Public and Private Health Expenditures in an Endogenous Growth Model with Inflation Targeting

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Objective:

Using an overlapping generations dynamic general equilibrium model characterized by:
– Public and Private Health Expenditures affecting the Probability of Survival;
– Financial Intermediaries holding obligatory Reserve Requirements;
– Firms Technology subjected to Production Externalities [Productive Public (Infrastructure) Expenditure], and;
– Inflation Targeting Monetary Authority;

We study $\Rightarrow$ **Growth Dynamics**.

Motivation and Contribution:

— Recent studies (Chakraborty (2004), Hashimoto and Tabata (2005), Bunzel and Qiao (2005), Agènor (2006), Aisa and Pueyo (2006), Ziramba and Gupta (2008)) have endogenized mortality rate in general equilibrium models (via public expenditures);

—But none, barring Bhattacharya and Qioa (2007), discussed the role of private health expenditures;

— Bhattacharya and Qioa (2007) show that when public health input is complementary to private health expenditures $\rightarrow$ endogenous fluctuations and even chaos in a standard Solow-type OLG model;

Against this backdrop, we analyze **growth dynamics by allowing for endogenous growth** [**First Attempt.**]

Economic Environment: Four agents: (a) Consumers; (b) Financial Intermediaries/Banks; (c) Firms, and; (d) The Consolidated Government

(I) **Consumer's Problem:**

$$\max_{\theta_t} U(c_{t+1}) = x(\theta_t)\frac{(c_{t+1})^{(1-\sigma)}}{1-\sigma}$$

s.to.

$$\begin{aligned} p_t d_t &= (1-\theta_t)p_t w_t \\ p_{t+1}c_{t+1} &= (1+i_{dt+1})p_t d_t \end{aligned}$$

where $x(\theta_t) = b\eta\theta_t^{b\eta}$, $\eta = (1+\phi_t)$, $\phi_t = \lambda\frac{g_t}{w_t}$.

Financial Intermediaries

– Banks behave competitively but are subjected to cash reserve requirements

– Provide a simple pooling function

– For simplicity bank deposits are assumed to be one period contracts

Formally,

$$\Pi_{Bt} = i_{Lt}L_t - i_{dt}D_t$$

$$\begin{aligned} M_t + L_t &\leqslant D_t \\ M_t &\geq \gamma_t D_t \end{aligned}$$

Firms:

All firms are identical and produces a single final good using:

$$y_t = Ak_t^{\alpha}(n_t(1-\lambda)g_t)^{(1-\alpha)}$$

where $A>0$.

The representative firm maximizes the discounted stream of profit flows subject to the capital evolution and loan constraints. Formally,

$$\max_{k_{t+1},n_t} \sum_{i=0}^{\infty} \rho^i [p_t y_t - p_t w_t n_t - (1+i_{Lt})L_t]$$

$$\begin{aligned} k_{t+1} &\leq (1-\delta_k)k_t + i_{kt} \\ p_t i_{kt} &\leq L_t \\ L_t &\leq (1-\gamma_t)D_t \end{aligned}$$

Government:

An infinitely-lived government purchases g_t units of the consumption good;

– Assumed to be useful to the agents (Public Health Expenditures);

– Targets Inflation;

– The government finances these purchases by seigniorage.

$$g_t = \frac{M_t - M_{t-1}}{p_t}$$

$$g_t = \gamma_t d_t \left(1 - \frac{1}{\Omega_t \widehat{\Pi}}\right)$$

Growth Dynamics:

$$\Omega_{t+1} = G(\Omega_t)$$

Multiple Equilibria:

(i) Higher $\Omega_t \Rightarrow$ Higher $\frac{g_t}{w_t} \Rightarrow$ Higher $\phi_t [= \frac{\lambda g_t}{w_t}] \Rightarrow$ Higher $\theta_t \Rightarrow$ Lower $\frac{d_t}{k_t} \Rightarrow$ Lower Ω_{t+1};

(ii) Higher $\Omega_t \Rightarrow$ Higher $\frac{g_t}{w_t} \Rightarrow$ Higher $\frac{(1-\lambda)g_t}{w_t} \Rightarrow$ Higher Ω_{t+1}.

(ii)$>$($<$)(i) at low (high) levels of Ω_t. Ω_L (Ω_H) unstable (stable): G locus cuts 45 degree line from below (above).

Ω_t is not a state variable, so it can jump $\Rightarrow$ a stable (Ω_H) steady-state is indeterminate ($\Rightarrow$ infinitely many RATEX paths to the stable equilibrium from initial k_1).

Conclusions:

- Extend Bhattacharya and Qiao (2007) into an endogenous growth model $\Rightarrow$ Multiple Equilibria (Endogenous Fluctuations) and Indeterminancy.

Future Research:

- Learning (??)