



Growth, income taxes and consumption aspirations

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ABSTRACT

In a Barro-type economy with exogenous consumption aspirations, raising income taxes favors growth even in the presence of lump-sum taxes. Such a policy is compatible with the behavior of private consumption, income taxes and growth rates observed in actual economies.

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1. Introduction

This paper is about the relationship between growth and income taxes. Barro (1990) represents an important breakthrough in characterizing the influence of income taxes on growth. Starting from low levels of tax rates, a raise in income taxes in Barro's setup increases the rate of growth, while growth becomes slower when income tax rates increase beyond a given threshold.¹ When a non-distortionary tax is also used to finance public investment, growth is shown to uniformly decrease with income taxes. However, the presence of technological externalities inducing over-accumulation of physical capital (Turnovsky, 1996), an endogenous labor-leisure choice (deHeck, 2006) or the requirement to finance an exogenous ratio of public expenditure to output (Marrero and Novales, 2005, 2007), would make the relationship between growth and income taxes to be positive again at low income tax rates. This paper contributes to the literature providing an additional reason ex-

plaining why there might exist a positive relationship between income taxes and growth even in the presence of non-distortionary taxation.

We consider a simple modification of the Barro-type framework by incorporating a Stone–Geary-type utility function (Geary, 1950–1951; Stone, 1954).² The representative consumer derives utility from the part of consumption that exceeds from a benchmark level, which can be interpreted either as a minimum subsistence level of consumption (Álvarez-Pelaez and Diaz, 2005) or a level of consumption aspirations (Carrera and Raurich, 2010). In this simple framework, we show that the aspiration by consumers to maintain certain consumption standards could give rise to an inverted U-shaped relationship between income taxes and growth, even when allowing for the possibility of lump-sum taxes.

The basic framework is described in the next section, results are shown in Section 3, and Section 4 concludes.

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¹ See also Futagami et al. (1993), Aschauer (2000) and Marrero (2008), among many others.

² There exists an extensive literature pointing out that the inclusion of subsistence consumption (i.e., basically Stone–Geary preferences) improves the explanatory power of growth models substantially. Steger (2000) argues this fact in a linear growth model. Additional empirical support has been found by Atkeson and Ogaki (1996) and Rebelo (1992), among others.

2. The model and the balanced growth equilibrium path

Technology and policy rules are standard. As in [Glomm and Ravikumar \(1994\)](#), the output, Y , is produced according to,

$$Y_t = AK_t^{1-\theta} G_t^\theta, \quad (1)$$

G and K are public and private capitals, respectively; labor is constant and normalized to one; A is a technological scale factor. K and G accumulate according to:

$$K_{t+1} = I_t + (1 - \delta)K_t, \quad (2)$$

$$G_{t+1} = I_t^g + (1 - \delta)G_t, \quad (3)$$

where $\delta \in (0, 1)$ is the capital depreciation rate, which, by simplicity, is assumed to be the same for both types of capitals, and I and I^g are private and public investments, respectively. As it is standard in the related literature, I^g is a constant fraction, x , of Y ,

$$I_t^g = xY_t, \quad 0 \leq x \leq 1. \quad (4)$$

The government collects taxes on total income at a rate τ , as well as lump-sum taxes, T , to finance I^g . We denote by v the ratio of T to Y , although it should be clear that it is T , rather than v , that is chosen by the Government. Hence,

$$x = \tau + v. \quad (5)$$

Either τ or v could be negative, but they must be positive in the aggregate, since $x \geq 0$. A fiscal policy is characterized by (x, v, τ) .

The representative consumer allocates one's resources between consumption, C , and investment, I ; labor is offered inelastically. Preferences are of the Stone–Geary form, being defined on the difference between C and a minimum consumption requirement – *aspiration* – denoted by C^* ,

$$\sum_{t=0}^{\infty} \beta^t \frac{\tilde{C}_t^{1-\sigma} - 1}{1-\sigma}, \quad \sigma > 0, \quad \tilde{C}_t = C_t - C_t^*, \quad (6)$$

where β is the subjective discount rate, $\beta \in (0, 1)$, and σ is a concavity parameter. In an endogenous growth setting, C^* is more conveniently interpreted as consumers' *aspirations* ([Carrera and Raurich, 2010](#)), which is assumed to be an exogenous fraction of output, $C^* = z^*Y$.

Optimal conditions for firms are the usual marginal product conditions,

$$r_t = (1 - \theta) \frac{Y_t}{K_t}, \quad (7)$$

$$w_t = \theta Y_t, \quad (8)$$

where w_t is real wage and r_t is the real interest rate. Given K_0 and policy variables, the representative household chooses $\{C_t, K_{t+1}\}_{t=0}^{\infty}$ to maximize (6), subject to the budget constraint

$$C_t + K_{t+1} - (1 - \delta)K_t + T_t = (1 - \tau)(w_t L_t + r_t K_t) \quad (9)$$

and $K_{t+1} \geq 0$, $C_t \geq C_t^*$, for all t . Competitive equilibrium optimality leads to the standard intertemporal optimality condition,

$$\left(\tilde{C}_{t+1} / \tilde{C}_t \right)^\sigma = \beta [1 - \delta + (1 - \tau_{t+1})r_{t+1}]. \quad (10)$$

In this setting, a balanced growth path (BGP) is a trajectory along which aggregate variables grow at a positive constant rate. A standard argument shows that $Y_t, \tilde{C}_t, K_t, G_t$ all grow at the same constant rate along the BGP, denoted by γ . Time subscripts are omitted hereinafter. The steady-state growth rate γ can be characterized by either combining (5), (7) and (10), which leads to

$$1 + \gamma = \left\{ \beta [1 - \delta + (1 - x + v)(1 - \theta)Ag^\theta] \right\}^{1/\sigma}, \quad (11)$$

where $g = G/K$, or by combining (4), (3) and (1), which gives us

$$1 + \gamma = Axg^{\theta-1} + 1 - \delta. \quad (12)$$

Proposition 1. Given policy variables x, v and τ , there exists a unique BGP.

Proof. The expressions for $1 + \gamma$ in (11) and (12) must be equal along the BGP. Hence, given (x, v, τ) , positive roots of

$$\Phi(g) = \beta^{1/\sigma} [1 - \delta + (1 - x + v)(1 - \theta)Ag^\theta]^{1/\sigma} - xAg^{-(1-\theta)} - 1 + \delta = 0 \quad (13)$$

are potential candidates to be steady-state values of g . Given $\sigma > 0$, $\theta \in (0, 1)$, $x < 1$, it is easy to show that $\Phi(g)$ is continuous and strictly increasing in g for $g > 0$, with $\lim_{g \rightarrow 0^+} \Phi(g) = -\infty$ and $\lim_{g \rightarrow +\infty} \Phi(g) = +\infty$. Hence, there exists a single and strictly positive level of g such that $\Phi(g) = 0$. $\square$

3. Growth, income taxes and aspirations

Since we want to focus on the relationship between growth and taxes, we solve the growth-maximizing policy for the competitive equilibrium. [Proposition 2](#) describes the relationship between x and v along this policy: growth would be maximized by setting lump-sum taxes at the highest level allowed by the constraint $\tilde{C} \geq 0$ (or $C = C^*$).

Proposition 2. The growth-maximizing ratio x^+ relates to the tax policy variable v through:

$$x^+ = \theta(1 + v). \quad (14)$$

Proof. Using (12) and specifying (9) along the BGP, we get: $\lim_{x \rightarrow 0} \gamma = -\delta < 0$ and $\lim_{x \rightarrow 1} \gamma = -C/K - \delta < 0$, so that positive values of γ can be attained only for values of x inside the interval $(0, 1)$. Taking derivatives in (12) with respect to x , we obtain

$$\frac{\partial \gamma}{\partial x} = Ag^{\theta-2} \left(g - x(1 - \theta) \frac{\partial g}{\partial x} \right) = 0. \quad (15)$$

By the implicit function theorem, since $\Phi(\cdot)$ is a $\mathcal{C}^2$ -mapping, we get:

$$\begin{aligned} \frac{\partial g}{\partial x} &= - \frac{\partial \Phi(g)/\partial x}{\partial \Phi(g)/\partial g} \\ &= \frac{(1 - \theta)\beta g + \sigma(1 - \delta + Axg^{\theta-1})^{\sigma-1}}{xg^{-1}\sigma(1 - \theta)(1 - \delta + Axg^{\theta-1})^{\sigma-1} + (1 - \theta)\beta\theta(1 - x + v)}. \end{aligned} \quad (16)$$

Combining (15) and (16), we easily obtain that $x^+ = \theta(1 + v)$. $\square$

Once v has been set at the highest level allowed by imposing the level of consumption aspirations as a binding constraint ($C = C^*$), public investment, and hence growth, can still be increased by using additional resources coming from income taxation. Exploring the possibility of a growth stimulus from this tax effort might lead to a growth-maximizing policy made up by a positive income tax rate. Indeed, [Proposition 3](#) provides an implicit analytical expression for the growth maximizing policy variables: g^+, x^+, v^+, τ^+ . In this general case, an explicit expression for the growth-maximizing policy cannot be obtained, since the level of g solving (13) depends in a highly non-linear way on structural and policy parameters. The only environment for which explicit expressions for g^+, x^+, v^+ and τ^+ can be determined is the benchmark case, when $\sigma = 1$ and $\delta = 1$, which is shown in [Corollary 4](#).

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