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The dynamics of bequeathed tastes with endogenous fertility

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HIGHLIGHTS

- This article attempts to characterise the global dynamics of an economy with bequeathed tastes (aspirations) and endogenous fertility.
- Endogenous fertility is responsible for preventing endogenous fluctuations.
- Aspirations represent an additional explanation for the declining fertility observed in developed countries.

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ABSTRACT

In contrast with the existing literature with overlapping generations, aspirations and exogenous fertility, this article shows that endogenous fertility prevents endogenous fluctuations in a general equilibrium economy.

1. Introduction

In two influential works, de la Croix (1996) and de la Croix and Michel (1999) show that standard-of-living aspirations may be responsible for endogenous and persistent income fluctuations in a general equilibrium economy with overlapping generations (OLG) and finitely lived agents. Aspirations, in fact, are a negative externality affecting savings and consumption of the working generation. In the words of de la Croix (1996, p. 89): "If children inherit life standard aspirations from their parents, then their savings are affected and cycles may appear in OLG models with production. At some point of an expansion, aspirations grow faster than wages, savings decrease, and a contraction begins". However, de la Croix (1996) and de la Croix and Michel (1999) do not include endogenous fertility in their models. According to the most part of the most recent literature stimulated by new home economics, the number of children in a given society comes from a rational choice based on a comparison between economic constraints and incentives. In a world where tastes are inherited, the issue of endogenous fertility becomes of particular importance, given the existing influence of parents' behaviour on their children's consumption decisions (external habits). This article shows that by accounting for endogenous fertility (weak altruism towards children), life standard aspirations are no longer a source of instability and fluctuations, as the stationary equilibrium of the resulting two-dimensional discrete time map is *globally stable* (i.e., there are no converging or ever lasting cycles). This is because aspirations reduce saving and fertility in the same way, so that

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capital accumulation is independent of the intensity of inherited tastes. In addition, standard-of-living aspirations may represent an alternative explanation for the declining fertility observed in developed countries over the last decades, as they are an element that favours the substitution of fertility for the consumption of material goods. This is in line with the results recently obtained by Kaneko et al. (2016).

The rest of the article proceeds as follows. Section 2 (resp. 3) characterises a model with inherited tastes, endogenous fertility and logarithmic (resp. CIES) preferences. Section 4 concludes.

2. The model

The model is an extension by de la Croix (1996) augmented with endogenous fertility, as in Galor and Weil (1996). The OLG closed economy is populated by rational and identical individuals of measure N_t per generation ($t = 0, 1, 2, \ldots$). Life of the typical agent is divided into childhood and adulthood. An individual makes economic decisions only when he is adult. Labour supply is inelastic and normalised to one. The lifetime budget constraint of an individual belonging to generation t is:

$$c_{1,t} + \frac{c_{2,t+1}}{R^e_{t+1}} = w_t(1 - qn_t), \tag{1}$$

where $c_{1,t}$ and $c_{2,t+1}$ are the material consumption levels when young and when old, R^e_{t+1} is the expected interest factor, $0 < q < 1$ is the fraction of income required to take care of a child and n_t is the number of children. Generation t inherits life standard aspirations (h_t) from the previous generation (parent). By assuming logarithmic preferences, the lifetime utility function of the individual representative of generation t is given by:

$$U_t = \ln(c_{1,t} - \gamma h_t) + \beta \ln(c_{2,t+1}) + \phi \ln(n_t), \tag{2}$$

where $0 < \gamma < 1$ is the intensity of aspirations, $0 < \beta < 1$ is the subjective discount factor and $\phi > 0$ is the relative taste for (the quantity of) children. Maximisation of (2) subject to (1) yields:

$$n_t = \frac{\phi(w_t - \gamma h_t)}{qw_t(1 + \beta + \phi)}, \tag{3}$$

and

$$s_t = \frac{\beta(w_t - \gamma h_t)}{1 + \beta + \phi}. \tag{4}$$

By looking at (3) and (4), it is clear that aspirations negatively affect saving and fertility. Consumption when young is:

$$c_{1,t} = \frac{w_t + \gamma h_t(\beta + \phi)}{1 + \beta + \phi}. \tag{5}$$

As material consumption and fertility are normal goods, the presence of inherited tastes makes the achievement of high consumption standards important. This favours the substitution of fertility for consumption to get higher utility. This result is in line with Kaneko et al. (2016), who study an OLG model of endogenous growth with transitional dynamics, aspirations and endogenous fertility.

Identical and competitive firms produce output Q_t by employing a technology encompassing the case of constant-returns-to-scale in production and the AK set up. To take this into consideration, we adopt a kind of production function formerly introduced by Jones and Manuelli (1990) and subsequently used, amongst others, by Rebelo (1991). Following the formulation used by Barro and Sala-i-Martin (2003), the production function is:

$$Q_t = AK_t^{\alpha} L_t^{1-\alpha} + BK_t, \quad A > 0,\ B \geq 0,\ 0 < \alpha < 1, \tag{6}$$

where K_t and $L_t = N_t$ are capital and labour inputs. Notice that when $B = 0$ then (6) boils down to the standard Cobb–Douglas technology with constant-returns-to-scale adopted by de la Croix (1996). Production function (6) allows to get endogenous growth with transitional dynamics, as the growth rate diminishes as the economy develops. Profit maximisation makes it possible to obtain the usual equilibrium conditions:

$$w_t = (1 - \alpha)(AK_t^{\alpha} + Bk_t), \tag{7}$$

$$R_t = \alpha(AK_t^{\alpha-1} + B), \tag{8}$$

where $k_t = K_t/N_t$ is capital per worker.

The aspirations of generation t are $h_t = c_{1,t-1}$, reflecting "the idea that children become habituated to a certain life standard when they still live with their parents" (de la Croix, 1996, p. 91). This statement makes the difference depending on whether one assumes exogenous fertility or endogenous fertility. In fact, given the market clearing condition in the capital market $n_t k_{t+1} = s_t$ ($N_{t+1} = n_t N_t$), endogenous fertility implies that capital accumulation is independent of aspirations. By taking the pair of non-negative initial endowments (k_0, h_0) as given, equilibrium implies

$$T = \begin{cases} k_{t+1} = \dfrac{\beta q}{\phi} w_t = \dfrac{\beta q}{\phi}(1 - \alpha)[Ak_t^{\alpha} + Bk_t] \\ h_{t+1} = c_{1,t} = \dfrac{w_t + \gamma h_t(\beta + \phi)}{1 + \beta + \phi} \\ \qquad = \dfrac{(1 - \alpha)[Ak_t^{\alpha} + Bk_t] + \gamma h_t(\beta + \phi)}{1 + \beta + \phi}. \end{cases} \tag{9}$$

The most important difference between a model with endogenous fertility and a model with exogenous fertility is that in the former case aspirations do not affect the accumulation of capital, whereas in the latter case they do. This is because aspirations reduce saving and fertility and promote an increase in consumption so as to maintain high standards. The reduction in saving reduces capital accumulation, whereas the reduction in fertility increases capital accumulation. These two opposite forces cancel each other out exactly so that aspirations are neutral on capital accumulation.

2.1. Global convergence

Let us rewrite the continuous and differentiable map $T : \mathbb{R}^2_+ \to \mathbb{R}^2_+$ as follows:

$$T = \begin{cases} x' = f(x) = m_0 x^{\alpha} + m_1 x \\ y' = g(x, y) = \dfrac{m_2 x^{\alpha} + m_3 x + \gamma(\beta + \phi)y}{1 + \beta + \phi}, \end{cases} \tag{10}$$

where $x' = k_{t+1}$, $x = k_t$, $y' = h_{t+1}$, $y = h_t$, $m_0 = \frac{\beta q}{\phi}(1 - \alpha)A > 0$, $m_1 = \frac{\beta q}{\phi}(1-\alpha)B \geq 0$, $m_2 = (1-\alpha)A > 0$ and $m_3 = (1-\alpha)B \geq 0$.

Proposition 1. *Let T be given by (10) and define $x^* = \left(\frac{m_0}{1-m_1}\right)^{\frac{1}{1-\alpha}}$. Set $I_0 = \{(x, y) \in \mathbb{R}^2_+ : x = 0\}$ is invariant for T; if $B < \frac{\phi}{\beta q(1-\alpha)} = \bar{B}$ also set $I_{x^*} = \{(x, y) \in \mathbb{R}^2_+ : x = x^*\}$ is invariant for T.*

Proof. The proof simply follows from by considering that T is triangular and that $x = 0$ is a fixed point of map f for all parameter values while $x = x^*$ is the unique positive fixed point of f iff $B < \bar{B}$. Hence the restriction of system T to the vertical lines $x = 0$ and $x = x^*$ is trapping on that lines. □

Let us assume that $B < \bar{B}$ (i.e. B is fixed at not too high a level, as in the case of the Cobb–Douglas production function).[2]

[2] When $B > \bar{B}$ there exists endogenous growth as in Kaneko et al. (2016).