

Interactions among dummy vars.

$$y = \beta_0 + \beta_1 x_1 + \delta_M M + \delta_W W + \delta_{MW} M \times W + u$$

Base / reference : $M=0 \wedge W=0$
group

Effect of $M=1 \wedge W=1$: $\delta_M + \delta_W + \delta_{MW}$
rel. to base group

Effect of $M=1 \wedge W=0$: δ_M $\rightarrow \$1.3$
rel. to base

Effect of $M=0 \wedge W=1$: δ_W
rel. to base

$$\begin{aligned}\hat{\delta}_M &= 1.3 \\ \hat{\delta}_W &= 0.02 \\ \hat{\delta}_{MW} &= 1.4\end{aligned}$$

Allowing for diff. slopes

$$y = \beta_0 + \beta_1 x_1 + \delta_0 M + \delta_1 M \times x_1 + u$$

if y : wage

x_1 : educ.

M :
 1 → marr.
 0 → not "

	Intercept	Slope on educ.
Marr.	$\beta_0 + \delta_0$	$\beta_1 + \delta_1$
Not marr.	β_0	β_1
Diff.	δ_0	δ_1

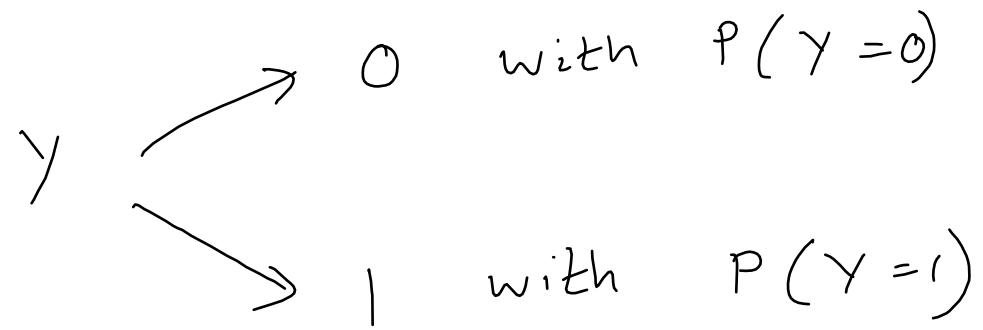
e.g. $\hat{\beta}_1 = 0.46$
 $\hat{\delta}_1 = 0.1$
 $\hat{\delta}_0 = 0.33$

The Linear Probability Model

Dep. var. \rightarrow dummy

e.g. employment status
graduation "

sign treaty



$$\begin{aligned} E(Y) &= [0 \times P(Y=0)] + [1 \times P(Y=1)] \\ &= P(Y=1) \end{aligned}$$

$$Y = \beta_0 + \beta_1 x_1 + \dots + \beta_k x_k + u$$

$$P(Y=1 | x_1, \dots, x_k) = \beta_0 + \beta_1 x_1 + \dots + \beta_k x_k$$

instead of $E(Y | x_1, \dots, x_k)$

e.g. $P(\text{sign} = 1 | \text{GDPPC, democracy})$

$P(\text{empl.} = 1 | \text{educ., job training})$

Slope coefficients :
$$\frac{\Delta P(Y=1 | x_1, \dots, x_k)}{\Delta x_j} = \beta_j$$

(continuous x_j)

MFOZ

$$inf = \beta_0 + \beta_1 educ + \beta_2 age + \beta_3(kids < 6) + u$$

↓
labor force

participation

status one add. child \downarrow prob. of by 0.303

being in labor force

↳ addl. children ↓ prob. of being in LF ↓

$$\text{by } 4 \times 0.303 = 1.212$$

Shortcomings of the LPM

- Fitted / predicted values can be outside $[0, 1]$
- Constant $\hat{\beta}$ may \Rightarrow unrealistic interpretation
- Heteroskedasticity
$$\text{Var}(y|x) = P(y=1|x)[1 - P(y=1|x)]$$
- May perform well near avg. values in data.