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Education IV Example - Quiz

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Question 1

1/1 point (graded)

In the example, what is used as the instrument for education?

- ☐ a. Yearly earnings
- ☒ b. Randomly assigned scholarships ✓
- ☐ c. Cognitive score
- ☐ d. Ability

Explanation

Yearly earnings and cognitive score are the outcome variables. Ability was an example of a source of omitted variable bias in a naïve regression. Randomly assigned scholarships to seniors in high school are used as an instrument for education.

Functions of Random Variable

- ▶ Module 5: Moments of a Random Variable, Applications to Auctions, & Intro to Regression
- ▶ Module 6: Special Distributions, the Sample Mean, the Central Limit Theorem, and Estimation
- ▶ Module 7: Assessing and Deriving Estimators - Confidence Intervals, and Hypothesis Testing
- ▶ Module 8: Causality, Analyzing Randomized Experiments, & Nonparametric Regression
- ▶ Module 9: Single and Multivariate Linear

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✓ Correct (1/1 point)

Question 2

1/1 point (graded)

Why are randomly assigned scholarships a good instrument for education? (Select all that apply)

- ☒ a. They are randomly assigned
- ☐ b. They can be added to the regression in order to control for omitted variable bias.
- ☒ c. They significantly affect education
- ☒ d. They do not affect the outcome variable except through the effect on education.
- ☐ d. They are strongly correlated with education and the outcome variable.




Explanation

A good (valid) instrument has to have 3 features:


Models

- ▶ Module 10: Practical Issues in Running Regressions, and Omitted Variable Bias
- ▶ Module 11: Intro to Machine Learning and Data Visualization
- ▼ Module 12: Endogeneity, Instrumental Variables, and Experimental Design

Endogeneity and Instrumental Variables

Finger Exercises due Dec 14, 2016
05:00 IST 

Experimental Design

Finger Exercises due Dec 14, 2016
05:00 IST 

Module 12: Homework

Homework due Dec 12, 2016
05:00 IST 

- ▶ Exit Survey

i. It has to have a significant effect on your variable (regressor) of interest: because otherwise it is not useful, since it would not explain any of the variation in your regressor.

ii. It has to be randomly assigned (or as good as randomly assigned): because otherwise it might be correlated with other variables that are omitted from your model but also have an effect on your outcome.

iii. It does not affect your outcome directly: because otherwise you would misinterpret the effect of the instrument as the effect of your regressor on the outcome variable, when it is in fact a combination of the effect of the regressor and the direct effect of your instrument. This would bias your coefficients. This is often referred to as “the exclusion restriction”.

II and III together imply “independence” of the instrument with respect to the potential outcomes.

ii implies A is correct since scholarships are randomly assigned. i implies C is correct, and iii implies D is correct.

B is not true because your instrument is not really an omitted variable. An omitted variable is precisely a variable that is still correlated with your outcome after controlling for your regressors, whereas an instrument should be uncorrelated with your outcome after controlling for your regressors. So controlling for the random scholarship award would be useless, because, in theory, if it is a good instrument it should be uncorrelated with your outcome once you account for the effect of your regressor.

E is not true because it does not necessarily mean assigned scholarships are a good instrument: whether your instrument is correlated or uncorrelated with your regressor depends on whether your regressor affects the outcome. If assigned scholarships have an impact on education and education affects the outcome, assigned scholarships will be correlated with both education and the outcome, since education and the outcome are correlated with each other. On the other hand, if assigned scholarships have an impact on education, and education doesn't affect the outcome variable, then scholarships and education will be correlated, whereas scholarships and the outcome won't be correlated (since education and the outcome are uncorrelated with each other). None of this implies whether i or ii hold in this case.

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Discussion

Topic: Module 12 / Education IV Example - Quiz[Show Discussion](#)

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