

$$y_{it} = x_{it}^T \alpha_i + \sigma_{it} + \varepsilon_{it} + z_{it}^T \beta_i$$

$$\sigma_{it} = \rho \sigma_{i,t-1} + v_{it} \quad \underline{\sigma}_i \sim N_T(0, R)$$

$$y_t(s) = x_t(s)^T \alpha(s) + \sigma_t(s) + \varepsilon_t(s) + \sqrt{\omega(s)} \quad t = 1, \dots, T$$

$s = 1, \dots, n$

$$1) \quad \sigma_t(s) = \eta_t + \omega(s)$$

$$\eta_t = \rho \eta_{t-1} + v_t \quad \rightarrow \quad \underline{\eta} \sim N_T(0, \sigma^2 R(\rho))$$

$\rho^{|t-t'|}$

$$\omega(s) \sim GP(0, H(\phi)) \quad \underline{\omega} \sim N_n(0, H(\phi))$$

$n \times 1$

↓
corr. spaziale
 $\exp\{-\phi d(s_i, s_j)\}$

$$2) \quad \sigma_t(s) = \eta_t \cdot \omega(s)$$

$$3) \quad \sigma_t(s) = \rho \sigma_{t-1}(s) + v_t(s) \quad \text{MODELLO DINAMICO}$$

$\stackrel{\text{IND}}{\rightarrow} v_t(s) \sim GP(0, \sigma^2 H(\phi))$