

Materials 13 - Still looking for a version of the model w/o overshooting

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1 Model summary

$$x_t = -\sigma i_t + \hat{\mathbb{E}}_t \sum_{T=t}^{\infty} \beta^{T-t} ((1-\beta)x_{T+1} - \sigma(\beta i_{T+1} - \pi_{T+1}) + \sigma r_T^n) \quad (1)$$

$$\pi_t = \kappa x_t + \hat{\mathbb{E}}_t \sum_{T=t}^{\infty} (\alpha\beta)^{T-t} (\kappa\alpha\beta x_{T+1} + (1-\alpha)\beta\pi_{T+1} + u_T) \quad (2)$$

$$i_t = \psi_\pi \pi_t + \psi_x x_t + \bar{i}_t \quad (3)$$

$$\hat{\mathbb{E}}_t z_{t+h} = \begin{bmatrix} \bar{\pi}_{t-1} \\ 0 \text{ } (\bar{x}_{t-1}) \\ 0 \text{ } (\bar{i}_{t-1}) \end{bmatrix} + b h_x^{h-1} s_t \quad \forall h \geq 1 \quad b = g_x \ h_x \quad \text{PLM} \quad (4)$$

$$\bar{\pi}_t = \bar{\pi}_{t-1} + k_t^{-1} \underbrace{(\pi_t - (\bar{\pi}_{t-1} + b_1 s_{t-1}))}_{\text{fcst error using (4)}} \quad (b_1 \text{ is the first row of } b) \quad (5)$$

$$k_t = \begin{cases} k_{t-1} + 1 & \text{for decreasing gain learning} \\ \bar{g}^{-1} & \text{for constant gain learning.} \end{cases} \quad (6)$$

2 To do

1. Check ψ_π above but close to 1

→ works but only quantitatively; qualitatively, the overshooting is still there, likely because this only cancels out one of the two channels through which $\mathbb{E} \pi$ affects x_t negatively.

2. Fix shock for simulation

Indeed the issue was that for learning, I accidentally scaled down the shock by $\sigma_i < 1$, while for RE I had maintained $\sigma_i = 1$.

3. Interest rate smoothing as $i_t = \rho i_{t-1} + (1 - \rho)(\psi_\pi \pi_t + \psi_x x_t) + \bar{i}_t$

Doesn't work either - it doesn't change the model except reduces ψ_π .

4. Indexation in NKPC

5. Find optimal gain as analog to Kalman gain

6. Initialize beliefs away from RE somehow.

7. Davig & Leeper-style switching Taylor rule where only generalized Taylor principle holds?

8. Learn h_x

A quick question on projection facility: checking `eig(phi)` when ϕ isn't square?