□ $\text{cor}(m_i, m_j) = 0$ for all m_i and m_j if $i \neq j$

$$\Rightarrow \text{var}(m) = \begin{bmatrix} \text{var}(m_1) & \text{cov}(m_1, m_2) & \text{cov}(m_1, m_3) & \cdots \\ \text{cov}(m_2, m_1) & \text{var}(m_2) & \cdots & \\ \vdots & & & \end{bmatrix}$$

$= 0$

$\Rightarrow \text{var}(m)$ will be a diagonal matrix

□ $\text{var}(m_1), \text{var}(m_2), \ldots, \text{var}(m_i)$?

□ Using $u_i = \frac{1}{2} u_s + \frac{1}{2} u_d + m_i$

$$\begin{aligned} \text{var}(u_i) &= \text{var}\left[\tfrac{1}{2} u_s + \tfrac{1}{2} u_d + m_i\right] \\ &= \text{var}(\tfrac{1}{2} u_s) + \text{var}(\tfrac{1}{2} u_d) + \text{var}(m_i) \\ &\quad + 2\,\text{cov}(\tfrac{1}{2} u_s, \tfrac{1}{2} u_d) \\ &\quad + \underbrace{2\,\text{cor}(\tfrac{1}{2} u_s, m_i) + 2\,\text{cov}(\tfrac{1}{2} u_d, m_i)}_{=0} \\ &= \tfrac{1}{4} \text{var}(u_s) + \tfrac{1}{4} \text{var}(u_d) + \tfrac{1}{2} \text{cov}(u_s, u_d) \\ &\quad + \text{var}(m_i) \end{aligned}$$