(M)

$$G = A \cdot \sigma_u^2$$

$$(*)\ \underline{cov(u_j, u_i)} = \underline{(A)_{ji}} \cdot \sigma_u^2$$

$$\begin{matrix} & & G & & j & i \\ & & & & \vdots & \\ j & \cdots & & cov(u_j,u_i) & & \end{matrix} = \begin{matrix} & & A & & s & d & i \\ & & & & \vdots & \vdots & \\ j & \cdots & (A)_{js} & \cdots & (A)_{jd} & \cdots & (A)_{ji} \\ & & & & \vdots & \vdots & \end{matrix} \cdot \sigma_u^2$$

$u_i = \frac{1}{2} u_s + \frac{1}{2} u_d + w_i$ insert to $(*)$

$$cov(u_j, u_i) = cov\left(u_j, \left[\tfrac{1}{2} u_s + \tfrac{1}{2} u_d + w_i\right]\right)$$

$$= cov(u_j, \tfrac{1}{2} u_s) + cov(u_j, \tfrac{1}{2} u_d) + \underbrace{cov(u_j, w_i)}_{=\emptyset}$$

$$= \tfrac{1}{2} cov(u_j, u_s) + \tfrac{1}{2} cov(u_j, u_d)$$

$$cov(u_j, u_s) = (A)_{js} \cdot \sigma_u^2 \; ; \; cov(u_j, u_d) = (A)_{jd} \cdot \sigma_u^2$$

$$cov(u_j, u_i) = \tfrac{1}{2}(A)_{js} \cdot \sigma_u^2 + \tfrac{1}{2}(A)_{jd} \cdot \sigma_u^2 = \tfrac{1}{2}\left[(A)_{js} + (A)_{jd}\right]\sigma_u^2$$

$$= (A)_{ji} \sigma_u^2$$