Endogenous Health Care in Overlapping Generations Model:

Simulation for Health Care and Economy

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Motivation

- **Health is an overlapping generations thing – Grossman Model (Grossman, 1972)**

$$H_{t+1} = (1 - \delta)(H_t + I_t)$$

- **Key Features of Model**
    - Agents in the model choose health care to consume, in addition to consumption and savings.
    - Consumption of health care at time t boosts labor productivity at time t+1 (consistent with Grossman).
    - Insurance in forms of Medicare (young people pay for old people's health insurance). Other kinda insurance could be added (Hashimoto and Tabata, 2010)
    - Production of health care VS non-health-care good.

What we can learn from simulation

- With the repeal of mandate (decreased insurance), what will happen to economic growth/ labor participation rate in healthcare VS non-health-care/ consumption of health care/ consumption of non-health-care, etc?
- What effect of aging/ decreased mortality rate affect health care consumption/ spending?

Demographics

$$\omega_{1,t+1} = (1-\rho_o)\sum_{s=1}^{E+S} f_s \omega_{s,t} + i_1\omega_{1,t}, \quad \forall t \tag{1}$$

$$\omega_{s+1,t+1} = (1-\rho_s)\omega_{s,t}(1+\zeta_s(h_{s,t})) + i_{s+1}\omega_{s+1,t}, \\ \forall t \quad \text{and} \quad 1 \leq s \leq E+S-1 \tag{2}$$

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$$N_t = \sum_{s=1}^{E+S} \omega_{s,t} \qquad \tilde{N}_t = \sum_{s=E+1}^{E+S} \omega_{s,t} \tag{3}$$

$$g_{n,t+1} = \frac{N_{t+1}}{N_t} - 1 \qquad g_{\tilde{n},t+1} = \frac{\tilde{N}_{t+1}}{\tilde{N}_t} - 1 \tag{4}$$

$$n_{s,t} = \begin{cases} 1, & E+1 \le s \le E + round(\frac{2S}{3}) \\ 0.2, & s \ge E + round(\frac{2S}{3}) \end{cases} \tag{5}$$

Households

- Budget Constraints

$$c_{s,t} + b_{s+1,t+1} + h_{s,t} + m_{s,t} = (1 + r_t)b_{s,t} + w_t n_s, \quad \forall E + 1 \leq s < round(\frac{2S}{3}) \tag{6}$$

$$c_{s,t} + b_{s+1,t+1} + h_{s,t} = (1 + r_t)b_{s,t} + w_t n_s + \frac{\sum_{s=E+1}^{round(\frac{2S}{3})} m_{s,t}}{round(\frac{S}{3})}, \quad \forall s \geq round(\frac{2S}{3}) \tag{7}$$

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- Utility Maximization

$$\max_{\substack{\{c_{s,t+s-1},h_{s,t+s-1}\}_{s=E+1}^{E+S},\\ \{b_{s+1,t+s}\}_{s=E+1}^{E+S-1}}} \sum_{s=E+1}^{E+S} \beta^{s-E-1}[\Pi_{n=E}^{s-1}(1-\rho_n)]U(c_{s,t+s-E-1}, h_{s,t+s-E-1}) \quad \forall s,$$

$s.t.$ 6 and 7, and $b_{E+1,t}, b_{E+S+1,t} = 0 \quad \forall t$ and $c_{s,t} \geq 0 \quad \forall s,t,$

where $U = ln(c_{s,t+s-E-1}^{\gamma} h_{t+1}^{1-\gamma})$

Firm

$$Y_t^H = A^H L_t^H \tag{8}$$

$$Y_t^N = F(K_t, L_t^N) = A^N K_t^{\alpha} (e^{g_y t} L_t)^{1-\alpha} \tag{9}$$

$$r_t = \alpha(\frac{Y_t}{K_t}) - \delta \tag{10}$$

$$w_t = (1-\alpha)(\frac{Y_t}{K_t}) \tag{11}$$

Market Clearing

$$L_t^H + L_t^N = \sum_{s=E+1}^{E+S} \omega_{s,t} n_s (1 + \zeta_s(h_{s,t})) \tag{12}$$

$$K_t = \sum_{s=E+2}^{E+S} (\omega_{s-1,t-1} b_{s,t} + i_s \omega_{s,t-1} b_{s,t}) \tag{13}$$

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$$Y_t^N = C_t + I_t - \sum_{s=E+2}^{E+S} i_s \omega_{s,t} b_{s,t+1} \quad \text{where} \tag{14}$$

$$I_t = K_{t+1} - (1-\delta) K_t \quad \text{and,} \tag{15}$$

$$C_t = \sum_{s=E+1}^{E+S} \omega_{s,t} c_{s,t} \tag{16}$$

$$Y_t^H = \sum_{s=E+1}^{E+S} \omega_{s,t} h_{s,t} \tag{17}$$

Calibration and Simulation

Calibrations

- ζ_s: OCED data on increase in productivity VS health care spending/capita
- ρ, f, i: US Census data