probability_i + \epsilon_i$. β_i is the average effect among compliers.
- We usually use canned software for this… e.g. in R!

Let’s do it ourselves!

- There is a short coding exercise on the website…