

$$5. \begin{bmatrix} \sum z_{i1}^2 & \sum z_{i1} z_{i2} \\ \sum z_{i1} z_{i2} & \sum z_{i2}^2 \end{bmatrix} = \begin{bmatrix} \sum z_{i1} (y_i - \bar{y}) \\ \sum z_{i2} (y_i - \bar{y}) \end{bmatrix}$$

$$6. \frac{A}{N} = \begin{bmatrix} \overline{z_1^2} & \overline{z_1 z_2} \\ \overline{z_1 z_2} & \overline{z_2^2} \end{bmatrix} \begin{bmatrix} \text{Var}(x_1) & \text{Cov}(x_1, x_2) \\ \text{Cov}(x_1, x_2) & \text{Var}(x_2) \end{bmatrix}$$

$$\frac{C}{N} = \begin{bmatrix} \overline{z_1 (y - \bar{y})} \\ \overline{z_2 (y - \bar{y})} \end{bmatrix} = \begin{bmatrix} \text{Cov}(x_1, y) \\ \text{Cov}(x_2, y) \end{bmatrix}$$

$$A = \begin{bmatrix} \text{Var}(x_1) & \text{Cov}(x_1, x_2) \\ \text{Cov}(x_1, x_2) & \text{Var}(x_2) \end{bmatrix} \quad C = \begin{bmatrix} \text{Cov}(x_1, y) \\ \text{Cov}(x_2, y) \end{bmatrix}$$

Intuition is that slope coefficients are found

by solving  $Ab = C$  for  $b$ .