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 group : $M = 0$ & $W = 0$

Effect of $M=1$ & $W=1$ rel. to base group : $\delta_M + \delta_W + \delta_{MW}$ $2.72

Effect of $M=1$ & $W=0$ rel. to base : δ_M $1.3

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

$\hat{\delta}_M = 1.3$

$\hat{\delta}_W = 0.02$

$\hat{\delta}_{MW} = 1.4$

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: $1 \rightarrow$ marr.
$0 \rightarrow$ 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. $\longrightarrow$ dummy

e.g. employment status

graduation "

sign treaty

$$y \begin{cases} \nearrow 0 & \text{with } P(Y=0) \\ \searrow 1 & \text{with } P(Y=1) \end{cases}$$

$$E(Y) = [0 \times P(Y=0)] + [1 \times P(Y=1)]$$
$$= P(Y=1)$$

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

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

instead of $E(Y \mid x_1 \dots x_k)$

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

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

Slope coefficients (continuous x_j) : $\dfrac{\Delta P(y=1 \mid x_1 \dots x_k)}{\Delta x_j} = \beta_j$

MROZ

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

↓

labor force participation status

$$\hat{\beta}_3 = -0.303$$

One addl. child ↓ prob. of being in labor force by 0.303

4 addl. children ↓ prob. of being in LF ↓ 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
  $$Var(y \mid x) = P(y=1 \mid x)\left[1 - P(y=1 \mid x)\right]$$
- May perform well near avg. values in data.