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Conspicuous Leisure: Optimal Income Taxation When Both Relative Consumption and Relative Leisure Matter*

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Abstract

In previous studies on public policy under relative-consumption concerns, leisure comparisons have been ignored. In this paper, we consider a two-type optimal non-linear income tax model, in which people care about both their relative consumption and their relative leisure. Increased consumption positionality typically implies higher marginal income tax rates for both ability types, whereas leisure positionality has an offsetting role. However, this offsetting role is not symmetric; concern about relative leisure implies a progressive income tax component (i.e., a component that is larger for the high-ability type than for the low-ability type). Leisure positionality does not modify the policy rule for public-good provision.

Keywords: Non-linear taxation; positional goods; public goods; redistribution; status

JEL classification: *D*62; *H*21; *H*23; *H*41

I. Introduction

> High-bred manners and ways of living are items of conformity to the norm of conspicuous leisure and conspicuous consumption (Veblen, 1899).

There is a substantial body of empirical evidence suggesting that people value not only their absolute consumption (broadly defined), but also their

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consumption relative to that of others.[1] In addition, there is a growing body of literature dealing with the implications of such relative-consumption concerns for economic policy, including income taxation (e.g., Boskin and Sheshinski, 1978; Oswald, 1983; Tuomala, 1990; Ireland, 2001; Corneo, 2002; Abel, 2005; Aronsson and Johansson-Stenman, 2008, 2010; Kanbur and Tuomala, 2010) and provision of public goods (e.g., Ng, 1987; Brekke and Howarth, 2002; Aronsson and Johansson-Stenman, 2008; Wendner and Goulder, 2008).[2] However, as far as we know, no previous theoretical study has analyzed the optimal policy responses to relative leisure comparisons. This is somewhat surprising because the role of leisure in social comparisons was highlighted by Veblen (1899) in *The Theory of the Leisure Class*. Therefore, in this paper, we consider optimal redistributive income taxation – and we also briefly discuss the provision of public goods – in an economy where private consumption and leisure are subject to relative social comparisons (i.e., consumer behavior is governed by positional preferences regarding both private consumption and leisure).[3]

The empirical literature on the importance of relative leisure comparisons is limited, presumably because of the difficulty of measuring relative concerns in general, and with respect to leisure in particular. Based on questionnaire-experimental methods, Alpizar *et al.* (2005), Solnick and Hemenway (2005), and Carlsson *et al.* (2007) have found evidence of relative leisure concerns. However, they have also found that leisure tends to be less positional than income and many private goods, as measured by the "degree of positionality", which is defined in Section II. Frijters and Leigh (2009) have considered an economy where individuals value both relative consumption and relative leisure, and where the "visibility" of relative leisure depends positively on the amount of time the individual has lived in the same neighborhood, and on the amount of time others have

[1] This includes happiness research (e.g., Easterlin, 2001; Blanchflower and Oswald, 2004; Ferrer-i-Carbonell, 2005; Luttmer, 2005), questionnaire-based experiments (e.g., Johansson-Stenman *et al.*, 2002; Solnick and Hemenway, 2005; Carlsson *et al.*, 2007), empirical studies of the consumption pattern for different socioeconomic groups, based on consumer expenditure surveys (Charles *et al.*, 2009), and brain science (Fliessbach *et al.*, 2007). There are also recent evolutionary models consistent with relative-consumption concerns (Samuelson, 2004; Rayo and Becker, 2007). In a recent exception in the happiness literature, Stevenson and Wolfers (2008) have claimed that the role of relative income is overstated. Clark *et al.* (2008) have provided a good overview of both the empirical evidence and economic implications of relative-consumption concerns.

[2] See also Frank (2007, 2008) for more general discussions of relative concerns and economic policy. An alternative approach is to assume conventional preferences where relative consumption has an instrumental value instead (e.g., Cole *et al.*, 1992, 1998).

[3] The study by Arrow and Dasgupta (2009) is related to our study. They have analyzed optimal individual and social intertemporal consumption decisions, but without considering optimal taxation, when individuals derive utility from relative consumption and relative leisure.

lived in the neighborhood. Therefore, if population turnover increases, the visibility (and therefore the utility) of relative leisure decreases, and the status race will be played primarily via relative consumption. In an empirical application based on US data, Frijters and Leigh (2009) have found support for this hypothesis in the sense that an increase in population turnover increases the average working week of those who do not migrate.

There is also other empirical evidence suggesting that social interaction in the labor market influences the labor–leisure choice. Aronsson *et al.* (1999) have found that the individual choice of the number of work hours depends positively on the average hours of work in the relevant reference group. In addition, their results show that if we were to neglect this social interaction (which is a common approach in the literature on labor supply), then we might seriously underestimate the effects of taxes on labor supply.[4] Pingle and Mitchell (2002) have considered such conformity effects and relative consumption/leisure concerns simultaneously, and they have found evidence that people interact with respect to their labor/leisure choices.

Because the existing body of literature on optimal taxation and public-good provision, based on the case where leisure is completely non-positional, has suggested strong and far-reaching policy implications, it is clearly of interest to also analyze the case where both consumption and leisure are positional. Of course, this is the case even if – as the limited evidence suggests – leisure is less positional than private consumption. Moreover, if positional preferences regarding leisure affect the labor-market outcome, it follows that the functioning of the labor market differs in a fundamental way from the conventional models used in most previous studies on redistributive income taxation. In turn, this might have implications for how the government ought to use the labor income tax to redistribute in the most efficient way.

Our study extends the analysis by Aronsson and Johansson-Stenman (2008), who have considered optimal non-linear income taxation and public-good provision in a model where utility depends on both absolute and relative private consumption, but where leisure is completely non-positional. As such, our paper is based on a two-type optimal income tax model – where the government implements a non-linear income tax subject to a self-selection constraint – developed in its original form by Stern (1982) and Stiglitz (1982). Thus, in our framework, the use of distortionary taxation is a consequence of optimization subject to informational limitations only,

[4] Corneo and Jeanne (1997) have analyzed conformity effects and relative consumption (but not leisure) concerns theoretically. Blomquist (1993) has shown theoretically, and using simulations, that not taking preference interdependence into account can lead to a serious bias in the estimated effects of a tax change. Aronsson and Sjögren (2010) have addressed social norms in the labor market (a conformity norm for work hours as well as a participation norm) and their implications for optimal redistributive non-linear income taxation.

and not of any other *a priori* restriction on the set of policy instruments (such as a necessity to use linear taxation). This framework is particularly suited for studying how redistributive and corrective aspects of public policy contribute to the income tax structure, as well as for capturing the policy incentives caused by interaction between the incentive constraint and the desire to internalize positional externalities. The results show (among other things) that the incentive for the government to increase the marginal income tax rates in response to the positional consumption externality is, in part, offset by the appearance of leisure positionality. However, this offsetting role is not symmetric; in particular, it is shown that concern about relative leisure implies a progressive income tax component (i.e., one that is larger for the high-ability type than for the low-ability type). Our results also imply that the optimal provision rule for the public good is affected by consumption positionality, while it remains unaffected by leisure positionality.

The outline of the paper is as follows. In Section II, we present the model and we analyze the outcome of private optimization. We characterize the optimal tax problem in Section III. In Section IV, we discuss the optimal tax policy and the provision of a public good under relative consumption and leisure comparisons, while in Section V we provide some concluding remarks. Proofs are presented in the Appendix.

II. Consumer Preferences and the Labor Supply Problem

There are two types of individuals: the less productive low-ability type (type 1) and the more productive high-ability type (type 2). We use n^i to denote the number of individuals of ability type i, and this number is large such that each individual's consumption is negligible compared to the aggregate consumption by each ability type. Individuals of ability type i care about their private consumption x^i, the provision of a public good g, and leisure z^i, which is given by a time endowment H, less the number of work hours l^i.

We also assume that each individual compares his/her own private consumption and leisure, respectively, with that of other people. In accordance with the bulk of previous comparable studies on relative consumption comparisons, yet with the modification that leisure is also a positional good here, we assume that the reference levels are given by average consumption and time spent on leisure, respectively. Hence, the measures of reference consumption and reference leisure can be written as $\bar{x} \equiv (n^1x^1 + n^2x^2)/(n^1 + n^2)$ and $\bar{z} \equiv (n^1z^1 + n^2z^2)/(n^1 + n^2)$.[5] We also

[5] Although this mean value comparison is the common approach in previous comparable literature, it is, of course, likely that most individuals tend to compare themselves more

follow previous studies in assuming that the relative consumption of private goods and leisure can be described by the difference between an individual's own consumption or leisure and the mean consumption or leisure in the economy as a whole, that is, people care about $\Delta_x^i = x^i - \bar{x}$ and $\Delta_z^i = z^i - \bar{z}$ (e.g., Akerlof, 1997; Corneo and Jeanne, 1997; Ljungqvist and Uhlig, 2000; Bowles and Park, 2005; Wendner, 2005; Carlsson *et al.*, 2007; Aronsson and Johansson-Stenman, 2008, 2010).[6]

The utility function of ability type i can then be written as

$$U^i = v^i(x^i, z^i, \Delta_x^i, \Delta_z^i, g) = u^i(x^i, z^i, \bar{x}, \bar{z}, g). \tag{1}$$

The function $v^i(\cdot)$ increases with each argument, implying that $u^i(\cdot)$ is decreasing with $\bar{x}$ and $\bar{z}$, and increasing with the other arguments. Both $v^i(\cdot)$ and $u^i(\cdot)$ are assumed to be twice continuously differentiable in their respective arguments, and strictly concave. The individuals treat $\bar{x}$ and $\bar{z}$ as exogenous.

In order to measure the extent to which relative consumption and leisure concerns matter for an individual, let us extend the definition in Johansson-Stenman *et al.* (2002) and define the degrees of consumption and leisure positionality for ability type i, based on the function $v^i(\cdot)$ in equation (1). To be more specific, we define the degree of consumption positionality α^i and the degree of leisure positionality β^i as

$$\alpha^i = \frac{v_{\Delta x}^i}{v_x^i + v_{\Delta x}^i} \text{ and } \beta^i = \frac{v_{\Delta z}^i}{v_z^i + v_{\Delta z}^i}, \tag{2}$$

where $0 < \alpha^i,\ \beta^i < 1$ by our earlier assumptions. The subscripts attached to the function $v^i(\cdot)$ denote partial derivatives, so $v_x^i \equiv \partial v^i / \partial x^i$ and $v_{\Delta x}^i \equiv \partial v^i / \partial \Delta_x^i$, etc. The variable α^i is interpretable as the fraction of the overall utility increase from the last dollar spent on consumption that is due to increased relative consumption. Similarly, β^i measures the fraction of the overall utility increase from the last time-unit spent on leisure that is due to increased relative leisure. The average degree of positionality for each

with some people than with others (see Clark and Senik, 2010, for some recent empirical evidence). Aronsson and Johansson-Stenman (2010) have analyzed optimal redistributive income taxation in an intertemporal model, allowing for both within-generation comparisons and upward comparisons (for private consumption only; leisure is treated as a non-positional good). They have found that the results from using these alternative measures of reference consumption closely resemble those from a mean value comparison, even if the interpretations are modified accordingly. It is possible to modify the results here for different reference levels in a similar way.

[6] Alternative approaches include ratio comparisons (e.g., Boskin and Sheshinski, 1978; Layard, 1980; Wendner and Goulder, 2008; Wendner, 2010) and comparisons of ordinal rank (e.g., Frank, 1985; Corneo and Jeanne, 2001; Corneo, 2002; Hopkins and Kornienko, 2004).

positionality measure then becomes

$$\bar{\alpha} \equiv \frac{n^1\alpha^1 + n^2\alpha^2}{n^1 + n^2} \text{ and } \bar{\beta} \equiv \frac{n^1\beta^1 + n^2\beta^2}{n^1 + n^2}, \tag{3}$$

where $0 < \bar{\alpha}, \bar{\beta} < 1$. Based on a representative sample in Sweden, Carlsson *et al.* (2007) have estimated that $\bar{\alpha} = 0.53$ (based on private income) and $\bar{\beta} = 0.22$, by using what they refer to as a non-parametric method. They have also considered a parametric method, then finding that $\bar{\alpha} = 0.65$ and $\bar{\beta} = 0.10$ (i.e., a substantially larger difference between the degrees of consumption and leisure positionality). Alpizar *et al.* (2005) have used a sample of students in Costa Rica and have estimated the degree of positionality for income as well as for different goods, including the length of vacation in weeks per year. For the ratio comparison specification, they have found that the degrees of positionality for private income, private cars, housing, insurance, and vacation equal 0.45, 0.55, 0.56, 0.41, and 0.41, respectively. Based on a difference comparison specification, they have obtained the corresponding values 0.40, 0.50, 0.51, 0.37, and 0.37, respectively. Thus, the differences between the degrees of positionality for income and private consumption, on the one hand, and for leisure, on the other, are relatively small here. However, it should be noted that the length of vacation is, of course, far from a perfect measure of the overall amount of leisure, and it follows intuitively that the degree of positionality is larger for the number of weeks of vacation than for leisure.

By letting $T(w^i l^i)$ denote the income tax payment by ability type i, the individual budget constraint is given by $w^i l^i - T(w^i l^i) = x^i$, where w^i denotes the before-tax wage rate. This implies the corresponding first-order condition for the number of work hours

$$u_x^i w^i [1 - T'(w^i l^i)] = u_z^i, \tag{4}$$

where $u_x^i = \partial u^i / \partial x^i$, $u_z^i = \partial u^i / \partial z^i$, and $T'(w^i l^i) = \partial T(w^i l^i) / \partial (w^i l^i)$ is the marginal income tax rate. Thus, while the reference consumption and leisure levels are endogenous in the model (and determined by the average consumption and leisure, respectively), each individual will take these reference levels as exogenous. This is because the number of individuals of each ability type is large, which implies that each individual's consumption is negligible compared to the aggregate consumption by each ability type. This is the conventional equilibrium assumption in models with externalities.

We follow much of the previous literature on optimal income taxation in assuming that output is produced by a linear technology, which implies that the gross wage rates are fixed. This assumption simplifies the calculations without being of major importance for the qualitative results that are derived in the following sections.

III. Optimal Tax and Expenditure Problem

The government wants to achieve a Pareto-efficient resource allocation, which it accomplishes by maximizing the utility of the low-ability type while holding utility constant for the high-ability type, subject to a self-selection constraint and the budget constraint.[7] We also assume that the government is the first mover in relation to the private sector (meaning that it recognizes how private agents respond to policy), and that it treats the measures of reference consumption and reference leisure as endogenous, such that $\bar{x} \equiv \frac{n^1 x^1 + n^2 x^2}{n^1 + n^2}$ and $\bar{z} \equiv \frac{n^1 z^1 + n^2 z^2}{n^1 + n^2}$.

The informational assumptions are conventional. The government is able to observe income, while ability is private information. We follow the standard approach in assuming that the government wants to redistribute from the high-ability type to the low-ability type, implying that it must prevent the high-ability type from pretending to be a low-ability type. Then, the self-selection constraint that can bind becomes

$$U^2 = u^2(x^2, z^2, \bar{x}, \bar{z}, g) \geq u^2(x^1, H - \phi l^1, \bar{x}, \bar{z}, g) = \hat{U}^2, \tag{5}$$

where $\phi = w^1/w^2 < 1$ is the wage ratio. The expression on the right-hand side of the weak inequality is the utility of the mimicker. We can interpret ϕl^1 as measuring the number of work hours that the mimicker needs to supply in order to reach the same income as the low-ability type. Therefore, although enjoying the same consumption as the low-ability type, the mimicker enjoys more leisure because the mimicker is more productive than the low-ability type.

By using $T(w^i l^i) = w^i l^i - x^i$ from the private budget constraints, it follows that the government's budget constraint can be written as

$$\sum_i n^i w^i l^i = \sum_i n^i x^i + g. \tag{6}$$

The second-best problem is formulated as a direct decision problem (i.e., as if the government decides private consumption and the number of work hours for each ability type, as well as decides how much of the public good to provide). The marginal income tax rates implicit in the second-best resource allocation can then be derived by combining the first-order conditions obeyed by the government with those faced by the private sector. The Lagrangian corresponding to this maximization problem is given by

$$\mathcal{L} = U^1 + \mu\left(U^2 - U_0^2\right) + \lambda\left(U^2 - \hat{U}^2\right) + \gamma\left[\sum_i n^i(w^i l^i - x^i) - g\right],$$

where U_0^2 is an arbitrarily fixed utility level for the high-ability type, while μ, λ, and γ are Lagrange multipliers associated with the minimum

[7] This approach is standard, following Stiglitz (1982).

utility restriction, the self-selection constraint, and the budget constraint, respectively. Then, the first-order conditions for z^1, x^1, z^2, x^2, and g, respectively, are given by

$$u_z^1 - \lambda\phi\hat{u}_z^2 - \gamma n^1 w^1 + \frac{n^1}{n^1+n^2}\frac{\partial\mathcal{L}}{\partial\bar{z}} = 0, \tag{7}$$

$$u_x^1 - \lambda\hat{u}_x^2 - \gamma n^1 + \frac{n^1}{n^1+n^2}\frac{\partial\mathcal{L}}{\partial\bar{x}} = 0, \tag{8}$$

$$(\mu+\lambda)u_z^2 - \gamma n^2 w^2 + \frac{n^2}{n^1+n^2}\frac{\partial\mathcal{L}}{\partial\bar{z}} = 0, \tag{9}$$

$$(\mu+\lambda)u_x^2 - \gamma n^2 + \frac{n^2}{n^1+n^2}\frac{\partial\mathcal{L}}{\partial\bar{x}} = 0, \tag{10}$$

and

$$u_g^1 + \mu u_g^2 + \lambda\left(u_g^2 - \hat{u}_g^2\right) - \gamma = 0. \tag{11}$$

Here, $\hat{u}^2 = u^2(x^1, H - \phi l^1, \bar{x}, \bar{z}, g)$ is used to denote the utility of the mimicker measured by using the second utility formulation in equation (1). Subscripts denote partial derivatives. In Section IV, first we explain the optimal taxation results in terms of the welfare effects of increases in $\bar{x}$ and $\bar{z}$ (i.e., in terms of the derivatives $\partial\mathcal{L}/\partial\bar{x}$ and $\partial\mathcal{L}/\partial\bar{z}$). Then, we expand these welfare effects and express the optimal marginal income tax rates in terms of the degrees of consumption and leisure positionality.

IV. Results

Let $MRS_{z,x}^i = u_z^i/u_x^i$ and $M\hat{R}S_{z,x}^2 = \hat{u}_z^2/\hat{u}_x^2$ denote the marginal rate of substitution between leisure and private consumption for ability type i and the mimicker, respectively, and let $N = n^1 + n^2$ denote population size. By combining equations (7) and (8) and equations (9) and (10), respectively, and by using the private first-order condition for the number of work hours given by equation (4), we obtain the following general additive expression for the optimal marginal income tax rate (for i = 1, 2):

$$T'(w^i l^i) = \tau^i + \frac{1}{N\gamma w^i}\left(\frac{\partial\mathcal{L}}{\partial\bar{z}} - MRS_{z,x}^i\frac{\partial\mathcal{L}}{\partial\bar{x}}\right). \tag{12}$$

The variable τ^i denotes the marginal income tax rate implemented for ability-type i in the standard two-type model without positional preferences, i.e.,

$$\tau^1 = \frac{\lambda^*}{n^1 w^1}\left(MRS_{z,x}^1 - \phi M\hat{R}S_{z,x}^2\right) \text{ and } \tau^2 = 0,$$

where $\lambda^* = \lambda \hat{u}_x^2/\gamma > 0$. The equations for τ^1 and τ^2 coincide with the marginal income tax rates derived by Stiglitz (1982) for an economy with fixed before-tax wage rates. We will return to the variable τ^i below.

Equation (12) shows that the optimal marginal income tax rate for each ability type can be expressed as a simple additive modification of the marginal income tax rate, which would apply in the absence of positional concerns. The modifying terms – given by the second part of the expression – reflect how ability type i contributes to welfare via the average consumption and leisure, respectively. Note also that when deriving equation (12), we have only assumed that individual utility depends (negatively) on $\bar{x}$ and $\bar{z}$, according to the second utility formulation in equation (1). To go further, we make use of the first utility formulation in equation (1), that is, the function $v^i(\cdot)$, which specifies how each individual's utility depends on social comparisons.

By using equations (7)–(10), the welfare effect of an increase in $\bar{x}$ and $\bar{z}$ can be written as

$$\frac{\partial \mathcal{L}}{\partial \bar{x}} = u_{\bar{x}}^1 + (\mu + \lambda) u_{\bar{x}}^2 - \lambda \hat{u}_{\bar{x}}^2 = -\gamma N \frac{\bar{\alpha}}{1 - \bar{\alpha}} + \lambda \hat{u}_x^2 \frac{\hat{\alpha}^2 - \alpha^1}{1 - \bar{\alpha}}, \quad (13a)$$

$$\frac{\partial \mathcal{L}}{\partial \bar{z}} = u_{\bar{z}}^1 + (\mu + \lambda) u_{\bar{z}}^2 - \lambda \hat{u}_{\bar{z}}^2 = -\gamma N \frac{\bar{\beta}\bar{w}(1+\zeta)}{1 - \bar{\beta}} + \lambda \hat{u}_z^2 \frac{\hat{\beta}^2 - \phi\beta^1}{1 - \bar{\beta}}, \quad (13b)$$

respectively, where $\zeta = \mathrm{cov}(\beta/\bar{\beta}, w/\bar{w})$ denotes the normalized covariance between the degree of leisure positionality and the before-tax wage rate. Equations (13a) and (13b) show that increases in $\bar{x}$ and $\bar{z}$ affect welfare via two channels: (i) via the average degree of consumption or leisure positionality (the first term) and (ii) via differences in each degree of positionality between the mimicker and the low-ability type (the second term). These are also the channels via which positional preferences contribute to modify the income tax structure compared to the standard model. Note that the second term on the right-hand side of equations (13a) and (13b) is proportional to the Lagrange multiplier of the self-selection constraint λ, suggesting a possible trade-off between externality correction and the desire to relax the self-selection constraint. We begin by analyzing how positional preferences affect the marginal income tax rates when the self-selection constraint does not bind, in which case the government may implement a first-best policy. Then, we continue with the second-best model.

First-Best Taxation

In the first-best case, where the self-selection constraint does not bind, we have $\lambda = 0$. In this case, marginal income taxation is used solely for corrective purposes. By using equations (12) and (13a, b), we can derive the following result.

Proposition 1. *In the first-best case, the marginal income tax rate for ability type i (i = 1, 2) can be written as*

$$T'(w^i l^i) = \bar{\alpha} - (1+\zeta)\frac{\bar{w}}{w^i}\frac{1-\bar{\alpha}}{1-\bar{\beta}}\bar{\beta}. \tag{14}$$

This means that (i) $T'(w^1 l^1) < T'(w^2 l^2)$ and that (ii) the marginal income tax rate is a decreasing function of ζ for both ability types.

In equation (14), the first term on the right-hand side $\bar{\alpha}$ (the average degree of consumption positionality) contributes to increase the marginal income tax rate. The reason is that private consumption causes a negative externality, because of others' reduced relative consumption, which is equal to $\bar{\alpha}$ per unit of consumption. Note that if leisure were completely non-positional ($\bar{\beta} = 0$), then $T'(w^i l^i) = \bar{\alpha}$ for $i = 1, 2$, because the only reason to distort the labor supply behavior in that case would be to internalize the positional consumption externality (see Aronsson and Johansson-Stenman, 2008).

The second part of equation (14) is novel and reflects the corresponding positive externality of an increase in an individual's number of work hours, which contributes to reduce the average time spent on leisure in the economy as a whole (meaning that relative leisure increases for other agents). This positive externality is larger if caused by the low-ability type rather than by the high-ability type, which explains the tax progression result in Proposition 1. The reason for this is that the low-ability type will have to reduce leisure more than a high-ability type must for the same consumption increase. Therefore, without a binding self-selection constraint, the optimal marginal income tax rate will be higher for the high-ability type than for the low-ability type, because it reflects the difference between the negative consumption externality and the positive leisure externality caused by an increase in the number of work hours.

Turning to the correlation between ability and degree of leisure positionality (i.e., the effect of the variable ζ in equation (14)), Proposition 1 implies that both marginal income tax rates decrease with ζ. In other words, the more leisure positional the low-ability type is relative to the high-ability type, *ceteris paribus*, the higher the implemented marginal income tax rates for both ability types. The driving force behind this result is that for a given β, an individual's marginal willingness to pay to avoid increased leisure for others, *ceteris paribus*, increases with the individual's income.[8] Therefore, the more leisure positional the low-ability type relative to the high-ability type (with $\bar{\beta}$ held constant), the smaller the positive externality of an increase in the number of work hours due to relative leisure comparisons and, as a consequence, the larger the net marginal social cost of consumption.

Finally, note that the component in equation (14) that is attributable to the positional leisure externality interacts with the average degree of consumption positionality. The intuition for this interaction effect is that if we were to increase the number of work hours for ability type i in order to offset his/her contribution to the positional leisure externality, then a fraction $\bar{\alpha}$ of the corresponding increase in before-tax income would already be taxed away by the desire to internalize the positional consumption externality (i.e., by the first term on the right-hand side). Therefore, other people's marginal willingness to pay for increased relative leisure is only $1-\bar{\alpha}$ times what it would have been, had the positional consumption externality not been taxed away.

The following result is a direct consequence of Proposition 1.

Corollary 1. *(A) For the special case where the positionality degrees are identical among types (i.e., $\alpha^1 = \alpha^2 = \bar{\alpha}$ and $\beta^1 = \beta^2 = \bar{\beta}$), we obtain*

$$T'(w^i l^i) = \bar{\alpha} - \frac{\bar{w}}{w^i}\frac{1-\bar{\alpha}}{1-\bar{\beta}}\bar{\beta}.$$

(B) For the special case where the consumption and leisure positionality degrees are equally large, and also identical among types (i.e., $\bar{\alpha} = \alpha^1 = \alpha^2 = \beta^1 = \beta^2 = \bar{\beta}$), we obtain

$$T'(w^i l^i) = \bar{\alpha}\left[1 - \frac{\bar{w}}{w^i}\right],$$

which implies that the optimal marginal income tax rate is strictly positive for the high-ability type and strictly negative for the low-ability type.

Part A follows directly from equation (14), with $\zeta = 0$. At first, part B might seem surprising, because one might have conjectured that the effects of the two positional externalities would cancel out if $\bar{\alpha} = \bar{\beta}$. It is easy to see that this is indeed the case in the simpler representative consumer framework (e.g., used by Dupor and Liu, 2003, in the case without relative

[8] By combining equations (1), (3), and (4), it can be shown that an individual k's marginal willingness to pay is proportional to k's marginal wage rate, that is, to $w^k[1 - T'(w^k l^k)]$. The reason why the optimal marginal income tax rate depends on ζ, which reflects the covariance with the gross (instead of the net) wage rate, is that the marginal tax payment is part of the externality, even though it is not part of k's marginal willingness to pay.

leisure concerns), because a lack of variation in the before-tax wage rates implies $T'(wl) = 0$.

However, the explanation given in the context of Proposition 1 as to why the marginal income rate tax is higher for the high-ability type than for the low-ability type still remains valid. To explain why they differ in sign in part B of Corollary 1, suppose that we were to increase the number of work hours for a low-ability individual, such that his/her consumption increased by one dollar. Consider the welfare effect that this change would impose on other low-ability individuals. If the average degrees of consumption and leisure positionality were equal, then the negative effect of reduced relative consumption would exactly cancel out the positive effect of increased relative leisure. However, as we have seen above, if the affected individuals have a higher before-tax wage rate, then the welfare gain of increased relative leisure would dominate the welfare loss of reduced relative consumption. Thus, the external welfare effect is either zero (for other low-ability individuals) or positive (for high-ability individuals), implying an overall positive welfare effect of more consumption, which motivates a negative marginal income tax rate. The argument for a positive marginal income tax rate implemented for the high-ability type is analogous.

Second-Best Taxation

Now, we return to the more realistic second-best model, and we analyze how a binding self-selection constraint ($\lambda > 0$) modifies the first-best policy discussed above. To simplify the presentation of the results, let

$$\alpha_d = \frac{\lambda \hat{u}_x^2\left(\hat{\alpha}^2 - \alpha^1\right)}{\gamma N} \quad \text{and} \quad \beta_d = \frac{\lambda \hat{u}_z^2\left(\hat{\beta}^2 - \phi\beta^1\right)}{\gamma N}$$

be indicators of differences in the degrees of consumption and leisure positionality, respectively, between the mimicker and the low-ability type. Note also that because the mimicker is more productive than the low-ability type, the difference in leisure positionality is adjusted by the relative wage rate.

Let us use the short notation $T'_{FB}(w^i l^i)$ for the first-best tax expression in equation (14) – yet evaluated in the second-best equilibrium analyzed here – such that

$$T'_{FB}(w^i l^i) = \bar{\alpha} - (1+\zeta)\frac{\bar{w}}{w^i}\frac{1-\bar{\alpha}}{1-\bar{\beta}}\bar{\beta}.$$

Then we can derive the following expressions for the optimal marginal income tax rates.

Proposition 2. *The second-best marginal income tax rate is given by (for $i = 1, 2$)*

$$T'(w^i l^i) = T'_{FB}\left(w^i l^i\right) + (1-\bar{\alpha})\tau^i + \frac{1-\bar{\alpha}}{1-\bar{\beta}}\frac{\beta_d}{w^i} - R\frac{\alpha_d}{1-\alpha_d}, \qquad (15)$$

where

$$R = 1 - \left[T'_{FB}\left(w^i l^i\right) + (1-\bar{\alpha})\tau^i + \frac{1-\bar{\alpha}}{1-\bar{\beta}}\frac{\beta_d}{w^i}\right] > 0.$$

Equation (15) differs from its first-best counterpart in primarily two ways: (*i*) through the traditional self-selection component τ^i; (ii) through self-selection effects associated with positional concerns (i.e., via α_d and β_d). Let us discuss the contribution of each such additional component.

As mentioned above, the variable τ^i represents the marginal income tax rate that the government would implement in the standard two-type model without positional preferences.[9] In particular, note that the effect of τ^i on the marginal income tax rate is here scaled down by the factor $(1-\bar{\alpha})$, compared to the corresponding tax formula in the standard two-type model. The intuition behind this scale factor is that $(1-\bar{\alpha})\tau^i$ serves to relax the self-selection constraint via channels other than relative-consumption concerns. This explains why the base for this tax component is the non-positional part of marginal income. Therefore, equation (15) attaches a lower weight to the traditional self-selection component, compared to the corresponding tax formula in an economy without positional concerns.

The third and fourth terms on the right-hand side together capture the incentives for the government to relax the self-selection constraint via tax-induced changes in $\bar{x}$ and $\bar{z}$. Let us start by interpreting each such term in isolation, and then summarizing their joint implications for optimal income taxation. Note that the third term is an extension of the expression $-[(1+\zeta)\bar{w}(1-\bar{\alpha})/(1-\bar{\beta})w^i]\bar{\beta}$ in equation (14), which is here part of $T'_{FB}(w^i l^i)$, and it arises because the redistributive aspects of leisure positionality can either reinforce, or counteract, the incentive to correct for the positional leisure externality. The additional component here is β_d, which measures the difference in the degree of leisure positionality between the mimicker and the low-ability type. The greater the value of β_d, *ceteris paribus*, the higher the third term on the right-hand side, because if the mimicker is

[9] Because we assume fixed before-tax wage rates, we have $\tau^1 > 0$ (at least if the utility function does not differ across ability types, as in Stiglitz, 1982) and $\tau^2 = 0$. However, equation (15) would take the same general form in a framework with endogenous before-tax wage rates, where (under the additional assumption of constant returns to scale) $\tau^1 > 0$ and $\tau^2 < 0$. The interpretation of equation (15) presented here also covers the more general case, where the relative wage rate is responsive to tax policy.

more leisure positional than the low-ability type, so that $\beta_d > 0$, then a higher $\bar{z}$ will contribute to relax the self-selection constraint. This means that a higher $\bar{z}$ makes it relatively less attractive to become a mimicker, which in itself is socially beneficial and contributes to increase the marginal income tax rates. In this case, therefore, the corrective ($\bar{\beta}$) and redistributive (β_d) aspects of leisure positionality affect the marginal income tax rates in opposite directions. However, if $\beta_d < 0$, which means that the low-ability type is more leisure positional (and is therefore hurt more by an increase in $\bar{z}$) than the mimicker, it follows that a higher $\bar{z}$ works to tighten the self-selection constraint. Therefore, the corrective and redistributive aspects of leisure positionality reinforce each other. Finally, note that the absolute value of the third term on the right-hand side of equation (15) is larger for the low-ability type than for the high-ability type. The reason for this is similar to the reason why the corresponding component in the first-best tax formula is larger for the low-ability type than for the high-ability type (i.e., because the low-ability type has to reduce leisure more than the high-ability type for the same consumption increase).

The final term on the right-hand side of equation (15) reflects the difference between the mimicker and the low-ability type with respect to consumption positionality. Note that the greater the value of α_d, *ceteris paribus*, the lower the marginal income tax rates, and vice versa. The intuition is that if the mimicker is more consumption positional than the low-ability type, so that $\alpha_d > 0$, then the self-selection constraint will be relaxed by an increase in the average consumption. This is socially beneficial, suggesting that the price of consumption should go down, which is obtained by reducing the marginal income tax rate. However, if $\alpha_d < 0$, which means that the low-ability type is more consumption positional than the mimicker, then an increase in the reference consumption will lead to a larger utility loss for the low-ability type than for the mimicker. In this case, the government can relax the self-selection constraint by implementing a higher marginal income tax rate than it would otherwise have done. Note that this mechanism applies to the last dollar earned net of taxes. That is, it does not apply to the fraction of an income increase that is already taxed away (irrespective of the underlying reason), which explains the appearance of the factor R.[10]

In summary, we have derived the following implications of Proposition 2.

Corollary 2. *Conditional on $\bar{\alpha}$, $\bar{\beta}$, and τ^i (for $i = 1, 2$), there is an incentive for the government to relax the self-selection constraint by implement-*

[10] Note that the inequality $R > 0$ in Proposition 2 follows from the fact that it cannot be optimal with a marginal income tax rate exceeding 100 percent, which would follow from equation (15) with $R < 0$.

ing (i) higher marginal income tax rates for both ability types, if $\alpha_d < 0$ *and* $\beta_d > 0$*, and (ii) lower marginal income tax rates for both ability types, if* $\alpha_d > 0$ *and* $\beta_d < 0$*, than it would otherwise have done. If* $\alpha_d = 0$ *and* $\beta_d = 0$*, this policy incentive vanishes, because tax-induced changes in* $\bar{x}$ *and* $\bar{z}$ *will then not affect the self-selection constraint.*

The intuition behind Corollary 2 is that if the mimicker is less consumption positional and more leisure positional than the low-ability type, a combination of lower $\bar{x}$ and higher $\bar{z}$ will relax the self-selection constraint. This can be accomplished via higher marginal income tax rates. An analogous argument for lower marginal income tax rates applies if the mimicker is more consumption positional and less leisure positional than the low-ability type, in which case a combination of higher $\bar{x}$ and lower $\bar{z}$ contributes to relax the self-selection constraint. In the special case where the mimicker and the low-ability type are equally positional in both dimensions, tax-induced changes in the reference points will, of course, neither tighten nor relax the self-selection constraint.

Public-Good Provision

The policy rule for the public good can be obtained by substituting equations (8) and (10) into equation (11) and by letting $MRS^i_{g,x} = u^i_g/u^i_x$ and $M\hat{R}S^2_{g,x} = \hat{u}^2_g/\hat{u}^2_x$ denote the marginal rate of substitution between the public good and private consumption for ability type i and the mimicker, respectively.

Proposition 3. *The Pareto-efficient provision rule for the public good can be written as*

$$\sum_i n^i \, MRS^i_{g,x} = \left[1 + \lambda^* \left(M\hat{R}S^2_{g,x} - MRS^1_{g,x}\right)\right] \frac{1 - \bar{\alpha}}{1 - \alpha_d}. \tag{16}$$

Note that this provision rule is independent of the degree of leisure positionality. Therefore, it is identical to the rule derived by Aronsson and Johansson-Stenman (2008), who have considered a framework where private consumption is a positional good whereas leisure is not. The intuition is straightforward, as follows. Because the government has access to a general income tax – through which it can perfectly control the private consumption and number of work hours – the social first-order conditions governing the number of work hours need not be used to derive the policy rule for the public good. Therefore, the policy rule governing the public good takes the same general form, irrespective of whether leisure is a positional good. However, if the optimal provision rule had instead been expressed with leisure or effective leisure (before-tax income) as the numeraire (cf., Mirrlees, 1976), then relative leisure concerns would have affected the provision rule.

In other words, the modification implied by equation (16), by comparison with the standard second-best formula for public provision in a two-type model derived by Boadway and Keen (1993), is that here the right-hand side is multiplied by the term $(1-\bar{\alpha})/(1-\alpha_d)$, which arises because private consumption is (in part) a positional good. The average degree of consumption positionality $\bar{\alpha}$ works to decrease the social cost of public provision (relative to private consumption), and therefore to increase the provision of the public good. The intuition is simply that private consumption gives rise to negative positional externalities, whereas public consumption does not. This effect can, in turn, either be counteracted or reinforced by the component reflecting differences in the degree of consumption positionality α_d between the mimicker and the low-ability type, depending on whether increased private consumption contributes to relax ($\alpha_d > 0$) or tighten ($\alpha_d < 0$) the self-selection constraint.

V. Conclusion

To the best of our knowledge, we are the first to explicitly highlight the role of leisure positionality when theoretically analyzing optimal public policy. In line with previous studies on optimal taxation under relative-consumption concerns, first we have shown that increased consumption positionality under reasonable assumptions implies higher marginal income tax rates for both high-ability and low-ability types. Perhaps in line with initial conjectures, then we have shown that leisure positionality has an offsetting role. However, this offsetting role is not symmetric. In particular, we have shown that concern about relative leisure implies a progressive income tax component (i.e., one that is larger for the high-ability type than for the low-ability type).

Thus, both effects have important implications for redistributive policy. Consumption positionality basically reduces the social cost of redistribution, because income taxes in part internalize positional consumption externalities. Leisure positionality reduces the size of these externalities. However, this effect is larger for the low-ability type, because the low-ability type has to reduce leisure more than the high-ability type for the same consumption increase. This results in a marginal income tax component that is larger for the high-ability type than for the low-ability type. We have also shown how the government might exploit differences in the degrees of consumption and leisure positionality across individuals in order to relax the self-selection constraint. If the mimicking high-ability type is less consumption positional and more leisure positional than the (mimicked) low-ability type, the government might relax the self-selection constraint by implementing higher marginal income tax rates for both ability types. The opposite policy incentive applies if the mimicker is more consumption positional and less leisure positional than the low-ability type.

Finally, our results show that leisure positionality does not directly affect the formula for public-good provision if derived in the same general way as in earlier comparable literature. In fact, it is only the positional preferences for consumption that modify the policy rule for public provision relative to the second-best formula, which would apply without any positional concerns. This means that there is no offsetting role of leisure positionality here. Overall, the results imply that relative concerns have important implications for both optimal income taxation and provision of public goods, and that this is also the case when people's preferences are equally positional in leisure and private consumption.

There are several possible extensions for future research. For example, this model and virtually all models that deal with optimal public policy under social comparisons assume that the dimensions in which people compare themselves are fixed. Yet, as pointed out by Oxoby (2004), the subjective importance attached to comparisons along different dimensions might, in part, be endogenous. He considers a model where people, because of cognitive dissonance, prefer to compare themselves with others in a dimension where they are relatively more successful. This might imply that low-ability individuals want to compare themselves more along the leisure dimension, whereas high-ability individuals prefer the consumption dimension, which might, in turn, increase income and consumption differences between productivity types. An interesting topic for future research would be to model such effects in an optimal income taxation framework. Another potentially fruitful idea is to consider leisure as an instrument that can be used to make one's private consumption more visible, and hence to signal wealth more effectively.

Appendix

Derivation of Equation (12)

We consider the marginal income tax rate implemented for the low-ability type. By combining equations (7) and (8), we obtain

$$\frac{u_z^1}{u_x^1}\left(\lambda\hat{u}_x^2 + \gamma n^1 - \frac{n^1}{n^1+n^2}\frac{\partial\mathcal{L}}{\partial\bar{x}}\right) = \lambda\phi\hat{u}_z^2 + \gamma n^1 w^1 - \frac{n^1}{n^1+n^2}\frac{\partial\mathcal{L}}{\partial\bar{z}}. \quad \text{(A1)}$$

Using the private first-order condition for the number of work hours, $w^1 - u_z^1/u_x^1 = w^1 T'(w^1 l^1)$, and substituting into equation (A1), we find

$$\gamma n^1 w^1 T'\big(w^1 l^1\big) = \lambda \hat{u}_x^2 \big(MRS_{z,x}^1 - M\hat{R}S_{z,x}^2\big) + \frac{n^1}{n^1+n^2}\left(\frac{\partial \mathcal{L}}{\partial \bar{z}} - MRS_{z,x}^1 \frac{\partial \mathcal{L}}{\partial \bar{x}}\right), \quad \text{(A2)}$$

where we have used $MRS_{z,x}^1 = u_z^1/u_x^1$ and $M\hat{R}S_{z,x}^2 = \hat{u}_z^2/\hat{u}_x^2$. Rearranging gives equation (12) for the low-ability type. The corresponding formula for the high-ability type is derived in the same general way. ■

Derivation of Equations (13a) and (13b)

Note from equation (1) that $u_x^i = v_x^i + v_{\Delta x}^i$, $u_{\bar{x}}^i = -v_{\Delta x}^i$, $u_z^i = v_z^i + v_{\Delta z}^i$, and $u_{\bar{z}}^i = -v_{\Delta z}^i$. Thus, we can use equation (2) to derive

$$u_{\bar{x}}^i = -\alpha^i u_x^i \quad \text{(A3)}$$

$$u_{\bar{z}}^i = -\beta^i u_z^i \quad \text{(A4)}$$

for $i = 1, 2$. By analogy, we can derive

$$\hat{u}_{\bar{x}}^2 = -\hat{\alpha}^2 \hat{u}_x^2, \quad \text{(A5)}$$

$$\hat{u}_{\bar{z}}^2 = -\hat{\beta}^2 \hat{u}_z^2, \quad \text{(A6)}$$

for the mimicker. Equations (A3)–(A6) imply

$$\frac{\partial \mathcal{L}}{\partial \bar{x}} = u_{\bar{x}}^1 + (\mu+\lambda)\, u_{\bar{x}}^2 - \lambda \hat{u}_{\bar{x}}^2 = -\alpha^1 u_x^1 - (\mu+\lambda)\, \alpha^2 u_x^2 + \lambda \hat{\alpha}^2 \hat{u}_x^2 \quad \text{(A7)}$$

and

$$\frac{\partial \mathcal{L}}{\partial \bar{z}} = u_{\bar{z}}^1 + (\mu+\lambda)\, u_{\bar{z}}^2 - \lambda \hat{u}_{\bar{z}}^2 = -\beta^1 u_z^1 - (\mu+\lambda)\, \beta^2 u_z^2 + \lambda \hat{\beta}^2 \hat{u}_z^2. \quad \text{(A8)}$$

Now, we use equations (8) and (10) to solve for u_x^1 and $(\mu+\lambda)u_x^2$, respectively, and equations (7) and (9) to solve for u_z^1 and $(\mu+\lambda)u_z^2$, respectively. Substituting into equations (A7) and (A8) and rearranging, we obtain equations (13a) and (13b). ■

Marginal Income Tax Formula in Proposition 2

Substituting equations (13a) and (13b) into equation (12) implies

$$\begin{aligned} T'(w^i l^i) = \tau^i + \frac{1}{N\gamma w^i}\Bigg[& -\gamma N \frac{\bar{\beta}\bar{w}(1+\zeta)}{1-\bar{\beta}} + \lambda \hat{u}_z^2 \frac{\hat{\beta}^2 - \phi\beta^1}{1-\bar{\beta}} \\ & - MRS_{z,x}^i \left(-\gamma N \frac{\bar{\alpha}}{1-\bar{\alpha}} + \lambda \hat{u}_x^2 \frac{\hat{\alpha}^2 - \alpha^1}{1-\bar{\alpha}} \right) \Bigg]. \end{aligned} \quad \text{(A9)}$$

By using $MRS^i_{z,x} = w^i[1 - T'(w^i l^i)]$, substituting into equation (A9), solving for $T'(w^i l^i)$, and rearranging, we obtain the marginal income tax rate presented in Proposition 2. The marginal income tax rate in Proposition 1 can then be derived as the special case where $\lambda = 0$ and $\tau^i = 0$. ■

Public Good

We define $MRS^i_{g,x} = u^i_g/u^i_x$ for $i = 1, 2$ and $M\hat{R}S^2_{g,x} = \hat{u}^2_g/\hat{u}^2_x$. Then, by using equations (8) and (10), we can rewrite equation (11) as

$$0 = MRS^1_{g,x}\left(\lambda\hat{u}^2_x + \gamma n^1 - \frac{n^1}{n^1+n^2}\frac{\partial\mathcal{L}}{\partial\bar{x}}\right) + MRS^2_{g,x}\left(\gamma n^2 - \frac{n^2}{n^1+n^2}\frac{\partial\mathcal{L}}{\partial\bar{x}}\right) - \lambda\hat{u}^2_x M\hat{R}S^2_{g,x} - \gamma. \tag{A10}$$

Finally, substituting equation (13a) into equation (A10) and rearranging, we obtain the policy rule for public provision in Proposition 3. ■

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