Macro II - Business cycle fluctuations, Lecture 5

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- Idea: marginal utility of consumption depends on reference value
- Three versions:

$$U(c_t, C_{t-1}) = \frac{(c_t - hC_{t-1})^{1-\sigma}}{1-\sigma} \text{ (external habit)}$$
$$U(c_t, c_{t-1}) = \frac{(c_t - hc_{t-1})^{1-\sigma}}{1-\sigma} \text{ (internal habit)}$$
$$U(c_{it}, c_{i,t-1}) = \frac{\left(\left(\int_0^1 (c_{it} - hc_{it-1})^{\frac{\varepsilon-1}{\varepsilon}} di\right)^{\frac{\varepsilon}{\varepsilon-1}}\right)^{1-\sigma}}{1-\sigma} \text{ (Deep habits)}$$

• Generates euler-equations where lagged output enters...

- Illustrate with the simplest case of external habits
- Marginal utility of consumption is now $\left(c_t h \mathcal{C}_{t-1}
 ight)^{-\sigma}$
- The Euler equation is now

$$\left(c_{t}-hC_{t-1}\right)^{-\sigma}=\beta E_{t}\left(\left(c_{t+1}-hC_{t}\right)^{-\sigma}\frac{I_{t}}{\Pi_{t+1}}\right)$$

 C_{t-1} is now a state variable that will imply a persistent reaction of output even with a MP shock.

Inflation indexation - introudced for two reasons

- ullet To eliminate steady-state price-dispersion in the case of $\pi^* \neq 0$
- To introduce inflation persistence featured in the data
- Firms that do not adjust optimally, uses indexation with par *ι*:

$$P_t^s = P_{t-1}^s \Pi_{t-1}^t$$
$$P_{t+k|t} = P_t^* \left(\frac{P_{t+k-1}}{P_{t-1}}\right)$$

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Leads to modified profit expression:

$$\sum_{k=0}^{\infty} E_t Q_{t,t+k} \left(P_{t+k|t} Y_{t+k|t} - TC_{t+k|t} \right)$$

Results in modified PC:

$$\left(\hat{\Pi}_{t}-\iota\hat{\Pi}_{t-1}\right)=\kappa\left(\hat{Y}_{t}-\hat{Y}_{t}^{n}\right)+\beta E_{t}\left(\hat{\Pi}_{t+1}-\iota\hat{\Pi}_{t}\right)$$

Lagged inflation is now a state variable.

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Sticky wages - moderate large real wage fluctuations

• Disutility of work:

$$\dots - \frac{\int_0^1 H_t\left(i\right)^{1+\phi} di}{1+\phi}$$

Production function with differential labor types allows sticky wages

$$Y_{t}(i) = A_{t}H_{t}(i)^{1-\alpha}$$

$$H_{t}(i) = \int_{0}^{1} \left(H_{t}(i,j)^{\frac{\varepsilon_{\omega-1}}{\varepsilon_{\omega}}} dj\right)^{\frac{\varepsilon_{\omega}}{\varepsilon_{\omega-1}}}$$

$$H_{t}(i,j) = \left(\frac{W_{t}(j)}{W_{t}}\right)^{-\varepsilon_{\omega}} H_{t}(i)$$

$$\begin{aligned} \pi_t^p &= \beta E_t \pi_{t+1}^p + \kappa_p \left(y_t - y_t^n \right) + \lambda_p \left(\omega_t - \omega_t^n \right) \\ \pi_t^\omega &= \beta E_t \pi_{t+1}^\omega + \kappa_\omega \left(y_t - y_t^n \right) - \lambda_\omega \left(\omega_t - \omega_t^n \right). \end{aligned}$$

• Key reference: Erceg, Henderson and Levin (2000)

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- Financial frictions and macro-prudential issues
- Forward-guidance puzzle
- Heterogenous agents and incomplete markets (HANK and TANK)
- Labour-market issues/welfare issues
- Microdata and the "correct" way to model price-rigidity
- Flat Phillip's curve, need new theory alltogether?

- First introduced as a way of amplifying shocks
- Key reference: Bernanke, Gertler and Gilchrist, Handbook of monetary economics

Forward-guidance puzzle: Monetary policy too powerful

$$\begin{aligned} x_t &= E_t x_{t+1} - (i_t - \pi_{t+1} - r_t^n) \\ x_t &= -E_t \sum_{k=0}^{\infty} (r_{t+k} - r_{t+k}^n) \\ \pi_t &= \beta E_t \pi_{t+1} + \kappa x_t \\ \pi_t &= E_t \sum_{k=0}^{\infty} \beta^k x_{t+k} \end{aligned}$$

- No discounting in the Euler equation: remedy: assume risk of "death" (Del Negro et. al.)
- Assume incomplete markets (Nakamura and Steinson), gives lower effects of monetary policy, see http://www.princeton.edu/~moll/HANK_FG.pdf for intuition
- Alter pricing equation: Kiley

A small but exploding lit tries to model economic consequences of the Corona virus. One of the first parpers was Christiano, Rebelo and Trabandt, "The Macroeconomics of Epidemics". Key mechanisms:

- fear of infection generates reduction in labour supply (supply effect)

- fear of infection leads to reduction in consumption (demand effect)
- externality present: agents treat infection rate as given

The externality leads to an inefficient market equilibrium: infected people do not internalize the contagion they impose on others. Leads to scope for policy (lockdown etc.).