Session01

Sunday, October 1, 2023 9:20 AM

① Lagrangian

② Bellman ⇒ $\begin{cases} \text{State} \\ \text{Control} \end{cases}$ variables

③ Hamiltonian

The Basic MIU Model:

Money In Utility

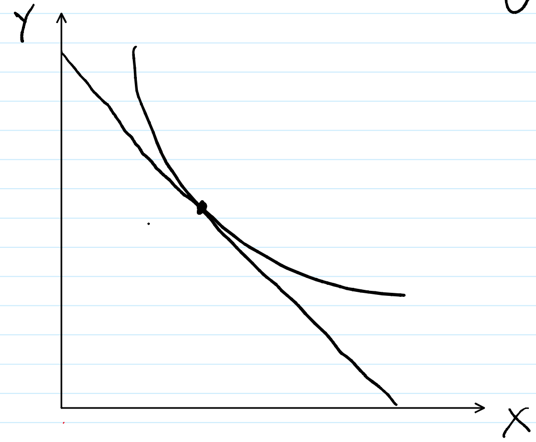
$$x_1 \quad x_2 \quad \cdots \quad x_n$$

$$P_1 \quad P_2 \quad \cdots \quad P_n$$

$$\frac{P_2}{P_1} \quad \frac{P_3}{P_1} \quad \cdots \quad \frac{P_n}{P_1}$$

$P_1 = 1$

$U = U(X, Y)$



$$z_t = \frac{M_t}{P_t N_t} \equiv m_t$$

P_t شاخص قیمت

Real Balances تراز حقیقی

tavakolianh.github.io

$U = U(c_t, z_t)$

$$z_t = \frac{M_t}{P_t N_t} \equiv m_t$$

$$U''_{cz} = U''_{zc} = 0$$ Seperable جدایی پذیر

جمع پذیر

$$\lim_{z \to 0} U'_z = \infty \qquad U(X,Y) = aX + bY$$

$$z_t = \frac{M_t}{P_t N_t} \longrightarrow \text{پول}$$

M_t →
- پایه پولی
- پول = اسکناس و مسکوک در جریان نزد بانک + سپرده دیداری
- نقدینگی = پول + سپرده مدت‌دار

RTGS

ساتنا

$$\sum_{t=0}^{\infty} \beta^t U_t = \sum_{t=0}^{\infty} \beta^t U(C_t, m_t)$$

$$0 < \beta < 1 \qquad \beta = \frac{1}{1+\rho}$$

$$Y_t + \tau_t N_t + (1-\delta)K_{t-1} + \frac{(1+i_{t-1})B_{t-1}}{P_t} + \frac{M_{t-1}}{P_t} = C_t + K_t + \frac{M_t}{P_t} + \frac{B_t}{P_t}$$

$$Y = C + S$$

$$Y = C$$

$$C = C + S$$

$$S = 0$$

$$\overbrace{W_t N_t + R_t K_{t-1}}^{Y_t} + \tau N_t + \overbrace{(1-\delta) K_{t-1}}^{} + \frac{(1+i_{t-1}) B_{t-1}}{P_t} + \frac{M_{t-1}}{P_t}$$

$$= C_t + K_t + \frac{M_t}{P_t} + \frac{B_t}{P_t}$$

$$K_t = (1-\delta) K_{t-1} + I_t$$

$$\tau N_t + \frac{(1+i_{t-1}) B_{t-1}}{P_t} = \frac{B_t}{P_t} + \frac{M_t - M_{t-1}}{P_t}$$

$$Y_t = F(K_{t-1}, N_t)$$

$$\frac{Y_t}{N_t} = F\left(\frac{K_{t-1}}{N_t}\right) = F\left(\frac{K_{t-1}}{N_{t-1}} \cdot \frac{N_{t-1}}{N_t}\right)$$

$$N_t = (1+n) N_{t-1}$$

$$y_t = \frac{Y_t}{N_t} = F\left(\frac{k_{t-1}}{1+n}\right)$$

$$k_{t-1} = \frac{K_{t-1}}{N_{t-1}}$$

$$m_t = \frac{M_t}{P_t} \qquad \frac{M_{t-1}}{P_{t-1}} \cdot \frac{P_{t-1}}{P_t} = \frac{m_{t-1}}{1+\pi_t}$$

$$\frac{P_t}{P_{t-1}} = 1 + \pi_t \qquad \frac{(1+i_{t-1}) B_{t-1}}{P_t} = \frac{(1+i_{t-1}) b_{t-1}}{}$$

$$\frac{P_t}{P_{t-1}} = 1+\Pi_t \qquad \frac{(1+i_{t-1})B_{t-1}}{P_t} = \frac{(1+i_{t-1})\,b_{t-1}}{1+\Pi_t}$$

$$\text{Max} \sum_{t=0}^{\infty} \beta^t U(c_t, m_t)$$

s.t.

$$\omega_t \equiv f\left(\frac{k_{t-1}}{1+n}\right) + \tau_t + \left(\frac{1-\delta}{1+n}\right)k_{t-1} + \frac{(1+i_{t-1})b_{t-1} + m_{t-1}}{(1+\Pi_t)(1+n)}$$

$$= c_t + k_t + m_t + b_t$$

$$\mathcal{L} = \sum_{t=0}^{\infty} \beta^t \Bigg\{ U(C_t, M_t) + \lambda_t \Bigg[f\left(\frac{k_{t-1}}{1+n}\right) + \tau_t + \left(\frac{1-\delta}{1+n}\right)k_{t-1}$$

$$+ \frac{(1+i_{t-1})b_{t-1} + m_{t-1}}{(1+\Pi_t)(1+n)} - c_t - k_t - m_t - b_t \Bigg]\Bigg\}$$