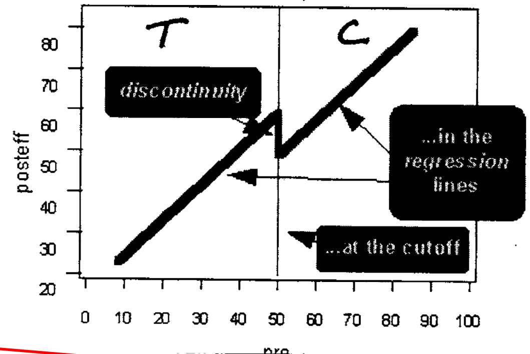
controlled non-random assignment

Stat 209 ~~[crossed out]~~
Wm Trochim
Cornell

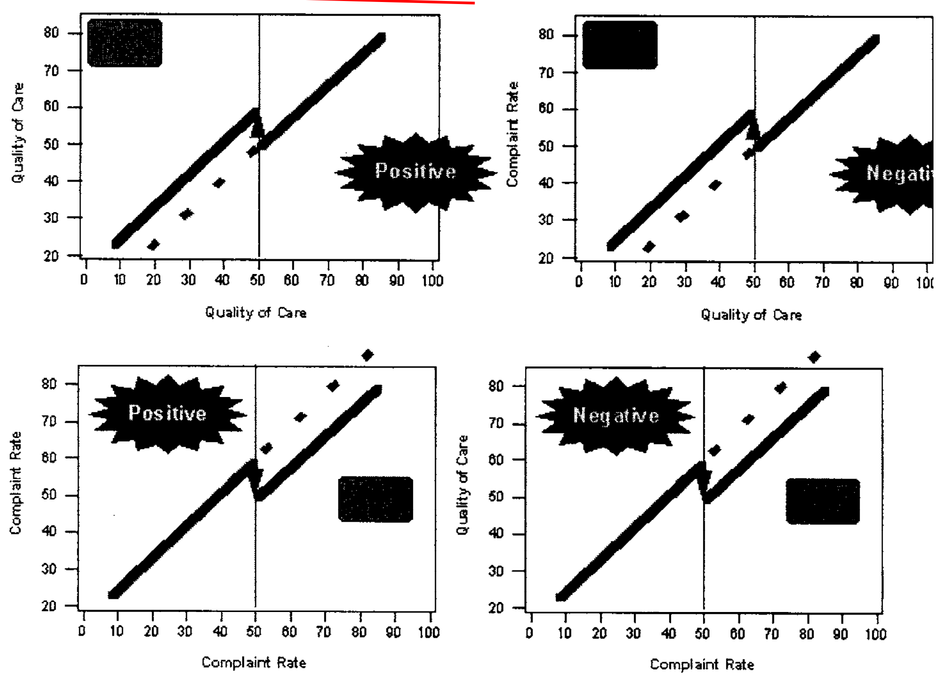
The Regression-Discontinuity Design

Sharp cut X^c

If there is a treatment effect, there will be a...



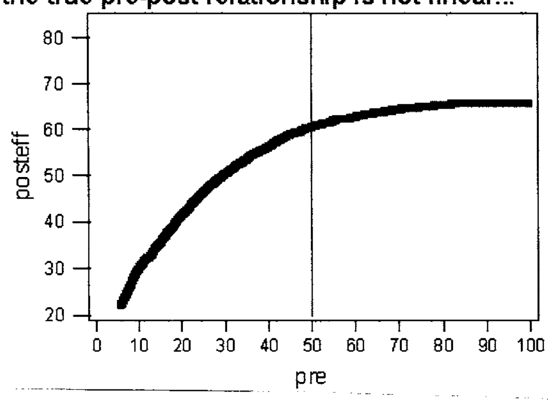
Hospital care examples

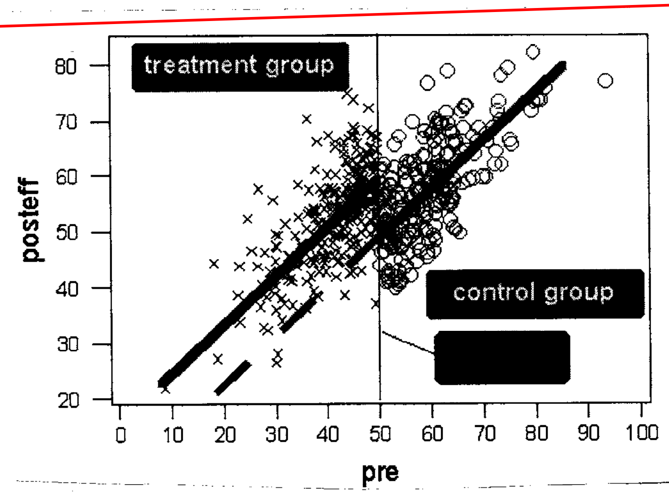


Threats

null effect, dose-response

If the true pre-post relationship is not linear...

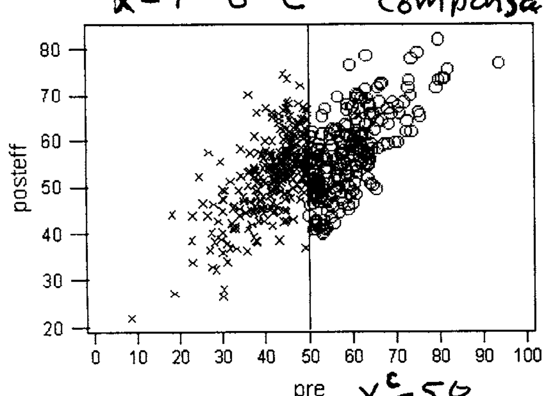




Data Example

x=T o=C compensatory assignment (Title I)

$\tau \approx 10$



$X^c = 50$

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The regression equation is
   posteff = 49.8 + 0.824*precut + 9.89*group
   - 0.0196*linint

Predictor        Coef       Stdev     t-ratio       p
Constant      49.7508      0.6957       71.52   0.000
precut        0.82371     0.05889       13.99   0.000
group          9.8939      0.9528       10.38   0.000
linint       -0.01963     0.08284       -0.24   0.813

s = 6.639       R-sq = 47.5%      R-sq(adj) = 47.2%
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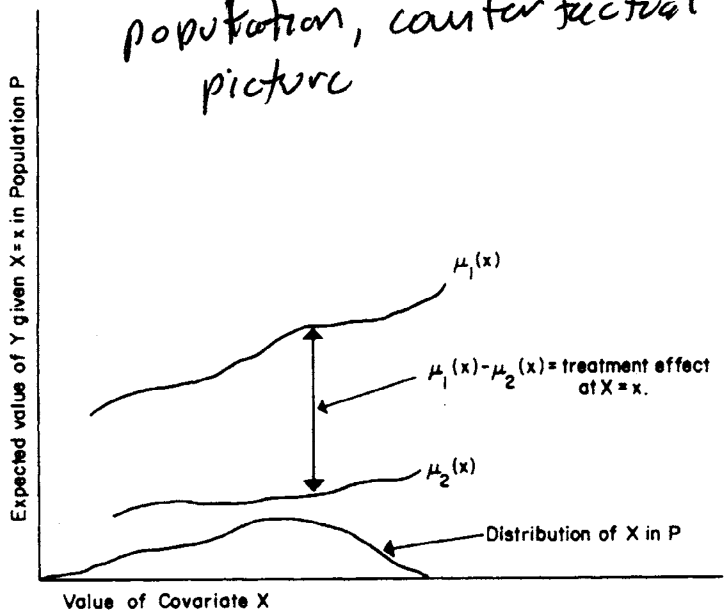
precut = $X - X^c$

note: probabilistic assignment preferred HW2 #6

Rubin (1977) Assignment on Covariate

population, counterfactual picture



pick-a-point comparision

probabilistic assignment

HW 2 [redacted]

FIG. 1

The Treatment Effect in Population P :

$$\tau = \underset{x \in P}{\text{Ave}} \, [\mu_1(x) - \mu_2(x)]$$

for assignment on X probabilistic or not

Result 4: If $\mu_1(x)$ and $\mu_2(x)$ are both linear in x and parallel, then the simple analysis of covariance estimator

$$\bar{y}_1 - \bar{y}_2 - (\bar{x}_1 - \bar{x}_2)\,\hat{\beta} \qquad (8)$$

where
$$\hat{\beta} = \frac{\sum_{i=1}^{2} \sum_{i=1}^{n_i} (y_{ij} - \bar{y}_i)(x_{ij} - \bar{x}_i)}{\sum_{i=1}^{2} \sum_{j=1}^{n_i} (x_{ij} - \bar{x}_i)^2}$$

is unbiased for τ .

Subpopulation P_x calcs (e.g. treatment exposure)

Belson ex. (ancova using control group slope) Cochran reading

Data example (p.16) $\tau > 0$