

Materials 12 - tinkering around with policy and expectation formation

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1 Model summary

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

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

$$i_t = \psi_\pi \pi_t + \psi_x x_t + \rho i_{t-1} + \bar{i}_t \quad (3)$$

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

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

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

2 Changes

1. To policy

- (a) $\mathbb{E}(\pi)$ instead of π in TR

2. To expectation formation

- (a) Curiosity: check IRFs from Euler equation learning
 - (b) IRFs from vector learning (meaning learn all observables)
 - (c) Different implications from Bayesian learning?

Some reasoning why:

1. Townsend (1983) investigates “forecasting the forecasts of others” and finds damped oscillations
→ do higher-order beliefs play a role for causing oscillations in learning? If so, EE learning IRFs should exhibit no oscillations (and indeed they do not!)
2. Vector learning: are model implications different when agents learn the LOM of not only inflation but also of the other variables? → No. (Note: I’m using the same gain for all variables.)
3. Does learning both slope and constant make a difference? → Not for decreasing gain learning, but for constant gain learning yes.

3 IRFs from vector learning: EE and LH, $T = 400, N = 100$

Figure 1: Learning constant only

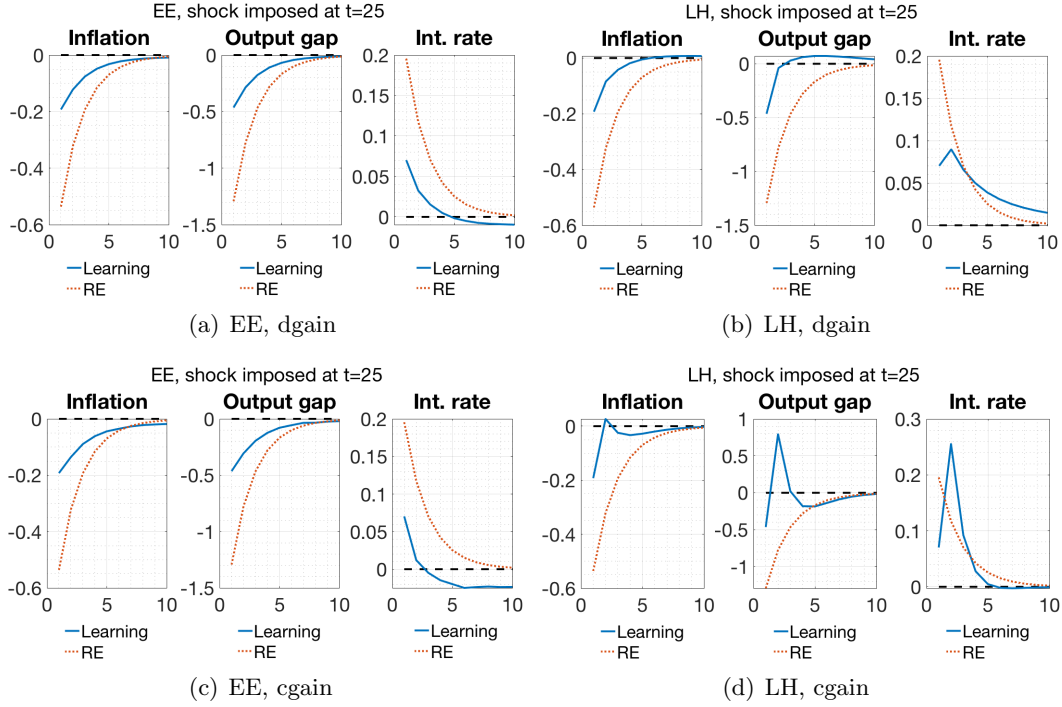


Figure 2: Learning slope and constant

