

LSDV

$$y_{it} = x_{it}'\beta + \alpha_1 d_1 + \alpha_2 d_2 + \cdots + \alpha_N d_N + \varepsilon_{it}$$

$$\begin{aligned} y_{11} &= x_{11}'\beta + \alpha_1 + 0 + \varepsilon_{11} \\ &\vdots \\ y_{1T} &= x_{1T}'\beta + \alpha_1 + 0 + \varepsilon_{1T} \end{aligned} \quad \left. \vphantom{\begin{aligned} y_{11} \\ \vdots \\ y_{1T} \end{aligned}} \right\} i=1$$

$$\begin{aligned} y_{21} &= x_{21}'\beta + 0 + \alpha_2 + \varepsilon_{21} \\ &\vdots \\ y_{2T} &= x_{2T}'\beta + 0 + \alpha_2 + \varepsilon_{2T} \end{aligned} \quad \left. \vphantom{\begin{aligned} y_{21} \\ \vdots \\ y_{2T} \end{aligned}} \right\} i=2$$

β 估计: y 对 d_1, d_2 回归的残差, x 对 d_1, d_2 回归的残差, 两个残差回归.

x 对 d_1, d_2 回归的估计, 就是 x 的均值.

$$(X'X)^{-1}X'y. \quad X = \begin{bmatrix} 1 & 0 \\ \vdots & \vdots \\ 0 & 1 \\ \vdots & \vdots \\ 0 & 1 \end{bmatrix}_{T \times 2} \quad X'X = \begin{bmatrix} T & 0 \\ 0 & T \end{bmatrix}$$

$$(X'X)^{-1} = \begin{bmatrix} \frac{1}{T} & 0 \\ 0 & \frac{1}{T} \end{bmatrix}, \quad X'y = \begin{bmatrix} \sum_{t=1}^T y_{1t} \\ \sum_{t=1}^T y_{2t} \end{bmatrix} \quad \begin{matrix} \frac{1}{T} \sum y_{1t} \\ \frac{1}{T} \sum y_{2t} \end{matrix}$$