1970

Regression Adjustment in Quasi-experiments

STAT 209

outcome Y

group $G = 1, 0$

Head Start
Bryk, Weisberg
in Oakes

mis-specified model $Y = \beta_0 + \beta_1 G + u$ but G, u not indep

t-test.

adjustment (premeasure) X (pre-test?)

$$\hat{\alpha} = \bar{Y}_1 - \bar{Y}_0 - \hat{\beta}(\bar{X}_1 - \bar{X}_0)$$

estimated effect

IV alternative
X as instrument for G to correct bias in $\hat{\beta}_{YG}$ (2-best)

$\hat{\beta} = 0$ t-test no adj.

$\hat{\beta} = 1$ gain scores if X "pretest"

$\hat{\beta} = \hat{\beta}_{YX \cdot G}$ standard ancova (under adjusts, over adjusts)

correcting for underadjusts

$\hat{\beta} = \hat{\beta}_{YX \cdot G} / rel(X)$ adjustment for measurement error in slope

$\hat{\beta} = \hat{\beta}_{YX \cdot G} / r_{YX \cdot G} = \frac{S_{Y \cdot G}}{S_{X \cdot G}}$ validity correction Campbell-Erlebacher St. change score (week 9)

$\hat{\beta} = \hat{\beta}_0$ control slope Belson equiv to $D(\bar{X}_1)$ adjustment

numerical illustrations

Anderson et al (1980) Ch. 12 Table 12.1 Head Start Data

	Pre	Post	$r_{prepost}$	n
Innovative curriculum	17.1 (6.1)	23.3 (4.6)	.67	157
Standard Head start	14.6 (6.2)	18.9 (5.8)	.78	669

pre diff 2.5 post diff 4.4

Inference?

$\hat{\beta}$ options

t-test	$\hat{\beta} = 0$	$\hat{\alpha} = 4.4$
gain	$\hat{\beta} = 1$	$\hat{\alpha} = 1.9$
ancova	$\hat{\beta} = \beta_{1X \cdot G} = .76$	$\hat{\alpha} = 2.5$
C-E	$\hat{\beta} = \frac{5.6}{6.2} = .9$	$\hat{\alpha} = 2.1$
Belson	$\hat{\beta} = .73$	$\hat{\alpha} = 2.57$