About r

r ..... different for schooling levels

r ..... stable during 1940 – 1970 in the USA

r ..... decline in 70's growing later

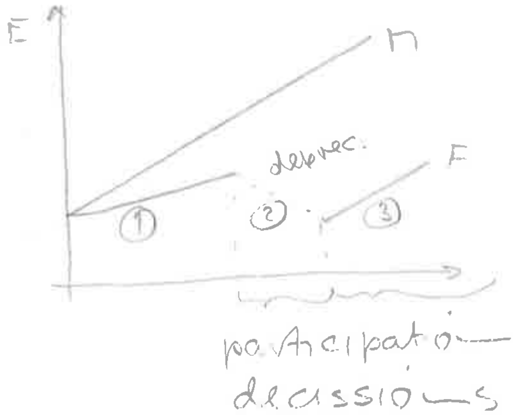
r ..... high in developping countries

lower in developed

very low in centrally planned & scandinavia

Gender wage differential

- discrimination
- job segregation
- different Xs : EXP = Age − S − 6 − h



(1) Low investment due to lower PV(Y)

(2) No I + deprec ~ 3% / year

(3)

Mincer & Polachek: $\ln Y_t = a + bS + b_1 x + b_2 x^2 - b_3 h - b_4 h^2$

h ... employers expecting h do not offer carrier track jobs

- L_H is cheaper than household cleaner / nanny
- earlier retirement against women
- legislation is not very effective (unemployment)

COEFICIENT ON EDUCATION

- in Mincerian regression - private rate of return

  ↓ valid only if ability does not exist

  - productivity effect

    ↳ abilities that are unobserved must be $cov(EDU, A) = 0$

- private and social marg. returns differ => inefficient outcome

  1) $r_p > r_s$ -> over investment

  2) $r_p < r_s$ -> underinvestment } ?

     ↳ improved matching (Stiglitz 75)

     $\boxed{\text{CASE}}$ unpleasant schooling people - ~~skilled~~ having comparative advantage in low skilled jobs

     If employers cannot distinguish ->

     -> signaling helps to raise both wages

- Ability and education

  ↑ A_i -> more productive at every level

  -> higher opportunity costs of schooling

    ↳ ↘EDU

  -> value future more -> discount less

    ↳ ↗EDU

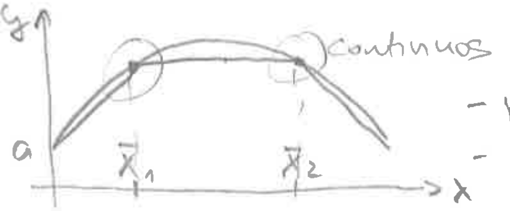
  -> learn faster

    ↳ ↗↘ ? EDE

-> easier OJT -> -> ↑w

Notes on estimation

Splines $\rightarrow$ $y = a + b_1 x + b_2(x-\bar{x}_1)\,D[x>\bar{x}_1] + b_3(x-\bar{x}_2)\,D[x>\bar{x}_2]$



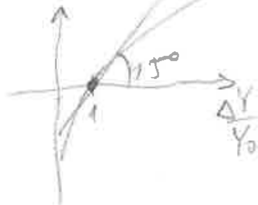
D ... indicator fcio = dummy

- polynomial versions possible
- possible for more x's
- regions of x by definition or optional

$\ln y = \beta x + \delta D \ : \ D = 1, 0$

$\left.\begin{array}{l} \ln y_0 = \beta x + 0 \\ \ln y_1 = \beta x + \delta \end{array}\right\}$ $\ln y_1 - \ln y_0 = \ln \frac{y_1}{y_0} = \ln\left(\frac{Y_0 + \Delta Y}{Y_0}\right) = \ln\left(1 + \frac{\Delta Y}{Y_0}\right) = \delta$

$\% \Delta Y = \frac{\Delta Y}{Y_0} = e^{\delta} - 1 \ \Rightarrow \ \delta \sim \%$ for small δ



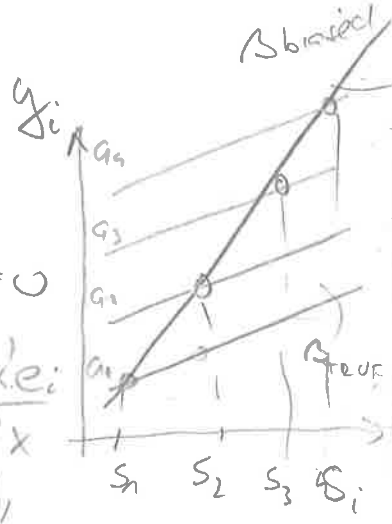
Ability bias

$y_i = \beta x_i + \underbrace{a_i + e_i}_{\varepsilon_i}$, $cov(a_i, x_i) > 0$

$cov(a_i, e_i) = cov(x_i, e_i) = 0$

$\hat{\beta}_{OLS} = \frac{x'y}{x'x} = \frac{x'(\beta x + a + e)}{x'x} = \beta + \frac{x'a}{x'x} + \frac{x'e_i}{x'x}$

$\frac{x'a}{x'x} \downarrow > 0 \downarrow$ bias ; $\frac{x'e_i}{x'x} \downarrow 0$



- error in variables

RHS : EDU < recall error, imputation error, drop outs } $\Rightarrow$ bias ↗ ↘

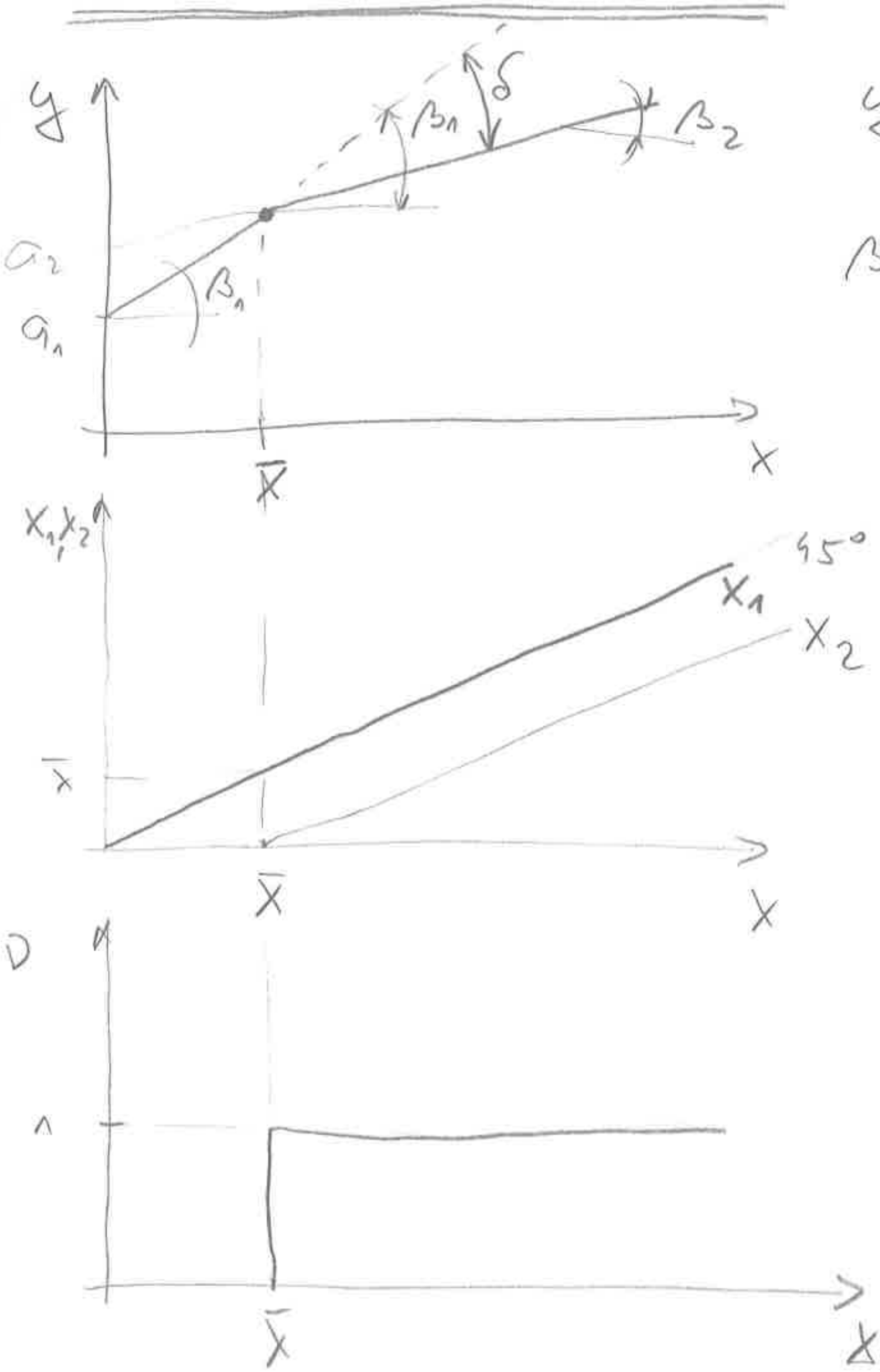
LHS : Y ... recall $\rightarrow$ no bias

taxes $\rightarrow$ bias

$EXP = AGE - EDU - 6 - \overset{\text{missing}}{h}$

- specification EDU < years ? levels ?

tuition on SPLINES



$$y = a_1 + \beta_1 \underset{X_1}{X} + \underbrace{(X-\bar X)\, D(x>\bar x)}_{X_2}\, \delta$$

$$\beta_2 = \beta_1 + \delta$$

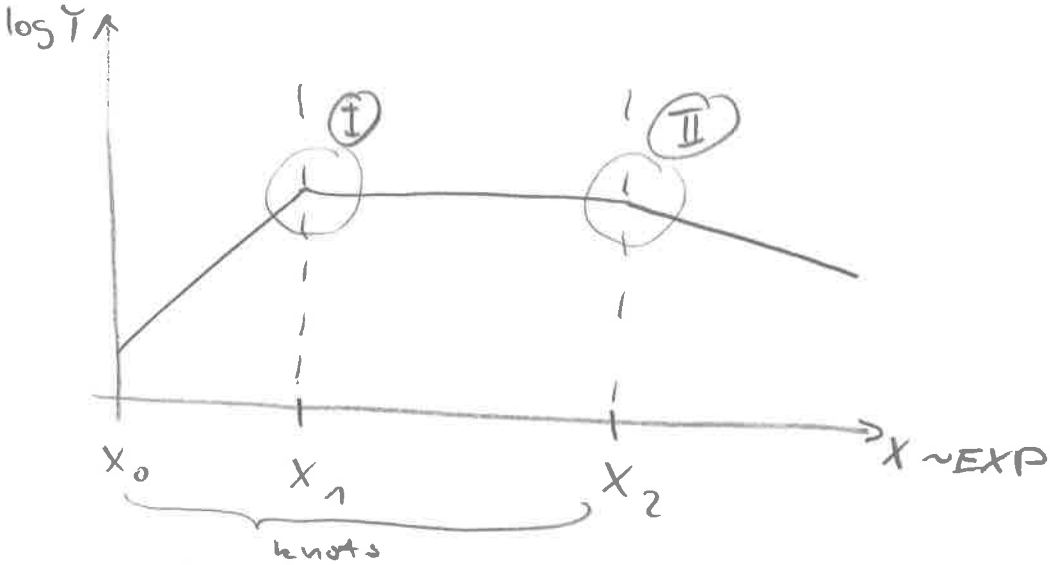
or

$$\cancel{y = a_1 + \beta_1 X D(X \leq \bar X) + a_2 + (X-\bar X) D(X > \bar X)\beta_2}$$

SPLINES

- use if theory does not predict fc. form
- use if continuity $f(x)$ needed

- CASE of EXPerience ~ EXP profile



Choice of knots:

- arbitrary
- other rules

$\bar{X}_0, \bar{X}_1, \bar{X}_2$ ~ knots = const

$D_1 = 1$ if $\bar{X}_0 \leq X < \bar{X}_1$

$D_2 = 1$ if $\bar{X}_1 \leq X < \bar{X}_2$

$D_3 = 1$ if $\bar{X}_2 < X$

$$Y = [a_1 + b_1(X - \bar{X}_0)]D_1 + [a_2 + b_2(X - \bar{X}_1)]D_2 + [a_3 + b_3(X - \bar{X}_2)]D_3 + u$$

Impose continuity at I & II

$$a_2 = a_1 + b_1(\bar{X}_1 - \bar{X}_0)$$

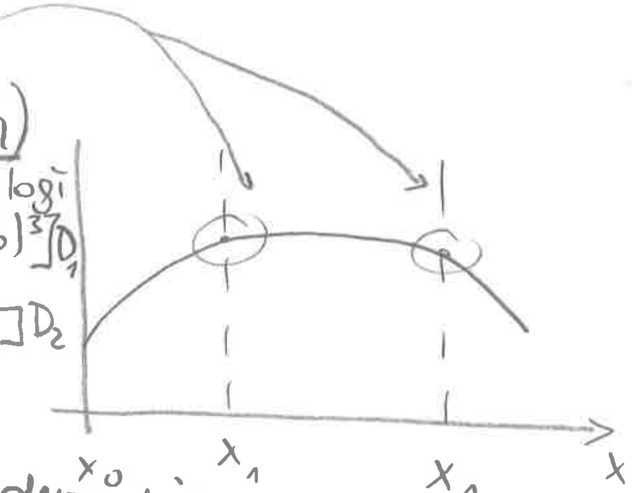
$$a_3 = a_2 + b_2(\bar{X}_2 - \bar{X}_1)$$

- POLYNOMIAL SPLINE (smooth)

$$Y = [a_1 + b_1(X - X_0) + c_1(X - X_0)^2 + d_1(X - X_0)^3]D_1$$

$$+ [a_2 \ldots \ldots]D_2$$

$\vdots$



Impose continuity & continuity of 1st & 2nd derivatives

$\rightarrow a_2 = a_1 + b_1(x_1 - x_0) + c_1(x_1 - x_0)^2 + d_1(x_1 - x_0)^3$

$\rightarrow b_2 = \ldots$

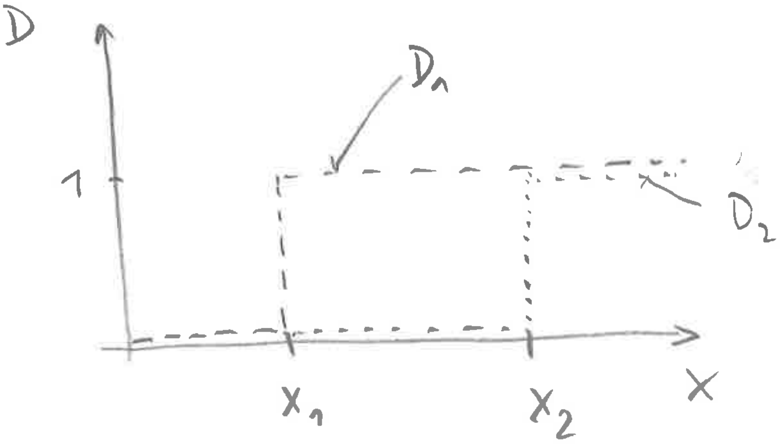
Simple formula (for general specification)

$$\boxed{Y = a_1 + b_1(X - X_0) + c_1(X - X_0)^2 + d_1(X - X_0)^3 + \sum_{i=1}^{k} (d_{i+1} - d_i)(X - X_i)^3 D_i^*}$$

$$\boxed{\begin{aligned} D_i^* &= 1 \quad \text{if} \quad X \geq X_i \\ &= 0 \quad \text{otherwise} \end{aligned}}$$ marginal definition

$k+1 = 3 \sim$ # intervals

$\underbrace{a_1, b_1, c_1, d_1, d_2, \ldots d_k}_{\text{parameters}}$



- more X's can be defined by splines

CASE of 1st order:

$D_1 = 1(X \geq X_1)$ $\quad$ $D_2 = 1(X \geq X_2)$

$$Y = a + b_1(X - X_0) + b_2(X - X_1)D_1 + b_3(X - X_2)D_2$$

CASE of 2nd order:

$$Y = a + b_1(X - X_0) + c_1(X - X_0)^2 + C_2(X - X_1)^2 D_1 + C_3(X - X_2)^2 D_2$$

CASE of 3rd order: