Monetary Policy & Anchored Expectations - An Endogenous Gain Learning Model

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1 Puzzling Fed behavior fall 2019

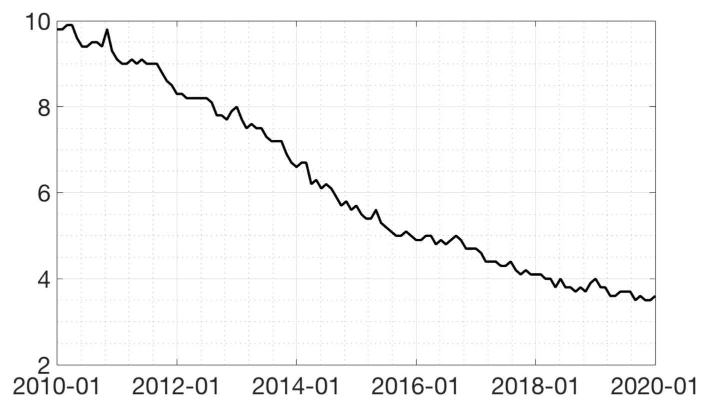

Figure 1: Unemployment rate (%)

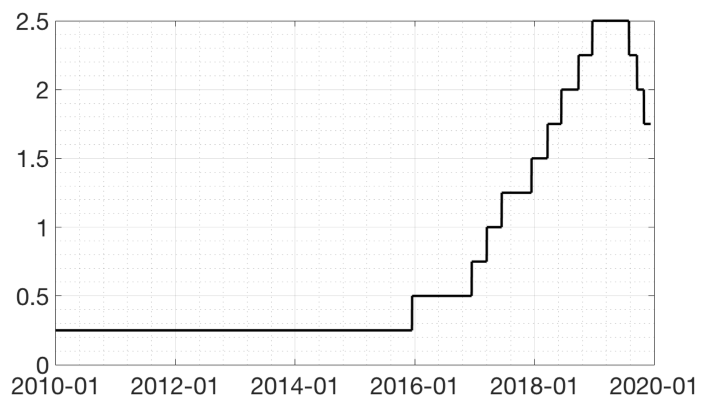

Figure 2: Fed funds rate target, upper limit (%)

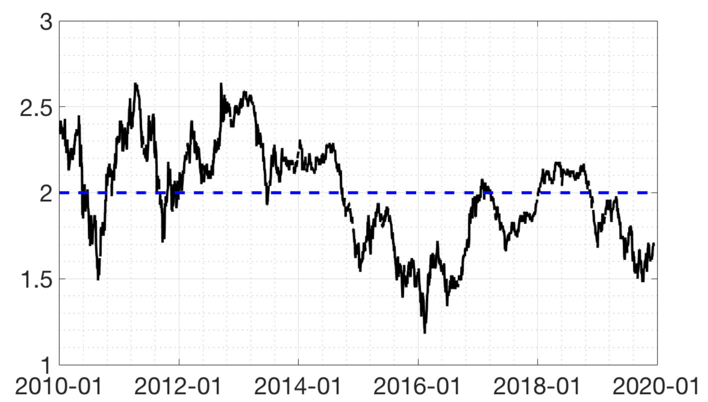

Figure 3: Market-based inflation expectations, 10 year, average (%)

2 Model with anchoring expectation formation

Macro model with Calvo nominal friction: standard up to expectation formation ($\hat{\mathbb{E}}$)

2.1 Expectation formation

- Model solution under rational expectations (RE)

$$s_t = h s_{t-1} + \epsilon_t \qquad \epsilon_t \sim \mathcal{N}(\mathbf{0}, \Sigma) \tag{1}$$

$$y_t = g s_t \tag{2}$$

- Here: private sector does not know g $\rightarrow$ estimate using (1) & observed states
- Households and firms don't know they are identical
- Special case: private sector doesn't know long-run mean of inflation:

$$\hat{\mathbb{E}}_t \pi_{t+1} = \bar{\pi}_{t-1} + g_1 h_1 s_t \tag{3}$$

- Updates estimate of mean inflation using recursive least squares

$$\bar{\pi}_t = \bar{\pi}_{t-1} + k_t \underbrace{\left(\pi_t - (\bar{\pi}_{t-1} + b_1 s_{t-1})\right)}_{\equiv fe_{t|t-1}, \text{ forecast error}} \tag{4}$$

2.2 Anchoring mechanism

Endogenous gain as anchoring mechanism:

$$k_t = k_{t-1} + \mathbf{g}(fe_{t|t-1}) \tag{5}$$

2.3 Aggregate laws of motion

IS- and Phillips curve

$$x_t = -\sigma i_t + \hat{\mathbb{E}}_t \sum_{T=t}^{\infty} \beta^{T-t}\left((1-\beta)x_{T+1} - \sigma(\beta i_{T+1} - \pi_{T+1}) + \sigma r_T^n\right) \tag{6}$$

$$\pi_t = \kappa x_t + \hat{\mathbb{E}}_t \sum_{T=t}^{\infty} (\alpha\beta)^{T-t}\left(\kappa\alpha\beta x_{T+1} + (1-\alpha)\beta\pi_{T+1} + u_T\right) \tag{7}$$

3 Ramsey policy under anchoring expectation formation

Result 1 *Target criterion under anchoring*

$$\pi_t = -\frac{\lambda_x}{\kappa}\Bigg\{x_t - \frac{(1-\alpha)\beta}{1-\alpha\beta}\Big(k_t + ((\pi_t - \bar{\pi}_{t-1} - b_1 s_{t-1}))\mathbf{g}_{\pi,t}\Big) \Big(\mathbb{E}_t \sum_{i=1}^{\infty} x_{t+i} \prod_{j=0}^{i-1}(1 - k_{t+1+j} - (\pi_{t+1+j} - \bar{\pi}_{t+j} - b_1 s_{t+j})\mathbf{g}_{\bar{\pi},\mathbf{t+j}})\Big)\Bigg\}$$

$\rightarrow$ Two layers of novel intertemporal tradeoffs: can postpone intratemporal tradeoff

Result 2 *For any adaptive learning scheme, the discretion and commitment solutions of the Ramsey problem coincide. The solution qualitatively resembles discretion and is thus not subject to the time inconsistency problem.*

Implementation?

- Need for feedback rules satisfying
- Form of feedback rule? Model suggests

$$i_t = \mathbf{f}(\pi_t, k_t, \bar{\pi}_{t-1}; t) \quad \text{nonlinear}$$

$\rightarrow$ Explains deviations from Taylor rule

$\rightarrow$ Interesting to assess Taylor rule as approximation to optimal rule

$\hookrightarrow$ Might do better than under RE since commitment plan not feasible here

- Optimal Taylor rule less aggressive on inflation than under RE