

Bayesian Estimation of DSGE Models¹

Chapter 7: From Linear to Nonlinear DSGE Models

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- Linear DSGE model leads to

$$\begin{aligned}y_t &= \Psi_0(\theta) + \Psi_1(\theta)t + \Psi_2(\theta)s_t + u_t, & u_t &\sim N(0, \Sigma_u), \\s_t &= \Phi_1(\theta)s_{t-1} + \Phi_\epsilon(\theta)\epsilon_t, & \epsilon_t &\sim N(0, \Sigma_\epsilon).\end{aligned}$$

- Nonlinear DSGE model leads to

$$\begin{aligned}y_t &= \Psi(s_t, t; \theta) + u_t, & u_t &\sim F_u(\cdot; \theta) \\s_t &= \Phi(s_{t-1}, \epsilon_t; \theta), & \epsilon_t &\sim F_\epsilon(\cdot; \theta).\end{aligned}$$

From Linear to Nonlinear DSGE Models

- While DSGE models are inherently nonlinear, the nonlinearities are often small and decision rules are approximately linear.
- One can add certain features that generate more pronounced nonlinearities:
 - stochastic volatility;
 - markov switching coefficients;
 - asymmetric adjustment costs;
 - occasionally binding constraints.