1.1) The Experimental Ideal

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December 2018

Tables, Graphics, and Figures from:

Mostly Harmless Econometrics

By Angrist and Pischke (2009): Ch 2

1 to poor health and a 5 to excellent health

Group	Sample Size	Mean Health Status	Std. Error
Hospital	7,774	3.21	0.014
No hospital	90,049	3.93	0.003

$$Y_i = \begin{cases} Y_{1i} & \textit{if } D_i = 1 \\ Y_{0i} & \textit{if } D_i = 0 \end{cases}$$

$$Y_{0i} + (Y_{1i} - Y_{0i})D_i$$

$$E[Y_i|D_i = 1] - E[Y_i|D_i = 0]$$

$$= E[Y_{1i}|D_i = 1] - E[Y_{0i}|D_i = 1]$$

$$+ E[Y_{0i}|D_i = 1] - E[Y_{0i}|D_i = 0]$$

Randomization

$$E[Y_i|D_i = 1] - E[Y_i|D_i = 0]$$

$$= E[Y_{1i}|D_i = 1] - E[Y_{0i}|D_i = 1]$$

$$= E[Y_{1i} - Y_{0i}|D_i = 1]$$

$$= E[Y_{1i} - Y_{0i}]$$

Comparison of treatment and control characteristics in the Tennessee STAR experiment

Variable	Class Size			P-value for equality across groups
	Small	Regular	Regular/Aide	
Free lunch	.47	.48	.50	.09
White/Asian	.68	.67	.66	.26
Age in 1985	5.44	5.43	5.42	.32
Attrition rate	.49	.52	.53	.02
Class size in kindergarten	15.10	22.40	22.80	.00
Percentile score in kindergarten	54.70	48.90	50.00	.00

Krueger (1999)

Experimental estimates of the effect of class size on test scores

Explanatory Variable	(1)	(2)	(3)	(4)
Small class	4.82	5.37	5.36	5.37
	(2.19)	(1.26)	(1.21)	(1.19)
Regular/aide class	.12	.29	.53	.31
	(2.23)	(1.13)	(1.09)	(1.07)
White/Asian	—	—	8.35	8.44
			(1.35)	(1.36)
Girl	—	—	4.48	4.39
			(.63)	(.63)
Free lunch	—	—	−13.15	−13.07
			(.77)	(.77)
White teacher	—	—	—	−.57
				(2.10)
Teacher experience	—	—	—	.26
				(.10)
Teacher Master's degree	—	—	—	−0.51
				(1.06)
School fixed effects	No	Yes	Yes	Yes
R^2	.01	.25	.31	.31

Source: Krueger (1999)

Regression Analysis of Experiments

$$Y_i = \alpha + \rho D_i + \eta_i$$

$$Y_i = E(Y_{0i}) + (Y_{1i} - Y_{0i})D_i + Y_{0i} - E(Y_{0i})$$

$$Y_i = \alpha + \rho D_i + X_i^{'}\gamma + \eta_i$$

Conditional Expectation

$$Y_i = \alpha + \rho D_i + \eta_i$$

$$E[Y_i | D_i = 1] = \alpha + \rho + E[\eta_i | D_i = 1]$$

$$E[Y_i | D_i = 0] = \alpha + E[\eta_i | D_i = 0]$$

$$E[Y_i | D_i = 1] - E[Y_i | D_i = 0]$$

$$= \rho + E[\eta_i | D_i = 1] - E[\eta_i | D_i = 0]$$