Comments on Mertens and Williams, "Tying Down the Anchor: Monetary Policy Rules and the Lower Bound on Interest Rates"

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Outline

- Summary of paper
- Comments

Summary

- NK model, unconstrained

$$\pi_t = \mu_t + \kappa x_t + \beta \mathbb{E}_t \pi_{t+1}, \qquad \mu_t \sim \text{iidU}[-\hat{\mu}, \hat{\mu}],$$

$$x_t = \epsilon_t - \alpha(i_t - \mathbb{E}_t \pi_{t+1} - r^*) + \mathbb{E}_t x_{t+1}, \qquad \epsilon_t \sim \text{iidU}[-\hat{\epsilon}, \hat{\epsilon}],$$

- Loss function

$$\mathscr{L} = (1-\beta)\mathbb{E}_0 \left[\sum_{t=0}^{\infty} \beta^t (\pi_t^2 + \lambda x_t^2) \right]$$

$$= (1-\beta) \sum_{t=0}^{\infty} \beta^t (\mathbb{E}_0[\pi_t]^2 + \text{Var}_0[\pi_t] + \lambda(\mathbb{E}_0[x_t]^2 + \text{Var}_0[x_t]))$$

Summary

- Optimal policy under discretion, unconstrained

$$i_t^{\text{opt}} = \theta_0 + \theta_E \mathbb{E}_t \pi_{t+1} + \theta_\epsilon \epsilon_t + \theta_\mu \mu_t$$

$$\theta_0 = r^* \quad \theta_E = 1 + \frac{1}{\alpha\kappa} - \frac{\lambda\beta}{\alpha\kappa(\kappa^2+\lambda)} \quad \theta_\epsilon = \frac{1}{\alpha} \quad \theta_\mu = \frac{\kappa}{\alpha(\kappa^2+\lambda)}$$

- Solution

$$\pi_t = -\frac{\lambda}{\lambda+\kappa^2}(\mu_t + \beta \mathrm{E}_t \pi_{t+1})$$

$$x_t = \frac{\kappa}{\lambda+\kappa^2}(\mu_t + \beta \mathrm{E}_t \pi_{t+1})$$

- Special: $\mathrm{E}_t \pi_{t+1} \neq 0$ even with i.i.d. zero-mean shocks, because LB might bind next period

Policies

Static (no make up of past misses)

1. Upper bound on interest rates
2. Dovish policies (respond less to shocks)
3. Average inflation targeting (higher inflation target when unconstrained)

Dynamic (make up of past misses)

1. Reifschneider-Williams (make up interest-rate misses)
2. Price-level targeting (make up all inflation misses)
3. Temporary price-level targeting (make up below-target misses)

Policy constrained by lower bound, $i^{LB} < 0$

- Policy rule $\quad i_t = \max\{\theta_0 + \theta_E \mathbb{E}_t \pi_{t+1} + \theta_\epsilon \epsilon_t + \theta_\mu \mu_t, i^{LB}\}$
- Lower bound sometimes binding implies average inflation below target,

$$\mathrm{E}\, \pi_t < \pi^* = 0.$$

Average inflation targeting (static, no make up of past misses)

- Choose lower intercept $\theta_0 = \ \theta_0^* = r^* - \left(\sqrt{r^* - i^{LB}} - \sqrt{\theta_\mu \hat{\mu}}\right)^2 < r^* = \theta_0$
- Implies higher inflation target when unconstrained $\pi^{**} > \pi^* = 0$
- Policy rule with nonzero inflation target π^*

$$
\begin{aligned}
i_t &= r^* + \pi^* + \theta_E(\mathrm{E}_t\pi_{t+1} - \pi^*) + \theta_\varepsilon\varepsilon_t + \theta_\mu\mu_t \\
&= [r^* - (\theta_E - 1)\pi^*] + \theta_E\mathrm{E}_t\pi_{t+1} + \theta_\varepsilon\varepsilon_t + \theta_\mu\mu_t
\end{aligned}
$$

- Lowering θ_0 is to raise π^*

Average inflation targeting (static, no make up of past misses)

- Choose lower intercept $\theta_0 = \ \theta_0^* = r^* - \left(\sqrt{r^* - i^{LB}} - \sqrt{\theta_\mu \hat{\mu}}\right)^2 < r^* = \theta_0$
- Implies higher inflation target when unconstrained $\pi^{**} > \pi^* = 0$
- Requires careful calibration so average inflation equals $\pi^* = 0$
- Rational expectations make it a complicated nonlinear problem
- Information requirements, parameters, frequency of binding LB
- Practical?

Reifschneider-Williams (dynamic, makes up for past **interest**-rate misses)

- State variable

$$z_t = \rho z_{t-1} + i_{t-1}^{\text{ref}} - i_{t-1}$$

- Policy rule

$$i_t = \max\left\{\theta_0 + \theta_E E_t[\pi_{t+1}] + \theta_\mu \mu_t + \theta_\epsilon \epsilon_t + \theta_z z_t, i^{\text{LB}}\right\}$$

Price-level targeting (dynamic, makes up for **all** past **inflation** misses)

- Price-level target

$$p_t = p_{t-1} + \pi_t$$

- Policy rule

$$i_t = \max\{\theta_0 + \theta_E \mathbb{E}_t \pi_{t+1} + \theta_\epsilon \epsilon_t + \theta_\mu \mu_t + \theta_p p_t, i^{LB}\}$$

Temporary price-level targeting
(dynamic, makes up for past **below-target inflation** misses)

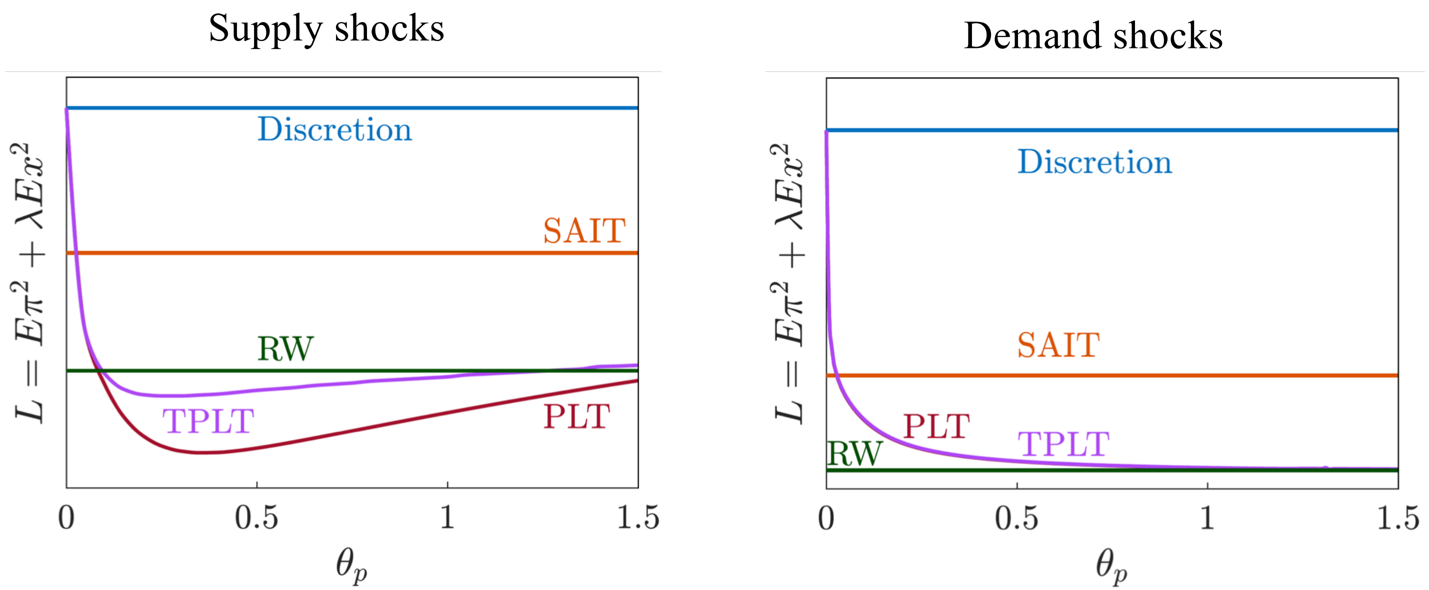
- Price-level target

$$\hat{p}_t = \begin{cases} 0 & \text{if } i_t > i^{\mathrm{LB}} \text{ and } \hat{p}_{t-1} = 0 \\ \min\{\hat{p}_{t-1} + \pi_t, 0\} & \text{if } i_t = i^{\mathrm{LB}} \text{ or } \hat{p}_{t-1} < 0. \end{cases}$$

- Policy rule

$$i_t = \begin{cases} \max\{\theta_0 + \theta_\mu \mu_t + \theta_\epsilon \epsilon_t + \theta_E \mathbb{E}(\pi_{t+1} | \hat{p}_t = 0), i^{\mathrm{LB}}\} & \text{if } \hat{p}_{t-1} = 0 \\ \max\{\theta_0 + \theta_\mu \mu_t + \theta_\epsilon \epsilon_t + \theta_E \mathbb{E}(\pi_{t+1} | \hat{p}_t) + \underset{\uparrow}{\theta_p \hat{p}_t}, i^{\mathrm{LB}}\} & \text{if } \hat{p}_{t-1} < 0 \end{cases}$$

Comparison of policies



- Overall order: PLT > MAIT > TPLT > RW > SAIT > Discretion

Comments

- Elegant and thorough analysis of relevant problem
- Impressive solution of complicated nonlinear problem
- Approach: Simple NK model, instrument rule under discretion, add response to different target/state variables, optimize over same loss function
- Instrument rule under discretion: No commitment
- Added response to different target/state variables: Commitment?
- Consistency?
- If commitment possible, why not just commitment to optimal policy with LB (Jung, Teranishi & Watanabe 2001; Eggertsson & Woodord 2003)?

Why focus on instrument rules rather than loss functions?

- Policies are here characterized by instrument rules rather than loss functions
- But focus on simple instrument rules (Taylor-type rules) is problematic
- Too restrictive: Do not use all relevant information
- Central banks respond to much more information
- Too rigid: Do not incorporate and adjust to new information, changing circumstances, and judgment
- No central bank is committed to a simple instrument rule
- Why not focus on loss functions and "forecast targeting"
- Commitment to minimize loss function rather than to simple instrument rule

Forecast targeting (see my recent paper on MP Strategies for the Fed)

- Focus on forecasts of target variables (now inflation and unemployment) and the policy-rate path
- Select the policy rate and, importantly, the whole policy-rate path, so that the corresponding forecasts of the target variables "look good"
- "Look good": Best minimize loss function
- Publish and justify policy-rate path and forecasts of target variables in order to make them credible
- This furthermore makes it possible to hold the central bank accountable

Focus on loss functions and forecasts instead of on instrument rules

- Price-level targeting

$$L_t = (p_t - p_t^*)^2 + \lambda(u_t - u_t^*)^2 \qquad p_t^* = p_{t-1}^* + \pi^*$$

- Average-inflation targeting (5-yr, 20-qtr, example)

$$L_t = (\bar{\pi}_t - \pi^*)^2 + \lambda(u_t - u_t^*)^2$$

$$\bar{\pi}_t = (p_t - p_{t-20})/5 \;\; = (\pi_t + \pi_{t-4} + \pi_{t-8} + \pi_{t-12} + \pi_{t-16})/5$$

- Proposed for Sweden (avoid downward inflation bias) and
  for ECB (interpretation of "without prejudice to price stability")
- Forecast targeting: Choose the policy-rate and policy-rate path (and other instruments and their paths) so that the forecasts of the target variables "look good"

Advantages of average-inflation targeting over alternatives

- Over temporary price-level targeting when ELB binds:
  Operating all the time. Private sector would see it in continuous operation, more likely make it well understood and credible.
- Over price-level targeting:
  Smaller step, considerable continuity with annual-inflation targeting. Averaging over several years instead of one (communication advantage).
  Still, half-way step toward price-level targeting
- Quite flexible
- Some weight on annual inflation possible
- If successful, averaging period can be extended, getting closer to price-level targeting
- If less successful, possible retreat toward annual-inflation targeting
- Needs consideration: Choice of weights, including “balance” (λ); averaging period (5-yr just example); possible escape clauses (UK overshoot); etc.