MOEN MEETS ROTEMBERG: AN EARTHLY MODEL OF THE DIVINE COINCIDENCE

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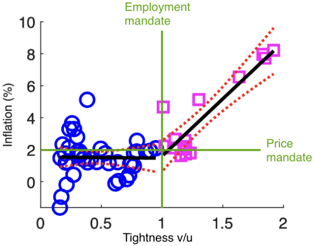
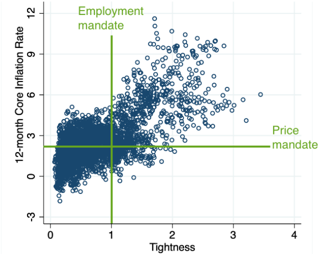
MAIN IDEA

This paper proposes a model of the divine conincidence

- Pricing competition through directed search (Moen, 1997)
- Price rigidity through quadratic price-adjustment costs (Rotemberg 1982)



A. Aggregate data, 2008–2022



B. Metropolitan data, 2001–2022

THE MODEL

Based on the model developed by Michaillat and Saez (2022), adding price dynamics and unemployment fluctuation.

- Matching function (to obtain an hyperbolic Beveridge curve)

$$h(U_k, V_k) = \omega \cdot \sqrt{U_k V_k} - sU_k$$

- The customer finding rate:

$$f(\theta_k) = \frac{h_k}{U_k} = \omega \cdot \sqrt{\theta_k} - s$$

- The worker-finding rate

$$q(\theta_k) = \frac{h_k}{V_k} = \frac{\omega}{\sqrt{\theta_k}} - \frac{s}{\theta_k}$$

THE MODEL

- Recruiter-producer ratio (fraction of tightness)

$$\tau(\theta_k) = \frac{s}{q(\theta_k) - s}$$

derived from the balanced flows:

$$\dot{y}_k = q(\theta_k) \cdot V_{jk} - sy_{jk} = q(\theta_k) \cdot [y_{jk} - c_{jk} - s \cdot y_{jk}]$$

- **Directed search and price-tightness competition**:

$$p_k \cdot y_{jk} = p_k[1 + \tau(\theta_k)] \cdot c_{jk}$$

the price must be the same across all households:

$$p_k \cdot [1 + \tau(\theta_k)] = p \cdot [1 + \tau(\theta)]$$

THE MODEL

- Rearrange to get the local tightness expression:

$$\theta_j(p_j) = \tau^{-1}(\frac{p}{p_j}[1 + \tau(\theta)] - 1)$$

  high price leads to low tightness and high unemployment, vice versa.

- **Price rigidity**

  Household incurs a quadratic price-adjustment cost when local inflation departs from normal inflation (appears in utility function)

$$\rho(\pi_k) = \frac{\kappa}{2} \cdot [\pi_k - \hat{\pi}]^2$$

MODEL SOLUTION

- By Hamiltonian:

  aggregate demand: Euler Equation

$$\frac{\dot{u}}{1-u} = \delta - [i - \pi + \sigma \cdot (1-u) \cdot l)$$

  s.s. : $1 - u = \frac{\delta - i + \pi}{\sigma \cdot l}$

  aggregate supply: Philips Equation

$$\dot{\pi} = \delta \cdot (\pi - \bar{\pi}) - \frac{1}{\kappa}[1 - \frac{u}{v(u)} \cdot \frac{1 - u - v(u)}{1 - 2u}]$$

- **Divine coincidence**

$$\kappa \cdot \delta \cdot (\pi - \bar{\pi}) = 1 - \frac{u}{v(u)} \cdot \frac{1 - u - v(u)}{1 - 2u}$$

  inflation is on target, if and only if the right hand side is zero.

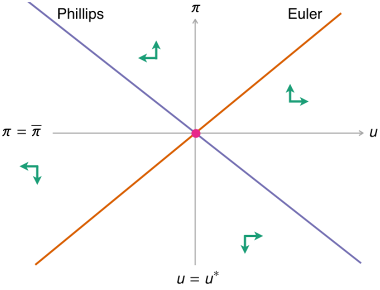
MODEL DYNAMICS: TAYLOR RULE $i = i^* + \phi(\pi - \bar{\pi})$

- Linearized Euler equation:

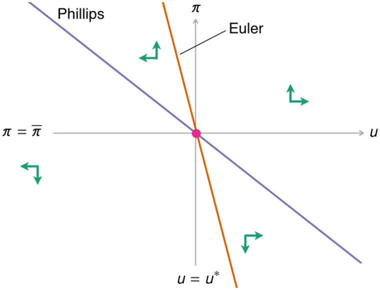
$$\frac{\dot{u}}{1 - u} = \delta \cdot (u - u^*) \cdot l - (\phi - 1)(\pi - \bar{\pi})$$

- Linearized Phillips curve:

$$\dot{\pi} = \delta\hat{\pi} + \frac{2}{\kappa} \cdot \frac{1 - u^*}{(1 - 2u^*)u^*} \cdot \hat{u}$$



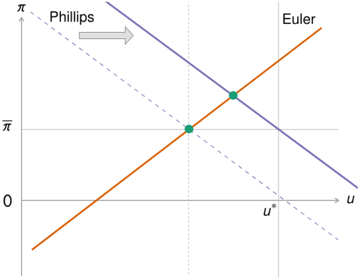
A. Active monetary policy



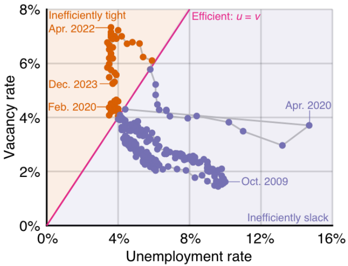
B. Passive monetary policy

FIGURE 3. Phase diagrams of the linearized model

MODEL DYNAMICS



A. After negative supply shock



B. Pandemic shift of the US Beveridge curve

FIGURE 6. Response of the linearized model to a negative supply shock

KINKS TO THE PHILIPS CURVE

wage cuts are more painful to workers than the price increases are to consumers

- Asymmetric price-adjustment cost
- assume:

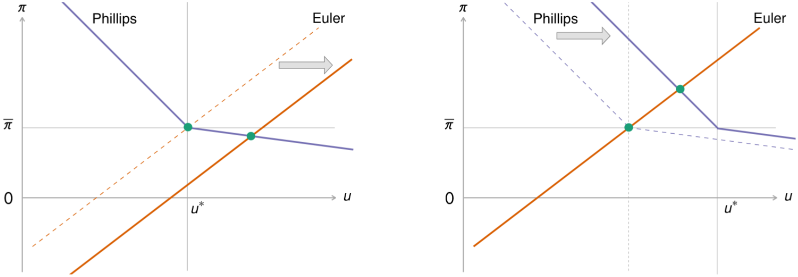
$$\kappa^{-} > \kappa^{+}$$

- Linearized Phillips curve:

$$\hat{\pi} = \frac{2}{\delta \kappa^{+}} \cdot \frac{1 - u^{*}}{(1 - 2u^{*})u^{*}} \cdot \hat{u}$$

$$\hat{\pi} = \frac{2}{\delta \kappa^{-}} \cdot \frac{1 - u^{*}}{(1 - 2u^{*})u^{*}} \cdot \hat{u}$$

KINKS TO THE PHILIPS CURVE



A. Negative aggregate-demand shock

B. Negative aggregate-supply shock

FIGURE 8. Response of the linearized model to shocks with a kinked Phillips curve