$$\hat{\beta} = \frac{\Sigma_i x_i y_i}{\Sigma_j x_j^2}$$

$$y_i = x_i \cdot \beta^* + e_i$$

$$\hat{\beta} = \beta^* + Ze$$

$$\hat{\beta} = \frac{\Sigma_i \; x_i (x_i \cdot \beta^* + e_i)}{\Sigma_j \quad x_j^2} = \frac{\Sigma_i \cdot x_i^2 \cdot \beta^* + e_i x_i}{\Sigma_j \, x_j^2}$$

$$\hat{\beta} = \frac{\beta^* \cdot \Sigma x_i^2}{\Sigma_j x_j^2} + \frac{\Sigma_i \, e_i x_i}{\Sigma_j x_j^2} = \beta^* + eZ$$

$$e = \Sigma e_i$$

$$Z = \frac{\Sigma_i x_i}{\Sigma_j x_j^2}$$