

[Description of AR models]

(AR1) first-order autoregressive

$$y_t - \mu = \phi_1(y_{t-1} - \mu) + \epsilon_t$$

μ : mean parameter,

ϕ_1 : AR1 parameter,

ϵ_t : random error term uncorrelated over time (white noise)

cf) $y_t = \theta_0 + \phi_1 y_{t-1} + \epsilon_t$,

where $\theta_0 = \mu(1 - \phi_1)$: constant parameter

→ these types of models: random walks

ex) $y_t = y_{t-1} + \epsilon_t$

cf) autocorrelation $y_t - y_{t-1}$

DW statistic

$$d_L \text{-----} d_U \text{-----} (4 - d_U) \text{-----} (4 - d_L) \text{-----}$$

(+)autocorr indecisive no autocorr indecisive (-)autocorr

(AR2) second-order autoregressive

$$y_t = \theta_0 + \phi_1 y_{t-1} + \phi_2 y_{t-2} + \epsilon_t, \quad \theta_0 = \mu(1 - \phi_1 - \phi_2)$$

(nth-order AR)

$$y_t = \theta_0 + \phi_1 y_{t-1} + \phi_2 y_{t-2} + \dots + \phi_p y_{t-p} + \epsilon_t, \quad \theta_0 = \mu(1 - \phi_1 - \phi_2 - \dots - \phi_p)$$