Redistribution through Charity, Optimal Taxation, and Social Status*

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Abstract

This paper analyzes tax policy responses to redistributive charitable giving through simultaneous treatment of (i) public and private redistribution, (ii) the warm glow of giving and stigma of receiving charitable donations, and (iii) social comparisons with respect to both charitable donations and private consumption. Whether charity should be taxed or supported turns out to largely depend on the relative strengths of the warm glow of giving and the stigma of receiving charity, respectively, and on the positional externalities caused by charitable donations. In addition, imposing stigma on the mimicker (which relaxes the self-selection constraint) strengthens the case for subsidizing charity. We also consider a case where the government is unable to target the charitable giving through a direct tax instrument, and examine how the optimal marginal income tax structure should be adjusted in response to charitable giving. Numerical simulations demonstrate that quantitative effects can be substantial.

Keywords: Conspicuous consumption, conspicuous charitable giving, social status, optimal income taxation, warm glow, stigma

JEL Classification: D03, D62, H21, H23

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1. Introduction
Redistribution from the rich to the poor is a core governmental task in modern societies. In many countries, private charity also plays a non-negligible role in this redistribution. Since redistribution through the tax system is normally associated with social costs, due to incentive effects, one may wonder whether such effects motivate governmental support of private redistribution through charitable giving. Indeed, private charitable giving is explicitly supported in many countries, e.g., through tax deduction, effectively implying subsidization of charity relative to private consumption. Are there good reasons for this policy and, if so, under what conditions? What would an optimal policy look like? The objective of the present paper is to answer these questions based on a model of optimal income taxation, in which there is redistribution both through the tax system and via charitable giving, and where the government can tax or subsidize the charitable donations.

Our study contributes to the literature in at least three ways. First, we integrate directly redistributive charitable giving from donors to recipients into a discrete version of the Mirleesian optimal tax problem. This means that our approach differs in a fundamental way from earlier studies on charitable giving and optimal redistributive taxation, where charitable giving is typically described as voluntary contributions to a public good. Second, our study is also the first to analyze how an optimal tax policy ought to respond to the potential social stigma faced by the receivers of charity. That is, we do not only model the warm-glow of giving on behalf of the donors, we also acknowledge a corresponding negative stigma effect for the receivers, such that the receivers would have preferred to obtain the same consumption possibilities through some other means than charity (in our case through the general income tax system). Third, together with the companion paper, Aronsson, Johansson-Stenman, and Wendner (2018), the present study contributes by integrating simultaneous status-motives for charitable giving and private consumption in the analysis. The difference between the two papers will be described below. While a broad perspective adds complexity, we believe that these elements, and their interactions, are crucial in order to understand the incentives facing donors as well as receivers of charity which, in turn, will determine the optimal tax treatment of charitable giving. Indeed, it turns out that assumptions regarding the warm glow of giving, the stigma of receiving charity, the strength of concerns for relative giving versus relative consumption, and transaction costs associated with charitable giving, respectively, are all key to understanding whether charity should be taxed or supported.

1 In 2017, total U.S. charitable giving amounted to about 2.1 percent of GDP (Giving USA Foundation, 2018).
We follow traditional theory of charitable giving in assuming that individuals experience a warm glow from donating. This is an important assumption and means that an individual $A$ derives utility from donating a certain amount to a poor individual $B$, while $A$ does not derive any utility if individual $C$ donates to $B$, or if the government transfers money to $B$. By contrast, an individual motivated by pure altruism would only care about the utility of individual $B$, not about his or her own contribution to it. Yet, the warm glow of giving assumption is supported by strong empirical evidence; see, in particular, Andreoni (1989, 1990). We also follow a more recent strand of literature in assuming a prestige-motive behind charitable giving, i.e., that charitable giving constitutes a means of signaling status (see, e.g., Glazer and Konrad, 1996; Harbaugh, 1998a; Cartwright and Patel, 2013). Empirical and experimental evidence demonstrates that donations are typically higher if they are observable than if they are not, and that the way in which they are reported matters for the size of the donations (e.g., Harbaugh, 1998b; Andreoni and Petrie, 2004; Alpizar et al., 2008). Furthermore, charitable giving seems to increase with the contributions made by other people (Andreoni and Petrie, 2004; Alpizar et al., 2008), suggesting that charitable giving resembles a positional good.

In addition to the status-motive behind charitable giving, a vast empirical literature shows that relative income and consumption concerns are important for individual well-being, suggesting a status-motive also behind private consumption. For instance, happiness research repeatedly finds that people derive well-being from their own income or consumption relative to that of referent others, and quasi-experimental research shows that a substantial fraction of the utility gain to the individual of increased consumption might be due to that the individual’s relative consumption increases (see, e.g., Johansson-Stenman et al., 2002; Solnick and Hemenway, 2005; and Carlsson et al., 2007, for evidence based on questionnaire-experimental research, and Easterlin. 2001; Blanchflower and Oswald. 2004; Ferrer-i-Carbonell. 2005; and Clark and Senik 2010, for evidence based on happiness research). This is directly relevant in the context of charitable giving, since relative consumption concerns typically influence the decisions to donate and, therefore, the optimal policy responses to charitable giving.

By analogy to the warm-glow of giving, we assume that recipients of charity suffer from social stigma or shame in the sense that they derive disutility from receiving charity for a given consumption level. While poverty in itself can also be associated with shame, as noted by Sen (1983, 1999), there is ample empirical evidence from sociological literature of social
stigma related to receiving charity and targeted welfare benefits; see, e.g., Chase and Walker (2013) and Baumberg (2016). There is also an economics literature on the implications of social stigma. For instance, Moffitt (1983) defines welfare stigma as the corresponding lack of self-respect due to an inability to support oneself, while Besley and Coate (1992) and Kleven and Kopczuk (2011) analyze how social stigma may matter for public policy. Moreover, a robust finding in the literature on subjective well-being is that unemployment tends to imply reduced well-being, also when correcting for the income loss that unemployment gives rise to (e.g., Clark and Oswald, 1994; Blanchflower and Oswald, 2004). This is clearly at odds with the assumptions normally made in economics, since unemployment implies more leisure, but is consistent with the idea of a stigma associated with living on welfare. While one can argue that there may be a stigma component also from favorable treatment through the tax system, we will focus on the stigma of receiving charitable donations in what follows, by assuming that potential charity recipients prefer redistribution through the tax system to receiving the same funds through charitable donations.²

Several earlier studies, including Feldstein (1980), Warr (1983), Roberts (1987), Saez (2004), Diamond (2006), Blumkin and Sadka (2007), and Aronsson, Johansson-Stenman, and Wendner (2018), have examined optimal tax policy in various settings in economies where charitable giving is modelled in terms of voluntary contributions to a public good. An important task of the government is then to simultaneously decide how much of the public good it should provide itself, and the extent to which it should support private contributions. Saez (2004) integrates charitable giving into a model of optimal linear taxation and characterizes the optimal subsidy (or tax) attached to voluntary contributions to the public good. Diamond (2006) extends the analysis to a model of optimal nonlinear taxation and shows that voluntary contributions to the public good by those with the highest earnings-ability lead to higher welfare through a relaxation of the incentive constraint.

Similar to our study, Blumkin and Sadka (2007) and Aronsson, Johansson-Stenman and Wendner (2018) analyze status-related motives behind charitable giving; albeit in very different contexts. In the study by Blumkin and Sadka, status signaling constitutes the only motive for charitable giving. They examine the welfare effects of introducing a tax on charitable giving under an optimal linear income tax, and find that the optimal tax on

² It is possible to interpret the stigma from receiving charity in our model as a net stigma effect compared to the stigma of receiving the same amount through the tax system.
charitable giving is non-negative. The intuition is that status concerns may lead to over-provision of the public good, in which case a tax on contributions leads to higher welfare. Aronsson, Johansson-Stenman, and Wendner (2018), in a companion paper sharing some important model assumptions with the present study, analyze the optimal tax treatment of voluntary contributions to a public good, to which the government also contributes through public revenue. In a way similar to the present study, they assume that individuals are positional both in terms of these voluntary contributions and in terms of private consumption. Their paper characterizes the marginal tax treatment of the voluntary contributions along with the optimality condition for the public provision of the public good. In doing so, they compare the policy rules implemented by a conventional welfarist government (which respects all aspects of consumer preferences and bases the social objective thereupon) with the corresponding policy rules implemented by paternalist governments. A major finding is that welfarist and paternalist governments may choose quite similar policies, despite that their motives for influencing the voluntary contributions to the public good differ in fundamental ways.

The studies closest in spirit to ours are Atkinson (1976) and Kaplow (1995, 1998), in the sense that these papers also analyze pure redistribution in terms of private consumption through charitable gifts. Kaplow analyzes model-economies where the donor is altruistic. He concludes that the equilibrium implies under-provision of donations relative to a first-best social welfare optimum (based on a utilitarian social welfare function), since each donor will only take into account his/her own utility associated with the donation (regardless of whether the donation per se is motivated by altruism or warm-glow), and not the utility of the receiver. Therefore, a Pigouvian subsidy would take the economy to the first-best optimum. Atkinson uses a similar framework to examine the conditions under which tax deductions for charitable contributions are preferable to a tax credit, and vice versa. Yet, none of these studies attempt to integrate charitable giving into a framework of optimal redistributive taxation.

Albeit based on a very different model, we follow Atkinson and Kaplow in considering pure redistribution, in terms of private consumption, through charitable donations from the rich to the poor, or more specifically in our model setup from individuals with high earnings-ability

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3 The donor only recognizes the recipient’s preferences indirectly (since the donor derives utility from the well-being of the recipient), whereas the social welfare function also directly reflects the preferences of the recipient.
to individuals with low earnings-ability. This approach is arguably relevant for at least two reasons. First, the bulk of earlier studies on the tax treatment of charitable donations referred to above has focused on public goods aspects and thus paid less attention to aspects associated with redistribution. Second, it allows us to examine the interesting question of whether - and to what extent – the government should redistribute via the tax system, and to what extent it should support private redistribution through gifts. We assume that the government redistributes through a nonlinear income tax, possibly combined with a tax instrument directly targeted at charitable giving, and that earnings-ability is private information. Diamond (2006) and Aronsson, Johansson-Stenman, and Wendner (2018) also consider models with nonlinear taxation; yet, they focus on contributions to public goods instead of pure redistribution. As in Diamond (2006), we find that a subsidy towards charitable giving works as a mechanism to relax the self-selection constraint, although for a completely different reason; the stigma of receiving charity makes mimicking less attractive.

Since social comparisons play an important role in the analysis carried out below, our paper also bears a close relationship to earlier research on relative consumption and optimal taxation. A major issue in this literature has been to examine how relative consumption comparisons among consumers affect the structure of marginal income taxation and/or commodity taxation, which a number of studies have addressed based on various models and tax instruments (e.g., Boskin and Sheshinski, 1978; Layard, 1980; Oswald, 1983; Dupor and Liu, 2003; Ljungqvist and Uhlig, 2000; Aronsson and Johansson-Stenman, 2008, 2010, 2014; Wendner and Golder, 2008; and Eckerstorfer and Wendner, 2013). It is now well established that an externality caused by such comparisons calls for a significant corrective element in the tax system, and it is also clear how this Pigouvian component is modified in economies with heterogeneous consumers due to the incentive constraint faced by policy makers. Yet, none of these studies addresses the consequences of positional concerns with respect to charitable giving.

In summary, the novel contributions of the present paper are to (i) integrate pure redistribution through charitable giving into a framework of optimal redistributive income taxation, and (ii) simultaneously examine the effects that the warm-glow of giving, status

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4 See Auten et al. (2002) and Clotfelter (1992, 2014) for extensive empirical analyses of the redistributive effects of charity.

5 A corrective tax element of similar magnitude typically follows if the government is paternalist in the sense of not respecting the consumer preference for relative consumption. Although such a government is not concerned with externality correction, it would like each individual to behave as if the preference for relative concerns were absent. In turn, this calls for a corrective tax element closely related to the positional externality; see Aronsson and Johansson-Stenman (2018).
concerns, and social stigma may have on the social the cost benefit analysis of charitable giving. This contribution is significant for at least four reasons: First, the analysis of several different motives for redistribution through charitable giving makes it possible to pin down more clearly the crucial conditions under which charitable giving should be supported or not. Second, if individuals try to signal status through both consumption and charitable giving – as the evidence presented above seems to suggest – the joint policy implications ought to be addressed simultaneously in the same framework. Indeed, our results show that relative concerns for private consumption directly affect the optimal policy targeted at charitable giving, which suggests that policies aimed at targeting different positional externalities may interact in important ways. Moreover, transaction costs associated with charitable giving play an important role in this context, since positional externalities cause a discrepancy between the private and social marginal resource costs of making charitable contributions.

Third, we offer a broad perspective on the tax policy implications of pure redistribution through charitable giving by distinguishing between a case where the government can control charitable giving through a direct tax instrument and a case where it cannot. This distinction largely determines the policy implications of charitable giving and is also important for the optimal income tax structure. A setting where the government lacks a direct tax instrument for targeting charitable giving is also interesting more generally, by exemplifying a realistic case where the government has fewer effective tax instruments than variables it wishes to influence. Fourth, by using an optimal income tax model with information asymmetries, we are able to relate the tax policy implications of private redistribution through charitable giving more closely to the modern literature on optimal redistributive taxation. As such, our approach differs from Atkinson (1976) and Kaplow (1995, 1998), who did not formally address redistribution through optimal taxation. In addition to realism, allowing for nonlinear taxation has the obvious advantage over more restrictive tax instruments in that the results are straightforward to interpret: tax wedges relate directly to information limitations and externalities in our model instead of to an amalgam of these motives for taxation and an arbitrary linearity restriction. In this sense, our study also provides a complement to Diamond (2006) and Aronsson, Johansson-Stenman, and Wendner (2018) by examining other aspects of charitable giving than they did.

The paper is organized as follows. Section 2 presents a baseline model where consumers differ in ability, which is private information, while both income and charitable giving are
fully observable to the government. As we simplify by distinguishing between only two ability types, we also assume that high-ability individuals are the sole contributors to charity and that all low-ability individuals receive an equal share of these gifts.\(^6\) We show in Section 3 that charity may either be taxed or subsidized at the margin in the second-best optimum, depending on the relative strengths of the warm glow of giving and stigma from receiving charity, respectively, and on the positional externalities caused by charitable donations. We also show that positional consumption externalities directly affect this marginal tax/subsidy if charitable giving is associated with transaction costs.

In Section 4 we relax the assumption that the government can control charitable giving through a direct instrument. This will modify the optimal marginal income tax structure for both ability types, since the marginal value of the positional consumption externality takes a different form here than in the baseline model. In addition, since the income tax in this case constitutes an indirect instrument through which the government may influence charitable giving, the structure of marginal income taxation of the high-ability type will change also for this reason compared with the baseline model. In general, the sign of the marginal income tax rate faced by the high-ability type is ambiguous here (even if we were to assume that positional concerns about consumption per se motivates a higher marginal income tax rate), and we give a detailed characterization of the mechanisms implicit in this tax structure.

In Section 5, we supplement the theoretical analyses carried out in Sections 3 and 4 with extensive numerical simulations. These simulations serve to illustrate how the marginal taxation of income and charitable giving, as well as the overall redistribution, vary with key parameters of the model. Section 6 concludes the paper, and the appendix presents the proofs and mathematical results that support the analysis of the main text.

2. A Model with Social Comparisons and Charitable Giving

The economy is populated by a fixed number of individuals, of whom \(n_1\) are of a low-ability type \((i = 1)\) and \(n_2\) are of a high-ability type \((i = 2)\). This distinction refers to productivity as measured by the before-tax wage rate. The total population becomes

\[
n_1 + n_2 = N .
\]

Individuals of each type are endowed with one unit of time and supply \(0 \leq l^i \leq 1\) units of labor. An individual of type \(i\) cares about own absolute consumption, \(c^i\), and leisure, \(z^i \equiv 1 - l^i\), as

\(^6\) Thus, our model is an extension of Stiglitz’ (1982) two-type model of optimal income taxation.
well as about own consumption relative to a consumption reference level, \( \Delta c' = c' - \bar{c} \), where we follow much earlier literature on public policy and relative consumption in assuming

\[
\bar{c} = \frac{n_1 c_1 + n_2 c_2}{N},
\]

(2)
i.e., the consumption reference level is given by the economy’s average level of consumption. This additive specification of relative consumption is commonly used in the literature (e.g., Gali, 1994; Akerlof, 1997; Ljungqvist and Uhlig, 2000; Bowles and Park, 2005; and Aronsson and Johansson-Stenman, 2008, 2010, 2014).\(^7\)

As indicated above, individuals also care about their net charitable giving, \( g' \), such that each individual prefers to give rather than receive charity for a given consumption level. Those who give to charity will experience a warm-glow effect, whereas those who receive charity will face a stigma effect.

Those who give to charity are also concerned with their relative contribution, i.e., how much they give compared with other contributors, whereas those who receive charity analogously care about how much they receive compared with other recipients. Hence, each individual cares about \( \Delta g' = g' - \bar{g}' \), where \( \bar{g}' \) is the average net contribution of type \( i \). Since each individual of type \( i \) is identical, it follows that \( \bar{g}' = g' \). This means that the warm-glow effect of the absolute donation is not the only motive for charitable giving; individuals also derive utility from giving more than their referent others. By a symmetrical argument, receivers of charitable donations do not only face a direct stigma effect attached to the absolute donation, they also derive disutility by receiving more than others.

We will solely focus on the case where, in equilibrium, high-ability individuals contribute to charity and low-ability individuals receive. We also assume that there is a transaction cost associated with charity such that the total amount received by low-ability individuals is less than the amount spent on charitable giving by high-ability individuals. For the low-ability individuals to receive \( g^2 \) dollars, the high-ability individuals will have to spend \( g^2 + \mu(g^2) \)

\(^7\) A quotient formulation, where the individual’s relative consumption is given by the ratio of his/her own consumption to the reference measure (as in, e.g., Boskin and Sheshinski, 1978; Layard, 1980; Abel, 2005; and Wendner and Goulder, 2008), would give the same qualitative results as those presented below.
dollars, where $\mu(g^2) \geq 0$ is the transaction cost of giving to charity. The marginal resource cost is assumed to be non-negative, $\mu_g(g^2) = \partial \mu(g^2) / \partial g^2 \geq 0$. A natural interpretation is that a higher amount donated typically requires the household to collect more information on presumptive charities.

2.1 Individual Behavior and Production

The utility function faced by an individual of ability-type $i$ can then be written as:

$U_i = v_i(c^i, z^i, g^i, \Delta c^i, \Delta g^i) = u_i(c^i, z^i, g^i, \bar{c}^i, \bar{g}^i)$.  

(3)

The function $v_i(\cdot)$ defines utility as a function of absolute consumption, leisure, and net charitable giving, respectively, and of the relative consumption and relative net charitable giving, while the function $u_i(\cdot)$ is a convenient reduced form that helps shorten the notations.

We assume that $v_i(\cdot)$ is strictly quasi-concave, increasing in $c^i$ and $z^i$, and non-decreasing in $g^i$, $\Delta c^i$, and $\Delta g^i$. Thus, by using subscripts to denote partial derivatives, the relationships between $u_i(\cdot)$ and $v_i(\cdot)$ are summarized as:

$u_{c}^i = v_{c}^i + v_{\Delta c}^i > 0$, $u_{z}^i = v_{z}^i > 0$, $u_{g}^i = -v_{\Delta g}^i \leq 0$, $u_{\bar{c}}^i = v_{\bar{c}}^i + v_{\Delta \bar{c}}^i \geq 0$, and $u_{\bar{g}}^i = -v_{\Delta \bar{g}}^i \leq 0$.

Let us also consider a less general leisure separable version of the utility function in equation (3):

$U_i = V_i(k(c^i, g^i, \bar{c}, \bar{g}), z^i)$.  

(3b)

The leisure separable utility function in equation (3b) implies that the marginal rates of substitution between $c^i, g^i, \bar{c}$ and $\bar{g}$ are all independent of leisure. Note that while the utility functions may still vary between types, the sub-utility function $k$ is the same among types.

In our two-type setting, high-ability individuals contribute to charity and low-ability

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8 Since many options are available for charitable donations, this assumption is clearly reasonable. In addition, such a cost is also interesting from the perspective of policy incentives, as it contributes to intertwine the policies used to correct for positional consumption externalities and positional gifts externalities.

9 This formulation completely disregards possible public goods aspects of charitable giving. One example might be that people have preferences for the standard of living of the poor (suggesting that the consumption level of the poor constitutes a public good to which the high-income earner voluntarily contribute), as in Warr (1983). If the donors act as Nash-competitors to one another, this may constitute an argument for subsidizing donations (since the public good would otherwise be under-provided relative to the Samuelson condition). Adding this public goods aspect to our model would just strengthen the argument for subsidizing charitable giving; it does not offset the policy incentives related to the warm glow and status driven motives for charitable giving examined below.
individuals receive charitable donations. Note that the charitable donation received by each low-ability individual is given by \( g^1 = -n^2 g^2 / n^1 \). The individual budget constraint facing each type can then be written as

\[
\begin{align*}
 w^1 l^1 + g^2 n^2 / n^1 - c^1 &- T(w^1 l^1, 0) = 0, \\
 w^2 l^2 - c^2 - g^2 - \mu(g^2) &- T(w^2 l^2, g^2) = 0,
\end{align*}
\]

where \( w^i \) denotes the hourly before-tax wage rate facing ability-type \( i \), while \( T(w^i l^1, g^i) \) is a general tax function through which the tax payment depends on both income and charitable giving. Thus, we assume that there is no tax on receiving charity, such that \( T(w^1 l^1, g^1) = T(w^1 l^1, 0) \).

Individuals are assumed to be atomistic agents by treating the levels of reference consumption, \( \bar{c} \), and reference giving, \( \bar{g} \), as exogenous, and they choose consumption, leisure, and giving if being a high-ability type so as to maximize utility given by equation (3) subject to their respective budget constraints in equations (4). In addition to equations (4), an interior solution satisfies the following first-order conditions for work hours and giving:

\[
\begin{align*}
 MRS^1_{c,c} &\equiv \frac{u^1_c}{u^1_c} = \frac{v^1_c}{v^1_c + v^1_{\Delta c}} = w^i \left(1 - T^i_{w} \right), \quad i = 1, 2 \tag{5} \\
 MRS^2_{g,c} &\equiv \frac{u^2_g}{u^2_c} = \frac{v^2_g}{v^2_c + v^2_{\Delta c}} = 1 + T^2_g + \mu_g, \tag{6}
\end{align*}
\]

where \( T^i_{w} \) is the marginal income tax rate facing each individual of ability-type \( i \) and \( T^2_g \) is the marginal tax (if positive) or subsidy (if negative) on charitable giving faced by high-ability individuals.

Finally, there is a linear production technology with labor as the only input, where the constant marginal cost of production is normalized to one. Given competitive markets, the before-tax wage rates equal the marginal productivity of the respective type.

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\( ^{10} \) Instead of assuming that all low-ability individuals receive charitable donations, an alternative would be to assume that they differ in their preferences for charitable donations (such as in the stigma perceived), meaning that only some of them will accept donations in the end. Yet another alternative would be to assume that charitable donations are allocated by lottery among the low-ability individuals. Both these assumptions would increase the analytical complexity of the model, while the main mechanisms driving the results would be the same as below.
2.2 The Problem of the Government

Following convention in the literature on optimal income taxation, the government is able to observe income, while individual ability is private information. The government is also able to directly tax or subsidize charitable giving – an assumption to be relaxed in Section 4 below. We consider a “normal case,” where the government wants to redistribute from the high-ability to the low-ability type. This means that we must add a self-selection constraint that serves to prevent individuals of the high-ability type from mimicking the low-ability type in order to gain from the redistribution. By using \( g^1 = \frac{-n^2 g^2}{n^1} \) and \( \Delta g^1 = g^1 - \bar{g}^1 = \frac{-n^2 (g^2 - \bar{g}^2)}{n^1} = \frac{-n^2 \Delta g^2}{n^1} \), the utility function of the (high-ability) mimicker, denoted by a hat,\(^{11}\) is given by

\[
\hat{U}^2 = \bar{v}^2(c^1, 1 - \phi l^1, -n^2 g^2 / n^1, \Delta c^1, -n^2 \Delta g^2 / n^1)
\]

where \( \phi = w_1 / w_2 \) denotes the relative wage rate that converts labor (and leisure) units of the low-ability type into the corresponding units for the mimicker and \( \phi l^1 \) represents the mimicker’s labor supply. The mimicker is a high-ability individual who pretends to be a low-ability individual by earning the same income as the low-ability type (i.e., \( w^2 \phi l^1 = w^1 l^1 \)). Since charitable giving is fully observed by assumption, whereas ability is not, the mimicker will receive as much charity as the true low-ability individuals. Consequently, the mimicker will be subject to the same stigma and relative stigma effects. Thus, if written in terms of the function \( v^2(\cdot) \) in equation (3), the self-selection constraint is given by

\[
v^2(c^2, z^2, g^2, \Delta c^2, \Delta g^2) \geq \bar{v}^2(c^1, 1 - \phi l^1, -n^2 g^2 / n^1, \Delta c^1, -n^2 \Delta g^2 / n^1).
\]  

(7)

The economy’s resource constraint is given by

\[
\sum_{i=1}^{2} n^i w^i l^i = \sum_{i=1}^{2} n^i c^i + n^2 \mu(g^2).
\]  

(8)

Equation (8) means that output is used for private consumption and the transaction cost associated with charitable giving. The direct transfer of charitable giving washes out of the resource constraint, as the donations are just a flow of resources from the high- to the low-ability type.

The social decision problem is formulated as one of deriving a Pareto-efficient allocation by maximizing utility of the low-ability type subject to a minimum utility level for the high-ability type. The other constraints are the self-selection and resource constraints in equations

\(^{11}\) Note that the mimicker and the true high-ability type share a common utility function. The hat symbol just allows us to separate them in a simple way.
(7) and (8). The socially optimal resource allocation solves the following problem:

$$\text{Max}_{c^1, c^2, g^1, g^2} L = v^1(c^1, z^1, -g^2 n^2 / n^1, \Delta c^1, -n^2 \Delta g^2 / n^1)$$

$$+ \delta \left[ v^2(c^2, z^2, g^2, \Delta c^2, \Delta g^2) - \bar{U}^2 \right] + \gamma \left[ \sum_{i=1}^{2} n^1 w^i l^i - \sum_{i=1}^{2} n^1 c^i - n^2 \mu(g^2) \right],$$

$$+ \lambda \left[ v^3(c^2, z^2, g^2, \Delta c^2, \Delta g^2) - \tilde{v}^2(c^1, 1 - \phi l^1, -g^2 n^2 / n^1, \Delta c^1, -n^2 \Delta g^2 / n^1) \right],$$

where \( \bar{U}^2 \) specifies a fixed utility level for type 2 individuals. The Lagrange multipliers \((d, g, l)\) refer to the minimum utility restriction, the resource constraint, and the self-selection constraint, respectively. In contrast to individual households, the government takes into account the positional externalities — as arising from \( \bar{c} \) and \( \bar{g} \) — into account. The social first-order conditions for an interior solution can then be written as

$$L_{c^1} = v^1_c + v^1_{\Delta c^1} - \lambda \left( \hat{v}^2_c + \hat{v}^2_{\Delta c^1} \right) - \gamma n^1 + \frac{n^1}{N} L_\tau = 0,$$  \(10\)

$$L_{c^2} = (\delta + \lambda) \left( v^2_c + \hat{v}^2_{\Delta c^1} \right) - \gamma n^2 + \frac{n^2}{N} L_\tau = 0,$$  \(11\)

$$L_{\hat{v}^2} = -v^1_z + \lambda \phi \hat{v}^2 z = 0,$$  \(12\)

$$L_{w^1} = -(\delta + \lambda) v^2_z + \gamma n^2 w^1 = 0,$$  \(13\)

$$L_{g^2} = (\delta + \lambda) v^2_g - v^1_g n^2 / n^1 + \lambda \hat{v}^2_g n^2 / n^1 - \gamma n^2 \mu_g (g^2) = 0.$$  \(14\)

In equations (10) and (11), \( L_{\tau} \) denotes the partial welfare effect of increased reference consumption, \( \bar{c} \), given by

$$L_{\tau} = -\hat{v}^2_{\Delta c^1} - (\delta + \lambda) v^2_{\Delta c^1} + \lambda \hat{v}^2_{\Delta c^1}.$$  \(15\)

The right-hand side of equation (15) is ambiguous in sign, since an increase in \( \bar{c} \) reduces the utility for the true ability-types (which contributes to lower welfare) as well as for the mimicker (which contributes to higher welfare).

### 3. Optimal Taxation Results

In this section, we will derive and present the optimal marginal tax rates by comparing the social first-order conditions in equations (10)–(14) with the private first-order conditions given in equations (5) and (6). To simplify the presentation of the results, we start by considering a simplified version of the model where the resource cost of charitable giving is zero. In this case, the marginal tax/subsidy attached to charitable contribution will only reflect the warm-glow and stigma effects as well as the positional charity externality; it does not directly depend on the positional consumption externality.
The marginal tax policy presented below depends on the extent to which the relative consumption and relative charitable giving affect well-being at the individual level. Therefore, let us introduce the following degrees of positionality with respect to consumption, $\alpha^i$, and charitable giving, $\beta^i$:

$$\alpha^i \equiv \frac{v_{c\Delta c}'}{v_{c}' + v_{c\Delta c}'} \in [0,1),$$

$$\beta^i \equiv \frac{v_{g\Delta g}'}{v_{g}' + v_{g\Delta g}'} \in [0,1).$$

The degree of consumption positionality, following, e.g., Johansson-Stenman et al. (2002), reflects the share of the marginal utility of consumption arising from an increase in $\Delta c$. Therefore, $\alpha^i$ can be interpreted as the share of the overall utility gain of an additional dollar spent on consumption that is due to increased relative consumption for an individual of ability-type $i$.

The degree of charitable positionality is correspondingly defined as the share of marginal utility of charitable giving arising from an increase in $\Delta g$. If the charitable giving increases by one dollar (ceteris paribus), the contributor’s utility increases both due to the warm-glow effect and the (presumably status driven) effect of increased relative giving. $\beta^2$ reflects the share of the utility increase that is due to increased relative giving by high-ability individuals. Correspondingly, low-ability individuals who receive charity will experience a utility decrease (for a given consumption level) for two reasons, i.e., both due to an increased absolute amount of charity received and an increased amount of charity received relative to what others receive. The parameter $\beta^1$ reflects the share of the utility decrease attributable to the increased relative charity received.

For further use, we also define the average degree of consumption positionality, $\bar{\alpha} \equiv (\alpha^1 n^1 + \alpha^2 n^2) / N$, and an indicator of the difference in the degree of consumption positionality between the mimicker and the low-ability type, $\alpha^d \equiv (\bar{\alpha}^2 - \bar{\alpha}^1) \lambda \hat{u}_{c}^2 / (\gamma N)$. Quasi-experimental research estimates $\bar{\alpha}$ to be in the interval 0.2–0.5 (see, e.g., Johansson-Stenman et al., 2002; Clark and Senik, 2005; Carlsson et al., 2007; and the overview given in Wendner and Golder, 2008). We are not aware of any empirical estimate of the $\beta$s.
3.1 Optimal Marginal Income Tax Rates

The policy rules for marginal income taxation take the same form irrespective of whether charitable giving is costly. It is straightforward to show (see Appendix) that the optimal marginal income tax rates are given as follows (for $i=1, 2$):

$$T_{wi}(w'l', g') = \tau^i + [1 - \tau^i][\overline{\alpha} - [1 - \tau^i][1 - \overline{\alpha}]]\frac{\alpha^d}{1 - \alpha^d}.$$  \hfill (18)

In the leisure separable case, i.e., given preferences according to equation (3b), $\hat{\alpha}^2 = \alpha^1$ such that $\alpha^d = 0$, and equation (18) reduces to

$$T_{wi}(w'l', g') = \tau^i + [1 - \tau^i][\overline{\alpha}].$$  \hfill (18b)

The variable $\tau^i$ is a short notation for the marginal income tax formula faced by type $i$ in the standard two-type model, in which there are no concerns about either relative consumption or charity. Note that the marginal income tax rates in (18) are identical to the ones derived by Aronsson and Johansson-Stenman (2008) in a model without charitable giving. The reason equation (18) applies here as well is that the government can control charitable giving through a direct tax instrument, meaning that charitable giving will not change the policy rule for marginal income taxation. Briefly, the policy rule for marginal income taxation can be decomposed into three mechanisms. The first, $\tau^i$, denotes the policy rule for marginal taxation that would be implemented in the absence of any positional consumption externality. This component is typically positive for the low-ability types and serves to relax the self-selection constraint by exploiting that the low-ability type attaches a higher marginal value to leisure than a potential mimicker does, while it is zero for the high-ability type under the assumption of a fixed relative wage rate.\footnote{See, e.g., Stiglitz (1982).} The second component on the right hand side of equation (18) represents a corrective tax element and depends on the average degree of positionality, $\overline{\alpha}$, which is a measure of the positional consumption externality per unit of consumption. Note that this effect is scaled down by $1 - \tau^i < 1$ for the low-ability type, since the fraction of an additional unit of income already taxed away for other reasons does not give rise to any externalities. Finally, the third component reflects how the government exploits differences in the degree of positionality between the mimicker and the (mimicked) low-ability type to relax the self-selection constraint. If a potential mimicker is more positional than the low-ability type ($\alpha^d > 0$), the government can relax the self-selection constraint through a policy-induced increase in the level of reference consumption, $\overline{c}$, which, in turn,
constitutes an incentive to implement a lower marginal income tax rate than otherwise. By analogy, if the low-ability type is more positional than a potential mimicker \((\alpha^d > 0)\), there is a corresponding motive to increase the marginal income tax rate beyond the level represented by the sum of the first two terms. These mechanisms are discussed at length in Aronsson and Johansson-Stenman (2008) and will not be further discussed here.

3.2 Optimal Marginal Tax/Subsidy Rates for Charity without Transaction Costs

We will now turn to the marginal tax/subsidy on charitable giving. To simplify the presentation and interpretation, we begin with the case most commonly analyzed in the literature, where there are no transaction costs of giving, i.e., where \(\mu_g(g^2) = 0\) for all levels of \(g^2\). Immediately from equation (14), we obtain the following social first-order condition for charitable giving:

\[
(\delta + \lambda) v^2_g n^1 / n^2 = v^1_g - \lambda \hat{v}^2_g > 0. 
\]  

Equation (19) implies that the social marginal utility of charitable giving (the left-hand side) is equal to a “net marginal stigma cost,” i.e., the social marginal stigma cost imposed on the low-ability type, \(v^1_g > 0\), adjusted for the social marginal benefit of imposing stigma on the mimicker, \(\lambda \hat{v}^2_g > 0\), which contributes to relax the self-selection constraint. It is worth noting that the social marginal benefits and costs of charitable giving are measured with the indicator of relative giving, \(\Delta g^2\), held constant, since the externalities that relative concerns about charity give rise to are internalized in the social optimum.

In the absence of any stigma effect, in which case \(v^1_g - \lambda \hat{v}^2_g = 0\), an interior social optimum (if it exists) would imply \(v^2_g = 0\). On the other hand, if being a receiver of charity is associated with stigma, and if the self-selection constraint is not binding (\(\lambda = 0\)), first-order condition (19) means \(v^2_g > 0\), i.e., a lower level of charitable giving due to the marginal utility cost of stigma for the low-ability type. This stigma effect is intuitive. Yet, if the self-selection constraint is binding (\(\lambda > 0\)), the stigma effect on the mimicker relaxes the self-selection constraint. As a consequence, more charitable giving is optimal (i.e., \(v^2_g\) is lowered by the term \(\lambda \hat{v}^2_g\)).
By noting that equation (19) requires $v^i_g - \lambda \tilde{v}^2_g > 0$, the marginal tax/subsidy on charitable giving is characterized as follows:

**Proposition 1.** Without transaction costs, the optimal marginal tax/subsidy rate on charitable giving can be written as

$$T^2_g = \frac{1}{1-\beta^2} \frac{v^i_g - \lambda \tilde{v}^2_g}{\Psi} - 1,$$

(20)

where $\Psi = v^i_c + v^i_{\Delta c} - \lambda (\tilde{v}^2_c + \tilde{v}^2_{\Delta c}) = v^i_c / (1-\alpha^i) - \lambda \tilde{v}^2_i / (1-\alpha^2)$. In the leisure separable case where the utility function takes the form of equation (3b), equation (20) simplifies to read

$$T^2_g = \frac{1-\alpha^i}{1-\beta^2} \frac{v^i_g}{v^i_c} - 1.$$

(21)

Proof: See the Appendix.

To interpret Proposition 1, we begin with the leisure separable case, and by noting that the policy rule in equation (21) coincides with the policy rule that would apply under first-best conditions where the self-selection constraint does not bind (i.e., if $\lambda = 0$). The ratio $v^i_g / v^i_c$ is a low-ability individual’s marginal willingness to pay to avoid the stigma from receiving charitable donations, measured with the relative charitable benefit ($\Delta g^i$) and the relative consumption ($\Delta c^i$) held constant. As the government recognizes that relative comparisons are pure waste from society’s point of view, $v^i_g / v^i_c$ is interpretable as a measure of social marginal willingness to pay. If the relative concerns were absent, such that $\alpha^i = \beta^2 = 0$, this marginal willingness to pay would be the sole determinant of the optimal marginal tax/subsidy on charitable giving, i.e., (21) would read $T^2_g = v^i_g / v^i_c - 1$. In the extreme case where the stigma effect is so large that individuals of the low-ability type are indifferent between accepting additional charity and not accepting it, then $v^i_g / v^i_c = 1$ and $T^2_g = 0$, i.e., charity should be neither taxed nor subsidized at the margin. In the other extreme case of no stigma effect, such that

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13 That the first-best policy rule carries over to the leisure separable case resembles other important results, such as the finding by Atkinson and Stiglitz (1976) that consumption taxes are unnecessary (and if they exist they should be uniform) if the income tax is optimal, and the conclusion by Boadway and Keen (1993) that one should rely on the first-best Samuelson provision rule for public goods.
it follows that $T^2_{g} = -1$, i.e., a marginal subsidy rate of 100 percent. In all cases in between these extremes, i.e., where $0 < v' / v < 1$, it follows that $-1 < T^2_{g} < 0$, still implying that charity should be subsidized, although at a rate of less than 100 percent.

The key here is that charitable giving leads to higher utility for the donor (high-ability type) without influencing the economy’s resource constraint. Moreover, we know the size of this utility increase for the donor: Since type 2 individuals give for free, and since they maximize their utility by doing so, we know that the marginal benefit of giving an additional dollar equals the marginal benefit of consuming it. Thus, if there were no stigma effect, there would be an external benefit that is equally large as the donation itself, implying an optimal subsidy rate of 100 percent. It is interesting to compare this finding with the results of Kaplow (1995), who in his equation (5) derived an expression for the optimal subsidy rate in the absence of any social stigma for the receivers. He assumed a utilitarian social welfare function and that the subsidy is financed by a lump-sum tax. The result of Kaplow is still not a 100% subsidy, however, other than in a special case. This may seem puzzling, since our more general Pareto efficiency objective implicitly encompasses all Paretian social welfare functions, including Kaplow’s utilitarian one. Yet, it is straightforward to show that this discrepancy disappears if one would add an optimal redistributive lump-sum tax in Kaplow’s model, thus implying a subsidy rate of 100 percent in his extended model.

Yet, the larger the stigma effect, the lower the external benefit and consequently the lower the marginal subsidy. In other words, the sole reason for the subsidy is the warm-glow of giving. Without it, there would only be a social cost of charity due to the stigma effect (the transfer of consumption possibilities from high-ability to low-ability individuals does not give rise to a social benefit, since the government can redistribute income without costs if the self-selection constraint does not bind). We will return to the warm-glow issue below.

The multiplier $(1 - a^1)/(1 - \beta^2)$ in equation (21) may either scale up or scale down the marginal subsidy (or may even turn it into a marginal tax) depending on whether the low-ability type’s degree of consumption positionality exceeds or falls short of the positional gifts externality that each high-ability individual imposes on other people of the same type through

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14 According to equation (19), to arrive at this extreme (yet interior) solution, $v^2_{g}$ must approach zero when the gift reaches a certain level.
charitable contributions (measured by $\beta^2$). An increase in $\alpha^1$ increases the marginal subsidy to charitable giving, ceteris paribus, as it means an even greater tendency for low-ability individuals to overestimate the marginal utility of consumption and thus underestimate the marginal cost of stigma from society’s point of view.\footnote{Note that this component has nothing to do with correction for positional consumption externalities, which is accomplished through marginal income taxation. Instead, this component arises because relative consumption concerns lead to a discrepancy between the private and social marginal utility of consumption.} Similarly, an increase in $\beta^2$ reduces the marginal subsidy (or increases the marginal tax) for charitable giving.\footnote{This result resembles the finding of Blumkin and Sadka (2007a), although their model differs from ours in several important ways.} The intuition is that $\beta^2$ represents the fraction of type 2 individuals’ marginal utility of charitable giving that is social waste, due to that their concerns about relative contributions lead to an externality, meaning that only $1-\beta^2$ of an additional dollar in contribution gives rise to warm glow. The condition for when charity should be taxed, rather than subsidized, then follows from equation (21):

$$T^2_g > (\leftarrow) 0 \text{ iff } v^1_g > (\leftarrow) \frac{1-\beta^2}{1-\alpha} v^1_g.$$ 

Let us return to the general policy rule in equation (20), which is based on the assumptions that the self-selection constraint binds ($\lambda > 0$), and that leisure is not in general separable in terms of the utility function. Compared with equation (21), the most important implication is that the government has an incentive to relax the self-selection constraint by exploiting that charitable benefits lead to disutility for the mimicker due to the stigma effect.\footnote{Also Diamond (2006) finds that subsidized contributions may relax the self-selection constraint, although for reasons other than those discussed here. In his model, individuals may voluntarily contribute to a public good, and the utility gain of a subsidy on voluntary contributions is smaller for the mimicker than for the high-income earner.} However, consider first an interesting special case of equation (20), namely the case of no stigma effects, which reproduces one of the extreme results discussed in the context of equation (21):

**Corollary 1.** Without transaction costs, and in the absence of any stigma effects, the optimal marginal tax/subsidy rate on charitable giving can be written as

$$T^2_g = -1,$$  \hspace{1cm} (20b)

This result follow immediately from equation (20) if $\lambda\hat{\nu}^2_g = v^1_g = 0$. The intuition is again that charitable giving leads to higher utility for the donors without influencing the economy’s resource constraint, while the receivers are indifferent between public and private
redistribution. In the opposite extreme case where there is no warm glow of giving but a negative stigma effect of receiving donations, it follows from equation (19) that \( \gamma_g^1 - \lambda \gamma_g^2 = 0 \), i.e., an interior solution for charitable giving (if it exists) requires that the net marginal stigma cost is zero. To accomplish this, a 100 percent marginal subsidy rate is required here as well, although for a different reason. In the more interesting scenario with both warm-glow and stigma effects, the optimal second-best policy is typically to subsidize charitable giving at a marginal rate of less than 100 percent or, if the net marginal stigma cost is large enough, tax charitable giving at the margin.

By comparing equations (18) and (20), we can see that relative concerns affect the policy rule for marginal income taxation in a different way compared to the policy rule for marginal taxation/subsidization of charitable giving. While relative consumption concerns give rise to an externality-correcting motive for income taxation, which shows up as a direct effect in the policy rules for marginal income taxation, there is no such direct externality-correcting charity tax in the absence of warm-glow and stigma effects. In our model, where all contributors to charity are identical, the only effect of the positional gifts externality is to weaken (strengthen) the already existing incentive to subsidize (tax) charitable giving at the margin due to warm glow and stigma.

To see the intuition behind the tax treatment of positional gifts externalities more clearly, consider the simplified case in which there is neither an absolute warm-glow effect of giving nor an absolute stigma effect from receiving charitable donations, but where high-ability individuals still care about relative giving and low-ability ones care about relative stigma. It would then follow that \( u^i_g = v^i_{ag} = -u^i_g \) and \( u^i_g = -v^i_{ag} < 0 \) for \( i = 1,2 \). As a consequence, the social first-order condition for charitable giving (equation [19]) would be redundant; in fact, it would always be satisfied since \( v^1_g = 0, v^2_g = 0, \) and \( \gamma^2_g = 0 \) irrespective of the level of \( g^2 \).

Intuitively, if there is neither a warm-glow motive to support charitable giving, nor a stigma motive to counteract it, there are no such welfare effects on which to base public policy either. This illustrates the importance of warm-glow and stigma effects for the rationale behind taxes/subsidies on charitable giving.

\[ ^{18} \text{At this marginal rate, and in the absence of a warm-glow, the high-ability type would be indifferent between charitable giving and private consumption (suggesting that the subsidy rate must exceed 100 percent for infra-marginal units to induce the desired level of gifts).} \]
3.3 Optimal Marginal Tax/Subsidy Rates for Charity with Transaction Costs

Let us now turn to the general and more realistic version of the model set out above with transaction costs of charitable giving. Proceeding in the same way as before, we derive the following analogue to equation (19) with transaction costs:

\[(\delta + \lambda)v^2_e = \gamma n^2 \mu_g (g^2) + n^2 (v^1_e - \lambda \nu^2_e) / n^1 > 0.\]  
(22)

Equation (22) thus shows that the social marginal utility of charitable giving for the high-ability type, \((\delta + \lambda)v^2_e\), balances the marginal resource cost as given by \(\gamma n^2 \mu_g (g^2)\), plus the net marginal stigma cost as given by \((v^1_e - \lambda \nu^2_e)\). According to equation (22), in the presence of a marginal cost of giving, the optimal level of giving should be reduced compared with a situation in which this marginal cost is nil (as in equation [19]). We can now derive:

**Proposition 2.** With a positive marginal transaction cost of charitable giving, the optimal marginal tax/subsidy rate for charitable giving is given by

\[T^*_e = \frac{1}{(1-\beta^2)} \frac{v^1_e - \lambda \nu^2_e}{\Psi} + \left[\frac{1-\alpha}{(1-\alpha^d)(1-\beta^2)} - 1\right] \mu_g (g^2) - 1,\]  
(23)

In addition to the effects of charitable giving identified in Proposition 1, the positive marginal cost of charitable giving affects the optimal marginal tax/subsidy rate in the following ways:

(i) If \(\frac{1-\alpha}{(1-\alpha^d)(1-\beta^2)} - 1 > 0\), a higher marginal cost reduces the optimal marginal subsidy (increases the optimal marginal tax) on charitable giving, and

(ii) if \(\frac{1-\alpha}{(1-\alpha^d)(1-\beta^2)} - 1 < 0\), a higher marginal cost increases the optimal marginal subsidy (reduces the optimal marginal tax) on charitable giving, ceteris paribus. In the leisure separable case, equation (23) can be simplified to

\[T^*_e = \frac{1-\alpha^d}{1-\beta^2} \frac{v^1_e}{v^*_e} + \frac{\beta^2 - \alpha}{1-\beta^2} \mu_g (g^2) - 1.\]  
(23b)

Proof: See the Appendix.

The first term on the right-hand side of equation (23) is equivalent to its counterpart in equation (20) and was discussed at some length above, whereas the second term is novel and refers to the marginal cost of giving to charity. In turn, this marginal cost affects the optimal marginal subsidy/tax via two distinct effects. First, because of the resource cost of charitable
giving, in order to attain a given optimal allocation, the marginal subsidy must be larger or the tax lower (in absolute terms) than without this resource cost. This is captured by the second component in square brackets.

Second, the marginal cost also affects the marginal tax (subsidy) on charitable giving via the relative concerns about both consumption and giving, as expressed by the multiplier \((1-\bar{\alpha})/[(1-\alpha^d)(1-\beta^2)]\). As a consequence, by introducing a cost of giving, the optimal marginal subsidy/tax attached to charitable contributions will be adjusted in response to positional consumption externalities, which was not the case when this cost was nil (see Proposition 1). This is seen from the appearance of the average degree of consumption positionality, \(\bar{\alpha}\), which is a measure of the marginal positional consumption externality per unit of consumption (recall that the relative consumption concerns are driven by mean-value comparisons). The average degree of positionality \(-\bar{\alpha}\) in the numerator of the multiplier, \((1-\bar{\alpha})\), contributes to increase the marginal subsidy (or decrease the marginal tax) on charitable giving, ceteris paribus. The intuition is that resources are lost in the process of charitable contributions. Therefore, a higher marginal subsidy or lower marginal tax shifts the households’ expenditure away from consumption and thus counteracts the positional consumption externality. The denominator \([(1-\alpha^d)(1-\beta^2)]\) either reinforces \((\alpha^d < 0)\) or counteracts \((\alpha^d > 0)\) this effect depending on whether a potential mimicker is more or less positional in terms of consumption than the low-ability type. If the low-ability type is more positional than the mimicker \((\alpha^d < 0)\), then decreased consumption contributes to relax the self-selection constraint and thus reinforces the social benefit of decrease in the positional consumption externality. Instead, if the mimicker is more positional than the low-ability type \((\alpha^d > 0)\), increased consumption contributes to relax the self-selection constraint. Finally, the higher the high-ability individuals’ degree of positionality in charitable giving, \(\beta^2\), the lower the marginal subsidy (the higher the marginal tax) on charitable giving, as the government realizes that relative giving is pure waste.

The components in square brackets in equation (23) can be understood in terms of a discrepancy between the private and social marginal resource cost of charitable giving, where the discrepancy depends on the externalities that relative concerns about consumption and donations give rise to. This discrepancy is relevant since the resource cost means that charitable contributions will reduce the total resources available for private consumption,
ceteris paribus. Consider first the special case where \( \alpha^d = 0 \), i.e., where the mimicker and the low-ability type are equally consumption positional, in which case an increase in \( \mu_k(g) \) contributes to increase (decrease) the right-hand side of equation (22) if \( \beta^2 > (\leq) \alpha^2 \). This means that the larger the positional charity externality compared with the positional consumption externality, the more the marginal cost of charitable giving will contribute to reduce the marginal subsidy (or increase the marginal tax) on charitable giving. The intuition is that the private marginal resource cost underestimates its social counterpart if \( \beta^2 > \alpha^2 \), which the lower marginal subsidy or higher marginal tax serves to adjust for.\(^{19}\) An analogous interpretation in terms of increased marginal subsidies (or lower marginal taxation) of charitable giving follows when \( \beta^2 < \alpha^2 \).

By relaxing the assumption that \( \alpha^d = 0 \), we can also see that the more consumption-positional the mimicker is relative to the low-ability type, i.e., the larger the \( \alpha^d \), the more \( \mu_k(g) \) will underestimate the social marginal resource cost of charitable giving. The intuition is that the government may in this case relax the self-selection constraint by a policy-induced increase in private consumption, meaning that increased charitable giving is associated with an additional cost for that particular reason. By analogy, if the low-ability type is more consumption-positional than the mimicker, such that \( \alpha^d < 0 \), increased charitable giving has the beneficial side effect of relaxing the self-selection constraint through a policy-induced decrease in private consumption, which motivates increased marginal subsidization (or decreased marginal taxation) of charitable giving at the margin.

Finally, note that if \( \alpha = \alpha^d = \beta^2 = 0 \), i.e., if neither consumption nor charitable giving were positional goods, then the second term on the right-hand side of equation (23) would vanish. In this case, there is no longer any discrepancy between the private and social marginal resource cost of charitable giving, meaning that there is no reason for the government to adjust the marginal subsidy/tax formula in response to the marginal resource cost. Equation (23) will then coincide with equation (20).

\(^{19}\) This result is further emphasized if we assume away the relative consumption comparisons completely such that \( \alpha = 0 \), in which case \( \beta^2 > 0 \) means that the second term on the right-hand side of equation (23) is positive.
4. Optimal Income Taxation Without a Direct Instrument to Control Charitable Giving

In the previous sections, we examined a case where the government is able to effectively control charitable giving through a direct tax or subsidy. Although this case is interesting and accords well with the idea that high-income consumers may have positional preferences for charitable giving, it is still not necessarily the case that the government is able to target these contributions perfectly through a direct tax instrument. One reason is, of course, that charitable contributions are not necessarily fully observable at the individual level: individuals may have an incentive to exaggerate their charitable giving to benefit from the subsidy, or underreport their contributions to avoid the tax, described in the previous section. Furthermore, charitable giving is often organized by non-governmental entities with their own interests and incentives. Another reason is that the tax treatment of charitable giving might be politically controversial. Therefore, in this section, we analyze a scenario where the government is not able to influence the charitable giving through a direct instrument, i.e., the redistribution and correction policies are solely based on income taxation. To simplify the analysis, we abstract from the resource cost of charitable giving addressed in Subsection 3.3, which is not essential for the main insights derived here.

4.1 Individual Behavior

The tax function will now be written \( T^i = T(w^i l^i) \), as the tax payment (positive or negative) solely depends on the individual’s income. The budget constraints facing low-ability and high-ability individuals then become

\[
\begin{align*}
& w^1 l^1 - T(w^1 l^1) + n^2 g^2 / n^1 - c^1 = 0, \tag{24a} \\
& w^2 l^2 - T(w^2 l^2) - g^2 - c^2 = 0, \tag{24b}
\end{align*}
\]

respectively. The decision problem faced by the low-ability type takes exactly the same form as in the previous section, meaning that equation (5) still represents the first-order condition for work hours. For the high-ability type, the first-order condition for work hours in equation (5) also remains valid, while the first-order condition for charitable giving changes to read

\[
-\varepsilon_u^2 + \varepsilon_u^2 \leq 0. \tag{25}
\]

To be able to influence charitable giving through the income tax, the government may utilize that (25) implicitly defines charitable giving as a function of the private consumption and

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20 A more realistic alternative might be to allow for an intermediate case, e.g., a limited form of tax deduction. However, as long as the tax treatment of charitable contributions deviates from the flexible policy examined in the previous section, the incentive to affect the charitable contributions through marginal income taxation presented below would still prevail. To characterize these tax policy incentives in the simplest possible way, we focus on the extreme case where the government lacks a direct instrument for taxing or subsidizing charitable giving.
hours of work of the high-ability type. More specifically, if (25) holds as a strict equality, we can solve for \( g^2 \) as a function of \( c^2, z^2, \bar{c} \), and \( \bar{g}^2 \), i.e., \( g^2 = \bar{g}^2(c^2, z^2, \bar{c}, \bar{g}^2) \). By using \( g^2 = \bar{g}^2 \), we obtain the reduced form

\[
g^2 = g^2(c^2, z^2, \bar{c}).
\]  

Equation (26) is interpretable as the reaction function for \( g^2 \) perceived by the government, since the government recognizes the relationship between \( g^2 \) and \( \bar{g}^2 \). In the general case, the comparative statics of equation (26) are ambiguous. To gain some additional insights and provide intuition, we also consider a simplified version of equation (26) based on a separable utility function for the high-ability type:

\[
U^2 = v^2(c^2, z^2, g^2, \Delta c^2, \Delta g^2) = \bar{v}(c^2, z^2) + h(g^2) + k(\Delta c^2) + q(\Delta g^2),
\]

where each sub-utility function is increasing in its respective argument and strictly concave, and consumption and leisure are weak (Edgeworth) complements such that \( v_{z}^2 \geq 0 \). Then, if \( g^2 > 0 \), (25) simplifies to

\[
-\left(\bar{v}(c^2, z^2) + k_{c}(\Delta c^2)\right) + h_{g}^{2}(g^2) + q_{\Delta g}^{2}(\Delta g^2) = 0.
\]

Totally differentiating, and using \( \bar{g}^2 = g^2 \) give

(i) \( \frac{\partial g^2}{\partial c^2} > 0 \),  
(ii) \( \frac{\partial g^2}{\partial z^2} \leq 0 \),  
(iii) \( \frac{\partial g^2}{\partial \bar{c}} < 0 \).

The comparative statics in (28b) have straightforward interpretations. An increase in private consumption leads to decreased marginal utility of consumption. In turn, this leads the individual to redirect spending towards more charitable giving, ceteris paribus. On the other hand, increased use of leisure increases the marginal utility of consumption (by the assumption of complementary) and leads to increased private consumption and less charitable giving, ceteris paribus. Finally, since the individuals are positional in terms of consumption, it follows that an increase in the reference consumption increases the marginal utility of consumption, ceteris paribus, which leads to less charitable giving.

4.2 The Government

As in the previous sections, the government attempts to correct for positional externalities, emanating from both consumption and charitable giving, and also redistribute between the two ability types. However, in the case analyzed in this section it has no direct instrument to subsidize or tax charity. By using \( g^1 = -n^2 g^2 / n^1 \) and \( \bar{g}^1 = -n^2 \bar{g}^2 / n^1 \) as before, the public decision problem is to choose \( l^1, c^1, l^2, \) and \( c^2 \) to maximize utility for the low-ability type

25
while holding utility fixed for the high-ability type subject to the self-selection constraint and the resource constraint, implying that we can write the Lagrangian as

\[ L = u^1(c^1, z^1, -n^2g^2 / n^1, \bar{c}, -n^2\bar{g}^2 / n^1) + \delta \left[ u^2(c^2, z^2, g^2, \bar{c}, \bar{g}^2) - \bar{U}^2 \right] + \lambda \left[ u^2(c^2, z^2, g^2, \bar{c}, \bar{g}^2) - \bar{u}^2(c^1, 1 - \phi l^1, -n^2g^2 / n^1, \bar{c}, -n^2\bar{g}^2 / n^1) \right] + \gamma \sum n^1 \left[ w'l^1 - c^1 \right] \]

However, \( g^2 \) is not a direct choice variable anymore and can therefore only be affected indirectly. It is here instead given by equation (26), i.e., \( g^2 = g^2(c^2, z^2, \bar{c}) \). We continue to assume that the mimicker does not contribute to charity, which is perhaps somewhat more questionable here, since the model no longer requires that charitable giving is observable to the government. For purposes of comparison, we would like to keep the model as close as possible to that of the previous section (except that the government can no longer directly control charitable giving), which means that we assume that the mimicker does not contribute to charity.

The social first-order conditions can then be written as

\[ l^1: -u^1_z + \lambda \phi u^2_z + \gamma n^1w^1 = 0 \]

\[ c^1: u^1_z - \lambda u^2_z - \gamma n^1 + L \frac{n^1}{N} = 0 \]

\[ l^2: -\left( \delta + \lambda \right) u^2_z + \gamma n^2w^2 - L \frac{\partial g^2}{\partial z^2} = 0 \]

\[ c^2: \left( \delta + \lambda \right) u^2_z - \gamma n^2 + L \frac{n^2}{N} + L \frac{\partial g^2}{\partial c^2} = 0 \]

The social first-order conditions for \( l^1 \) and \( c^1 \), given by equations (30) and (31), take the same general form as in the previous section. Yet, as we will show below, the marginal income tax rate implemented for the low-ability type will differ from the policy implemented in the previous section due to interaction effects between the positional consumption and gifts externalities. In addition, the social first-order conditions for \( l^2 \) and \( c^2 \) in equations (32) and (33) are directly dependent on the welfare effect of charitable giving (through the partial derivative of the Lagrangian with respect to \( g^2 \)), since changes in the hours of work and

---

\[ ^{21} \text{On the one hand, the mimicker is no longer restricted in his/her contribution behavior and may therefore want to contribute to charitable giving. On the other hand, the mimicker is also a recipient of charity, and it may seem somewhat counterintuitive to contribute to and benefit from charitable giving at the same time. In addition, recall that the mimicker has the same income as the low-ability type.} \]
private consumption of the high-ability type affect charitable giving through the reaction function given in equation (26). This will be discussed further below.

To gain further insight into the implications of charitable giving for optimal income taxation, we differentiate the Lagrangian with respect to $\bar{c}$ and $g^2$, while using $g^2 = \bar{g}^2$. This gives

$$L = u^1 + (\delta + \lambda)u^2 - \lambda \hat{u}^2 + L_g \frac{\partial g^2}{\partial c}$$

(34a)

$$L_g = (\delta + \lambda)u^2 - n^2(u^1 - \lambda \hat{u}^2) / n^1 + L_g^*$$

(34b)

where

$$L_g^* = (\delta + \lambda)u^2 - n^2(u^1 - \lambda \hat{u}^2) / n^1.$$  

(34c)

Recall from the previous section that $u^i = -\alpha' u^i$, $\hat{u}^2 = -\bar{\alpha}^2 \hat{u}^2$, and $u^g = -\beta' u^g$ for $i=1,2$. By using equations (31), (33), (34a), (34b), and (34c), we can then derive

$$L_g = (\delta + \lambda)v^2 - n^2\left(u^1(1 - \beta^i) - \lambda \hat{u}^2(1 - \bar{\beta}^2)\right) / n^1$$

(35a)

$$L_g = -\frac{\gamma}{1 - \bar{\alpha}} \left(\frac{\alpha^d}{1 - \alpha^d} + \frac{1}{1 - \alpha}\right) \left((\delta + \lambda)v^2 - n^2\left(v^1 - \lambda \hat{v}^2\right) / n^1\right)\left(\frac{\partial g^2}{\partial c} + \alpha^2 \frac{\partial g^2}{\partial c^2}\right).$$

(35b)

Note that the right-hand side of equation (35a) can be either positive or negative. It contains the components of the social first-order condition for $g^2$ derived in equation (19) in Section 2, although the two terms do not necessarily sum to zero here. The first term on the right-hand side of equation (35b) is the direct partial welfare effect of increased reference consumption, which depends on the average degree of consumption positionality, $\bar{\alpha}$, and the difference in the degree of consumption positionality between the mimicker and the low-ability type, $\alpha^d$ (as defined in the previous section). We can see that the larger the $\bar{\alpha}$, the greater the welfare cost of increased reference consumption, ceteris paribus. This effect is, in turn, either reinforced ($\alpha^d < 0$) or counteracted ($\alpha^d > 0$) by an incentive to relax the self-selection constraint by exploiting that the mimicker and the low-ability type typically differ in terms of degree of consumption positionality.

The second term on the right-hand side of equation (35b) is an indirect welfare effect of increased reference consumption and arises because the two externalities interact through the reaction function for $g^2$ in equation (26). As such, this component depends on the social cost benefit rule for $g^2$ and would, of course, vanish in a setting where the government directly
controls charitable giving, in which case the social first-order condition for \( g^2 \) would read 
\[
(\delta + \lambda)\nu^2_g - n^2(\nu^i_g - \lambda \nu^2_g) / n^1 = 0.
\]
The multiplier \( \partial g^2 / \partial c + \alpha^2 \partial g^2 / \partial c^2 \) reflects two different channels through which the two positional externalities interact. These channels are (i) a direct effect of \( \tau \) on \( g^2 \) and, therefore, on \( g^2 \), and (ii) a feedback effect because \( \tau \) affects \( c^2 \) through equation (33). The latter effect depends on the high-ability type’s degree of consumption positionality: the higher the degree, the stronger the feedback effect. According to the comparative statics based on the simplified utility function in equation (27), \( \partial g^2 / \partial c < 0 \) and \( \partial g^2 / \partial c^2 > 0 \) Thus, the lower the high-ability type’s degree of consumption positionality, the more likely it is that \( \partial g^2 / \partial c + \alpha^2 \partial g^2 / \partial c^2 \) is a negative number.

We are now ready to derive the marginal income tax rates, which is accomplished by combining the social first-order conditions in equations (30)–(33) with the private first-order condition for labor supply in equation (5). The marginal income tax policy is summarized in Proposition 3.

**Proposition 3.** If the government lacks a direct instrument to control the charitable giving, the optimal marginal income tax rates can be characterized as

\[
T^1_{wl} = \frac{\lambda^*}{n^1 w^1} \left( MRS^1_{z,c} - \phi MRS^2_{z,c} \right) - \frac{L_c}{w^1 \gamma N} MRS^1_{z,c}, 
\]

\[
T^2_{wl} = -MRS^2_{z,c} \frac{L_c}{w^2 \gamma N} + \frac{L_{z^2}}{\gamma w^2 n^2} \left( \frac{\partial g^2}{\partial z^2} - MRS^i_{z,c} \frac{\partial g^2}{\partial c^2} \right),
\]

where \( \lambda^* = \lambda \hat{u}^i_c / \gamma \), \( MRS^i_{z,c} = \frac{u^i_c}{u^i_c} \) for \( i=1,2 \), and \( MRS^2_{z,c} = \hat{\lambda}^{2}_i u^i_c / \hat{\lambda}^{2}_i u^i_c \).

Proof: See the Appendix.

The low-ability type’s marginal income tax rate given in equation (36a) takes the same general form as in Aronsson and Johansson-Stenman (2008), with the modification that the welfare effect of increased reference consumption is now given by equation (35b). As a consequence, the sign of the second term on the right-hand side no longer only depends on the average degree of consumption positionality and the difference in this degree of positionality between the mimicker and the low-ability type (as above). It also depends on whether an increase in \( g^2 \) leads to higher or lower social welfare. An analogous effect appears as the first
term on the right-hand side in the marginal income tax formula for the high-ability type given in equation (36b).

To provide intuition behind the tax policy implications of consumption positionality, and in particular the implications of the second term on the right-hand side of equation (35b), we add the (reasonable) assumption that \( \alpha > \alpha^d \), in which case the first term on the right-hand side of equation (35b) is negative, and then use the simplified utility function given in equation (27) and associated comparative statics in (28b). It follows that the partial welfare effect of increased reference consumption, as specified in equation (35b), is negative if

\[
\left( (\delta + \lambda)v_s^2 - n^2(v_g^1 - \lambda \hat{v}_s^2) / n^1 \right) \left[ \frac{\partial g^2}{\partial c^2} + \alpha^2 \frac{\partial g^2}{\partial c^2} \right] < 0, \tag{37}
\]

where \( \partial g^2 / \partial c^2 < 0 \) and \( \partial g^2 / \partial c^2 > 0 \) by (28b). Since the functional form assumption for the utility function implies \( |\partial g^2 / \partial c^2| > |\partial g^2 / \partial c^2| \), the sign of the term within the square bracket depends on the high-ability type’s degree of consumption positionality. If this degree is sufficiently high, such that \( \partial g^2 / \partial c^2 + \alpha^2 \partial g^2 / \partial c^2 > 0 \), the negative sign of (37) requires that charity is over-provided relative to the second-best optimal provision rule in Section 2, i.e., \( (\delta + \lambda)v_s^2 < n^2(v_g^1 - \lambda \hat{v}_s^2) / n^1 \). This exemplifies an incentive to increase the marginal income tax rates for both ability types that in turn leads to a smaller positional consumption externality as well as a simultaneous decrease in the level of charitable giving (both of which are desirable).

On the other hand, if the high-ability type’s degree of consumption positionality is low enough such that \( \partial g^2 / \partial c^2 + \alpha^2 \partial g^2 / \partial c^2 < 0 \), and if we continue to assume that charitable giving is over-provided in equilibrium relative to the second-best optimal policy rule, (37) will be replaced with

\[
\left( (\delta + \lambda)v_s^2 - n^2(v_g^1 - \lambda \hat{v}_s^2) / n^1 \right) \left( \frac{\partial g^2}{\partial c^2} + \alpha^2 \frac{\partial g^2}{\partial c^2} \right) > 0. \tag{38}
\]

In this case, the two terms on the right-hand side of equation (35b) differ in sign (under the assumption that \( \alpha > \alpha^d \)), meaning that the marginal tax policy implication of the positional consumption externality is ambiguous (since a decrease in this externality would lead to an increase in the already over-provided charitable giving).
Policy implications opposite to those just discussed would follow if charitable giving were under-provided in equilibrium relative to the second-best optimal policy rule, i.e., if
\[(\delta + \lambda)v^2_g > n^2(v^1_g - \lambda \hat{v}^2_g) / n^1.\]

The second term on the right-hand side of equation (36b) is also novel and arises because the high-ability type’s labor supply and consumption choices directly affect the charitable giving and, therefore, the tax policy incentives. Note first that this effect has nothing to do with consumption positionality (i.e., it would be present also in a model without consumption positionality where \(L^* = 0\)). To provide intuition, consider once again the simplified utility function with comparative statics in (28b), in which case
\[\frac{\partial g^2}{\partial z^2} - MRS_{z,c}^2 \frac{\partial g^2}{\partial c^2} < 0.\]  

With (39) at our disposal, it follows that the second term on the right-hand side of equation (36b) constitutes an incentive to tax high-ability labor at the margin if \((\delta + \lambda)v^2_g < n^2(v^1_g - \lambda \hat{v}^2_g) / n^1\). In this scenario, the high-ability type over-provides charitable donations relative to the policy rule ideally preferred by the government in equation (19). Therefore, by reducing high-ability type’s labor supply and disposable income, less will be spent on charitable giving. If instead \((\delta + \lambda)v^2_g > n^2(v^1_g - \lambda \hat{v}^2_g) / n^1\), meaning that the high-ability type under-provides charitable donations in equilibrium, there is an analogous incentive to reduce the marginal income tax rate facing the high-ability type. The intuition is that lower marginal income taxation leads to increased charitable giving, which is desirable as long as giving falls below the level implied by equation (19).

Finally, note that equations (36) would coincide with equations (18) if
\[L^* = (\delta + \lambda)v^2_g - n^2(v^1_g - \lambda \hat{v}^2_g) / n^1 = 0,\]
i.e., if the marginal welfare contribution of charitable giving is zero at the optimum. This would be the case if the government were able to control the charitable donations through a direct instrument, as in Sections 2 and 3. Therefore, the fact that charitable giving is no longer necessarily at the socially optimal level (due to the lack of such an instrument) is the source of discrepancy between the policy rules for marginal income taxation given in equations (36) and those presented in Section 3.
5. Numerical Simulations

In this section, we supplement the theoretical analyses in Sections 3 and 4 with numerical simulations. In doing so we are able to go beyond the policy rules for marginal taxation addressed above and analyze the levels of marginal and average tax rates as well as the overall allocations of consumption and leisure. The main purpose is to examine (i) how the two versions of the model (i.e., with and without a direct tax instrument to control charitable giving) differ in terms of marginal tax and redistribution policy, and (ii) how the optimal tax and redistribution policies vary with key parameters of the model.\footnote{All simulations are based on the two-type models examined in the theoretical sections. The simulations should thus not be seen as trying to mimic real economies.}

5.1 Numerical Model

The theoretical results derived in Sections 3 and 4 are based on the general governmental objective of a Pareto-efficient resource allocation. The policy rules for marginal taxation presented above are thus necessary conditions for maximizing any social welfare function that fulfills the Pareto criterion, as long as it is consistent with the preferred redistribution profile. However, the levels of marginal (and average) taxation, as well as the overall redistribution policy, will clearly depend on which specific social welfare function we use as well as on the functional form assumptions underlying the individual utility functions.

We assume that all individuals share a common utility function, characterized by the same degree of consumption positionality for all (including the mimicker) equal to $\alpha$, as well as a common degree of gifts positionality equal to $\beta$. We also assume that individuals derive additional utility from giving if, and only if, their own consumption level (or net income) is larger than the consumption level of the recipients. Therefore, only high-ability individuals may donate, and only low-ability individuals will potentially receive charitable donations.

The utility related to the warm glow of donating for individual $i$ is given by $\nu \ln(M + D(\text{give}' - \beta \text{give}')$, where $D$ is a dummy-variable taking the value 1 when the receiver has a lower consumption level than oneself and zero otherwise. The corresponding disutility of receiving donations for individual $i$ the becomes $\sigma \ln(M + \text{receive}' - \beta \text{receive}')$. In equilibrium, only the high-ability individuals will potentially give donations, and the low-
ability individuals potentially receive such donations, meaning that the utility functions facing the two types can be written as follows:\(^{23}\)

\[
U^1 = \ln(c^1 - \alpha \tilde{c}) + \eta \ln(z^1) + \nu \ln(M) - \sigma \ln(M - g^1 + \beta \tilde{g}^1),
\]

\[
U^2 = \ln(c^2 - \alpha \tilde{c}) + \eta \ln(z^2) + \nu \ln(M + g^2 - \beta \tilde{g}^2) - \sigma \ln(M).
\]

Note that these utility functions are leisure separable according to equation (3b). Consider first the case where the government can control the charitable giving through a direct instrument. Based on equations (40), and by assuming that the resource cost of charitable giving takes the form \(\mu(g^2) = \varepsilon \sqrt{g^2}\) for \(\varepsilon > 0\), the private first order conditions become\(^{24}\)

\[
MRS_{gc}^1 = \eta \frac{c^1 - \alpha \tilde{c}}{z^1} = w^1 \left(1 - T^i_{wl}\right)
\]

\[
MRS_{gc}^2 = \eta \frac{c^2 - \alpha \tilde{c}}{z^2} = w^2 \left(1 - T^2_{wl}\right)
\]

\[
MRS_{gc}^2 = \nu \frac{c^2 - \alpha \tilde{c}}{M + g^2 - \beta \tilde{g}^2} = 1 + T^2_g + 0.5 \varepsilon (g^2)^{-0.5}.
\]

By analogy to equation (41c), we can derive the marginal rate of substitution between gifts and private consumption for the low-ability type

\[
MRS_{gc}^1 = \sigma \frac{c^1 - \alpha \tilde{c}}{M - g^1 + \beta \tilde{g}^1}.
\]

Note that \(M\) must be large enough such that individuals of type 1 accept donations at a zero donation level, i.e. such that \(MRS_{gs}^1 < 1\) when \(g^2 = 0\), in turn implying \(M > \sigma (c^1 - \alpha \tilde{c})\) in equilibrium. It must also be small enough to ensure that individuals of type 2 are willing to donate at a zero donation level, i.e., \(MRS_{gs}^2 > 1\) for \(g^2 = 0\), in turn implying that \(M < \nu (c^2 - \alpha \tilde{c})\) in equilibrium.

If the government cannot control charitable giving through a direct instrument, the private first order conditions for work hours remain as above, while equation (41c) is replaced by

\[
MRS_{gc}^2 = \nu \frac{c^2 - \alpha \tilde{c}}{M + g^2 - \beta \tilde{g}^2} = 1 + 0.5 \varepsilon (g^2)^{-0.5}.
\]

---

\(^{23}\) Similar functional form assumptions are used in other literature on optimal taxation under social comparisons; see, Kanbur and Tuomala (2013) and Aronsson and Johansson-Stenman (2018). The latter study assumes a difference comparison, as we have done, whereas the former instead assumes a ratio comparison form.

\(^{24}\) It is not entirely clear to us whether the cost of charitable giving should be concave (as we assume) or convex (which is the conventional assumption for cost functions). We base our formulation on the assumption that the initial cost of searching among presumptive charities is the main mechanism behind this cost.
Therefore, by using \( g^2 = \bar{g}^2 \), equation (43) implicitly defines \( g^2 \) as a function of \( c^2 \) and \( \bar{c} \), which constitutes the reaction function through which the government may influence the charitable giving via the income tax.

Turning to the optimal tax problem, we follow much earlier literature in assuming a utilitarian social welfare function

\[
W = n^1U^1 + n^2U^2. \tag{44}
\]

The self-selection and resource constraints can be written as follows:

\[
\ln(c^2 - \alpha \bar{c}) + \eta \ln(c^2) + \nu \ln(M + g^2 - \beta \bar{g}^2) - \sigma \ln(M) \\
\geq \ln(c^1 - \alpha \bar{c}) + \eta \ln(1 - \phi l^1) + \nu \ln(M) - \sigma \ln(M + (g^2 - \beta \bar{g}^2)n^2 / n^1)
\]

\[
\sum_{i=1}^{2} n^iw^i l^i = \sum_{i=1}^{2} n^i c^i + n^2 \bar{c} + \sqrt{g^2}
\]

(46)

where we have used \( g^1 = -n^2 g^2 / n^1 \). In the version of the model where the government can control the charitable giving through a direct tax instrument, the social decision-problem is to choose \( l^1, c^1, l^2, c^2 \), and \( g^2 \) to maximize the social welfare function given in equation (44) subject to the self-selection and resource constraints in equations (45) and (46). In doing so, the government (or social planner) also recognizes that the two reference measures are endogenous and given by \( \bar{c} = (1/N) \sum_i n^i c^i \) and \( g^2 = \bar{g}^2 \), respectively. By analogy, if the government lacks a direct tax instrument for controlling the charitable giving, the social decision-problem is to choose \( l^1, c^1, l^2, c^2 \) to maximize the social welfare function subject to the same self-selection and resource constraints, and subject to the reaction function for \( g^2 \) implicitly defined by equation (43).

5.2 Baseline Simulation Results

In the baseline settings, we assume a substantial productivity differential between the types and that the degrees of positionality are relatively modest (equal to 0.2 for both consumption and charitable giving). The baseline parameters are the following:

\[
\gamma = 0.2, \quad \phi = 0.2, \quad \sigma = 0.5, \quad \varepsilon = 0.4, \quad \nu = 0.4, \quad M = 5, \quad n^1 = 0.8, \quad n^2 = 0.2, \quad w^1 = 15, \quad w^2 = 60.
\]
Table 1 Baseline Results

a) Direct instrument to control charitable giving

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b) No direct instrument to control charitable giving

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<td>0.84</td>
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<td>0.17</td>
<td>-0.72</td>
<td>0.48</td>
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</table>

In both parts of Table 1, we can observe a sizable redistribution through income taxes. Indeed, the average tax is around -70 per cent for low-ability individuals (and about 50 per cent for high-ability individuals), meaning that they will receive about 0.7 USD as a tax transfer per dollar earned; yet, their marginal tax rate is positive and equal to 27-28 per cent. Furthermore, despite that a first best tax policy would equalize the consumption across individuals – due to the functional form assumption for the individual utility functions – the second best allocation portrayed here implies a substantial inequality measured in terms of consumption, although substantially smaller than in terms of the before-tax wage rates. As such, the self-selection constraint effectively reduces the scope for redistribution. Nevertheless, given this level of governmental redistribution through taxes, Table 1a shows that it is still optimal to subsidize charitable giving, where the subsidy rate is 16 per cent. The resulting redistribution through charity is also far from negligible.

Table 1b, which illustrates the case where the government lacks a direct instrument through which to influence charitable donations, gives results reminiscent to those in Table 1a, albeit with two important exceptions. First, without a direct instrument to affect charitable giving, these donations are smaller at the optimum. In turn, this means that the high-ability individuals consume more, and the low-ability individuals consume less, in Table 1b than in Table 1a. Therefore, a full set of instruments allows for more redistribution without violating the self-selection constraint. Second, and more interestingly, the marginal income tax rate implemented for the high-ability type is lower here than in Table 1a. The intuition is that the charitable giving is under-provided relative to the policy rule ideally preferred by the
government, implying that the government now uses the marginal income tax faced by the high-ability type as an indirect instrument for increasing the level of charitable giving. This mechanism is illustrated in equation (36b): since \( L_{g^2} > 0 \) in Table 1b (meaning that increased charitable giving leads to higher social welfare, ceteris paribus), the second term on the right hand side of equation (36) is negative and thus contributes to a lower marginal income tax rate. Note that this mechanism is absent in the simulation results presented in Table 1a, where the government has a direct instrument for influencing the charitable giving and uses this instrument such that \( L_{g^2} = 0 \).

We would, nevertheless, like to point out that the marginal and average income tax policies are quite similar in Tables 1a and 1b, despite that the direct tax/subsidy instrument for charitable giving is absent in the simulations underlying Table 1b. In other words, the benchmark simulations imply that the marginal income tax policies and overall redistribution are not very sensitive to whether the government can control the charitable giving through a direct instrument. This suggests that the marginal income tax is a somewhat weak instrument from the perspective of targeting charitable contributions, which is further emphasized by the discrepancy between Tables 1a and 1b regarding the level of these donations.

### 5.3 Sensitivity Analyses

In this subsection, we present a number of sensitivity analyses to examine how the results of the benchmark simulations will change in response to variations in the degrees of consumption and gifts positionality, the measure of stigma attached to charitable donations, and the relative wage rate, respectively. Variations in each such parameter will be addressed in turn, where the other parameters take the same values as in the benchmark model.

#### Table 2. Varying the degree of consumption positionality, \( \alpha \)

2a) Direct instrument to control the charitable giving

<table>
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<th>( c^2 )</th>
<th>( g^2 )</th>
<th>( l^1 )</th>
<th>( l^2 )</th>
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</tr>
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</tr>
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<td>0.85</td>
<td>-0.85</td>
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</table>
2b) No direct instrument to control the charitable giving

<table>
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<th>$\alpha$</th>
<th>$c^1$</th>
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<th>$g^2$</th>
<th>$l^1$</th>
<th>$l^2$</th>
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<th>$T_{wl}^2$</th>
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<th>$T_g^2$</th>
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<tbody>
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</tr>
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<td>0.84</td>
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<td>0.45</td>
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<tr>
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<td>0.87</td>
<td>0.84</td>
<td>-0.92</td>
<td>0.63</td>
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</table>

Tables 2 show that the marginal income tax rates increase with the degree of consumption positionality, which is in line with earlier studies on optimal nonlinear income taxation under relative consumption concerns based on numerical models (e.g., Kanbur and Tuomala, 2013; Aronsson and Johansson-Stenman, 2018). As implied by equation (18), the marginal income tax rate implemented for the high-ability type always equals the common degree of consumption positionality in Table 2a, since there is no discrepancy in the degree of positionality between the mimicker and the low-ability type when the utility function takes the form of equation (40). The marginal income tax rate facing the low-ability type analogously exceeds the common degree of consumption positionality, due to that marginal taxation of low-ability individuals also constitutes a means of relaxing the self-selection constraint. Another distinguishing feature is that the redistribution among consumer types increases substantially with the degree of consumption positionality.

We can also note from Table 2a that the optimal marginal subsidy to charitable giving increases with the degree of consumption positionality. In fact, when $\alpha$ increases from zero, $T_g^2$ goes from a positive number (a marginal tax) to a negative number (marginal subsidy). As shown in the theoretical section, there are two simultaneous forces at work here. First, the higher $\alpha$, the more will the low-ability type underestimate the social marginal value of avoiding stigma (due to an overestimation of the social marginal utility of consumption). Second, relative concerns for private consumption induce the high-ability type to overestimate the social marginal cost of charitable giving (and for this reason spend less resources on charity), which also contributes to increase the marginal subsidy.
Finally, the marginal and average tax rates, as well as the distribution of consumption, are qualitatively similar regardless of whether the government can control the charitable giving through a direct instrument.

Table 3 Varying the degree of gifts positionality, β

3a) Direct instrument to control the charitable giving

<table>
<thead>
<tr>
<th>β</th>
<th>c^1</th>
<th>c^2</th>
<th>g^2</th>
<th>l^1</th>
<th>l^2</th>
<th>T_{wl}^1</th>
<th>T_{wl}^2</th>
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<th>\bar{T}_2</th>
<th>T_g^2</th>
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<td>22.12</td>
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<td>-0.19</td>
</tr>
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<td>0.84</td>
<td>0.29</td>
<td>0.20</td>
<td>-0.71</td>
<td>0.48</td>
<td>-0.16</td>
</tr>
<tr>
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<td>0.84</td>
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<td>0.20</td>
<td>-0.68</td>
<td>0.45</td>
<td>-0.11</td>
</tr>
<tr>
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<td>5.53</td>
<td>0.56</td>
<td>0.84</td>
<td>0.28</td>
<td>0.20</td>
<td>-0.63</td>
<td>0.42</td>
<td>-0.04</td>
</tr>
<tr>
<td>0.80</td>
<td>14.89</td>
<td>23.18</td>
<td>6.51</td>
<td>0.57</td>
<td>0.83</td>
<td>0.29</td>
<td>0.20</td>
<td>-0.56</td>
<td>0.38</td>
<td>0.16</td>
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</table>

3b) No direct instrument to control the charitable giving

<table>
<thead>
<tr>
<th>β</th>
<th>c^1</th>
<th>c^2</th>
<th>g^2</th>
<th>l^1</th>
<th>l^2</th>
<th>T_{wl}^1</th>
<th>T_{wl}^2</th>
<th>\bar{T}_1</th>
<th>\bar{T}_2</th>
<th>T_g^2</th>
<th>L_g^2</th>
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</thead>
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<tr>
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<td>1.70</td>
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<td>0.84</td>
<td>0.28</td>
<td>0.16</td>
<td>-0.73</td>
<td>0.49</td>
<td>-</td>
<td>0.16</td>
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<td>3.14</td>
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<td>0.84</td>
<td>0.28</td>
<td>0.18</td>
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<td>-</td>
<td>0.05</td>
</tr>
<tr>
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<td>15.10</td>
<td>22.74</td>
<td>4.95</td>
<td>0.56</td>
<td>0.84</td>
<td>0.28</td>
<td>0.19</td>
<td>-0.64</td>
<td>0.43</td>
<td>-</td>
<td>0.01</td>
</tr>
<tr>
<td>0.80</td>
<td>15.02</td>
<td>22.37</td>
<td>10.40</td>
<td>0.56</td>
<td>0.84</td>
<td>0.29</td>
<td>0.22</td>
<td>-0.47</td>
<td>0.32</td>
<td>-</td>
<td>-0.02</td>
</tr>
</tbody>
</table>

We can see from Table 3a that none of the marginal income tax rates are very sensitive to changes in the degree of gifts positionality. The reason is that the government has a perfect instrument for influencing the charitable giving (by construction of the model), meaning that the relative concerns for donations do not directly affect the policy rules for marginal income taxation. Therefore, the marginal income tax rate facing the high-ability type remains constant and equal to the degree of consumption positionality, while the marginal income tax rate implemented for the low-ability type varies slightly due to that a change in β may either tighten or relax the self-selection constraint.
In Table 3a, the optimal marginal subsidy to charitable donations decreases in response to an increase in $\beta$ and eventually turns into a marginal tax. An increase in $\beta$ means that (i) a larger fraction of the high-ability type’s marginal utility of charitable giving is social waste, and (ii) a greater tendency for the high-ability type to underestimate the social marginal cost of charitable giving. Both these effects work to decrease the marginal subsidy to such donations. In Table 3b, where the simulations are based on the assumption that the government cannot directly tax or subsidize charitable contributions, the analogous (albeit indirect) policy response is to increase the marginal income tax rate facing the high-ability type to weaken the incentive for charitable contributions as $\beta$ increases. The pattern of the average tax rates and distribution of consumption is similar across the two parts of the table: the government redistributes less via the tax system when the charitable donations increase.

**Table 4** Variation in the marginal disutility of receiving charitable donations, $\sigma$

<table>
<thead>
<tr>
<th>$\sigma$</th>
<th>$c^1$</th>
<th>$c^2$</th>
<th>$g^2$</th>
<th>$l^1$</th>
<th>$l^2$</th>
<th>$T_{wl}^1$</th>
<th>$T_{wl}^2$</th>
<th>$\bar{T}^1$</th>
<th>$\bar{T}^2$</th>
<th>$T_g^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>16.83</td>
<td>16.33</td>
<td>37.26</td>
<td>0.55</td>
<td>0.89</td>
<td>0.19</td>
<td>0.20</td>
<td>0.09</td>
<td>-0.06</td>
<td>-0.89</td>
</tr>
<tr>
<td>0.3</td>
<td>15.66</td>
<td>20.86</td>
<td>6.58</td>
<td>0.56</td>
<td>0.85</td>
<td>0.25</td>
<td>0.20</td>
<td>-0.67</td>
<td>0.44</td>
<td>-0.41</td>
</tr>
<tr>
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<td>14.95</td>
<td>23.40</td>
<td>1.40</td>
<td>0.56</td>
<td>0.83</td>
<td>0.29</td>
<td>0.20</td>
<td>-0.73</td>
<td>0.49</td>
<td>0.10</td>
</tr>
</tbody>
</table>

4a) Direct instrument to control the charitable giving

4b) No direct instrument to control the charitable giving

<table>
<thead>
<tr>
<th>$\sigma$</th>
<th>$c^1$</th>
<th>$c^2$</th>
<th>$g^2$</th>
<th>$l^1$</th>
<th>$l^2$</th>
<th>$T_{wl}^1$</th>
<th>$T_{wl}^2$</th>
<th>$\bar{T}^1$</th>
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</thead>
<tbody>
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<td>0.86</td>
<td>0.25</td>
<td>-0.04</td>
<td>-0.68</td>
<td>0.45</td>
<td>-</td>
<td>0.66</td>
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<tr>
<td>0.3</td>
<td>15.20</td>
<td>23.57</td>
<td>2.46</td>
<td>0.57</td>
<td>0.85</td>
<td>0.27</td>
<td>0.11</td>
<td>-0.71</td>
<td>0.46</td>
<td>-</td>
<td>0.28</td>
</tr>
<tr>
<td>0.5</td>
<td>15.05</td>
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<td>2.02</td>
<td>0.56</td>
<td>0.83</td>
<td>0.29</td>
<td>0.22</td>
<td>-0.73</td>
<td>0.49</td>
<td>-</td>
<td>-0.06</td>
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</tbody>
</table>

Table 4a shows show that the size of the donation per high-ability individual and the marginal subsidy towards donations fall substantially when the stigma attached to receiving charitable donations increase. If the stigma is sufficiently high (represented by $\sigma = 0.5$ in the table), charitable giving should be taxed at the margin. In Table 4b, the analogous policy response is to increase the marginal income tax rate implemented for the high-ability type when the stigma attached to charitable contributions increase. Here, the co-variation between the
charitable contributions and $\sigma$ is much smaller than in Table 4a, indicating once again that marginal income taxation is not an effective means of targeting charitable giving.

Table 5. Variation in the relative wage rate, $w^2 / w^1$, where $w^j = 15$

5a) Direct instrument to control the charitable giving

<table>
<thead>
<tr>
<th>$w^2 / w^1$</th>
<th>$c^1$</th>
<th>$c^2$</th>
<th>$g^2$</th>
<th>$l^1$</th>
<th>$l^2$</th>
<th>$T^1_{wd}$</th>
<th>$T^2_{wd}$</th>
<th>$\bar{T}^1$</th>
<th>$\bar{T}^2$</th>
<th>$T^2_g$</th>
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<tr>
<td>3</td>
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<td>19.10</td>
<td>2.44</td>
<td>0.62</td>
<td>0.82</td>
<td>0.27</td>
<td>0.20</td>
<td>-0.39</td>
<td>0.40</td>
<td>-0.23</td>
</tr>
<tr>
<td>4</td>
<td>15.29</td>
<td>22.19</td>
<td>3.39</td>
<td>0.56</td>
<td>0.84</td>
<td>0.27</td>
<td>0.20</td>
<td>-0.71</td>
<td>0.48</td>
<td>-0.16</td>
</tr>
<tr>
<td>6</td>
<td>18.93</td>
<td>28.25</td>
<td>4.52</td>
<td>0.45</td>
<td>0.87</td>
<td>0.28</td>
<td>0.20</td>
<td>-1.63</td>
<td>0.57</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>22.62</td>
<td>34.24</td>
<td>5.20</td>
<td>0.34</td>
<td>0.88</td>
<td>0.29</td>
<td>0.20</td>
<td>-3.16</td>
<td>0.61</td>
<td>0.17</td>
</tr>
<tr>
<td>10</td>
<td>26.32</td>
<td>40.20</td>
<td>5.61</td>
<td>0.23</td>
<td>0.89</td>
<td>0.29</td>
<td>0.20</td>
<td>-6.18</td>
<td>0.65</td>
<td>0.34</td>
</tr>
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</table>

5b) No direct instrument to control the charitable giving

<table>
<thead>
<tr>
<th>$w^2 / w^1$</th>
<th>$c^1$</th>
<th>$c^2$</th>
<th>$g^2$</th>
<th>$l^1$</th>
<th>$l^2$</th>
<th>$T^1_{wd}$</th>
<th>$T^2_{wd}$</th>
<th>$\bar{T}^1$</th>
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<tr>
<td>3</td>
<td>13.35</td>
<td>21.02</td>
<td>0.79</td>
<td>0.63</td>
<td>0.83</td>
<td>0.26</td>
<td>0.06</td>
<td>-0.40</td>
<td>0.40</td>
<td>-</td>
<td>0.01</td>
</tr>
<tr>
<td>4</td>
<td>15.13</td>
<td>23.16</td>
<td>2.24</td>
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<td>0.84</td>
<td>0.28</td>
<td>0.17</td>
<td>-0.72</td>
<td>0.48</td>
<td>-</td>
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<td>28.24</td>
<td>4.53</td>
<td>0.45</td>
<td>0.87</td>
<td>0.28</td>
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<td>-1.63</td>
<td>0.57</td>
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<td>22.85</td>
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<td>0.28</td>
<td>0.25</td>
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<td>0.65</td>
<td>-</td>
<td>-0.12</td>
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</table>

According to Tables 5, an increased wage differential reduces the hours of work for the low-ability type and increases the hours of work for the high-ability type. At the same time, the tax system becomes more redistributive (as seen by the average tax rates). The charitable donation per high-ability individual increases with the relative wage, i.e., the more productive the high-ability type relative to the low-ability type, the larger will be the donation in absolute value. Note also from Table 5a that the donations increase when the relative wage rate increases, while the marginal subsidy to these donations decreases and eventually turns into a marginal tax. In the absence of a direct instrument for influencing charitable giving, we can see from the final column of Table 5b that the charitable giving is under-provided (relative to the policy rule ideally preferred by the government) for moderate wage differentials and over-provided for high wage differentials.
6. Conclusions

In this paper, we have analyzed the optimal tax policy responses to private redistribution through charitable giving from richer to poorer agents based on a two-type model of optimal nonlinear income taxation. We consider a rich behavioral model where receiving charity is associated with a stigma effect, and where potential givers are motivated not only by warm glow but also by status concerns associated with giving more than others. Furthermore, since status concerns in terms of private consumption may affect the incentives of giving to charity, and thus also the optimal policy directed at charitable giving, our model also assumes that people care about their relative consumption compared with others.

An important take-home message of the paper is that the warm glow of giving and stigma of receiving charity play crucial roles for whether charitable giving should be subsidized or taxed at the margin. In a first-best resource allocation, where the self-selection constraint does not bind, and in the absence of any transaction cost of charitable contributions, a necessary condition for subsidizing charity at the margin is that givers experience a warm glow. Diamond (2006) argues against using such warm-glow welfare effects as a basis for taxation. If we followed Diamond and disregard warm-glow welfare effects, the case for public charity support would be considerably weakened. Yet, in a second-best resource allocation with a binding self-selection constraint, it may be optimal to subsidize charitable giving at the margin also in the absence of any warm glow, since the stigma effect of receiving charity contributes to relax the self-selection constraint.

When introducing transaction costs of charitable giving in the model, we find that the marginal transaction cost contributes to marginal subsidization (taxation) of charitable giving if the positional consumption externality exceeds (falls short of) the positional gifts externality. The intuition is that these externalities lead to a discrepancy between the public and private marginal resource cost of charitable giving. Overall, and based on our analysis, there are cases both for taxing and subsidizing charitable giving. Finally, we characterize how the optimal marginal income tax policy responds to charitable giving in a case where the government lacks a direct instrument for taxing or subsidizing charity, and derive conditions under which this results in higher or lower marginal income taxes implemented for both ability types.
We note the following limitations in our analysis. First, we do not consider the case in which households feel social pressure to donate, as demonstrated in DellaVigna et al. (2012). Second, our theoretical analysis emphasizes the effects of relative comparisons of charitable giving, as well as the interactions between concerns about relative consumption and relative charitable giving. Although the evidence discussed in the introduction points to a status motive for charitable contributions, so far there exists no empirical evidence regarding the degree of positionality with respect to charitable giving ($\beta^2$). These limitations define significant future research questions. Notwithstanding these limitations, we hope this study clarifies the theoretical impact of the interactions between relative comparisons of charitable giving and consumption on (second-best) optimal nonlinear taxation of charitable giving and income, and that it can contribute to future discussions on tax reform when positional preferences are accounted for.

Appendix

Derivation of Equation (18)

Consider first the low-ability type. From equation (12) we can derive

$$MRS_{1,\ell}(v^1_c + v^1_{\ell c}) = \lambda \hat{\phi} \hat{v}^2_c + \gamma n^1 w^1. \quad (A1)$$

Equation (10) implies

$$v^1_c + v^1_{\ell c} = \gamma n^1 + \lambda \hat{\phi} \hat{v}^2_c + \lambda \hat{\phi} \hat{v}^2_{\ell c} - \frac{n^1}{N} L_{\ell c}. \quad (A2)$$

Combining equations (A1) and (A2) yields

$$MRS_{1,\ell} \left( \lambda \hat{\phi} \hat{v}^2_c + \lambda \hat{\phi} \hat{v}^2_{\ell c} - \frac{n^1}{N} L_{\ell c} \right) = \lambda \hat{\phi} \hat{v}^2_c + \gamma n^1 \left( w^1 - MRS_{1,\ell}^{1} \right), \quad (A3)$$

where in the last step we have used the private optimum condition for labor supply, i.e., equation (5). From equation (1) follows that for each type (including the mimicker)

$$v^1_{\ell c} = \alpha' (v^1_c + v^1_{\ell c}), \quad (A4)$$

which substituted into equation (15) implies

$$L_{\ell c} = -\alpha' (v^1_c + v^1_{\ell c}) - (\delta + \lambda) \alpha \alpha' (v^2_c + v^2_{\ell c}) + \lambda \alpha' \alpha (v^2_c + v^2_{\ell c}). \quad (A5)$$

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25 Based on a field-experimental design of door-to-door fundraising, DellaVigna et al. (2012) conclude that a common reason for donating is social pressure and that it may even be the case that such charity campaigns on average reduce the net utility of potential givers.
Note also that Equation (11) can be rearranged such that

\[(\delta + \lambda)(v^2_{c} + v^2_{\Delta c}) = \gamma n^2 - \frac{n^2}{N} L_{x}. \tag{A6}\]

Substituting equations (A2) and (A6) into equation (A5) yields

\[L_{x} = -\alpha'\left(\gamma n^1 + \lambda\left(\hat{v}^2_{c} + \hat{v}^2_{\Delta c}\right) - \frac{n^1}{N} L_{x}\right) - \alpha^2\left(\gamma n^2 - \frac{n^2}{N} L_{x}\right) + \lambda\hat{\alpha}^2\left(\hat{v}^2_{c} + \hat{v}^2_{\Delta c}\right) \]
\[= -\alpha L_{x} - \alpha\gamma N + \lambda\left(\hat{v}^2_{c} + \hat{v}^2_{\Delta c}\right)\left(\hat{\alpha}^2 - \alpha^1\right) \]
\[= -\gamma N\frac{\alpha}{1-\alpha} + \lambda\left(\hat{v}^2_{c} + \hat{v}^2_{\Delta c}\right)\frac{\hat{\alpha}^2 - \alpha^1}{1-\alpha} \tag{A7}\]

where we have used equation (16). Solving for the optimal marginal income tax rate in equation (3) and substituting equation (A7) then imply

\[T^1_{w} = \frac{MRS^1_{c,c}}{\gamma n^1 w^1}\left(\hat{\alpha}^2 + \lambda\hat{v}^2_{c} - \frac{n^1}{N} L_{x}\right)\frac{\lambda\phi\hat{v}^2_{c}}{\gamma n^1 w^1} \]
\[= \frac{MRS^1_{c,c}}{\gamma n^1 w^1}\left(\hat{\alpha}^2 + \lambda\hat{v}^2_{c} - \frac{n^1}{N} - \gamma N\frac{\alpha}{1-\alpha} + \lambda\left(\hat{v}^2_{c} + \hat{v}^2_{\Delta c}\right)\frac{\hat{\alpha}^2 - \alpha^1}{1-\alpha}\right)\frac{\lambda\phi\hat{v}^2_{c}}{\gamma n^1 w^1} \]
\[= \frac{\lambda\hat{\alpha}^2}{\gamma n^1 w^1}\left(MRS^1_{c,c} - \phi \hat{MRS}^1_{c,c}\right) + \frac{MRS^1_{c,c}}{\gamma n^1 w^1}\left(\frac{\alpha}{1-\alpha} - \frac{\lambda\left(\hat{v}^2_{c} + \hat{v}^2_{\Delta c}\right)\frac{\hat{\alpha}^2 - \alpha^1}{1-\alpha}}{\gamma N}\right) \tag{A8}\]

where

\[\tau^1 = \frac{\lambda\hat{\alpha}^2}{\gamma n^1 w^1}\left(MRS^1_{c,c} - \phi \hat{MRS}^1_{c,c}\right)\]

is the policy rule for marginal income taxation for type 1 individuals in the original Stiglitz (1982) model, in which there are no relative consumption concerns. Let us finally again use the private optimum condition, equation (5), in equation (A8) in order to obtain

\[T^1_{w} = \tau^1 + \left(1 - T^1_{w}\right)\left(\frac{\alpha}{1-\alpha} - \frac{\alpha^1}{1-\alpha}\right) \tag{A9}\]

Solving for \(T^1_{w}\) and re-arranging gives equation (18) for type 1 individuals. Equation (18) for type 2 individuals is derived similarly, in which \(\tau^2 = 0\).

**Proof of Propositions 1 and 2**

Consider first the proof of Proposition 2. From the individual optimum condition for charity, equation (6), follows that
\[ T_s^2 = \frac{v_s^2 + v_{\lambda c}^2}{v_s^2 + v_{\lambda c}^2} - 1 - \mu_s(g^2) = \frac{v_s^2 + v_{\lambda c}^2}{v_s^2 + v_{\lambda c}^2} - 1 - \mu_s(g^2) = \frac{1}{1 - \beta^2} \frac{v_s^2}{v_s^2 + v_{\lambda c}^2} - 1 - \mu_s(g^2) \] (A10)

where we used equation (17) in the last step. By using the social first-order condition for charitable giving in equation (14), we can then derive

\[ v_s^2 = \frac{v_l^1 + \gamma n^1 \mu_s(g^2) - \lambda \hat{\nu}_s^2 n^2}{\delta + \lambda}. \] (A11)

The social first-order condition for consumption among type 2 individuals, equation (11), implies

\[ v_c^2 + v_{\lambda c}^2 = \frac{\gamma n^2 - n^2 L_T}{\delta + \lambda} = \frac{\gamma n^2 - n^2}{\delta + \lambda} \left( \frac{\gamma N - \alpha}{1 - \alpha} - \lambda (v_c^2 + v_{\lambda c}^2) \frac{\lambda^2 - \alpha^2}{1 - \alpha} \right) \]

\[ = \frac{1}{1 - \alpha} \frac{\gamma n^2}{\delta + \lambda} (1 - \alpha^d) \] (A12)

Substituting equations (A11) and (A12) into equation (A10) then gives

\[ T_s^2 = \frac{1 - \alpha}{1 - \alpha} \frac{v_l^1 + \gamma n^1 \mu_s(g^2) - \lambda \hat{\nu}_s^2 - \mu_s(g^2) - 1}{1 - \alpha^d} \]

\[ = \frac{1 - \alpha}{1 - \alpha} \frac{v_l^1 - \lambda \hat{\nu}_s^2}{1 - \alpha^d} + \frac{1 - \alpha}{1 - \alpha^d} \mu_s(g^2) - 1 \]

\[ = \frac{1 - \alpha}{1 - \alpha} \frac{v_l^1 - \lambda \hat{\nu}_s^2}{1 - \alpha^d} + \mu_s(g^2) \left( 1 - \frac{\alpha}{1 - \alpha} \frac{1}{1 - \alpha^d 1 - \beta^2} - 1 \right) \frac{1 - \alpha^d}{1 - \alpha^d 1 - \beta^2} - 1. \] (A13)

\[ = \frac{1 - \alpha}{1 - \alpha} \frac{v_l^1 - \lambda \hat{\nu}_s^2}{1 - \alpha^d} - \frac{(1 - \alpha^d)(1 - \beta^2)}{(1 - \alpha^d)(1 - \beta^2)} \mu_s(g^2) - 1 \]

\[ = \frac{1 - \alpha}{1 - \alpha} \frac{v_l^1 - \lambda \hat{\nu}_s^2}{1 - \alpha^d} + \left[ 1 - \frac{\alpha}{1 - \alpha} \frac{1}{1 - \alpha^d 1 - \beta^2} - 1 \right] \mu_s(g^2) - 1 \]

Let us finally eliminate \( \gamma n^1 \). Solving equation (10) for \( \gamma n^1 \) gives

\[ \gamma n^1 = v_l^1 + v_{\lambda c}^1 - \lambda \hat{\nu}_c^2 - \lambda \hat{\nu}_{\lambda c}^2 + \frac{n^1}{N} L_T \]

\[ = v_l^1 + v_{\lambda c}^1 - \lambda \hat{\nu}_c^2 - \lambda \hat{\nu}_{\lambda c}^2 - \gamma n^1 \frac{\alpha - \alpha^d}{1} \] (A14)

Now, using \( v_l^1 + v_{\lambda c}^1 = v_l^1 (1 - \alpha^d) \) and \( \hat{\nu}_c^2 + \hat{\nu}_{\lambda c}^2 = \hat{\nu}_c^2 (1 - \alpha^2) \), and then collecting the \( \gamma n^1 \)-terms, equation (A14) can be written as

\[ \gamma n^1 = \frac{1 - \alpha}{1 - \alpha} \left[ v_l^1 (1 - \alpha^d) - \lambda \hat{\nu}_c^2 (1 - \alpha^2) \right]. \] (A15)
Substituting equation (A15) into equation (A13) gives equation (23) in Proposition 2. Equation (20) in Proposition 1 follows as the special case where \( \mu_g(g^2) = 0 \). □

**Proof of Proposition 3**

Consider first the marginal income tax formula for the low-ability type. Combining equations (30) and (31) gives

\[
\frac{u_c^i}{u_c^i} \left[ \lambda \hat{u}_c^i + \gamma n^i - L \frac{n^i}{N} \right] = \lambda \phi \hat{u}_c^i + \gamma n^i w^i. \tag{A16}
\]

By using \( w^i - u_c^i / u_c^i = w^i T_{wl}^1 \) in equation (A16) and then solving for \( T_{wl}^1 \), we can derive

\[
T_{wl}^1 = \frac{\lambda \hat{u}_c^i}{\gamma n^i w^i} \left( \frac{u_c^i}{u_c^i} - \phi \frac{\hat{u}_c^i}{u_c^i} \right) - \frac{u_c^i}{u_c^i} \frac{L}{w^i \gamma N}
\]

which is equation (36a).

Turning to the marginal income tax formula for the high-ability type, we can similarly combine equations (32) and (33) to derive

\[
\frac{u_c^2}{u_c^2} \left[ \gamma n^2 - L \frac{n^2}{N} - L_s \frac{\partial g^2}{\partial c^2} \right] = \gamma n^2 w^2 - L_s \frac{\partial g^2}{\partial c^2}. \tag{A18}
\]

Using \( w^2 - u_c^2 / u_c^2 = w^2 T_{wl}^2 \) in equation (A18) and solving for \( T_{wl}^2 \) gives

\[
T_{wl}^2 = -\frac{u_c^2}{u_c^2} \frac{L_s}{w^2 \gamma N} + \frac{L_s}{\gamma w^2 n^2} \left( \frac{\partial g^2}{\partial c^2} - \frac{u_c^2}{u_c^2} \frac{\partial g^2}{\partial c^2} \right), \tag{A19}
\]

which is equation (36b). □

To derive equation (35b), we use \( u_c^i = -\alpha^i u_c^i \) for \( i = 1, 2 \) and \( \hat{u}_c^2 = -\hat{\alpha}^2 \hat{u}_c^2 \). Substituting into equation (34a) gives

\[
L_c = -\alpha^1 u_c^1 - (\delta + \lambda)\alpha^2 u_c^2 + \lambda \hat{u}_c^2 + L_s \frac{\partial g^2}{\partial c^2}. \tag{A20}
\]

Solving equation (31) for \( u_c^1 \) and equation (33) for \( (\delta + \lambda)u_c^2 \), respectively, such that

\[
u_c^1 = \lambda \hat{u}_c^2 + \gamma n^1 - L \frac{n^1}{N}
\]

\[
(\delta + \lambda)u_c^2 = \gamma n^2 - L \frac{n^2}{N} - L_s \frac{\partial g^2}{\partial c^2},
\]

and substituting into equation (A20) implies

\[44\]
\[ L_\tau = -\alpha^1 \left( \lambda \hat{u}_c^2 + \gamma n^1 - L_\tau \frac{n^1}{N} \right) - \alpha^2 \left( \gamma n^2 - L_\tau \frac{n^2}{N} - L_g \frac{\partial g^2}{\partial c^2} \right) \]
\[ + \lambda \hat{\alpha}^2 \hat{u}_c^2 + L_g \frac{\partial g^2}{\partial c} \]  

Collecting \( L_\tau \)-terms and rearranging gives
\[ L_\tau \left( 1 - \frac{n^1 \alpha^1 + n^2 \alpha^2}{N} \right) = -\gamma \left( n^1 \alpha^1 + n^2 \alpha^2 \right) + \lambda \hat{\alpha}^2 \left( \hat{\alpha}^2 - \alpha^1 \right) \]
\[ + L_g \left( \frac{\partial g^2}{\partial c} + \alpha^2 \frac{\partial g^2}{\partial c^2} \right) \]  

Finally, by using the expression for \( L_g \) in equation (35a) and substituting into equation (A22), we obtain equation (35b).

References


