Advanced Macroeconomics II

Monetary Policy Design

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The Basic New Keynesian Model: The Non-Policy Block

- New Keynesian Phillips curve

$$\pi_t = \beta E_t\{\pi_{t+1}\} + \kappa \widetilde{y}_t$$

where $\widetilde{y}_t \equiv y_t - y_t^n$ ("output gap")

- Dynamic IS equation

$$\widetilde{y}_t = -\frac{1}{\sigma}(i_t - E_t\{\pi_{t+1}\} - r_t^n) + E_t\{\widetilde{y}_{t+1}\}$$

where

$$r_t^n \equiv \rho + \sigma E_t\{\Delta y_{t+1}^n\}$$

Monetary Policy Design (I): Efficient Natural Equilibrium

- *Assumption*

$$y_t^n = y_t^e$$

- *Optimal Policy ("Divine Coincidence")*

$$\widetilde{y}_t = 0 \quad ; \quad \pi_t = 0$$

- *Implementation*

$$i_t = r_t^n + \phi_\pi \pi_t$$

where $\phi_\pi > 1$ (uniqueness condition)

- *Evaluation of Simple rules (Second Best Policies)*

Welfare loss (approximation)

$$\mathbb{L} = \left[\left(\sigma + \frac{\varphi + \alpha}{1 - \alpha} \right) var(\widetilde{y}_t) + \frac{\epsilon}{\lambda} var(\pi_t) \right]$$

Example of a simple rule:

$$i_t = \rho + \phi_\pi \pi_t + \phi_y \widehat{y}_t$$

Table 4.1
Evaluation of Simple Rules: Taylor Rule

	Technology				*Demand*			
ϕ_π	1.5	1.5	5	1.5	1.5	1.5	5	1.5
ϕ_y	0.125	0	0	1	0.125	0	0	1
$\sigma(y)$	1.85	2.07	2.25	1.06	0.59	0.68	0.28	0.31
$\sigma(\widetilde{y})$	0.44	0.21	0.03	1.23	0.59	0.68	0.28	0.31
$\sigma(\pi)$	0.69	0.34	0.05	1.94	0.20	0.23	0.09	0.10
$\mathbb{L}$	1.02	0.25	0.006	7.98	0.10	0.13	0.02	0.02

Monetary Policy Design (II):

- *Assumption*: time-varying $y_t^n - y_t^e$
- *Welfare-relevant output gap*

$$x_t \equiv y_t - y_t^e$$

- *New Keynesian Phillips curve*

$$\pi_t = \beta E_t\{\pi_{t+1}\} + \kappa x_t + u_t$$

where $u_t \equiv \kappa(y_t^e - y_t^n)$

$$\Longrightarrow \text{policy tradeoff}$$

- *Dynamic IS equation*

$$x_t = -\frac{1}{\sigma}(i_t - E_t\{\pi_{t+1}\} - r_t^e) + E_t\{x_{t+1}\}$$

on $r_t^e \equiv \rho + \sigma E_t\{\Delta y_{t+1}^e\}$

- *A simple rule:*

$$i_t = \rho + \phi_\pi \pi_t$$

- *Equilibrium*

Assumptions: (i) $\{\Delta a_t\} \sim i.i.d. \longrightarrow r_t^e = \rho$, (ii) $\{u_t\} \sim i.i.d.$

$$\pi_t = \frac{\sigma}{\sigma + \kappa\phi_\pi}\, u_t$$

$$x_t = -\frac{\phi_\pi}{\sigma + \kappa\phi_\pi}\, u_t$$

- *Welfare losses*

$$\vartheta\ var(x_t) + var(\pi_t)$$

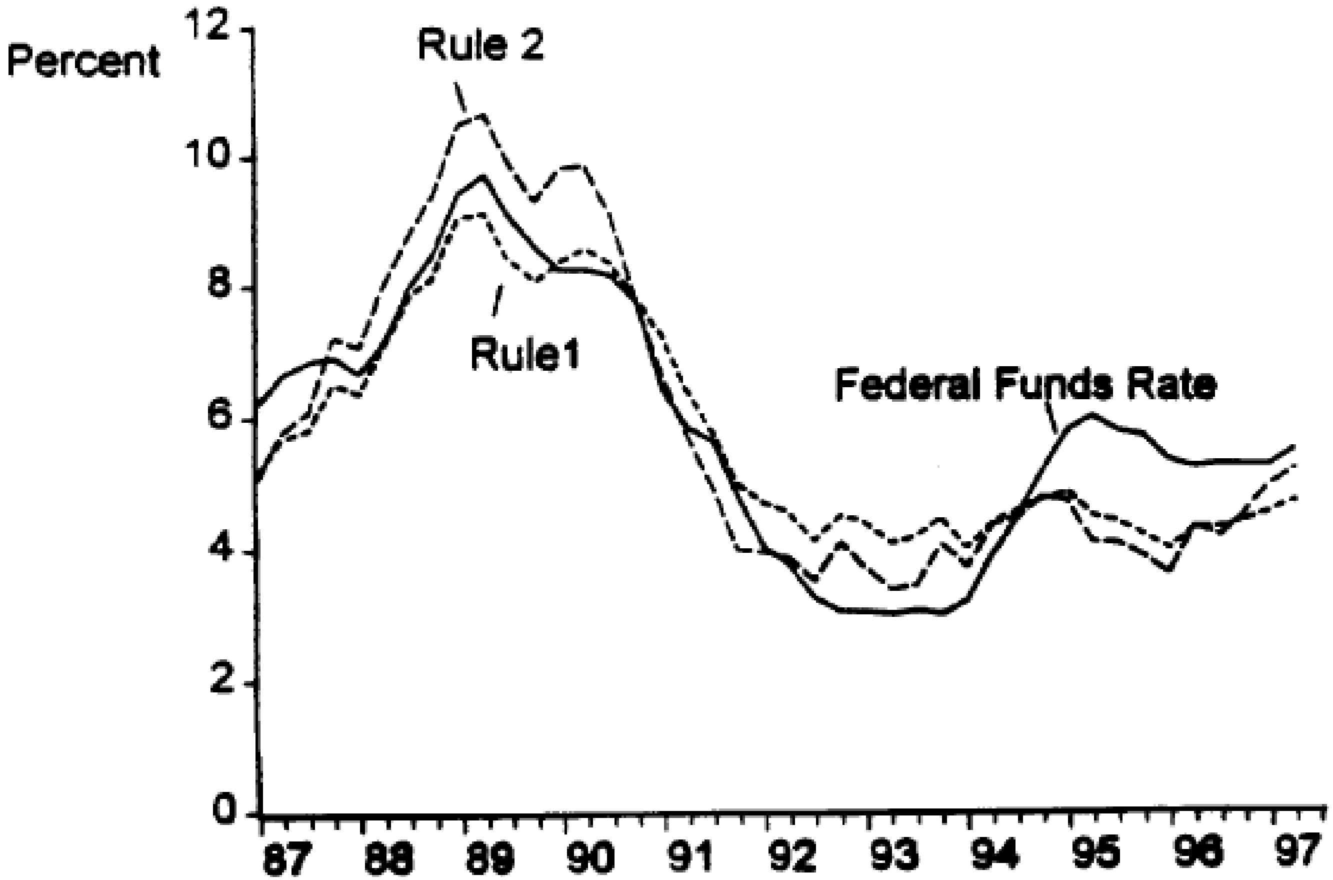
- *Optimized simple rule:*

$$\phi_\pi^* = \frac{\sigma\kappa}{\vartheta}$$

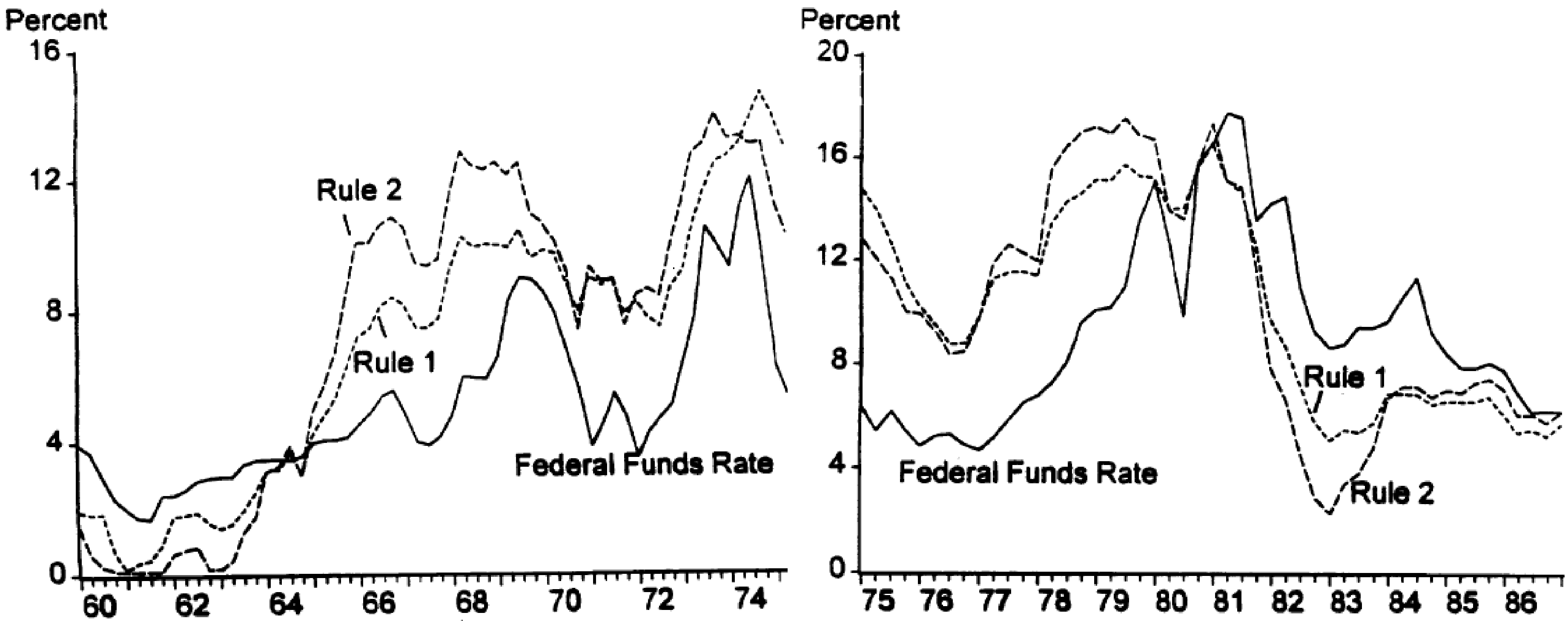
- *Utility-based welfare losses*: $\vartheta \equiv \left(\sigma + \frac{\varphi+\alpha}{1-\alpha}\right)\frac{\lambda}{\epsilon} \qquad \Longrightarrow \qquad \phi_\pi^* = \sigma\epsilon$

The Taylor Rule (Taylor 1993)

$$i_t = 4 + 1.5(\pi_t - 2) + 0.5\, y_t$$



Source: Taylor 1999



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