

$G = \text{var}(u)$ variance-covariance matrix of u

- Variance Structure of MLEM

$$R = \text{var}(e) = I_n \cdot \sigma_e^2 \rightarrow \text{scalar number "error variance"}$$

$\rightarrow n \times n$ Identity matrix

$$I_n = \begin{bmatrix} 1 & 0 & 0 & 0 & \dots \\ 0 & 1 & 0 & 0 & \dots \\ 0 & 0 & 1 & 0 & \dots \\ \vdots & \vdots & \vdots & \vdots & \ddots \end{bmatrix}$$

multiplying any matrix M with I_n does not change M :
 $I_n \cdot M = M$

- Matrix G :

$$G = A \sigma_u^2 \rightarrow \text{genetic additive variance (scalar number)}$$

numerator relationship matrix (Verwandtschafts matrix)

- Meaning of the notation "var(u)" when u is a vector of length q :

$$u = \begin{bmatrix} u_1 \\ u_2 \\ \vdots \\ u_q \end{bmatrix}; \quad \text{var}(u) = \begin{bmatrix} \text{var}(u_1) & \text{cov}(u_1, u_2) & \dots & \text{cov}(u_1, u_q) \\ \text{cov}(u_2, u_1) & \text{var}(u_2) & \dots & \text{cov}(u_2, u_q) \\ \vdots & \vdots & \ddots & \vdots \\ \text{cov}(u_q, u_1) & \text{cov}(u_q, u_2) & \dots & \text{var}(u_q) \end{bmatrix}$$

Meaning of $\text{var}(x)$, if x is a scalar random