Materials 22 for Peter - Results and impossibilities so far

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1 Results and impossibilities

Analytical

1. Commitment solution doesn't exist under learning (we already saw)

2. Cannot solve for Ramsey policy because an endogenous gain makes the problem nonlinear

   Let f_t be the expectation of the private sector. Then with an endogenous gain, one of the model equations is

$$f_t = f_{t-1} + k_t^{-1}(\pi_t - f_{t-1}) \tag{1}$$

3. For Ramsey policy, can solve for target criterion

   (Woodford's book, Svensson). For a simplified version of the model where agents only learn the mean of inflation, it is

$$\pi_t = -\frac{\lambda_x}{\kappa}\Big\{x_t - \frac{(1-\alpha)\beta}{1-\alpha\beta}\Big(k_t^{-1} + ((\pi_t - \bar{\pi}_{t-1} - b_1 s_{t-1}))\mathbf{g}_\pi(t)\Big) \\ \Big(\mathbb{E}_t \sum_{i=1}^{\infty} x_{t+i} \prod_{j=1}^{i-1}(1 - k_{t+j}^{-1}(\pi_{t+1+j} - \bar{\pi}_{t+j} - b_1 s_{t+j}))\Big)\Big\} \tag{2}$$

   Here $\mathbf{g}$ is an unspecified anchoring function that determines how the gain changes as a function of the forecast error. $\mathbf{g}_\pi$ is its derivative wrt. π.

4. (No commitment would imply renewed interest in Taylor-type rules, but cannot solve for optimal Taylor-rule coefficients because 1) cannot solve for optimal time paths of observables 2) "noninertial plan" à la Woodford is too restrictive for a learning model.)

Numerical

5. With anchoring, central bank's loss function is U-shaped in ψ_π (Taylor-rule coefficient on inflation)

   Central bank optimally less aggressive on inflation under anchoring than under RE.

2 Where to go from here

1. I know that optimal policy is characterized by the target criterion (2). Can check how close a Taylor-rule (or alternative rules) can come to implementing it.

2. From problem to possibility: estimating an anchoring function

   The anchoring criterion I used so far was the CUSUM-inspired discrete criterion $\rightarrow$ analytical work required replacement by a smooth alternative, **g**. Now I can try to learn what that object looks like. Right now I am estimating via GMM a very simplistic function of the form:

$$k_t = k_{t+1} + \frac{1}{(d\, fe_{t-1})^2} \tag{3}$$

   where fe_{t-1} is the most recent forecast error and d is the only parameter I'm estimating.