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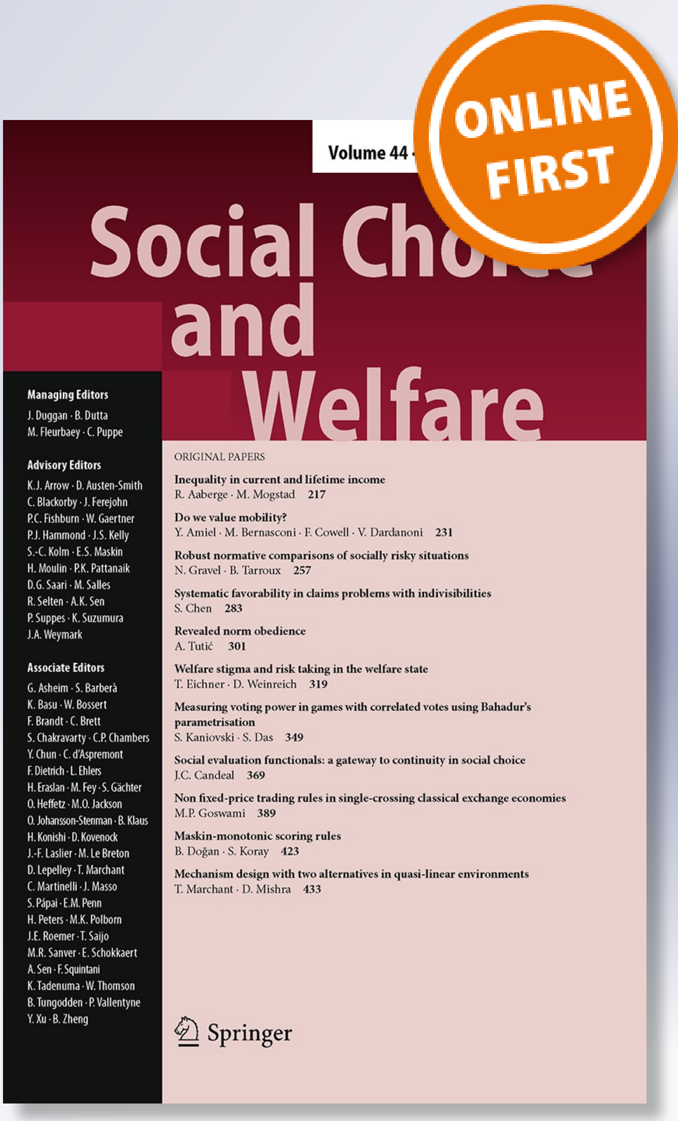

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Abstract We study optimal redistributive taxes when individuals differ in two characteristics—earning ability and leisure needs—assumed to be imperfectly correlated. Individuals have private information about their abilities but needs are observable. With different levels of observable needs the population can be separated into groups and needs may be used as a tag. We first assume that the social planner considers individuals should be compensated for their leisure needs and characterize the optimal redistributive policy, and the extent of compensation for needs, with tagging. We also consider an alternative social objective where individuals are deemed responsible for their needs.

JEL Classification H21 · H41

1 Introduction

Individuals divert time away from leisure or paid labor to a variety of duties. Examples of such duties include the need to take care of children or dependent parents, the hours devoted to commuting, or the extra time required for daily activities because of physical or mental disabilities. The amount of time devoted can vary significantly across individuals, yet these differences are often neglected in tax policy design. In this paper we incorporate them explicitly and explore the implications for the optimal

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redistributive scheme. In particular, we study the extent and nature of compensation for leisure needs when needs are observable and may be used as a tag.

In the standard optimal redistributive taxation framework individuals are assumed to differ in a single characteristic: ability, which is private information but has a commonly known distribution. The private information nature of this characteristic imposes limits on the amount of redistribution that can be achieved. In particular, the redistributive policy must be designed so that individuals are given proper incentives to reveal their true types. Mirrlees (1971) and Stiglitz (1982) were among the first to emphasize the implications of informational asymmetries on the design of optimal taxes, and in particular the role of incentive compatibility constraints.

In reality individuals differ in more than one characteristic. Several authors have explored whether observable individual characteristics that are correlated with the unobservable ability can play a role in the design of redistributive policies. In a seminal paper in the area, Akerlof (1978) showed that "tagging" (i.e. conditioning the tax on the observable individual characteristic) can enhance social welfare, although for particular social objectives it violates the principle of horizontal equity.

Over time Akerlof's tagging idea has gained considerable attention and there is presently a large interest in the role of tagging in optimal taxation. Recent contributions include Blomquist and Micheletto (2008), Weinzierl (2011) and Farhi and Werning (2013)—on age-dependent taxation[1]—Cremer et al. (2010) and Alesina et al. (2011)—on gender-based taxation -, Mankiw and Weinzierl (2010)—on height-based taxation -, and Blumkin et al. (2009)—on race tagging. Until recently the literature had produced few analytical results on the implications of tagging for the properties of optimal non-linear income tax schedules. Immonen et al. (1998) employed simulations to explore the pattern of optimal marginal income tax rates in an economy with a continuum of abilities and two tagged groups. In a similar setting Cremer et al. (2010) more recently provided analytical results by assuming quasilinear preferences, a Rawlsian social welfare function, and a constant and identical elasticity of labor supply within and across the tagged groups.

The papers mentioned above focused on"pure tagging" cases, where the observable characteristic is used to separate the population into identifiable groups but has no normative significance. Boadway and Pestieau (2006) studied alternatively the implications for redistributive taxation of using a tag with normative significance: differences in consumption needs. They explored the differences between pure tagging and tagging with consumption needs. They showed that, under reasonable circumstances, the tax system is more redistributive in the tagged group with the higher proportion of high-ability individuals, and that inter-group redistribution goes from the group with higher proportion of high-ability individuals to that with a lower proportion. When individuals differ in consumption needs and these can be used as a tag, full compensation for needs is optimal if a different tax schedule applies to each group. The compensation for needs is a component of the optimal inter-group lump-sum redistribution and, within each group, the optimal tax schedule depends on the distribution of

[1] Optimal age-dependent taxation had been previously studied by Lozachmeur (2006) in a life-cycle framework with representative agent, and hence abstracting from any (intracohort) redistributive aspect of the tax system.

ability types in the group. When observable consumption needs cannot be used as a tag and individuals face a common tax schedule, due for instance to political constraints or ethical concerns with the violation of horizontal equity, there is generally imperfect compensation for needs: both under- and over-compensation can result depending on the correlation between ability and needs.

In a related paper, Boadway and Pestieau (2003) incorporated leisure needs. They showed that, when leisure needs are observable and used as a tag, the maximin optimum implies a standard non-linear income tax schedule (i.e. non-distortion at the top and distortion at the bottom) within each group, and a transfer between groups that depends on the correlation between ability and needs. They did not provide however explicit results on compensation for leisure needs. In this paper we explore the extent and nature of compensation for leisure needs. In order to do so we adopt assumptions that are relatively common in the tagging literature: namely, additive leisure needs, quasilinear preferences and a maximin social welfare function. We also discuss the implications of relaxing these assumptions.

We consider first the case where the social planner deems that leisure needs deserve compensation and characterize the optimal redistributive policy, and the extent of compensation for needs, with tagging. Even if leisure needs are observable the amount required to fully compensate individuals for their needs depends on their unobservable ability, which contrasts with the linear consumption needs case in Boadway and Pestieau (2006), where the amount of compensation for needs is independent of the ability type. In the maximin solution the low-ability individuals achieve the same utility level regardless of their needs but it is optimal to impose a different tax schedule in each group: in particular, the marginal tax rates and the effective labor supplied by low-ability types differ and depend on the distribution of ability types in each group. High-ability needy individuals can be under- or over-compensated for their needs and this also depends on the distribution of ability types in each group. It is however worth highlighting that, in our framework, it is optimal to impose a different tax schedule in each group even when the proportion of low-ability individuals is the same in both groups. This result differs from those obtained with linear consumption needs and stems from the fact that it is more costly for high-ability individuals in the needy group to pretend to be low-ability.

We also briefly explore the case in which the social planner attempts to hold individuals responsible for their needs. We believe that this exercise is relevant if the needs are up to some extent a reflection of the individual's choice (for instance, the handicap is the outcome of the individual's actions). We show that in the second best, contrary to what would happen in the linear consumption needs case, it is not possible to make all needy individuals fully responsible for their needs.

The rest of the paper is organized as follows. In the next section we describe the model with two levels of ability and two levels of leisure needs, and provide the laissez-faire allocation. In Sect. 3 we characterize the first-best solution, when both ability and leisure needs are assumed to be observable. We characterize the second-best maximin optimum, with unobservable ability but observable leisure needs, in Sect. 4. In order to shed more light on the results we provide a numerical illustration in Sect. 5. In Sect. 6 we explore the consequences of adopting an alternative social objective in which the planner attempts to make the individuals responsible for their needs. We briefly discuss in Sect. 7 the implications of being unable to observe leisure needs. A final section concludes. In the appendix we discuss the implications of relaxing some of the main assumptions.

Before proceeding, it may be worth stressing the policy implications of our exercise. Weinzierl (2012) has recently argued that real-world taxes make surprisingly limited use of tagging. He nevertheless highlights notable exceptions, such as the tax treatment of disabled individuals and families with children, where some sizable tagging does take place. These are precisely two examples where leisure needs (i.e. time diverted from leisure and paid labor) are significant. Admittedly, in these cases both consumption and leisure needs play a role. In the rest of the paper we focus on the disability example as a common thread. Handicapped individuals require more time for daily activities and often also more consumption goods. We believe that the problem comes as much, if not more, from the additional time required. We purposely focus on leisure needs because we believe it is this aspect that has been most often neglected in tax policy design.[2] Note that from a practical implementation point of view information on leisure needs may be inferred from time use surveys, which are now increasingly available.

2 The model

We assume that individuals differ in ability and leisure needs and consider the case with two ability and leisure needs types. Ability is represented by the wage rate w_i, $i = L, H$, where L and H stand for low and high ability, respectively (i.e. $w_H > w_L$). The leisure need is represented by the time spent in unpaid duties $\overline{\ell}_j$. In what follows we normalize the low leisure need to 0 and denote the high leisure need by $\overline{\ell}$. Accordingly, we refer to needy and unneedy individuals $j = N, U$ (i.e. $\overline{\ell}_N = \overline{\ell} > \overline{\ell}_U = 0$).[3] There are hence four types of individuals ij. We assume that individual preferences can be represented by a quasilinear utility of the form:[4]

$$U_{ij} = c_{ij} - v\left(\ell_{ij} + \overline{\ell}_j\right) \quad i = L, H;\ j = N, U \tag{1}$$

[2] A notable exception for the case of families with children is the recent paper by Maniquet and Neumann (2015). They compare families of different sizes and use two complementary equivalence scales: the standard one for consumption and another, less standard, for the time devoted to raise one child.

[3] We use unneedy, instead of non-needy, for notational convenience. We are grateful to an anonymous referee for this suggestion.

[4] The Stone–Geary specification has often been employed to represent consumption needs, and was previously adopted for leisure needs in Boadway and Pestieau (2003). An important aspect of this additive representation of leisure needs is that the amount required to compensate for needs is increasing in ability. Most of the examples of handicaps mentioned above have in common that the opportunity cost of the time devoted to those unpaid tasks differs across ability types. It is for instance generally acknowledged that the amount of income lost from one hour of commute is larger for high-ability individuals than for low-ability ones. Other specifications could have been adopted. One possibility would be to incorporate a constant need parameter $\delta_j \geq 1$ ($\delta_j = 1$ for those individuals with no needs) with the disutility term becoming $v\left(\delta_j \ell_{ij}\right)$, which amounts to a proportional reduction in productivity. Another possibility would be $v\left(\ell_{ij} + \delta_j / w_i\right)$, implying the same opportunity cost for all. The implications of these alternative specifications are explored in Appendix 1.

where c_{ij} and ℓ_{ij} represent the consumption and the labor supply of individual ij, and the disutility of labor function $v(.)$ is assumed to be continuous, differentiable, strictly increasing and strictly convex function (i.e. $v' > 0$ and $v'' > 0$). The proportion of individuals with ability i and leisure need j in the population is given by n_{ij}. Adding up across all types we have $\sum_i \sum_j n_{ij} = 1$.

As pointed out by Boadway and Pestieau (2003), the assumption that individual utilities are identical net of needs implies that utility levels are comparable among households. This avoids the conceptual problem of how to define the social planner's objective function when individual preferences are different and utilities are non-comparable (see Boadway et al. (2002) for an analysis of optimal redistribution with heterogeneous preferences).

In the laissez-faire, each individual chooses c_{ij} and ℓ_{ij} to maximize (1) subject to the budget constraint $c_{ij} = w_i \ell_{ij}$. Hence, each ij $(i = L, H;\ j = N, U)$ solves:

$$\max_{\ell_{ij}} \quad U_{ij} = w_i\, \ell_{ij} - v\left(\ell_{ij} + \overline{\ell}_j\right). \tag{2}$$

The first-order condition (hereafter FOC) is $v'\left(\ell_{ij} + \overline{\ell}_j\right) = w_i$. Hence, $\ell_{iU} = \ell_{iN} + \overline{\ell}$ (i.e. $\ell_{iU} > \ell_{iN}$) for all i, and $\ell_{Hj} > \ell_{Lj}$ for all j. All individuals with the same ability provide the same effective labor supply. However, the amount of hours worked in the labor market, and appropriately remunerated, is lower for needy individuals. Needy individuals of ability w_i earn and consume $w_i\overline{\ell}$ less than their counterparts with no needs. Among those individuals with the same needs, we have the standard result that those with higher ability work and earn more. High-ability unneedy individuals earn and consume the most. Low-ability needy individuals earn and consume the least. It is not possible to disentangle a priori the relationship between high-ability needy individuals and low-ability unneedy individuals (i.e. c_{HN} and c_{LU}). The precise relationship depends on the particular ability and need gaps, as well as the specific functional form for the disutility of labor. In any case, within each ability group needy individuals are worse off than unneedy ones, and within each needs group low-ability individuals are worse off than high-ability ones. It seems in principle fair to compensate for both differences in ability and needs.

We represent in Fig. 1 the budget sets that the four types of individuals face depending on their productivity and their needs in the $\left(\widehat{\ell}, c\right)$-space where $\widehat{\ell}_{ij} = \ell_{ij} + \overline{\ell}_j$ denotes the effective labor supply. The indifference curves of the four types of individuals have the same shape if represented in the $\left(\widehat{\ell}, c\right)$-space. We also show a possible laissez-faire solution. In the case depicted type-HN individuals are better of than type-LU ones but the opposite can hold for alternative assumptions on wage gaps, needs gaps and disutility of labor functional forms.

3 The first best

As a benchmark we analyze the first-best solution. The problem of the planner who fully observes individual characteristics is expressed by the following Lagrangian:

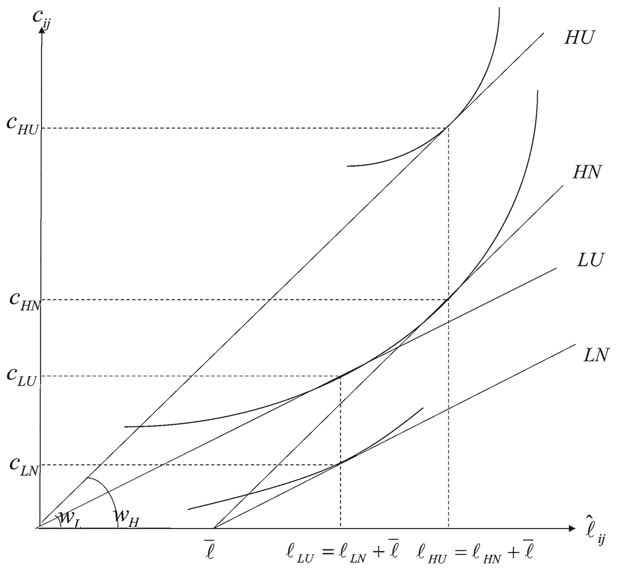

Fig. 1 Budget sets and laissez-faire allocation

$$£ = \sum_i \sum_j n_{ij} \left[G \left[c_{ij} - v \left(\ell_{ij} + \overline{\ell}_j \right) \right] + \mu \left(w_i \ell_{ij} - c_{ij} \right) \right], \tag{3}$$

where μ is the Lagrange multiplier associated with the budget constraint. Given the quasi-linearity of individual utilities, we use a strictly concave social utility transformation $G(\cdot)$ to reflect different degrees of aversion towards inequality.

The FOCs yield $v'\left(\ell_{ij} + \overline{\ell}_j\right) = w_i$ and $G'_{ij} = \mu \; \forall ij$, where G'_{ij} is the marginal social utility of consumption accruing to individual ij. As before, $\ell_{iU} = \ell_{iN} + \overline{\ell}$ (i.e. $\ell_{iU} > \ell_{iN}$) for all i, and $\ell_{Hj} > \ell_{Lj}$ for all j. Among individuals with the same needs, the most productive work and consume more. Individuals with the same ability supply the same effective amount of labor $\widehat{\ell}$, with those with higher needs working less in the marketplace. However, in the first-best all individuals achieve the same level of utility regardless of their ability or needs: $U_{ij} = c_{ij} - v\left(\widehat{\ell}_{ij}\right)$ is equal for all ij, with $c_{iN} = c_{iU}$ for all i. How can this first-best allocation be decentralized? In addition to the traditional redistribution between ability groups there is redistribution within each ability group from unneedy to needy individuals.

Boadway and Pestieau (2003) show that full compensation for linear consumption needs would require a rather simple tax-transfer scheme. In order to fully compensate for needs in consumption $\overline{c}$, and achieve the same effective consumption $\widehat{c} = c - \overline{c}$ for all the individuals with the same ability, a lump-sum transfer of $(n_{LU} + n_{HU})\,\overline{c}$ needs to be provided to each needy individual and a lump-sum tax of $(n_{LN} + n_{HN})\,\overline{c}$ has to be raised from each unneedy individual, regardless of their ability.[5] In our case, since

[5] This result is due to the quasi linearity of utility assumed by Boadway and Pestieau (2003) which implies that income, consumption and needs are measured in the same unit.

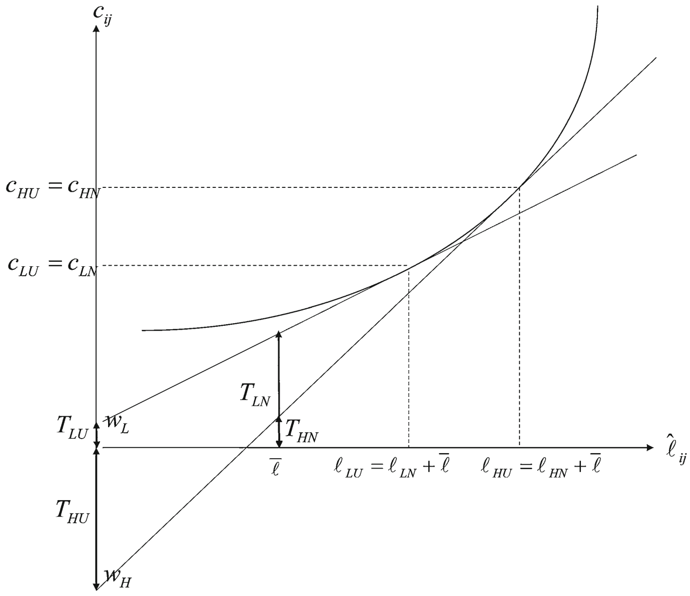

Fig. 2 First-best allocation

the valuation of the leisure needs differs by ability type, a transfer of equal magnitude to both ability types within the needy group would not lead to full compensation. A complete set of four net transfers $\{T_{LN}, T_{HN}, T_{LU}, T_{HU}\}$ would be required to decentralize the first-best.

High-ability unneedy individuals pay a tax and low-ability needy individuals receive a transfer but it is not possible to determine in general whether the intermediate types pay taxes or receive transfers, as this depends on the particular wage gaps, needs gaps, etc. A possible first-best allocation is depicted in Fig. 2 in the $\left(\widehat{\ell}, c\right)$-space. The tax and transfers for the unneedy are represented in the vertical axis. The transfers for the needy are represented at the vertical of $\overline{\ell}$. In the case depicted high-ability unneedy individuals pay a tax, and all other types receive a transfer, with the low-ability needy individuals receiving the largest transfer.

4 Tagging with leisure needs

In a second-best framework with imperfect information we need to incorporate self-selection constraints (hereafter SSCs) to ensure individuals reveal their true types. When ability is not observable the FB allocation represented in Fig. 2 is no longer feasible. In order to show this we represent in Fig. 3 the indifference curves of the four individual types in the (y, c)-space, where income y and consumption c are the variables the planner observes in the second best. In this space the solid indifference curves represented in Fig. 3 yield the same utility level. A type-HN individual would be better off with the treatment designed for a type-LN. We represent the utility level achieved by such a mimicker by the dashed indifference curve HN'. Similarly a type-

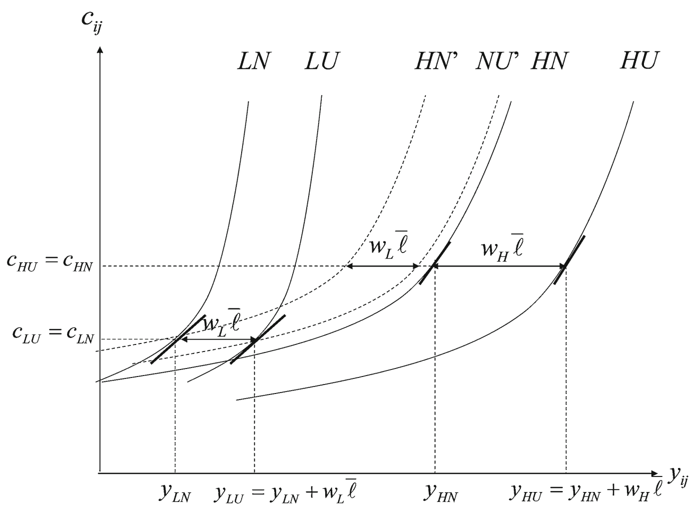

Fig. 3 Inability to achieve the FB allocation with asymmetric information

HU individual would be better off with the treatment designed for type-LU, at the dashed indifference curve HU'. Note also that the horizontal distance between the indifference curves of the high-ability individuals in the first-best allocation is $w_H\bar{\ell}$, while the horizontal distance between two high-ability individuals attempting to mimic the low-ability individuals in their respective groups is $w_L\bar{\ell}$, which implies that in such an event a type-HU mimicker would be better off than a type-HN mimicker. When needs are observable, the relevant SSCs are the ones that relate high- and low-ability individuals within each group.

In the following we focus on the maximin social objective,[6] which has been commonly employed in the tagging literature.[7] Tagging has often been criticised on the basis that it can lead to violations of the principle of horizontal equity. This criticism was acknowledged in the seminal Akerlof (1978) paper and has been recently discussed in Mankiw and Weinzierl (2010). The latter stress that, when ability is unobservable, respecting horizontal equity implies neglecting information about individual characteristics that, when correlated with ability, can make redistribution more efficient. The maximin social objective serves as a compromise: it ensures equal utility levels for the individuals at the bottom of both groups, yet allows for flexible policy combinations that take that relevant information into account.

The Lagrangian for the maximin social criterion is:

$$£ = c_{LN} - v\left(\frac{y_{LN}}{w_L} + \bar{\ell}\right) + \mu \sum_i \sum_j n_{ij}\left(y_{ij} - c_{ij}\right)$$

[6] We discuss the implications of employing a more general social welfare function in Appendix 3.

[7] See for instance Boadway and Pestieau (2003, 2006) and Cremer et al. (2010).

$$+\lambda_N\left[c_{HN}-v\left(\frac{y_{HN}}{w_H}+\bar{\ell}\right)-c_{LN}+v\left(\frac{y_{LN}}{w_H}+\bar{\ell}\right)\right]$$
$$+\lambda_U\left[c_{HU}-v\left(\frac{y_{HU}}{w_H}\right)-c_{LU}+v\left(\frac{y_{LU}}{w_H}\right)\right]$$
$$+\gamma\left[c_{LU}-v\left(\frac{y_{LU}}{w_L}\right)-c_{LN}+v\left(\frac{y_{LN}}{w_L}+\bar{\ell}\right)\right]$$

where λ_j stand for the Lagrange multipliers associated with SSCs within each needs group j $(j = N, U)$ and γ stands for the Lagrange multiplier associated with the constraint that relates both low-ability types. The public information on leisure needs implies that the two low-ability types can be separated. There is then no incentive compatibility constraint linking the two low-ability types but instead a constraint that ensures that the utility of type-LU individuals does not fall below the utility of type-LN ones.

The FOCs associated with the consumption variables yield:

$$\mu = 1, \quad \lambda_N = n_{HN}, \quad \lambda_U = n_{HU} \quad \text{and} \quad \gamma = n_{LU} + n_{HU}. \tag{4}$$

Therefore, all the constraints bind. It is worth noticing that $U_{LN} = U_{LU}$ in the maximin outcome, regardless of the distribution of abilities in the needy and unneedy groups.

The FOCs associated with the income variables yield:

$$\frac{1}{w_H}v'\left(\frac{y_{HN}}{w_H}+\bar{\ell}\right) = \frac{1}{w_H}v'\left(\frac{y_{HU}}{w_H}\right) = 1, \tag{5}$$

$$\frac{1}{w_L}v'\left(\frac{y_{LN}}{w_L}+\bar{\ell}\right) = \frac{1+\frac{n_{HN}}{n_{LN}}\frac{1}{w_H}v'\left(\frac{y_{LN}}{w_H}+\bar{\ell}\right)}{1+\frac{n_{HN}}{n_{LN}}} < 1, \tag{6}$$

$$\frac{1}{w_L}v'\left(\frac{y_{LU}}{w_L}\right) = \frac{1+\frac{n_{HU}}{n_{LU}}\frac{L}{w_H}v'\left(\frac{y_{LU}}{w_H}\right)}{1+\frac{n_{HU}}{n_{LU}}} < 1. \tag{7}$$

These conditions lead to the following proposition:

Proposition 1 *In the second-best maximin optimum type-HU and type-HN individuals face zero marginal taxes and supply the same effective amount of labor, which coincides with the first-best level. Type-LU and type-LN individuals face positive marginal tax rates and supply a lower effective amount of labor than in the first best, but not necessarily the same.*

Both low-ability types are distorted at the margin and supply a lower amount of effective labor than in the first-best. The relationship between the marginal tax rates they face and the effective amount of labor they supply depends, however, on the distribution of ability types in each group. Both high-ability individuals face zero marginal tax rates and supply the same amount of effective labor, which coincides with the first-best level.[8] This does not mean however that they achieve the same utility levels. It can be shown that the relationship between the utility levels achieved by the two high-ability types depends on the distribution of ability types in each group.

Corollary 1 *If* $n_{HU}/n_{LU} \geq n_{HN}/n_{LN}$, *then* $\widehat{\ell}_{LN} > \widehat{\ell}_{LU}$.

If the proportion of high-ability individuals in the two groups is the same, the effective labor supply of low-ability needy individuals is larger. This also holds if the proportion of high-ability individuals is lower in the needy group. The effective labor supply of needy individuals is lower only if the proportion of high-ability individuals is sufficiently large in the needy group. Using our example, low-ability handicapped individuals supply a smaller amount of effective labor only when the proportion of high-ability individuals among the handicapped is sufficiently large.

It is worth highlighting that it is optimal to impose different tax schedules in the two groups even when the distribution of ability types is the same in both groups. This contrasts with the linear consumption needs case in Boadway and Pestieau (2006) where the tax treatments of two individuals with the same ability and different needs would differ only by a lump-sum amount in those circumstances. Using our example, the marginal distortion imposed on low-ability handicapped individuals is smaller. The social planner can distort low-ability handicapped individuals less because, among high-ability individuals, it is more costly for the handicapped to pretend to be low-ability.

As the proportion of high-ability individuals decreases among the handicapped there is even less incentive to distort the labor supply of low-ability handicapped individuals. The opposite occurs when the proportion of high-ability individuals increases among the handicapped. As noted above, the effective labor supply of low-ability handicapped individuals may fall below that of low-ability non-handicapped individuals when the proportion of high-ability individuals in the handicapped group is sufficiently large. When this happens high-ability handicapped individuals are made worse off than the non-handicapped high-ability ones.

Corollary 2 *If* $\widehat{\ell}_{LN} \leq \widehat{\ell}_{LU}$ *then* $U_{HU} > U_{HN}$.

The high-ability handicapped individuals are harmed when there are few low-ability individuals among them, and they are hence more readily identified as high-ability. When $\widehat{\ell}_{LN} > \widehat{\ell}_{LU}$ the relationship between the utility levels of the high-ability types is ambiguous. If the distribution of ability types is the same in both groups, high-ability handicapped individuals are worse off but as the proportion of low-ability individuals among the handicapped increases they may become better off.

We provide a numerical example in Sect. 5 to shed more light on these results.

[8] With a separable but not quasilinear utility specification the high-ability individuals do not necessarily supply the same effective amount of labor $\widehat{\ell}$, and these amounts do not longer coincide with the first-best ones. We elaborate on this in Appendix 2.

Table 1 First-best for different proportions

(p_N, p_U)	(0.7, 0.3)				(0.5, 0.5)				(0.3, 0.7)			
Types	LN	LU	HN	HU	LN	LU	HN	HU	LN	LU	HN	HU
c	56.88	56.88	78.75	78.75	56.25	56.25	78.12	78.12	55.63	55.63	77.5	77.5
y	37.50	56.25	75	100	37.50	56.25	75	100	37.50	56.25	75	100
T	19.38	0.63	3.75	−21.25	18.75	0	3.12	−21.88	18.13	−0.62	2.5	−22.5
$\widehat{\ell}$	0.75	0.75	1	1	0.75	0.75	1	1	0.75	0.75	1	1
U		28.75				28.125				27.5		

5 Numerical illustration

The functional form we employ for the numerical simulation is:

$$U_{ij} = c_{ij} - \frac{1}{\alpha} \frac{\left(\frac{y_{ij}}{w_i} + \overline{\ell}_j \right)^{\epsilon}}{\epsilon}.$$

We use $w_H = 100 > w_L = 75$, $\overline{\ell}_N = 0.25 > \overline{\ell}_U = 0$, $\epsilon = 2$ and $\alpha = 0.01$. We assume that the proportion of individuals in each needy and unneedy group is the same and focus on the role of varying the distribution of ability types across the groups, keeping the overall proportion of low- and high-ability individuals in the society however constant, so that the role of the different distribution of ability types across groups is isolated from the role of the overall number of low- and high-ability individuals in the society. We call p_N the proportion of low-ability individuals in the needy group and p_U the proportion of low-ability individuals in the unneedy group. We start from the benchmark case where both groups have the same proportions of high- and low-ability individuals and explore subsequently the cases where the proportions of high- and low-ability individuals differ, considering both the cases where the proportion of low-ability individuals is higher in the needy group and the opposite case where it is higher in the unneedy group. That is, we do not make any a priori assumption on the correlation between productivity and need. Table 1 includes the first-best solution and Table 2 the second-best with tagging.[9]

We mentioned in Sect. 3 that in the first-best type-HU pays a tax and type-LN receives a transfer but it is impossible to determine in general whether the intermediary types pay taxes or receive transfers. In Table 1 whether type-LU pays a tax or receives a transfer depends on the distribution (i.e. (p_N, p_U)). For (0.7, 0.3) type-LU individuals receive a transfer (0.63), for (0.5, 0.5) the transfer/tax is zero and for (0.3, 0.7) type-LU individuals pay a tax (−0.62).

According to the results in Sect. 4, $\widehat{\ell}_{LN} > \widehat{\ell}_{LU}$ and the marginal tax rate imposed on the needy individual is lower when the distribution of ability types is the same in both groups (i.e. $(p_N, p_U) = (0.5, 0.5)$ in Table 2). It is optimal to distort type-LU

[9] In the tables T stands for the overall transfer/tax (i.e. $c - y$) an individual receives/pays and T' for the marginal tax rate.

Table 2 Second-best with tagging for different proportions

(p_N, p_U)	(0.7, 0.3)				(0.5, 0.5)				(0.3, 0.7)			
Types	LN	LU	HN	HU	LN	LU	HN	HU	LN	LU	HN	HU
c	46.57	32.43	81.51	78.56	39.89	38.13	78.45	80.48	33.58	44.48	76.30	83.26
y	29.89	27.84	75	100	22.83	39.13	75	100	13.14	47.37	75	100
T	16.68	4.60	6.51	−21.44	17.06	−1	3.45	−19.52	20.44	−2.89	1.30	−16.74
$\widehat{\ell}$	0.648	0.371	1	1	0.554	0.522	1	1	0.425	0.631	1	1
T'	0.135	0.505	0	0	0.261	0.304	0	0	0.433	0.158	0	0
U	25.54	25.54	31.51	28.56	24.52	24.52	28.45	30.48	24.54	24.54	26.30	33.26

individuals more at the margin because it is less costly for high-ability individuals in the unneedy group to pretend to be low-ability than for their counterparts in the needy group. There is a transfer towards the needy group (i.e. the handicapped individuals in our example): for this particular parameter values both unneedy types consume less than they earn (type-HU considerably less: $T_{LU} = -1$ and $T_{HU} = -19.52$) , and both needy types consume more than they earn (type-LN considerably more: $T_{LN} = 17.06$ and $T_{HN} = 3.45$), yet type-HU remains better off than type-HN ($U_{HU} = 30.48 > U_{HN} = 28.45$) and both are better off than in the first-best (i.e. high-ability types benefit from the fact that ability is unobservable).

When the distribution of ability types differs by group, the observability of needs conveys further information about the distribution of ability. When the proportion of low-ability types in the needy group increases, the marginal distortion on type-LN individuals decreases (their effective labor supply increases) and the opposite holds for type-LU. For $(p_N, p_U) = (0.7, 0.3)$ type-HN individuals are made better-off than type-HU ones ($U_{HN} = 31.51 > U_{HU} = 28.56$), who end up worse off than in the first-best for these parameter values. The high-ability needy individuals benefit from being mixed with a large proportion of low-ability ones in their group whereas the high-ability unneedy individuals are harmed by being more easily identified as high-ability as the proportion of low-ability individuals decreases in their group.

When the proportion of low-ability individuals in the needy group decreases (the proportion of low-ability individuals in the unneedy group increases) the marginal distortion on type-LN increases (and the marginal distortion on type-LU decreases). The effective labor supply of type-LN individuals may fall below that of type-LU ones. This is for example the case for $(p_N, p_U) = (0.3, 0.7)$ in Table 2: $\widehat{\ell}_{LN} = 0.425 < \widehat{\ell}_{LU} = 0.631$. High-ability needy individuals are harmed because they can now be more readily identified as high-ability (i.e. their overall utility decreases and may become lower than in the first best) whereas high-ability unneedy individuals benefit from being mixed with an increasing number of low-ability ones.

6 Responsibility

We have assumed so far that individuals deserve compensation for their needs. Compensation for leisure needs seems fair when needs stem from some kind of handicap outside the control of the individual. It is unclear, however, that the social planner would want to compensate individuals for all possible types of leisure needs, particularly if those needs can be linked to some element of choice. Using our example, this would correspond to time devoted to handicaps that are the outcome of lifestyle decisions of individuals. In this section we consider the consequences of attempting to hold the individuals responsible for their needs.[10]

We choose to capture responsibility for leisure needs in the social objective by subtracting the disutility of the time need, $v\left(\overline{\ell}_j\right)$, from type-$ij$ individual utility.[11] This is consistent with the egalitarian-equivalence approach in Fleurbaey (2008).[12] This approach takes a reference wage rate and for this wage rate computes the equivalent budget set in the (ℓ, c) -space (not the $\left(\widehat{\ell}, c\right)$-space). If the reference wage is zero, and assuming $v(0) = 0$, this simply amounts to computing individual utility as $c - v\left(\ell + \overline{\ell}\right) + v\left(\overline{\ell}\right)$: that is, counting only the extra disutility of ℓ.[13]

In the first-best maximin outcome with responsibility:

$$c_{iN} - v\left(\frac{y_{iN}}{w_i} + \overline{\ell}\right) + v\left(\overline{\ell}\right) = c_{iU} - v\left(\frac{y_{iU}}{w_i}\right). \tag{8}$$

The labor supply of each type coincides with what was obtained in the first-best problem with compensation. However, consumption is now adjusted so that $c_{iU} - c_{iN} = v\left(\overline{\ell}\right)$ for each i. A gap $v\left(\overline{\ell}\right)$ in consumption between unneedy and needy individuals is deemed fair. We represent in Fig. 4 in the $\left(\widehat{\ell}, c\right)$-space to enable comparison with Fig. 2 in the compensation case.

The second-best problem with a maximin objective is captured by the following Lagrangian:

$$\begin{aligned} £ = {} & c_{LN} - v\left(\frac{y_{LN}}{w_L} + \overline{\ell}\right) + v\left(\overline{\ell}\right) + \mu \sum_i \sum_j n_{ij}\left(y_{ij} - c_{ij}\right) \\ & + \lambda_N \left[c_{HN} - v\left(\frac{y_{HN}}{w_H} + \overline{\ell}\right) - c_{LN} + v\left(\frac{y_{LN}}{w_H} + \overline{\ell}\right)\right] \end{aligned}$$

[10] Admittedly, it is difficult and often questionable to blame individuals for errors they made in the past motivated by some ignorance on the consequences of their choices or some urge of instant gratification. The results in this section should be viewed as a benchmark.

[11] Note that in general the adjustment required to make individuals responsible for their leisure needs depends on the individuals' preferences, including the utility specification and the nature of the leisure needs, considered.

[12] This is one possible representation of the concept of responsibility. Fleurbaey (1995) provides a rather broad discussion of the treatment of responsibility in economic theory and in egalitarian theories of justice. Fleurbaey and Maniquet (2006, 2007) deal with this issue in a framework more closely related to ours. They characterize the optimal income tax when individuals differ in ability and preferences for leisure, and consider fairness principles that capture the notions of compensation and responsibility.

[13] This approach has the advantage that it does not interact with ability since the correction is the same for the two ability types. It means that in the comparison of two individuals with identical needs and different ability, the low-ability individual is deemed worse off whenever her utility is lower. We are very grateful to Marc Fleurbaey for this suggestion.

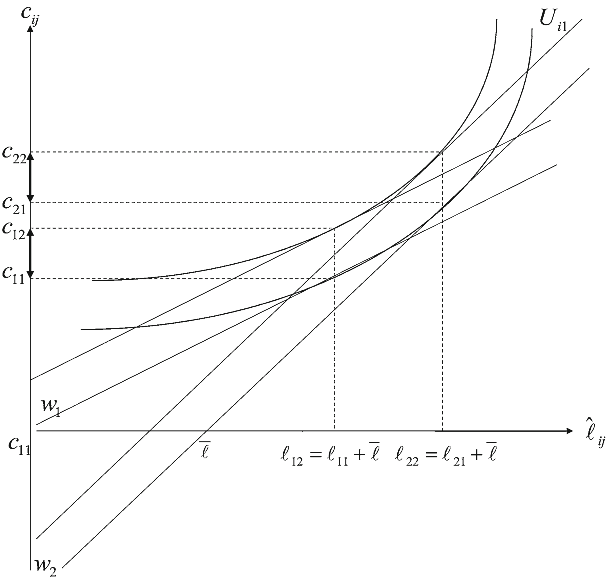

Fig. 4 First-best allocation with responsibility

$$+\lambda_U \left[c_{HU} - v\left(\frac{y_{HU}}{w_H}\right) - c_{LU} + v\left(\frac{y_{LU}}{w_H}\right)\right]$$
$$+\gamma \left[c_{LU} - v\left(\frac{y_{LU}}{w_L}\right) - c_{LN} + v\left(\frac{y_{LN}}{w_L} + \overline{\ell}\right) - v\left(\overline{\ell}\right)\right]$$

It is worth noticing that, although the social planner does not account for the disutility of the time $\overline{\ell}$ in the social objective, individuals do account for this extra disutility in the SSCs. The marginal distortions and the effective amount of labor supply remains the same as in the compensation case. However the consumption and utility levels differ from those achieved under compensation. In the first-best the consumption and utility levels of two individuals with the same ability and different needs differ exactly by the amount $v\left(\overline{\ell}\right)$. In the second-best the difference between utility levels remains $v\left(\overline{\ell}\right)$ for the low-ability individuals but this is no longer the case for the high-ability ones.

We provide a numerical illustration in Tables 3 and 4, for the first best and the second best respectively. For the disutility of labor specification and the parameter $\overline{\ell}$ used $v\left(\overline{\ell}\right) = 3.125$. In Table 3 the gap between the consumption and utility levels achieved by needy and unneedy individuals with the same ability is $v\left(\overline{\ell}\right)$ for both ability types. In Table 4 the gap between the utility levels achieved by low-ability individuals remains $v\left(\overline{\ell}\right)$, even if this no longer holds for consumption levels since the effective labor supply generally differs. In the second best the gap between the utility levels achieved by high-ability individuals depends on the distribution of ability types in each group. For the parameter values employed $U_{HU} - U_{HN} > v\left(\overline{\ell}\right)$ when $(p_N, p_U) = (0.5, 0.5)$. When the proportion of low-ability individuals in the needy group decreases the dif-

Table 3 First-best with responsibility

(p_N, p_U)	(0.7, 0.3)				(0.5, 0.5)				(0.3, 0.7)			
Types	LN	LU	HN	HU	LN	LU	HN	HU	LN	LU	HN	HU
c	55.31	58.44	77.19	80.31	54.69	57.81	76.56	79.69	54.06	57.19	75.94	79.06
y	37.5	56.25	75	100	37.5	56.25	75	100	37.5	56.25	75	100
T	17.81	2.19	2.19	19.69	17.19	1.56	1.56	−20.31	16.56	0.94	0.94	−20.94
$\widehat{\ell}$	0.75	0.75	1	1	0.75	0.75	1	1	0.75	0.75	1	1
U	27.19	30.31	27.19	30.31	26.56	29.69	26.56	29.69	25.94	29.06	25.94	29.06

Table 4 Second-best with responsibility

(p_N, p_U)	(0.7, 0.3)				(0.5, 0.5)				(0.3, 0.7)			
Types	LN	LU	HN	HU	LN	LU	HN	HU	LN	LU	HN	HU
c	45.01	33.99	79.95	80.12	38.33	39.70	76.89	82.04	32.02	46.04	74.74	84.82
y	29.89	27.84	75	100	22.83	39.13	75	100	13.14	47.37	75	100
T	15.12	6.16	4.95	−19.88	15.50	0.57	1.89	−17.96	18.87	−1.33	−0.26	−15.18
$\widehat{\ell}$	0.648	0.371	1	1	0.554	0.522	1	1	0.425	0.631	1	1
T'	0.135	0.505	0	0	0.261	0.304	0	0	0.433	0.158	0	0
U	23.98	27.11	29.95	30.12	22.96	26.09	26.89	32.04	22.97	26.10	24.74	34.82

ference increases; when the proportion of low-ability individuals in the needy group increases the gap decreases and it may be that $U_{HU} - U_{HN} < v\left(\overline{\ell}\right)$. This is for instance the case for $(p_N, p_U) = (0.7, 0.3)$. We interpret that when this occurs high-ability individuals in the needy group are not made fully responsible for their needs.

7 Non-observable needs

We have assumed that needs are observable and can be used as a tag. We now briefly discuss the implications of being unable to observe leisure needs. This exercise is relevant because it enables us to assess differences with respect to the analysis carried out above where needs could be observed and used as a tag. With unobservable ability and leisure needs we have an optimal tax problem similar to the one studied by Cremer et al. (2001).[14] They show that the distribution of the two characteristics, and in particular the correlation between them, plays a crucial role. Their analysis also emphasizes the complexities involved in determining the pattern of binding self-selection constraints.

In our case, a simple comparison of the marginal rates of substitution of consumption for income for different type-ij individuals,

[14] Cremer et al. (2001) studies the optimal tax mix problem when individuals differ in unobservable productivity and endowments. They consider several consumption goods and a separable, but not necessarily quasi-linear, utility specification.

$$MRS_{yc}^{ij} = \frac{v'\left(\frac{y_{ij}}{w_i} + \overline{\ell}_j\right)}{w_i}, \quad (9)$$

points to the impossibility of establishing in general whether the indifference curves of type-HN individuals are steeper or flatter than those of type-LU ones. This has important implications for the analysis of binding self-selection constraints in the general four-types society.[15]

It is worth noticing a key difference with respect to the consumption needs case studied in Boadway and Pestieau (2006). The utility specification is the same: quasi-linear, linear in consumption. If consumption needs were unobservable in their framework, two individuals with the same ability but different needs would become effectively indistinguishable: their indifference curves in the (y, c)-space exhibit the same shape, even if the two types achieve different utility levels when allocated the same (y, c)-bundle since the effective consumption of the needy individual is then lower. In our framework, where needs enter the non-linear disutility of labor part, the indifference curves of two individuals with the same ability and different needs exhibit, according to (9), different shapes. This feature can be exploited to separate them in the case of unobservable leisure needs, even if the unobservability of needs reduces the overall social welfare that can be achieved when compared to the case when needs are observable and used as a tag.

8 Conclusions

The main aim of the paper was to investigate how differences in leisure needs, represented by different amounts of time individuals divert from leisure and paid labor to a variety of duties, ought to be treated in the income tax system, and in particular whether, and if so how, they should be compensated. To explore this issue we have characterized the optimal redistributive tax scheme when individuals differ in imperfectly correlated earning ability and leisure needs. Individuals have private information about their abilities but needs are observable. The population can then be separated into groups and needs can be used as a tag. Weinzierl (2012) recently argued that real-world taxes make surprisingly little use of tagging. He however highlighted that some sizable tagging occurs in the tax treatment of disabled individuals and families with children, which are precisely two examples where leisure needs play a key role.

We first assumed that the social planner deems differences in leisure needs worth of compensation, on top of traditional compensation for productivity differences, and characterized the optimal redistributive policy, and the extent of compensation for leisure needs, with tagging. Even if leisure needs are observable the amount required to fully compensate the individuals for their needs depends on their unobservable ability (i.e. the cost of opportunity of the time devoted to those duties differs by

[15] There are in principle two cases to analyze: (1) $MRS_{yc}^{11} > MRS_{yc}^{21} > MRS_{yc}^{12} > MRS_{yc}^{22}$ and (2) $MRS_{yc}^{11} > MRS_{yc}^{12} > MRS_{yc}^{21} > MRS_{yc}^{22}$. Both cases may be analyzed in the traditional Mirrlees setting and yield the usual prediction of positive marginal tax rates for all but type-22 individuals.

ability type). For the maximin objective the utility level achieved by the low-ability types is the same, but the marginal tax rates imposed on them, and the effective labor they supply, differ in the second best. We showed the marginal distortions depend on the distribution of ability types in each group and affect the gap between the utility levels achieved by the high-ability types: high-ability needy individuals can be under- or overcompensated for leisure needs, with overcompensation arising when the proportion of low-ability types in the needy group is sufficiently large (e.g. when the proportion of low-ability individuals among the handicapped is sufficiently large). We also showed that it is optimal to impose a different tax schedule in each group even when the distribution of ability types is the same in both groups, which contrasts with the results obtained with linear consumption needs. In particular we showed that the marginal tax rate is smaller for low-ability needy individuals. This is due to the fact that, because of the added disutility of leisure needs, it is more difficult for the high-ability needy individuals to pretend to be low-ability (e.g. it is more difficult for handicapped high-ability individuals to pretend to be low-ability).

We also considered an alternative social objective in which the social planner deems individuals responsible for their leisure needs. We showed that attempting to make individuals responsible for their leisure needs does not correspond to pure tagging, as it would be the case with linear consumption needs. Low-ability needy individuals are made fully responsible for their needs but it is not always possible to make high-ability needy individuals fully responsible, particularly so when the proportion of low-ability individuals in the needy group is relatively large. We also briefly discussed the implications of being unable to observe leisure needs. In the appendix we discuss the implications of relaxing some of the main assumptions.

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Appendix 1: Alternative specifications for leisure needs

We adopted an additive representation for leisure needs. For this specification we argued that the amount required to fully compensate for needs is increasing in ability type. In Fig. 1 we represented the budget sets and the laissez-faire allocation for the four types. Individuals with the same ability w_i supply the same amount of effective labor but needy ones consume $w_i \overline{\ell}$ less.

One alternative would be to employ a disutility term $v\left(\delta_j \ell_{ij}\right)$ with the parameter $\delta_j \geq 1$ ($\delta_j = 1$ for those individuals with no needs). This is a suitable representation when needs imply a proportional reduction in productivity. If we set $\delta_U = 1$ for unneedy individuals and $\delta_N = \delta > 1$ for needy individuals, individuals with the same ability w_i supply the same amount of effective labor but high-ability needy individuals consume $w_H \ell_{HU} (\delta - 1)/\delta$ less than their unneedy counterparts while low-ability needy individuals consume $w_L \ell_{LU} (\delta - 1)/\delta$ than their unneedy counterparts. The amount required to fully compensate individuals for their needs remains an increasing function of ability.

Another alternative would be to employ $v\left(\ell_{ij}+\delta_j/w_i\right)$ with the parameter $\delta_j \geq 0$ ($\delta_j = 0$ for those individuals with no needs). Note that this specification implies that high-ability individuals are not only more productive at work but also more productive at meeting their needs δ_j. In this particular case the compensation does not depend on the ability type. If we set $\delta_U = 0$ for unneedy individuals and $\delta_N = \delta > 0$ for needy individuals, individuals with the same ability supply the same amount of effective labor and needy ones consume δ less regardless of their ability.

Appendix 2: Alternative separable utility specification

The quasilinear utility specification we have adopted is restrictive but greatly simplifies the analysis and the graphical illustration. It also allows us to compare the results with those obtained for linear consumption needs in Boadway and Pestieau (2006). One implication of the quasilinear assumption is that the effective labor supply of the high-ability individuals is the same and is fixed at first-best levels throughout. With a separable but not quasilinear utility specification the high-ability individuals do not necessarily supply the same amount of effective labor $\widehat{\ell}$ in the second best, and the amounts do not longer coincide with those in the first best.

The slope of the indifference curves in the (y, c)-space of a more general separable specification $U_{ij} = u\left(c_{ij}\right) - v\left(\ell_{ij}+\overline{\ell}_j\right)$ is

$$MRS^{ij}_{yc} = \frac{v'\left(\dfrac{y_{ij}}{w_i}+\overline{\ell}_j\right)}{w_i u'\left(c_{ij}\right)}.$$

In the second best both high-ability types face zero marginal tax rates but it is now possible for them to supply different amounts of effective labor as long as the consumption levels are adjusted to maintain the non-distortion at the margin. It is possible to show that among high-ability individuals the type that supplies less effective labor also consumes more, and is hence better off. High-ability needy individuals may consume more and supply less effective labor than high-ability unneedy ones if the proportion of low-ability individuals in the needy group is sufficiently large. Otherwise high-ability unneedy individuals supply less effective labour, consume more and are better off. We provide a numerical example in Table 5 for the same parameter values and functional forms as in Sect. 5 except that now $u\left(c_{ij}\right) = \log c_{ij}$.

Many results carry forward: for equal proportions, $\widehat{\ell}_{LN} > \widehat{\ell}_{LU}$ with a lower marginal tax rate on type-LN. The high-ability unneedy individuals are better off, as in Table 2 for equal proportions, but now this arises as a combination of both a smaller effective labor supply and larger consumption than the high-ability needy individuals. As the proportion of low-ability individuals in the needy group increases high-ability needy ones may become better off, as was the case for $(p_N, p_U) = (0.7, 0.3)$ in Table 2, but now high-ability needy individuals both consume more and supply less effective labor than high-ability unneedy individuals.

Table 5 Maximin with separable utility specification: second-best with different proportions

(p_N, p_U)	(0.7, 0.3)				(0.5, 0.5)				(0.3, 0.7)			
Types	LN	LU	HN	HU	LN	LU	HN	HU	LN	LU	HN	HU
c	44.86	35.39	62.53	61.50	40.99	39.42	61.40	62.55	35.52	44.71	60.19	64.17
y	30.43	32.95	54.96	81.31	25.88	42.11	56.43	79.94	15.35	49.57	58.08	77.92
T	14.43	2.44	7.57	−19.81	15.11	−2.69	4.97	−17.39	20.17	−4.86	2.11	−13.75
$\widehat{\ell}$	0.656	0.439	0.800	0.813	0.595	0.5615	0.814	0.799	0.455	0.661	0.831	0.779
T'	0.216	0.585	0	0	0.35	0.41	0	0	0.569	0.212	0	0
U	3.373	3.373	3.496	3.458	3.359	3.359	3.454	3.497	3.363	3.363	3.407	3.554

Appendix 3: Alternative social objective

We adopted a maximin social objective. In our framework this objective ensured equal utility levels for the individuals at the bottom of both groups. Other social welfare functions can lead to different types of low-ability individuals achieving different utility levels in the second best, an horizontal inequity outcome of tagging that is often criticised. We could use for instance a more general social welfare function

$$W = \sum_i \sum_j n_{ij} G \left[c_{ij} - v \left(\ell_{ij} + \overline{\ell}_j \right) \right],$$

where $G(\cdot)$ is a strictly concave social utility transformation that reflects different degrees of aversion towards inequality. The maximin may be viewed as a particular case of this specification when the aversion to inequality is infinite. We provide a numerical example in Table 6 for the case in which $G(\cdot)$ takes a less inequality averse logarithmic form.

For the case of equal proportions high-ability unneedy individuals are better off than high-ability needy individuals, as was the case in Table 2, but now low-ability needy individuals are better off than low-ability unneedy individuals . For equal proportions marginal tax rates are still higher for low-ability unneedy individuals but both types

Table 6 Second-best with logarithmic social objective: different proportions

(p_N, p_U)	(0.7, 0.3)				(0.5, 0.5)				(0.3, 0.7)			
Types	LN	LU	HN	HU	LN	LU	HN	HU	LN	LU	HN	HU
c	53.88	47.24	84.61	82.30	51.33	49.30	82.22	84.10	48.85	51.42	79.91	85.97
y	37.10	54.68	75	100	36.82	55.14	75	100	36.54	55.60	75	100
T	16.78	−7.44	9.61	−17.70	14.51	−5.84	7.22	−15.80	12.31	−4.18	4.91	−14.03
$\widehat{\ell}$	0.745	0.729	1	1	0.74	0.735	1	1	0.737	0.741	1	1
T'	0.007	0.028	0	0	0.012	0.020	0	0	0.017	0.012	0	0
U	26.15	20.66	34.61	32.29	23.88	22.28	32.22	34.10	21.67	23.95	29.91	35.97

are distorted less, and achieve lower utility levels, than in the maximin case. As the proportion of low-ability individuals increases in the needy group (decreases in the unneedy group) low-ability unneedy individuals are made significantly worse off than their needy counterparts.

References

Akerlof GA (1978) The economics of "tagging" as applied to the optimal income tax, welfare programs, and manpower training. Am Econ Rev 68:8–19

Alesina A, Ichino A, Karabarbounis L (2011) Gender-based taxation and the division of family chores. Am Econ J 3:1–40

Blomquist S, Micheletto L (2008) Age-related optimal income taxation. Scand J Econ 110:45–71

Boadway R, Pestieau P (2006) Optimal taxation with tagging. Annales d'Economie et de Statistique 83–84:50–123

Boadway R, Pestieau P (2003) Optimal redistribution and needs. In: Ahlheim Michael, Wenzel Heinzdieter, Weigard Wolfgang (eds) Steuerpolitk-Von der Theorie zur Praxis, Fetschrift fur Manfred Rose. Springer-Verlag, Berlin, pp 1–14

Boadway R, Marchand M, Pestieau P, Racionero M (2002) Optimal redistribution with heterogeneous preference for leisure. J Public Econ Theory 4:475–498

Blumkin T, Margalioth Y, Sadka E (2009) Incorporating affirmative action into the welfare state. J Public Econ 93:1027–1035

Cremer H, Gahvari F, Lozachmeur JM (2010) Tagging and income taxation: theory and application. Am Econ J 2:31–50

Cremer H, Pestieau P, Rochet JC (2001) Direct versus indirect taxation. The design of the tax structure revisited. Int Econ Rev 42:781–799

Farhi E, Werning I (2013) Insurance and taxation over the life cycle. Rev Econ Stud 80:596–635

Fleurbaey M (1995) Equality and responsibility. Eur Econ Rev 39:683–689

Fleurbaey M, Maniquet F (2006) Fair income tax. Rev Econ Stud 73:55–83

Fleurbaey M, Maniquet F (2007) Help the low-skilled or let the hardworking thrive? A study of fairness in optimal income taxation. J Public Econ Theory 9:467–500

Fleurbaey M (2008) Fairness, responsibility and welfare. Oxford University Press

Immonen R, Kanbur R, Keen M, Tuomala M (1998) Tagging and taxing: the optimal use of categorical and income information in designing tax/transfer schemes. Economica 65:179–192

Lozachmeur JM (2006) Optimal age-specific income taxation. J Public Econ Theory 8:697–711

Maniquet F, Neumann D (2015) Pauvreté, besoins et responsabilité dans l'impôt sur le revenu en Belgique. Revue Française d'Economie (Forthcoming)

Mankiw G, Weinzierl M (2010) The optimal taxation of height: a case study of utilitarian income redistribution. Am Econ J 2:155–176

Mirrlees J (1971) An exploration in the theory of optimum income taxation. Rev Econ Stud 38:175–208

Stiglitz JE (1982) Self-selection and Pareto efficient taxation. J Public Econ 17:213–240

Weinzierl M (2011) The surprising power of age-dependent taxes. Rev Econ Stud 78(4):1490–1518

Weinzierl M (2012) Why do we redistribute so much and tag so little? The principle of equal sacrifice and optimal taxation, NBER Working Paper no. 18045