

Endogenous Health Care in Overlapping Generations Model:

Simulation for Health Care and Economy

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MACSS Project Proposal

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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.

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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

$$\omega_{1,t+1} = (1 - \rho_0) \sum_{s=1}^{E+S} f_s \omega_{s,t} + i_1 \omega_{1,t}, \quad \forall t \quad (1)$$

$$\omega_{s+1,t+1} = (1 - \rho_s) \omega_{s,t} (1 + \zeta_s(h_{s,t})) + i_{s+1} \omega_{s+1,t}, \quad (2)$$

$$\forall t \quad \text{and} \quad 1 \leq s \leq E + S - 1$$

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

$$n_{s,t} = \begin{cases} 1, & E + 1 \leq s \leq E + \text{round}(\frac{2S}{3}) \\ 0.2, & s \geq E + \text{round}(\frac{2S}{3}) \end{cases} \quad (4)$$

Households

- Budget Constraints

$$c_{s,t} + b_{s+1,t+1} + h_{s,t} + m_{s,t} = (1 + r_t)b_{s,t} + w_t n_s, \quad \forall E + 1 \leq s < \text{round}\left(\frac{2S}{3}\right) \quad (5)$$

$$c_{s,t} + b_{s+1,t+1} + h_{s,t} = (1 + r_t)b_{s,t} + w_t n_s + \frac{\sum_{s=E+1}^{\text{round}(\frac{2S}{3})} m_{s,t}}{\text{round}(\frac{S}{3})}, \quad \forall s \geq \text{round}\left(\frac{2S}{3}\right) \quad (6)$$

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- Utility Maximization

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

s.t. **5** and **6**, 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

$$Y_t^H = A^H L_t^H \quad (7)$$

$$Y_t^N = F(K_t, L_t^N) = A^N K_t^\alpha (e^{g_y t} L_t)^{1-\alpha} \quad (8)$$

$$r_t = \alpha \left(\frac{Y_t}{K_t} \right) - \delta \quad (9)$$

$$w_t = (1 - \alpha) \left(\frac{Y_t}{K_t} \right) \quad (10)$$

Market Clearing

$$L_t^H + L_t^N = \sum_{s=E+1}^{E+S} \omega_{s,t} n_s (1 + \zeta_s(h_{s,t})) \quad (11)$$

$$K_t = \sum_{s=E+2}^{E+S} (\omega_{s-1,t-1} b_{s,t} + i_s \omega_{s,t-1} b_{s,t}) \quad (12)$$

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$$Y_t^N = C_t + I_t - \sum_{s=E+2}^{E+S} i_s \omega_{s,t} b_{s,t+1} \quad \text{where} \quad (13)$$

$$I_t = K_{t+1} - (1 - \delta) K_t \quad \text{and,} \quad (14)$$

$$C_t = \sum_{s=E+1}^{E+S} \omega_{s,t} c_{s,t} \quad (15)$$

$$Y_t^H = \sum_{s=E+1}^{E+S} \omega_{s,t} h_{s,t} \quad (16)$$

Calibration and Simulation

Calibrations

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

