

specifies that  $E \left( u_{t-k} \sum_j \alpha_j u_{t-j} = u_{t-k} \varepsilon_t \right)$

Yule-Walker:

$$\rho_k + \alpha_1 \rho_{k-1} + \dots + \alpha_h \rho_{k-h} = 0 \quad k > 0$$

since

$$\rho_{-j} = \rho_j$$

$$\rho_0 + \alpha_1 \rho_0 + \alpha_2 \rho_0 + \dots + \alpha_h \rho_{h-1} = 0$$

Yule series

$$\rho_2 + \alpha_1 \rho_1 + \alpha_2 \rho_0 + \dots = 0$$

$$u_t + \alpha_1 u_{t-1} + \alpha_2 u_{t-2} + \dots = \varepsilon_t$$

$$E \left( u_{t+k} \cdot u_t = u_{t+k} \sum_{j=1}^h A_j z_j^t \right) \quad k \geq 0$$

Wold:

$$\rho_k + \alpha_1 \rho_{k+1} + \dots + \alpha_h \rho_{k+h} = \frac{\text{var } \varepsilon}{\text{var } u} \beta_k$$

Merkhoff series

$$u_t + \alpha_1 u_{t-1} = \varepsilon_t$$

$$\equiv u_t - \rho u_{t-1} = \varepsilon_t$$

$$[1 - \rho D] u_t = \varepsilon_t$$

$$u_t = \frac{\varepsilon_t}{1 - \rho D} = \varepsilon_t [1 + \rho D + \rho^2 D^2 + \dots] = \left( \sum_j \rho^j D^j \right) \varepsilon_t$$

$$b_j = \rho^j$$

$$\text{var } u = \text{var} \left\{ \sum_{j=0}^{\infty} \rho^j \varepsilon_{t-j} \right\} = \text{var } \varepsilon \sum_{j=0}^{\infty} \rho^{2j} = \frac{\text{var } \varepsilon}{1 - \rho^2}$$

from Yule-Walker

$$\rho_j + \rho \rho_{j-1} = 0$$

$$\rho_j = -\rho \rho_{j-1}$$

$$\rho_k = \rho^k$$