A Note on Optimal Taxation under Status Consumption and Preferences for Equality*

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Abstract

This note analyzes optimal taxation when (i) a fraction of people has positional preferences, and (ii) concerns for relative consumption and preferences for equality are operative simultaneously. We show that incentive compatibility motivates a regressive marginal tax structure, which in the end implies that people with positional preferences are taxed at a lower marginal rate than people without such preferences. A counteracting mechanism arises if those who are not concerned with their relative consumption have preferences for income-equality, even if people with positional preferences should still be taxed at a lower marginal rate than motivated by their contributions to externalities.

Keywords: Optimal taxation, relative consumption, equality

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1. Introduction

This note addresses two related research questions: (i) How is the optimal marginal tax structure affected by heterogeneity in terms of preferences for relative consumption? (ii) How should the marginal tax structure be modified if preferences for relative consumption and equality (which might be in conflict with one another) are operative simultaneously? Although both questions are highly relevant based on empirical and experimental research, none of them has been thoroughly addressed in earlier studies. Our study serves to bridge this gap.

There is a large literature based on happiness research and questionnaire-experiments showing that people are concerned with their relative consumption, and that relative consumption plays an important role for individual well-being.[1] Research on optimal nonlinear taxation in economies where individuals are concerned with their relative consumption typically assumes that all people have such concerns, and the results imply much higher marginal tax rates than in standard models where people are completely non-positional (e.g., Oswald, 1983; Tuomala, 1990; Aronsson and Johansson-Stenman, 2008, 2010, 2018; Kanbur and Tuomala, 2013).

Yet, although degrees of positionality (the extent to which increased relative consumption matters for the marginal utility of consumption) are often found to be quite high on average,[2] they also seem to vary substantially among subjects in questionnaire-experimental studies, suggesting that status concerns may vary in the population.[3] We show that such heterogeneity might itself motivate a more regressive marginal tax structure.[4] Furthermore, relative concerns do not necessarily motivate higher marginal taxes for everybody.

Turning to the second research question, we wish to examine joint policy implications of preferences for status consumption and equality. Despite empirical evidence in favor of inequality-aversion and other social preferences,[5] models where individuals derive well-being from motives other than material self-interest are rare in the literature on optimal taxation.

[1] This evidence includes Easterlin (2001), Johansson-Stenman et al. (2002), Blanchflower and Oswald (2005), Ferrer-i-Carbonell (2005), Luttmer (2005), Solnick and Hemenway (2005), Carlsson et al. (2007), and Clark and Senik (2010).

[2] See Wendner and Goulder (2008) for an overview.

[3] See, e.g., Solnick and Hemenway (1998) and Alpizar et al. (2005). In Solnick and Hemenway, only a fraction of the responses clearly indicates income positionality, whereas Alpizar et al. found that the distribution is almost bipolar in the sense that people are either very positional or almost non-positional.

[4] Dodds (2012) analyzes optimal linear income taxation in an economy where a fraction of the population is concerned with their relative consumption. By using numerical simulations, he finds that the income tax rate increases in response to an increase in the share of individuals with positional preferences.

[5] See Fehr and Schmidt (1999), Bolton and Ockenfels (2000), Charness and Rabin (2002) and references therein. See also, e.g., Fisman et al. (2007), Bellemare et al. (2008), and Beranek et al. (2015).

Exceptions are Aronsson and Johansson-Stenman (2020a, 2020b) and Nyborg-Sjøstad and Cowell (2021), who examine various aspects of optimal taxation in economies where people care about equality. Their results show that inequality aversion and social preferences may have profound effects on the marginal tax structure, and that the (qualitative and quantitative) results are sensitive to the underlying concepts of equality. However, these studies assume that all individuals have preferences for equality, and none of them allows positional preferences and preferences for equality to be operative at the same time.[6] We bridge this gap by assuming that a fraction of the population is characterized by positional preferences and another fraction by preferences for equality.

The outline of the note is as follows. In Section 2, we present the model. Section 3 addresses a special case where none of the agents have preferences for equality, i.e., individual preferences only differ in terms of their concerns for relative consumption. We derive the first-best resource allocation that would be chosen by a welfarist social planner and show that this outcome is not incentive compatible. We also characterize the optimal marginal tax policy satisfying incentive compatibility. Section 4 analyzes the full model, where people are either concerned with their relative consumption or have preferences for equality. Section 5 concludes. The derivation of mathematical results can be found in an Online Appendix.

2. The Model

Consider an economy where output is produced by a linear technology, implying that the gross wage rate w is fixed and the profit is zero. The economy is made up of two agent types; one with positional preferences (type p) and the other with preferences for equality in terms of the disposable income (type n). The utility function of an individual of each agent type can be written as

$$U^p = U^p(c^p, z^p, \Delta^p) = u(c^p, z^p) + \phi(\Delta^p) \tag{1}$$

$$U^n = U^n(c^n, z^n, \sigma) = u(c^n, z^n) + \psi(\sigma). \tag{2}$$

where c denotes consumption (or equivalently the disposable income) and z denotes leisure. The preferences for consumption and leisure are captured by the sub-utility function $u(c, z)$. This function is identical for both agent types and satisfies $u_c, u_z > 0$, $u_{cc}, u_{zz} < 0$. We also

[6] The implications of multiple market failures are rarely addressed in the context of optimal taxation. Exceptions include Eckerstorfer (2014) dealing with tax policy implications of multiple positional externalities, and Aronsson and Johansson-Stenman (2021) analyzing optimal redistributive income taxation in an economy with positional externalities and equilibrium unemployment.

assume that $u_{cz} = 0$.[7] The positional preference held by individuals of type p implies that they compare their own consumption with the average consumption in the economy, $\bar{c} = \sum_i c^i N^i / N$ for $i = p, n$, where N^i is the number of persons of agent type i and $N = \sum_i N^i$. The relative consumption of an individual of type p is given by $\Delta^p = c^p - \bar{c}$, and the utility of relative consumption is captured by the function $\phi(\Delta^p)$, which is increasing and strictly concave. Individuals of type n, have preferences for income equality captured by the function $\psi(\sigma)$, which is increasing and strictly concave in a measure of income equality, σ, to be defined below.

Since positional preferences effectively imply that individuals are better off when their consumption is high relative to that of referent others, while the preferences for income equality instead imply that individuals are better off when consumption/income is more evenly distributed in the population, the two types of preferences are in conflict with each other. This motivates our assumption that an individual does not simultaneously have positional preferences and preferences for income equality. Finally, we assume that all individuals treat $\bar{c}$ and σ as exogenous, which is a standard assumption in economies with externalities.

Individuals of both types receive the same market wage, w, and the hours of work are given by $l^i = 1 - z^i$ for an individual of any type $i = p, n$. The budget constraint becomes $c^i = y^i - T(y^i)$ where $y^i = wl^i$ is the pre-tax income, and $T(\cdot)$ is a general income tax function. Let $MRS^p = U_z^p / (U_c^p + U_\Delta^p)$ and $MRS^n = U_z^n / U_c^n$ denote the marginal rate of substitution between leisure and consumption/disposable income for individuals of type p and n, respectively. Substituting the budget and time constraints into the utility function and maximizing with respect to l^i produces the first-order condition $MRS^i = (1 - T_y^i)w$, where $T_y^i = dT(y^i)/dy$ is the marginal income tax rate.

3. Tax Policy When a Fraction of the Population Has Positional Preferences

Consider first a simplified version of the model where agent type n does not have preferences for income equality, in which case the utility function of individuals of this type reduces to $U^n = u(c^n, z^n)$. We begin by characterizing the first-best resource allocation in this context and then continue by examining the second-best optimal marginal tax policy.

[7] This assumption simplifies the analysis; it is not necessary for the results derived below.

3.1 First-Best and Incentive Compatibility

How would a social planner allocate the resources if individuals could be distinguished based on their preferences for relative consumption? Suppose that the planner maximizes a utilitarian social welfare function, $W = \sum_i U^i$, subject to the resource constraint $\sum_i N^i(wl^i - c^i) = 0$, the time constraints $1 = l^i + z^i$ for $i = p, n$, and the externality constraint $\bar{c} = \sum_i c^i N^i / N$. The Lagrangean associated with this problem can be written as

$$\mathbb{Z} = \sum_i N^i u(c^i, 1 - l^i) + N^p \phi(c^p - \bar{c}) + \gamma \sum_i N^i(wl^i - c^i) + \mu \left[\bar{c} - \frac{\sum_i c^i N^i}{N}\right] \tag{3}$$

where γ and μ are the Lagrange multipliers associated with the resource constraint and the externality constraint, respectively. The social first-order conditions are

$$\frac{\partial \mathbb{Z}}{\partial c^p} = N^p \left(u_c^p + \phi_\Delta^p - \gamma - \frac{\mu}{N}\right) = 0 \tag{4}$$

$$\frac{\partial \mathbb{Z}}{\partial l^p} = N^p(w\gamma - u_z^p) = 0 \tag{5}$$

$$\frac{\partial \mathbb{Z}}{\partial c^n} = N^n \left(u_c^n - \gamma - \frac{\mu}{N}\right) = 0 \tag{6}$$

$$\frac{\partial \mathbb{Z}}{\partial l^n} = N^n(w\gamma - u_z^n) = 0 \tag{7}$$

$$\frac{\partial \mathbb{Z}}{\partial \bar{c}} = \mu - N^p \phi_\Delta^p = 0. \tag{8}$$

Substituting $\mu = N^p \phi_\Delta^p > 0$ from equation (8) into equations (4) and (6), and combining the resulting expressions, give $u_c(c^{p,*}) + \phi_\Delta(\Delta^{p,*}) = u_c(c^{n,*})$, where superscript "*" indicates first-best. This equality implies $c^{p,*} > c^{n,*}$. Next, we combine equations (5) and (7) to obtain $u_z(z^{p,*}) = u_z(z^{n,*})$, which implies $z^{p,*} = z^{n,*}$. Since $c^{p,*} > c^{n,*}$ and $z^{p,*} = z^{n,*}$, it follows that $u(c^{p,*}, z^{p,*}) > u(c^{n,*}, z^{n,*})$ holds in the first-best optimum. We can therefore conclude that individuals of both agent types would prefer the bundle $(c^{p,*}, z^{p,*})$ over the bundle $(c^{n,*}, z^{n,*})$.

3.2 Second-Best Allocation and Tax Policy

Preferences are private information not known by the government. This information asymmetry implies that the government needs to take the following self-selection constraints into account:

$$u(c^p, z^p) + \phi(c^p - \bar{c}) \geq u(c^n, z^n) + \phi(c^n - \bar{c}) \tag{9a}$$

$$u(c^n, z^n) \geq u(c^p, z^p). \tag{9b}$$

The first constraint ensures that the bundle (c^p, z^p), which is intended for type *p*, is preferred by individuals of this type over the bundle (c^n, z^n). Analogously, the second constraint ensures that (c^n, z^n), which is the bundle intended for type *n*, is preferred by individuals of this type over (c^p, z^p). Note that the second constraint is not satisfied if the government tries to implement the first-best resource allocation in Subsection 3.1. Therefore, self-selection constraint (9b) will bind and limits the redistribution towards type *p* below the level implied by the first-best resource allocation. It is straightforward to show that (9a) will not bind when (9b) is binding.

Let us now solve for the second-best optimal tax policy that the government implements under this information asymmetry. Since $T(\cdot)$ is a general income tax, the government can implement any desired combination of c^i and l^i for agent type $i = p, n$, subject to constraints. We can therefore use c^p, c^n, l^p and l^n as direct decision-variables in the social optimization problem. The Lagrangean associated with the government´s maximization problem can then be written as follows:

$$\mathbb{Z} = \sum_i N^i u\left(c^i, 1 - l^i\right) + N^p \phi(c^p - \bar{c}) + \gamma \sum_i N^i\left[wl^i - c^i\right] + \mu\left[\bar{c} - \frac{\sum_i N^i c^i}{N}\right]$$
$$+\lambda[u(c^n, 1 - l^n) - u(c^p, 1 - l^p)] \quad (10)$$

where we have used $T\left(wl^i\right) = wl^i - c^i$, and where λ denotes the Lagrange multiplier associated with self-selection constraint (9b). The policy rules for marginal income taxation are presented in Proposition 1.

Proposition 1. *If only a fraction of the population has preferences for relative consumption, the second-best optimal marginal tax policy satisfies*

$$\frac{T_y^p}{1-T_y^p} = \frac{\mu}{\gamma}\frac{1}{N} - \frac{\lambda}{\gamma}\frac{\phi_\Delta^p}{N^p} \quad (11)$$

$$\frac{T_y^n}{1-T_y^n} = \frac{\mu}{\gamma}\frac{1}{N} \quad (12)$$

Hence, $T_y^n > T_y^p$.

To interpret Proposition 1, note first that the consumption choices made by all agents in the economy lead to negative positional externalities affecting individuals of type p via $\bar{c} = \sum_j c^j N^j / N$. Thus, the private marginal valuation of consumption exceeds the social marginal valuation, and this discrepancy distorts the private labor supply decision and motivates higher marginal taxation of everybody (as long as all individuals contribute to the positional externality). This is captured by the first term on the right-hand side (RHS) of equations (11) and (12), where $\mu/\gamma = N^p \phi_\Delta^p/\gamma > 0$.

The second term on the RHS of equation (11) appears because self-selection constraint (9b) is binding ($\lambda > 0$). This term is negative and contributes to reduce the marginal income tax implemented for individuals of type *p*. The intuition is that the first-best violates incentive compatibility, implying that the second-best policy must reduce u^p relative to u^n (compared to the first-best resource allocation). This can be achieved by implementing a lower marginal income tax for individuals of type *p*, in order to increase their labor supply, accompanied by an increase in their average tax rate such that the additional income cannot be used for consumption. This adjustment is carried out until the self-selection constraint is satisfied. The following corollary is an immediate consequence of Proposition 1:

Corollary 1. *Under asymmetric information about preference type, agents with positional preferences should face a lower marginal income tax rate than those without positional preferences. In turn, this motivates a regressive marginal tax structure.*

4. Positional Preferences and Preferences for Equality

Let us now return to the general model in Section 2, where individuals of type *n* have preferences for post-tax income equality. We begin by defining the measure σ through the following loss function associated with post-tax income deviations from the average level $\bar{c}$:

$$L(c^p, c^n) = \frac{\alpha^p}{2}(c^p - \bar{c})^2 + \frac{\alpha^n}{2}(c^n - \bar{c})^2 = \frac{1}{2}\beta^p(c^p - c^n)^2 + \frac{1}{2}\beta^n(c^n - c^p)^2. \tag{13}$$

If $c^p > c^n$, we can interpret $\alpha^p > 0$ as type *n*'s aversion towards deviations upwards from $\bar{c}$ and $\alpha^n > 0$ as type *n*'s aversion towards deviations downwards from $\bar{c}$, while $\beta^p = \alpha^p(N^n/N)^2 > 0$ and $\beta^n = \alpha^n(N^p/N)^2 > 0$ are obtained by using $\bar{c} = \sum_i c^i N^i/N$ in the second step in (13). The measure of post-tax income equality is then defined as $\sigma = -L(c^p, c^n)$, which satisfies the properties $\partial L/\partial c^p = (\beta^p + \beta^n)(c^p - c^n) > 0$ and $\partial L/\partial c^n = -\partial L/\partial c^p < 0$. With this extension, the Lagrangean associated with the government´s maximization problem can be written as

$$\mathbb{Z} = N^p U(c^p, 1 - l^p, c^p - \bar{c}) + N^n U(c^n, 1 - l^n, \sigma) + \gamma \textstyle\sum_i [wl^i - c^i] N^i$$
$$+\mu\left[\bar{c} - \frac{\sum_i N^i c^i}{N}\right] + \rho[-L(c^p, c^n) - \sigma] + \lambda[u(c^n, 1 - l^n) - u(c^p, 1 - l^p)]. \tag{14}$$

Note that we have incorporated the new externality constraint $\sigma = -L(c^p, c^n)$ as an explicit restriction, where ρ denotes the associated Lagrange multiplier. The marginal income tax structure is characterized in Proposition 2.

Proposition 2. *The marginal income tax policy satisfies*

$$\frac{T_y^p}{1-T_y^p} = \frac{\mu}{\gamma}\frac{1}{N} - \frac{\lambda}{\gamma}\frac{U_\Delta^p}{N^p} + \frac{\rho}{\gamma}\frac{1}{N^p}\frac{\partial L}{\partial c^p} \tag{15}$$

$$\frac{T_y^n}{1-T_y^n} = \frac{\mu}{\gamma}\frac{1}{N} + \frac{\rho}{\gamma}\frac{1}{N^n}\frac{\partial L}{\partial c^n}. \tag{16}$$

Compared to equations (11) and (12), each policy rule in Proposition 2 contains an additional term (the final term on the RHS), which is proportional to the shadow price $\rho/\gamma = N^n U_\sigma^n/\gamma > 0$. This component reflects the impact on the marginal tax structure of type *n*'s preferences for equality. By using equations (15) and (16) together with the comparative static properties of the function $L(\cdot)$, and conditional on that $c^p > c^n$ holds at the second-best optimum, we can derive the following corollary to Proposition 2:

Corollary 2. *(i) Type n individuals' preferences for equality in disposable income imply higher marginal income taxation of type p and lower marginal income taxation of type n, ceteris paribus. (ii) Type p individuals are still taxed at a marginal rate that falls short of their marginal contribution to the externalities.*

The intuition behind part (i) of the corollary is that increased consumption among individuals of type *n* and decreased consumption among individuals of type *p* leads to less inequality. Part (ii) reflects the mechanism described in Corollary 1: incentive compatibility necessitates that type *p* supplies more labor than under first-best conditions, which is accomplished through a lower marginal tax rate.

To take this discussion a bit further, we need to derive expressions for the social shadow prices of the externalities, μ/γ and ρ/γ, at the second-best optimum, which is the topic of the next subsection.

4.1 Social Shadow Prices of the Externalities

Each externality in our model creates a discrepancy between the private and social marginal valuation of an additional dollar. These discrepancies imply, in turn, that the social shadow prices of the externalities are intertwined when they are expressed in terms of private marginal willingness to pay measures. In this subsection, we briefly characterize the shadow prices of the two externalities.

Note first that the shadow prices of the two externalities can be written as $\mu/\gamma = N^p MWP^p_{\bar{c},soc}$ and $\rho/\gamma = N^n MWP^n_{\sigma,soc}$, where $MWP^p_{\bar{c},soc} = -U^p_{\bar{c}}/\gamma > 0$ and $MWP^n_{\sigma,soc} = U^n_{\sigma}/\gamma > 0$ are interpretable in terms of the social marginal value of avoiding (benefitting from) the negative (positive) externality. Since actual behavior is determined by private valuations, which can be estimated through preference elicitation methods (such as contingent valuation), it is convenient to rewrite the equations for the shadow prices in terms of the corresponding private marginal willingness to pay measures. Therefore, let $MWP^p_{\bar{c}} = -U^p_{\bar{c}}/\left(U^p_c + U^p_\Delta\right)$ denote a type p individual's marginal willingness to pay to avoid the positional externality, and let $MWP^n_{\sigma} = U^n_{\sigma}/U^n_c$ denote a type n individual's willingness to pay for an increase in σ (the measure of equality).

It is instructive to begin the analysis by examining how the marginal utility cost of public funds (γ) differs from the private marginal utility of consumption ($U^p_c + U^p_\Delta$ for type p and U^n_c for type n) by writing the social first-order conditions for c^p and c^n to read

$$\gamma = \left(U^p_c + U^p_\Delta\right) - \frac{\mu}{N^p}\frac{\partial \bar{c}}{\partial c^p} - \frac{\rho}{N^p}\frac{\partial L}{\partial c^p} - \frac{\lambda}{N^p}U^p_c \tag{17}$$

$$\gamma = U^n_c - \frac{\mu}{N^n}\frac{\partial \bar{c}}{\partial c^n} - \frac{\rho}{N^n}\frac{\partial L}{\partial c^n} + \frac{\lambda}{N^n}U^n_c. \tag{18}$$

The RHS of equations (17) and (18) suggests that this discrepancy arises for three reasons. First, individuals of both types contribute to the positional externality (the term proportional to μ), which reduces the marginal cost of public funds. Second, individuals of both types also contribute to the externality attached to inequality (the term proportional to ρ). Since increased disposable income among individuals of type p (n) leads to more (less) inequality through a smaller (larger) σ, ceteris paribus, this causes the government to reduce (increase) its marginal valuation of c^p (c^n). Finally, an increase in c^p (c^n) tightens (relaxes) the self-selection constraint, which induces the government to attach a lower (higher) marginal value to c^p (c^n). These three channels, through which the social marginal valuation differs from the private marginal valuations, will be referred to as the positionality effect, the income equality effect, and the self-selection effect, respectively, on social marginal valuations.

Together with the private marginal willingness to pay associated with each externality, the three mechanisms described in equations (17) and (18) determine the social shadow prices of the two externalities. Formulas for the social shadow prices are presented in Proposition 3.

Proposition 3. *The social shadow prices of the two externalities satisfy*

$$\frac{\mu}{\gamma} = \left(N^p MWP_{\bar{c}}^p + \frac{\rho}{\gamma} MWP_{\bar{c}}^p \frac{\partial L}{\partial c^p} + \lambda^p MWP_{\bar{c}}^p\right) \frac{1}{1-\overline{MWP}_{\bar{c}}} \tag{19}$$

$$\frac{\rho}{\gamma} = \left(N^n MWP_{\sigma}^n + \frac{\mu}{\gamma} MWP_{\sigma}^n \frac{\partial \bar{c}}{\partial c^n} - \lambda^n MWP_{\sigma}^n\right) \frac{1}{1-\Phi} \tag{20}$$

where $\lambda^p = \lambda U_c^p/\gamma$, $\lambda^n = \lambda U_c^n/\gamma$, $\overline{MWP}_{\bar{c}} = N^p MWP_{\bar{c}}^p/N < 1$, *and* $\Phi = MWP_{\sigma}^n \frac{\partial L}{\partial c^n} < 0$.

The first term in brackets on the RHS of equations (19) and (20) is the sum of the private marginal willingness to pay to avoid (benefitting from) the respective externality measured among those affected. To interpret the remaining terms inside brackets, note that the income equality effect defined above causes $U_c^p + U_\Delta^p$ to exceed γ, ceteris paribus, which, in turn, works to reduce $MWP_{\bar{c}}^p = -U_{\bar{c}}^p/(U_c^p + U_\Delta^p)$ relative to $MWP_{\bar{c},soc}^p = -U_{\bar{c}}^p/\gamma$. The second term inside brackets in (19), which is positive, adjusts for this discrepancy. Also, the self-selection effect causes $U_c^p + U_\Delta^p$ to exceed γ, which provides an additional channel through which $MWP_{\bar{c}}^p$ falls short of $MWP_{\bar{c},soc}^p$. The adjustment of this discrepancy is captured by the third term inside brackets in (19). Finally, the feedback term $1/(1-\overline{MWP}_{\bar{c}}) > 1$ adjusts for the positionality effect. The corresponding terms in equation (20) can be interpreted in a similar way. Thus, the second and third terms inside brackets in (20) adjust for the positionality and the self-selection effects, respectively, while the feedback term $1/(1-\Phi) < 1$ adjusts for the income equality effect.

Note that the interaction effect between the externalities captured by the second term inside brackets in (19) and (20) contribute to increase both μ/γ and ρ/γ. This can be seen more clearly if we solve equation system (19)-(20) to obtain an unconditional, yet equivalent, formulations of the shadow price equations

$$\frac{\mu}{\gamma} = \left[N^p MWP_{\bar{c}}^p + \frac{MWP_{\bar{c}}^p MWP_{\sigma}^n}{(1-\Phi)} N^n \frac{\partial L}{\partial c^p} + \frac{\lambda}{\gamma} MWP_{\bar{c}}^p \left(U_c^p - U_c^n \frac{MWP_{\sigma}^n}{(1-\Phi)} \frac{\partial L}{\partial c^p}\right)\right] \frac{1}{\Psi(1-\overline{MWP}_{\bar{c}})} \tag{21}$$

$$\frac{\rho}{\gamma} = \left[N^n MWP_{\sigma}^n + \frac{MWP_{\bar{c}}^p MWP_{\sigma}^n}{(1-\overline{MWP}_{\bar{c}})} N^p \frac{\partial \bar{c}}{\partial c^n} + \frac{\lambda}{\gamma} MWP_{\sigma}^n \left(U_c^p \frac{MWP_{\bar{c}}^p}{(1-\overline{MWP}_{\bar{c}})} \frac{\partial \bar{c}}{\partial c^n} - U_c^n\right)\right] \frac{1}{\Psi(1-\Phi)} \tag{22}$$

where

$$\Psi = 1 - \frac{MWP_{\bar{c}}^p}{(1-\overline{MWP}_{\bar{c}})} \frac{MWP_{\sigma}^n}{(1-\Phi)} \frac{\partial L}{\partial c^p} \frac{\partial \bar{c}}{\partial c^n}.$$

In equations (21) and (22), the interaction effect between the two externalities is reflected in the second term inside square brackets, which is positive. The third term in square brackets is interpretable in terms of a net effect of the self-selection constraint, which can be either positive or negative since the self-selection constraint affects equations (19) and (20) in opposite directions.

4.2 Alternative Marginal Income Tax Formulas

By substituting equations (21) and (22) into equations (15) and (16), we can gain further insights into the mechanisms underlying marginal income taxation. To write these expressions as compactly as possible, we introduce the following short notation:

$$\varepsilon^i = \frac{1}{\Psi(1-\overline{MWP}_{\bar{c}})}\frac{1}{N} > 0, \qquad \eta^i = \frac{1}{\Psi(1-\Phi)}\frac{1}{N^i}\frac{\partial L}{\partial c^i}$$

$$\theta^p = \frac{\varepsilon^p N^n}{(1-\Phi)}\frac{\partial L}{\partial c^p} + \frac{\eta^p N^p}{(1-\overline{MWP}_{\bar{c}})}\frac{\partial \bar{c}}{\partial c^n} > 0, \qquad \theta^n = \frac{\varepsilon^n N^n}{(1-\Phi)}\frac{\partial L}{\partial c^p} + \frac{\eta^n N^p}{(1-\overline{MWP}_{\bar{c}})}\frac{\partial \bar{c}}{\partial c^n} \gtreqless 0$$

$$\kappa^p = MWP^p_{\bar{c}}\left(\varepsilon^p + \eta^p \frac{MWP^n_\sigma}{(1-\overline{MWP}_{\bar{c}})}\frac{\partial \bar{c}}{\partial c^n}\right) > 0, \qquad \kappa^n = MWP^p_{\bar{c}}\left(\varepsilon^n + \eta^n \frac{MWP^n_\sigma}{(1-\overline{MWP}_{\bar{c}})}\frac{\partial \bar{c}}{\partial c^n}\right) > 0$$

$$\xi^i = MWP^n_\sigma\left(\eta^i + \varepsilon^i \frac{MWP^p_{\bar{c}}}{(1-\Phi)}\frac{\partial L}{\partial c^p}\right)$$

where $\eta^p > 0$, $\eta^n < 0$, $\xi^p > 0$ and $\xi^n \gtreqless 0$. With these definitions at hand, we can derive the following result:

Proposition 4. *The policy rules for marginal taxation in equations (15) and (16) can equivalently be written as*

$$\frac{T^p_y}{1-T^p_y} = \varepsilon^p N^p MWP^p_{\bar{c}} + \eta^p N^n MWP^n_\sigma + \theta^p MWP^p_{\bar{c}} MWP^n_\sigma + \frac{\lambda}{\gamma}\left(\kappa^p U^p_c - \xi^p U^n_c\right) - \frac{\lambda}{\gamma}\frac{U^p_\Delta}{N^p} \quad (23)$$

$$\frac{T^n_y}{1-T^n_y} = \varepsilon^n N^p MWP^p_{\bar{c}} + \eta^n N^n MWP^n_\sigma + \theta^n MWP^p_{\bar{c}} MWP^n_\sigma + \frac{\lambda}{\gamma}\left(\kappa^n U^p_c - \xi^n U^n_c\right). \quad (24)$$

As explained above, there are two motives for distorting the labor supply in this model: externality correction (captured by the first three terms on the RHS of each formula) and relaxation of the self-selection constraint. The first term reflects the Pigouvian tax element attached to the positional externality, which contributes to increase both marginal tax rates, and the second is the corresponding Pigouvian element attached to the equality-externality. Since $c^p > c^n$, this component is positive in (23) and negative in (24). The intuition is that equality is achieved through a simultaneous reduction in c^p and increase in c^n.

The interaction effect described above is captured by the third term in each marginal income tax formula, which is proportional to the product $MWP_{\bar{c}}^{p} MWP_{\sigma}^{n}$. As such, it reflects the interdependence between the two shadow prices in equations (15) and (16). Whereas the interaction term in (23) contributes to increase the marginal tax implemented for individuals of type p, the interaction effect in (24) is ambiguous. This is because decreased consumption among type p individuals reduces the positional externality as well as reduces the inequality, while decreased consumption among type n individuals leads to a decrease in the positional externality and increased inequality.

The self-selection constraint affects the marginal tax policy via two channels. One is an indirect effect via the two social shadow prices, μ/γ and ρ/γ, which is captured by the fourth term on the RHS of equations (23) and (24). Since we concluded in subsection 4.1 that the net effect of the self-selection constraint on each shadow price is ambiguous in sign, it follows that the corresponding effect on the marginal income tax rates is ambiguous as well. Finally, the fifth term in equation (23) it is equivalent to the direct effect of the self-selection constraint in equation (11) and contributes to a lower marginal income tax for individuals of type p.

5. Summary and Conclusion

We have analyzed optimal nonlinear income taxation in an economy where a fraction of the population has positional preferences, while the remaining fraction is concerned with income equality in society. The take-home message is threefold. First, if there are no preferences for equality, incentive compatibility necessitates a lower marginal income tax implemented for people with positional preferences than for people without such preferences. In turn, this motivates a regressive marginal tax structure in our model. Second, people with positional preferences should be taxed at a lower marginal rate than motivated by their marginal contribution to externalities, which applies regardless of whether the non-positional fraction of the population has preferences for equality. Finally, with multiple consumption externalities, the social shadow prices of these externalities become interdependent, which leads to interaction effects in the policy rules for marginal taxation. This interaction effect contributes to increase the marginal income tax implemented for high-income earners (people with positional preferences in our model), since a decrease in their disposable income reduces the positional externality as well as reduces the inequality. The sign of the corresponding interaction effect is ambiguous for low-income earners (people with preferences for equality in our model), since a decrease in their disposable income affects the two externalities in opposite directions.

An interesting extension would be to go further in the study of multiple externalities and their joint implications for optimal taxation. For instance, environmental consumption externalities are typically operative alongside positional externalities and equality externalities. In addition, both relative consumption and equality have important intertemporal dimensions (e.g., through educational choices and savings behavior), suggesting that additional insights would be gained from analyzing a dynamic model of optimal taxation. We hope to address these issues in future research.

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