Multiple categories (cont.)

$$y = \beta_0 + \beta_1 x_1 + \delta_0 x_2 + \delta_1 x_3 + \delta_2 x_4 + u$$

if y : wage

x_1 : educ.

x_2 : M=1 & W=1 $\rightarrow$ $x_2 = 1$ & 0 o.w.

x_3 : M=1 & W=0 $\longrightarrow$ $x_3 = 1$ & 0 o.w.

x_4 : M=0 & W=1 $\longrightarrow$ $x_4 = 1$ & 0 o.w.

base : M = 0 & W = 0

δ_0: effect of $x_2 = 1$ rel. to base

δ_1: " " $x_3 = 1$ "

δ_2: " " $x_4 = 1$ "

e.g. $\hat{\delta}_0 = 2.72$ $\hat{\delta}_1 = 1.3$ $\hat{\delta}_2 = 0.02$

Effect of marr. & west. rel. to base = \$2.72

" " " & not " " " " = \$1.3

Interaction among dummy vars.

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

Base/ref. group: $M = 0$ & $W = 0$

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

Effect of $M=1$ & $W=0$: δ_M

" " $M=0$ & $W=1$: δ_w

e.g. $\hat{\delta}_M = 1.3$ Effect of marr. & west
     $\hat{\delta}_w = 0.02$ rel. to base = \$2.72
     $\hat{\delta}_{MW} = 1.4$
                              Effect of marr. & = \$1.3
                              not west

Allowing for diff. slopes

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

e.g. y: wage

x_1: educ.

$M \longrightarrow 1 \longrightarrow$ married

$0 \longrightarrow$ not "

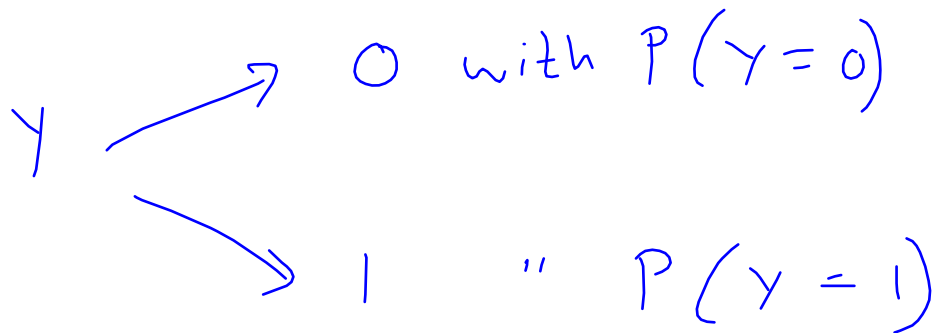|	Intercept	Slope on educ.
Marr.	$\beta_0 + \delta_0$	$\beta_1 + \delta_1$
Not marr.	β_0	β_1
Diff.	δ_0	δ_1

e.g. $\hat{\beta_1} = 0.46$

$\hat{\delta_0} = 0.33$

$\hat{\delta_1} = 0.1$

The Linear Probability Model

Dep. var. $\longrightarrow$ dummy var.   e.g. employed, graduation, sign treaty etc.

$$y \begin{cases} 0 \text{ with } P(Y=0) \\ 1 \quad " \quad P(Y=1) \end{cases}$$

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

$$= P(Y=1)$$

$$y = \beta_0 + \underbrace{\beta_1 x_1 + \ldots + \beta_k x_k}_{} + u$$

$$E(y \mid x_1 \ldots x_k)$$
$$P(y=1 \mid x_1 \ldots x_k)$$

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

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