The Endogenous Determination of the Taste for Leisure: Implications for Labor Supply and Social Security Reform

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1 Introduction

It is commonly assumed in the economic literature that the weights of consumption and leisure in a standard utility function are fixed, that they are innate and don't undergo any change over the life cycle. In this paper I suggest a framework for analyzing the effect of certain demographic, economic and social factors – specifically, the percentage of old-age population, the tax structure, Social Security, and the ethnocultural fractionalization of society – on the taste for leisure and subsequently on human capital accumulation and economic growth. What I show is that if we allow for the endogenous determination of the relative tastes for consumption and leisure, a standard model of life-time utility maximization and human capital accumulation produces results that are in harmony with a broad range of observed macroeconomic facts. The model also predicts a higher magnitude of labor choice adjustment in response to welfare and social security reforms, as agents not only immediately adjust their labor choice, but they also adjust the relative

weights the place on consumption and leisure, which results in an additional readjustment of the labor choices. This additional readjustment can take a long period of time and can have an intergenerational profile, as the inevstment away from the taste for leisure can be viewed as coming from parental education or evolving social norms. This said, the current model would predict that the labor choice adjustment in response to labor market incentives or disincentives would be slower, but larger than previously predicted. It only remains to defend this theoretical prediction with empirical facts.

The model follows along the path established by Becker and Mulligan (1994, 1997), who allow for the time preference to be determined endogenously and derive important life-cycle implications, concerning the effect of exogenous factors on relative patience. It also touches on the work of Assar Lindbeck (1997), concerning the effect of incentives and work norms on household behavior.

1.1

2 Empirical facts, which the model could explain

(1) People with higher earnings get higher social security benefits.

(2) Countries with large old-age population tend to have lower levels of human capital accumulation and lower growth levels.

(3) Countries with large immigrant minorities, who refuse to integrate culturally, tend to have lower average levels of human capital and lower growth levels.

(4) Scandinavian workers supply too much labor, given the marginal tax wedge on labor income.

(5) A pension reform, which forces young workers to save more than they currently do, will result in lower levels of human capital and lower growth levels.

The first four are broadly aggreed upon empirical facts, and the last one is a controversial notion, which was already proved in Mulligan and Sala-i-Martin (1999) using a different model. I will show how the framework of endogenous determination of the taste for leisure explains all five facts, and thus it is applicable to reforms currently contemplated or under way in the developed countries, like labor market reforms, welfare reforms, pension reforms, and immigration reforms.

3 The model

I assume that people can invest in their taste for leisure by buying resources Q at a market price π. We can think of these resources as time spent going on vacation to Spain and learning to enjoy the long

hours away from the work-place, or subscribing to a magazine which denounces the consumerism of modern societies. For simplicity, utility is assumed to be additively separable in consumption and leisure. The taste for leisure is a function of Q, $\theta(Q)$, and I assume it is concave and twice continuously differentiable, $\theta'(Q) > 0$ and $\theta''(Q) \leq 0$, and that it satisfies the Inada conditions, so that the marginal utility of Q is infinite when Q goes to zero. Also, for simplicity I assume that the inevestment in θ happens in the first period of one's life, $t = 0$. This is not an unreasonable assumption, given the claim of many psychologists that a major part of the mindset (which could include attitude toward work as well) is aquired during the early formative years of one's life.

The agent derives utility from consumption and leisure, and values currtent consumption more than future one. His discounted lifetime utility takes the form

$$U(c, l) = \sum_{t=0}^{\infty} \beta^t [u(c_t) + \theta(Q)v(l_t)], \qquad [1]$$

where S_t is the probability of being alive at time t. The agent also faces a consolidated budget constraint

$$c_0 + \sum_{t=1}^{\infty} R_t \left[c_t - (1 - \tau_t)w_t(1 - l_t) - v_t\right] + \pi Q = A_0, \qquad [2]$$

where R_t is the market interest rate at time t, w_t is the wage rate at time t, τ_t is labor tax rate at time t, v_t is transfer at time t, and A_0 denotes initial assets. The agent wishes to maximize [1] by choosing a

consumption and leisure sequences $\{c_t, l_t\}_{t=0}^{\infty}$ and Q, subject to [2]. At this point I assume that the agent always chooses positive amounts of c_t, l_t, and Q, so that we don't have to worry about corner solutions. The first order conditions for the problem are

$$(c_o) \quad u_c(0) = \lambda \tag{3}$$

$$(l_o) \quad \theta(Q)v_l(0) = \lambda(1-\tau_0)w_0 \tag{4}$$

$$(c_t) \quad \beta^t u_c(t) = \lambda R_t, \; \forall t \neq 0 \tag{5}$$

$$(l_t) \quad \beta^t \theta(Q) v_l(t) = \lambda R_t (1-\tau_t) w_t \; \forall t \neq 0 \tag{6}$$

$$(Q) \quad \theta'(Q) \sum_{t=0}^{\infty} \beta^t v(l_t) = \lambda \pi \tag{7}$$

where I have normalized $R_0 = 1$. The $t+1$ first order conditions plus the budget constraint represent a system of $t+2$ equatins in $t+2$ unknowns. Thus, we can reduce it to a system of two differential equations in two unknowns, l_0 and Q. For example, if we assume log utility, the system would be:

$$\theta'(Q) \sum_{t=0}^{\infty} \beta^t \left[t \ln \beta + \ln l_0 + \ln w_0 - \ln R_t - \ln w_t \right] = \frac{\theta(Q)}{w_0 l_0} \tag{8}$$

$$\sum_{t=0}^{\infty} R_t \left[\frac{\beta^t l_0 w_0}{R_t \theta(Q)} - w_t + \frac{\beta^t l_0 w_0}{R_t} \right] + \pi Q = A_0 \tag{9}$$

Although this procedure will not lead us to a closed-form solution, we can analyze the implications of the model using the following two equations:

$$\theta'(Q) \sum_{t=0}^{\infty} \beta^t v(l_t) = u_c(0)\pi \tag{10}$$

$$\frac{u_c(t)}{\theta(Q)v_l(t)} = \frac{1}{(1-\tau_t)w_t} \tag{11}$$

[10] is the usual identity equating the marginal benefit of acquiring one more unit of Q to the marginal cost od doing so. [11] is also a familiar relationship, saying that at each time t, the ratio of the marginal utilities of consumption and leisure, weighted by the appropriate tastes for consumption and leisure, should equal the inverse of the market price of leisure, namely the market wage net of taxes.

4 Life Cycle Implications

The question we will try to answer now with the help of [10] and [11] is what is the evolution of the taste for leisure over the life-cycle. Assume there are only two groups, young workers at the beginning of their career, and old workers close to retirement, and compare them in terms of the implications of the model. Given that empirically wages increase with tenure, we would expect the consumption of an old worker to be higher than the consumption of a young worker. Also, it is logical to think that the price of investing in leisure is lower for an old worker than for a young one (it is more socially acceptable to idle one's time when one is about to be retired, than when one is fighting for a place in the company). Thus, for an old worker RHS of [10] is smaller. Also, there exists $\overline{\beta}$, such that for $\beta < \overline{\beta}$, $\sum_{t=0}^{\infty} \beta^t v(l_t)$ is higher for an old worker, as for the young one the leisure at retirement is discounted too heavily.

Then, from [10] it follows that for $\beta < \overline{\beta}$, Q is bigger for an old worker, that is, a retiring worker has a higher taste for leisure.

5 Implications for labor supply and human capital accumulation

5.1 Implications for labor supply

5.1.1 Higher π implies higher lifetime labor supply.

From [10] and [11], a higher π implies lower Q, and thus lower l_t.

Proof:

Assume that Q is an ordinary good. As a result, when π increases, Q goes down. As $\frac{\partial \theta(Q)}{\partial Q} \geq 0$, θ decreases. Then in [10], the LHS goes up, and RHS is unaffected. Then, it must be that $v_l(t)$ goes up, hence l_t decreases, so labor supply goes up for each t, which completes the proof.

This is a general proof, which we could extend to a particular case. Assume, for instance, that the agent maximizes a CRRA utility of the form

$$EU = \sum_{t=0}^{\infty} \beta^t \left[\frac{c_t^{1-\sigma}}{1-\sigma} + Q^{\theta} \frac{l_t^{\phi}}{\phi} \right] \qquad [12]$$

subject to [2], where $0 < \sigma < 1$, $\theta < 1$ and $\phi < 1$. Suppose, for simplicity, that [2] is already net of taxes. After normalizing $R_0 = 1$, the first order conditions for the problem are:

$$(c_o) \quad c_0^{-\sigma} = \lambda \qquad [13]$$

$$(l_o) \quad Q^{\theta} l_0^{\phi-1} = \lambda w_0 \qquad [14]$$

$$(c_t) \quad \beta^t c_t^{-\sigma} = \lambda R_t, \; \forall t \neq 0 \qquad [15]$$

$$(l_t) \quad \beta^t Q^{\theta} l_t^{\phi-1} = \lambda R_t w_t \; \forall t \neq 0 \qquad [16]$$

$$(Q) \quad \theta Q^{\theta-1} \sum_{t=0}^{\infty} \beta^t \frac{l_t^{\phi}}{\phi} = \lambda \pi \qquad [17]$$

It is easy to show that

$$Q^* = \frac{\theta w_0}{\pi \phi} l_0^* \sum_{t=0}^{\infty} \beta^t \left[\frac{R_t w_t}{\beta^t w_0} \right]^{\frac{\phi}{\phi-1}} \qquad [18]$$

It is obvious from [13] that $\frac{\partial Q^*}{\partial \pi^*} \leq 0$.

What are the implications for labor supply? Using the Implicit Function Theorem and differentiating [13] with respect to π, we conclude that $\frac{\partial l_0^*}{\partial \pi} > 0$ iff $\phi + \theta > 1$.

What is the interpretation of π? We could think of π (the price of investing in leisure) as social pressure or some kind of social or work norms. An example of the application of the model would be the "Scandinavian paradox" (Regan 2005), which consists of the fact that Scandinavians, and especially Scandinavian women, work too long hours, given the high marginal tax wedges on labor income that they are facing. This model can add another explanation to the already exhaustive one offered by Regan, namely, that the professional "liber-

ation" of women in Sweden, Finland and Denmark in the 1960s and 1970s, and the subsequent culture of feminism, stronger than anywhere else in the OECD countries, has effectively raised the price of investing in the taste for leisure, π. Although the high marginal tax wedge on labor income has made femisim more costly, women in the above three countries, who would have been discouraged from market activities by the high labor taxes and would have shifted towards home production, now face strong social pressure from the community of other women, or simply the way they have been brought up and educated, which results in a higher π. Then, the model would have forseen the already observed result that Scandinavian women work more than economic theory would predict, given the labor tax structure.

5.1.2 Higher labor taxes imply higher taste for leisure

Assume τ_t increases, for some t. Then, by [10] and [11], this should discourage labor supply and increase the taste for leisure. That higher marginal taxes on labor discourage labor supply is a well known empirical fact (see, for example, Prescott [2002]). What the current model implies is that higher labor taxes should have a larger than previously hypothesized effect on labor supply, as they not only drive a wedge in the marginal rate of substitution between consumption and leisure, but also by increasing the expected future stock of leisure, they increase the

taste for leisure, which adds an additional decrease in labor supply by the logic of [11].

This fact thas implications for pension reform in the following sense: assume that due to the purported insolvency of the SS system, taxes are raised on the young workers. In a way, it is a transfer of income from young age, when consumption is valued more, to old age, when it is discounted more heavily. Thus, as the discounted lifetime stock of consumption goes down and because of discouraged labor supply the discounted lifetime stock of leisure goes up, the taste for leisure increases by the logic of [10] and further discourages labor supply. This means that a reform of Social Security, which increases taxes on the young workers (in other words, forces them to save more than they would've otherwise), will discourage labor supply on the margin.

5.2 Implications for human capital accumulation

Assume the framework from before, but now agents can also spend time accumulating human capital. Assume that all investment in the taste for leisure and all investment in human capital come during the first period of one's life, when one doesn't have to work, so the trade-off is between leisure and human capital accumulation. As before, this is not an unreasonable assumption, given that in most developed or developing countries the bulk of the investment in education comes

at an early age, when one's living expenses are usually covered by one's parents. Finally, human capital is accumulated using a standard neoclassical function, $g(t)$, and I assume that everyone starts with zero initial human capital.

This is a more specific model, which is inteded to study the effect of welfare and social security reform not only on labor choices, but on human capital accumulation as well, and, consequently, on growth.

Now the agent's problem is

$$\max_{\{c_t, l_t, Q, H\}_{t=0}^{\infty}} \sum_{t=0}^{\infty} \beta^t [u(c_t) + \theta(Q)v(l_t)], \quad [19]$$

$$\text{s.t.} \quad c_0 + \sum_{t=1}^{\infty} R_t \left[c_t - (1-\tau_t)w_t H(1-l_t)\right] + \pi Q = A_0 \quad [20]$$

$$H = g(1-l_0), \quad [21]$$

where R_t is the market interest rate, w_t is the wage rate at time t, τ_t is labor tax rate at time t, and A_0 denotes initial assets.

Normalizing $R_0 = 1$, the first order conditions for the problem are

$$(c_o) \quad u_c(0) = \lambda \quad [22]$$

$$(l_o) \quad \theta(Q)v_l(0) = \lambda g'(1-l_0) \sum_{t=1}^{\infty} R_t S_t (1-\tau_t) w_t (1-l_t) \quad [23]$$

$$(c_t) \quad \beta^t u_c(t) = \lambda R_t, \; \forall t \quad [24]$$

$$(l_t) \quad \beta^t \theta(Q) v_l(t) = \lambda R_t w_t (1-\tau_t) g(1-l_0), \; \forall t \quad [25]$$

$$(Q) \quad \theta'(Q) \sum_{t=0}^{\infty} \beta^t [u(c_t) - v(l_t)] = \lambda \pi \quad [26]$$

These $2t+1$ first order conditions plus the budget constraint allow us to write a system of two difference equations in two unknowns, l_0 and Q. The following procedure can be used:

1. From [6] and [7], $u_c(t) = \frac{\theta(Q)v_l(t)}{w_t(1-\tau_t)(1-l_0)}$ (i)
2. From [4] and [6], $u_c(t) = \frac{u_c(0)R_t}{\beta^t}$ (ii)
3. Then, $l(t) = v^{-1\prime}\left\{\frac{u_c(0)R_t w_t(1-\tau_t)(1-l_0)}{\beta^t\theta(Q)}\right\}$ (iii)
4. From [4] and [5], $u_c(0) = \dfrac{\theta(Q)v_l(0)}{\theta(Q)g'(1-l_0)\sum_{t=1}^{\infty} R_t(1-\tau_t)w_t(1-l_t)}$ (iv)
5. Plugging (iii) in (iv), we solve the difference equation for $u_c(0)$ in terms of $v_l(0)$.
6. Plug in (iii) to solve for $l(t)$ in terms of $l(0)$.
7. Plug in (i) and solve the difference equation for $c(t)$ in terms of $l(0)$.
8. Plug in [2] and [8] and solve for Q and l_0.

Although this procedure won't lead us to a closed-form solution, we can analyze the implications of the model using the following two equilibrium conditions:

$$\theta'(Q)\sum_{t=0}^{\infty}\beta^t v(l_t) = u_c(0)\pi \qquad [27]$$

$$\frac{u_c(0)}{\theta(Q)v_l(0)} = \frac{1}{g'(1-l_0)\sum_{t=0}^{\infty} R_t(1-l_t)w_t(1-\tau_t)} \qquad [28]$$

[27] is the usual identity equating the marginal benefit of investing one more unit of resources in Q to the marginal const of doing so, namely the foregone leisure. [28] presents a complication relative to a

model without human capital accumulation, in which the ratio of the marginal utilities of consumption and leisure, appropriately weighted, would be equal to the inverse of a discounted sum of future labor income, net of taxes, indexed by the marginal productivity of the human capital accumulation function.

5.2.1 Lower π implies lower levels of human capital.

From [9] and [10], a lower π implies higher Q, and thus higher l_0 and lower H.

Proof:

Assume that Q is an ordinary good. As a result, when π decreases, Q increases. As $\frac{\partial\theta(Q)}{\partial Q} \geq 0$, θ increases. Then in [28], the LHS goes up, so it must be that either $v_l(0)$ goes down or $g'(1-l_0)$ goes up. Both possibilities imply that l_0 increases, so $H = g(1-l_0)$ must decrease, which completes the proof.

(Note: it is important for the above proof that the marginal utility of consumption in period $t = 0$ stays constant. This is a reasonable assumption, given that we assumed there is no trade-off between leisure and consumption in period $t = 0$).

This is simply an extension to the model already described. Again, thinking of π (the price of investing in leisure) as social pressure or

social norms, we could apply this line of reasoning, for example, to societies with high level of ethno-cultural fractionalization, or to societies with a large immigrant population, which differs dramatically from the local one in religion and culture. Then, if most businesses are perceived by the immigrant population as "local" and "foreign", there will be high pressure from the immigrant community upon young children to not invest in taste for labor, hence invest more in the taste for leisure. A good example for that is the Netherlands, where the following phenomenon has become plainly visible during the last decade: the North African Muslim population has been reluctant to integrate in the Dutch society, which they perceive as too foreign, and the Turkish Muslim population has been willing to integrate. As a result, although both groups have been treated identically by the Dutch society, there are huge differences in the levels of education and acquisition of language skills between children of North African immigrants and children of Turkish immigrants. The same rationale can be applied to the perceived divergence of Black and White levels of schooling in the US in the last 20 years, when "being Black" – or rather "not being White" – has grown in value in the black community. Thus, the labor supply by the minority population declines. However, the additional result is that as the resources, needed to invest in the taste for leisure, become cheaper, not only leisure increases, but this increase results in

lower levels of human capital accumulation. Thus, the human capital in the minority population will be expected to decline in time, which is detrimental to the growth of the economy as a whole.

5.2.2 Higher percentage of old-age population implies lower levels of human capital.

Following standard gerontocracy analysis (e.g., Mulligan and Salla-i-Martin 1999), large old-age population implies bigger government, specifically, higher transfers from the young to the old through labor taxation, so τ_t is higher. Then, equations [27] and [28] imply that Q goes down, and consequently, l_0 goes up (as was already shown in the analysis without human capital), and H decreases. There is a lot of evidence that economic growth slows down in ageing countries, and our model implies that this slowing down should be larger than previously expected, especially in the long run, because the level of human capital goes down in addition to discouraged work effort as a result from higher levels of taxation.

This fact has interesting implications for the dynamics of the young-old equilibrium. In a Mulligan - Sala-i-Martin framework, the young and old "fight" for transfers, using a production function of the type $f_i = f(l_i, l_j)$, where $i, j \in \{young\ ,\ old\}$, and l stands for leisure. The expected result is that the old are able to win larger trasnfers as they

have more abundant and less costly leisure time. However, what our model suggests is that the increased transfers from young to old will actually increase the leisure of the young and lower its cost. Then, the equilibrium will change in time and the transfers from young to old will likely decrease. An interesting extension to the model would be to assume that $f_i = f(l_i, l_j, H_i)$, where H_i denotes the human capital of agent i, with $\frac{\partial f_i(\cdot)}{\partial H_i} \geq 0$. (We can think of this as people being more skilled in the political battles, in building lobbies, etc.). Then as the leisure of the young will increase and their human capital decreases, under certain conditions the equailibrium described by Mulligan and Sala-i-Martin will hold.

5.2.3 Pension reform, which forces higher savings than before, implies lower levels of human capital

By the logic of 5.2.2, human capital accumulation would go down in the case of a pension reform, which forces the young to save more than they currently do, in private accounts. The intuition is that we take consumption away from young age, when it is appreciated more, to older age, when consumption is discounted heavily. Thus, by the logic of [27], agents end up with a lower taste for consumption and a higher taste for leisure, and the amount of human capital in society is expected to go down. (Note: this possibility was already pointed out by

Mulligan and Sala-i-Martin (1999), using a different rationale). Thus, it is detrimental to human capital accumulation and hence growth for a country, which is undergoing major reforms (say, from communism to free market) and which starts with high Q, to implement immediately a generous pension system, achieved by heavy payroll taxation of the working population.

This is an important observation given that pension reform, which will force the young to save more than they currently contribute in social security taxes, is contemplated by many governments, most notably the US one, as a way to approach the potential insolvency of the pension program. It would be a very interesting exercise to empirically investigate whether countries that have partially moved towards a privatized individual account system, like Sweden the UK, Hong Kong or Poland, have undergone changes in human capital accumulations, unaccounted for by other factors.

5.3 Implications for a range of social security facts

5.3.1 Social Security benefits induce retirement

Mulligan and Sala-i-Martin (2004) show that countries, which induce retirement, on average also have larger benefits, and the difference in benefits, paid to retirees, between countries with and without induced

retirement can account to as much as 3% of the GDP. In the framework of the model, used in this paper, it is possible to approach this fact in two different ways. First, countries with high work culture (or strong "work norms", following Lindbeck's (1997) terminology) will have a higher π, and there people will invest relatively more away from leisure than in countries with more relaxed "work norms", where π will be lower. In this we need to employ the commonly held belief that induced retirement is a way of taking older people out of the market and opening work positions for younger people who would otherwise be unemployed, (see Bhatacharya, Mulligan and Reed III [2001] for a formalization). (Thus, Social Security is a policy tool designed to remove old-age workers from the market by means of a system of incentives and punishments.) Then, it is logical that countries with higher π will end up having higher wage-based punishments (that is, only income from wages after retirement age will be taxed, not all income) and larger benefits, used to induce workers of retirement age out of the labor market.

A second possible way to approach the problem is by noticing that countries with higher taste for leisure will end up consuming more leisure, so people will retire earlier and have more leisure time on their hands. Then, it may be argued that in a Mulligan and Sala-i-Martin framework of lobbying for transfers, the old will end up with higher

transfers than otherwise, because their leisure is more abundant and its price is low. Thus, by combining the current model and Mulligan and Sala-i-Martin's gerontocracy framework, we can conclude that countries with a higher taste for leisure end up with larger benefits, which could suggest that Gruber and Wise (2002) have overestimated the effect of social security incentives on retirement decisions.

5.3.2 Benefits increase with taxes paid

The model suggests that people who expect higher consumption, end up with a smaller taste for leisure and more human capital, so the expectation of higher consumption is self-fulfilling. Then, as already explained, they have to be lured into retirement with larger social security benefits, otherwise they would continue working beyong retirement age. Given that these are the people who pay more payroll taxes, as payroll taxes are proportionate to income, it is an expected implication of the model that benefits increase with taxes paid. This becomes especially true if we refer to the gerontocracy framework again, where "luring" would be part of the strategy of the current old to acquire more allies.

6 Conclusion

A model of lifetime utility maximization was developed, in which the relative taste for consumption and leisure was assumed to be endogenous. What makes the model useful is that in such a framework, many observed facts about labor supply, human capital accumulation, and Social Security structure can be explained with relative ease. It was shown that countries with stronger exogenous work norms will be expected to have both higher levels of labor supply and higher levels of human capital accumulation. Also, in a Mulligan and Sala-i-Martin gerontocracy framework, countries with higher percentage of old-age population would be expected to have lower levels of human capital due to discouraged labor supply and, subsequently, higher taste for leisure. It was argued that a pension reform, which forces young workers to save more than before, may result in lower levels of human capital accumulation and lower growth levels. Finally, it was argued that this framework can be used to explains why in most countries benefits increase with taxes paid, and why countries with stronger work norms have more generous systems of retirement benefits and harsher punishments for continued labor supply beyond retirement age. The natural next step would be to use actual data to test the implications of the model, for example, whether there was a visible shift in human

capital accumulation in countries that have undergone a pension reform, whether the countries with larger benefits are really the ones with stronger "work norms", etc.

7 Bibliography:

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