

$$y = X\beta + \epsilon$$

$$Y_i = \beta_0 + \beta_1 X_{i1} + \alpha_j + \gamma_j X_{i1} + \epsilon_i$$

$$\begin{bmatrix} Y_{i1} \\ Y_{i2} \\ Y_{i3} \end{bmatrix} = \begin{bmatrix} 1 & X_{i1} & 0 & 0 & 0 & 0 \\ 1 & X_{i1} & 1 & 0 & X_{i1} & 0 \\ 1 & X_{i1} & 0 & 1 & 0 & X_{i1} \end{bmatrix} \begin{bmatrix} \beta_0 \\ \beta_1 \\ \alpha_1 \\ \alpha_2 \\ \gamma_1 \\ \gamma_2 \end{bmatrix} + \epsilon_i$$