Stima dei parametri di un AR(2) con Yule-Walker

AR(2) $\Rightarrow$ $Y_t = \phi_1 Y_{t-1} + \phi_2 Y_{t-2} + \varepsilon_t$

$\hat{\gamma}_0 = 0.8$ $\quad \hat{\gamma}_1 = 0.528$ $\quad \hat{\gamma}_2 = 0.128$

Stimare $\phi_1, \phi_2, \sigma^2_\varepsilon$

- $\hat{\rho}_1 = \hat{\gamma}_1 / \hat{\gamma}_0 = 0.66$
  $\hat{\rho}_2 = \hat{\gamma}_2 / \hat{\gamma}_0 = 0.16$

- Eq. Y-W $\quad \rho_k = \phi_1 \rho_{k-1} + \phi_2 \rho_{k-2} \quad k = 1, 2$

- $\rho_1 = \phi_1 \rho_0 + \phi_2 \rho_1$
  $0.66 = \phi_1 \cdot 1 + \phi_2 \, 0.66 \Rightarrow \phi_1 = 0.66 (1 - \phi_2)$

- $\rho_2 = \phi_1 \rho_1 + \phi_2 \rho_0$
  $0.16 = \phi_1 \, 0.66 + \phi_2 \cdot 1$
  $0.16 = 0.66 (1 - \phi_2) \cdot 0.66 + \phi_2$

$$\hat{\phi}_2 = \frac{0.16 - 0.66^2}{1 - 0.66^2} = -0.488$$

$$\hat{\phi}_1 = 0.66 (1 + 0.488) = 0.982$$

$$\hat{\gamma}_0 = \hat{\phi}_1 \gamma_1 + \hat{\phi}_2 \gamma_2 + \hat{\delta}_2$$

$$\hat{\sigma}_\varepsilon^2 = \hat{\gamma}_0 \left(1 - \hat{\phi}_1 \hat{\rho}_1 - \hat{\phi}_2 \hat{\rho}_2\right)$$

$$= 0.128 \left(1 - 0{,}982 \cdot 0.66 - (-0.688) \cdot 0.16\right) =$$