Notes, Apr 12th, 2021

Average Treatment Effect

$d_i = 0$ ← not getting a new treatment
$d_i = 1$ ← policy shock

Assume d is randomly assigned

Y ← outcomes

$\underline{E(Y|d=1) - E(Y|d=0)}$ ← ATE

$Y \sim \beta_1 1_{d=1} (+\beta_0)$

Conditional Average Treatment Effect

x ← background, control variables

$\underline{E(Y|d=1, x) - E(Y|d=0, x)}$

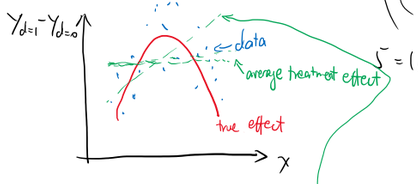
if x is discrete (Cartesian product of discrete variables)

$Y \sim \beta_1 1_{d=1} + (\beta_{1,1} 1_{gender=1} \cdot 1_{race=1} + \beta_{1,2} 1_{\cdot} \cdot 1_{race=2} \cdots)$

$\begin{pmatrix} gender & race \\ \begin{pmatrix} 0 \\ 1 \end{pmatrix} & \times \begin{pmatrix} 0 \\ 1 \\ 2 \end{pmatrix} \end{pmatrix}$

$5 = (6-1)$ fixed effect

x is continuous ... how?

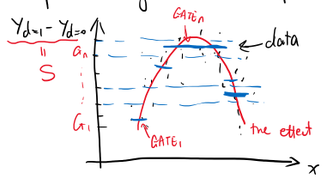


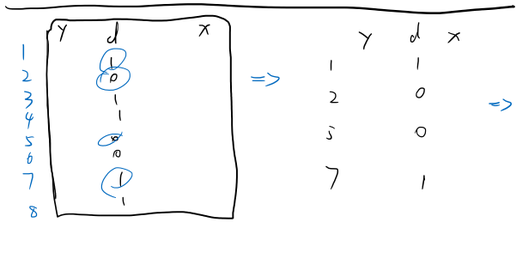
An alternative: assume a parametric form

$Y \sim \beta_0 1_{d=1} + \beta_2 (1_{d=1} \cdot x)$

$x, x^2, x^3, \log(x)$

Grouped Average Treatment Effect





$\Rightarrow$

	Y	d	x
1	1	1	
2	2	0	
3	5	0	
4	7	1	

$\Rightarrow$

	Y	d	x
1	1	1	
7	1	1	

$Y \sim x$

$\hat{Y}(x) - B = S$

$E(S) = \bar{S} = ATE$

	Y	d	x
2		0	
5		0	

$\boxed{Y \sim x} \Rightarrow \underline{\hat{Y}(x)}$ B