Monetary Policy Tradeoffs: Discretion vs. Commitment

by

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Policy Tradeoffs and the New Keynesian Phillips Curve

$$\pi_t = \beta E_t\{\pi_{t+1}\} + \kappa(y_t - y_t^n)$$

Criticism: optimality of strict inflation targeting, no policy tradeoffs,

Implicit assumption: $y_t^e - y_t^n = 0$

Identical optimal policy asymptotically if $y_t^e - y_t^n = const.$

Alternative: time-varying $y_t^e - y_t^n$ gap

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

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

The Monetary Policy Problem

$$\min E_0 \sum_{t=0}^{\infty} \beta^t \left(\pi_t^2 + \vartheta x_t^2\right)$$

subject to

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

for $t = 0, 1, 2, \ldots$where $\{u_t\}$ evolves exogenously according to

$$u_t = \rho_u u_{t-1} + \varepsilon_t$$

In addition:

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

Note: utility based criterion requires $\vartheta = \frac{\kappa}{\epsilon}$

Optimal Discretionary Policy

Each period the monetary authority chooses (x_t, π_t) to minimize

$$\pi_t^2 + \vartheta x_t^2$$

subject to

$$\pi_t = \kappa x_t + \upsilon_t$$

with $\upsilon_t \equiv \beta E_t\{\pi_{t+1}\} + u_t$ taken as given.

Optimality condition:

$$x_t = -\frac{\kappa}{\vartheta}\pi_t$$

Equilibrium

$$\pi_t = \frac{\vartheta}{\kappa^2 + \vartheta(1 - \beta\rho_u)}\, u_t$$

$$x_t = -\frac{\kappa}{\kappa^2 + \vartheta(1 - \beta\rho_u)}\, u_t$$

$$i_t = r_t^e + \frac{\vartheta\rho_u + \sigma\kappa(1 - \rho_u)}{\kappa^2 + \vartheta(1 - \beta\rho_u)} u_t$$

Figure 5.1

Discretion vs. Commitment: Responses to a Transitory Cost-Push Shock

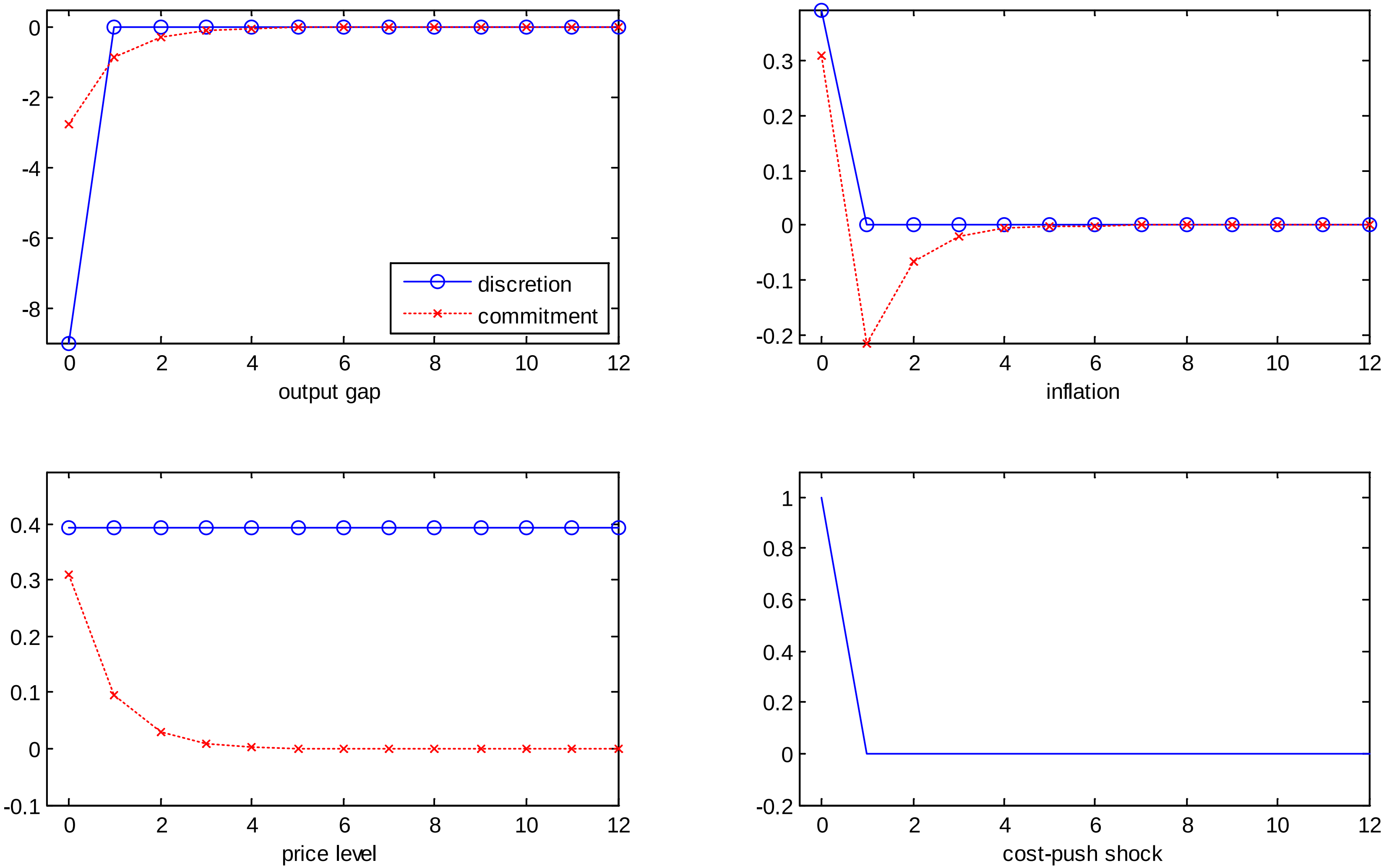
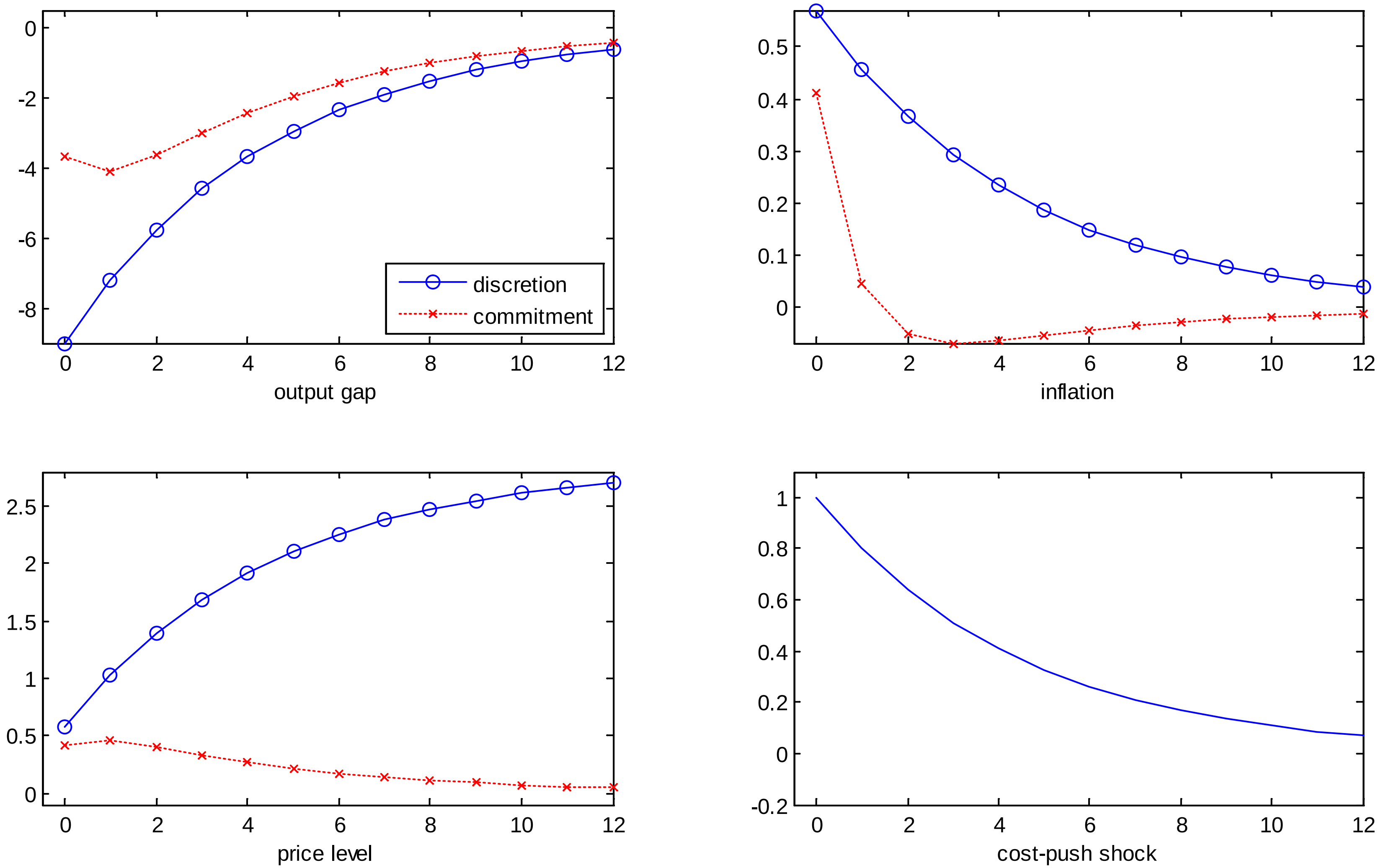


Figure 5.2
Discretion vs. Commitment: Responses to a Persistent Cost-Push Shock



Implementation:

$$\begin{aligned} i_t &= r_t^e + \frac{\vartheta\rho_u + \sigma\kappa(1-\rho_u)}{\kappa^2 + \vartheta(1-\beta\rho_u)} u_t + \phi_\pi \left(\pi_t - \frac{\vartheta}{\kappa^2 + \vartheta(1-\beta\rho_u)} u_t \right) \\ &= r_t^e + \Theta_i u_t + \phi_\pi \pi_t \end{aligned}$$

where $\Theta_i \equiv \frac{\sigma\kappa(1-\rho_u)-\vartheta(\phi_\pi-\rho_u)}{\kappa^2+\vartheta(1-\beta\rho_u)}$ and $\phi_\pi > 1$.

Optimal Policy with Commitment

State-contingent policy $\{x_t, \pi_t\}_{t=0}^{\infty}$ that minimizes

$$E_0 \sum_{t=0}^{\infty} \beta^t \left(\pi_t^2 + \vartheta x_t^2\right)$$

subject to the sequence of constraints

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

Lagrangean:

$$\mathcal{L} = E_0 \sum_{t=0}^{\infty} \beta^t \left[\frac{1}{2}\left(\pi_t^2 + \vartheta x_t^2\right) + \xi_t(\pi_t - \kappa x_t - \beta \pi_{t+1})\right] + t.i.p.$$

Optimality conditions:

$$\vartheta x_t - \kappa \xi_t = 0$$

$$\pi_t + \xi_t - \xi_{t-1} = 0$$

for $t = 0, 1, 2, \ldots$with $\xi_{-1} = 0$, Eliminating multipliers:

$$x_0 = -\frac{\kappa}{\vartheta}\pi_0$$

$$x_t = x_{t-1} - \frac{\kappa}{\vartheta}\pi_t$$

for $t = 1, 2, 3, ...$

Alternative representation:

$$x_t = -\frac{\kappa}{\vartheta}\widehat{p}_t$$

for $t = 0, 1, 2, ...$where $\widehat{p}_t \equiv p_t - p_{-1}$

Equilibrium

$$\widehat{p}_t = \gamma \widehat{p}_{t-1} + \gamma \beta E_t\{\widehat{p}_{t+1}\} + \gamma u_t$$

for $t = 0, 1, 2, ...$where $\gamma \equiv \frac{\vartheta}{\vartheta(1+\beta)+\kappa^2}$

Stationary solution:

$$\widehat{p}_t = \delta \widehat{p}_{t-1} + \frac{\delta}{1 - \delta\beta\rho_u} \, u_t$$

for $t = 0, 1, 2, ...$where $\delta \equiv \frac{1-\sqrt{1-4\beta\gamma^2}}{2\gamma\beta} \in (0, 1)$.

$\rightarrow$ *price level targeting !*

$$x_t = \delta x_{t-1} - \frac{\kappa\delta}{\vartheta(1 - \delta\beta\rho_u)} \, u_t$$

for $t = 1, 2, 3, ...,$ and

$$x_0 = -\frac{\kappa\delta}{\vartheta(1 - \delta\beta\rho_u)} \, u_0$$

Figure 5.1

Discretion vs. Commitment: Responses to a Transitory Cost-Push Shock

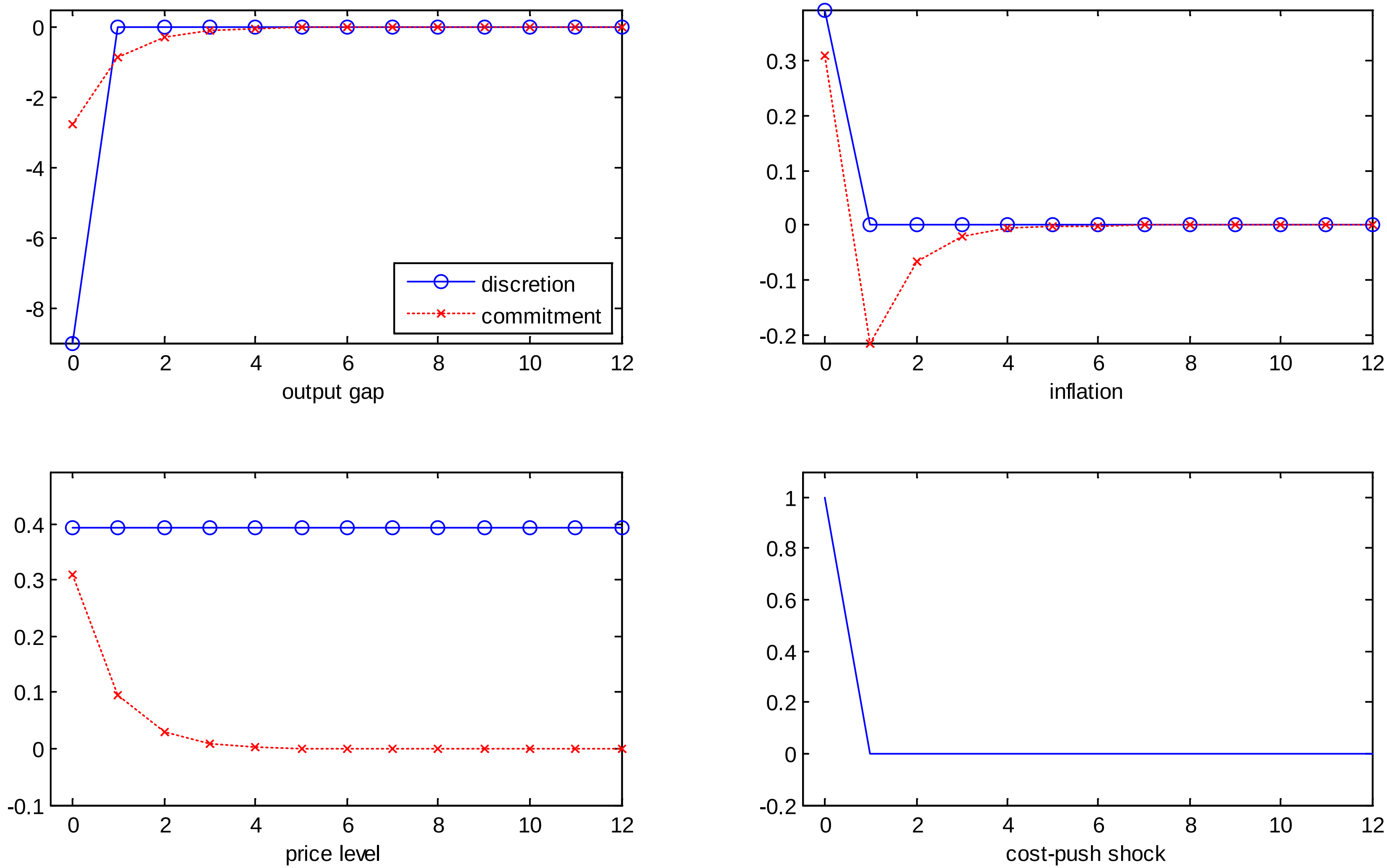
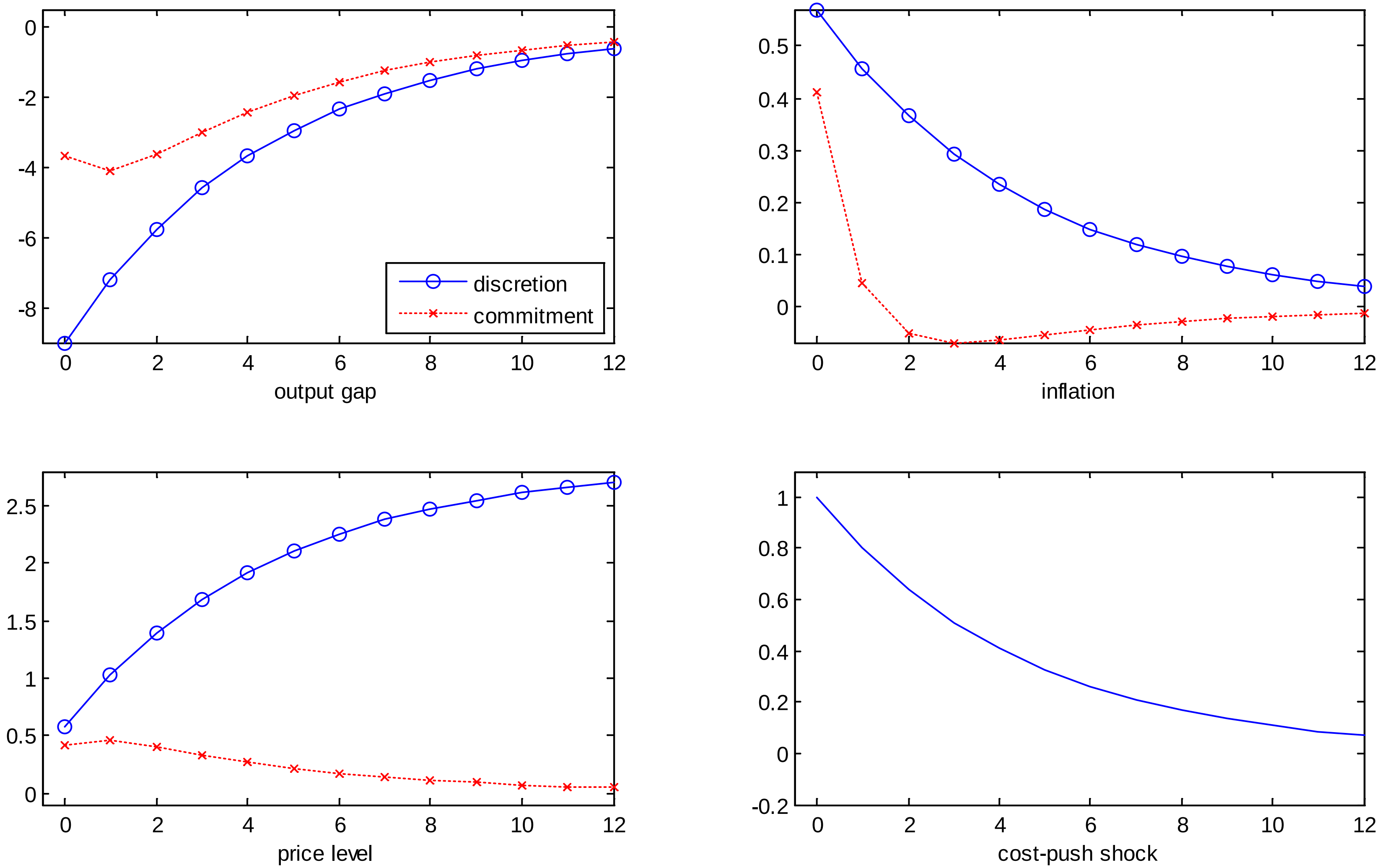


Figure 5.2

Discretion vs. Commitment: Responses to a Persistent Cost-Push Shock



Discussion: Gains from Commitment

$$\pi_t = \kappa x_t + \kappa \sum_{k=1}^{\infty} \beta^k E_t\{x_{t+k}\} + \frac{1}{1-\beta\rho_u}\, u_t$$

Implementation ($\rho_u = 0$ case)

Equilibrium nominal rate under the optimal policy with commitment

$$\begin{aligned} i_t &= r_t^e - (1-\delta)\left(1 - \frac{\sigma\kappa}{\vartheta}\right)\widehat{p}_t \\ &= r_t^e - (1-\delta)\left(1 - \frac{\sigma\kappa}{\vartheta}\right)\sum_{k=0}^{t}\delta^{k+1}u_{t-k} \end{aligned}$$

Rule:

$$i_t = r_t^e - \left(\phi_p + (1-\delta)\left(1 - \frac{\sigma\kappa}{\alpha_x}\right)\right)\sum_{k=0}^{t}\delta^{k+1}u_{t-k} + \phi_p\widehat{p}_t$$

for any $\phi_p > 0$.