Instrumental Variables

Dr. Patrick Toche

Textbook:

James H. Stock and Mark W. Watson, *Introduction to Econometrics*, 4th Edition, Pearson.

Other references:

Joshua D. Angrist and Jörn-Steffen Pischke, *Mostly Harmless Econometrics: An Empiricist's Companion*, 1st Edition, Princeton University Press.

Jeffrey M. Wooldridge, *Introductory Econometrics: A Modern Approach*, 7th Edition, Cengage Learning.

The textbook comes with online resources and study guides. Other references will be given from time to time.

Problems and Applications

Stock & Watson, Introduction (4th), Chapter 12, Exercise 5.

Consider the IV regression model

$$Y_i = \beta_0 + \beta_1 X_i + \beta_2 W_i + u_i$$

where X_i is correlated with u_i and Z_i is an instrument. Suppose that the first three assumptions are satisfied.

1. $\mathrm{E}[u_i | W_{1i}, \ldots, W_{ri}] = 0$;
2. $(X_{1i}, \ldots, X_{ki}, W_{1i}, \ldots, W_{ri}, Z_{1i}, \ldots, Z_{mi}, Y_i)$ are i.i.d. draws from their joint distribution;
3. X, W, Z, and Y have non-zero finite fourth moments (outliers unlikely);

Which IV assumption is not satisfied when:

a. Z_i is independent of (Y_i, X_i, W_i)?

b. $Z_i = W_i$?

c. $W_i = 1$ for all i?

d. $Z_i = X_i$?

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