Optimal redistribution when different workers are indistinguishable

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Abstract

Using the standard non linear income and commodity taxation framework this paper examines the optimal policy to be adopted when the same labor disutility can receive two opposite interpretations: taste for leisure and activity limitation. In the absence of complete information about individual characteristics, an income tax does not allow to distinguish lazy from handicapped individuals. One may however rely on a combination of commodity and income taxes to redistribute from the former to the latter when they differ in their preferences for commodities.

Keywords: Optimal non-linear taxation, quasi-linear preferences, asymmetric information

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1 Introduction

Optimal redistribution programs have raised much interest in the public economics literature and in the policy debate. Most contributions in the area deal with the question of how best to balance equity and efficiency in a context where individuals differ in their productive capacity and the government seeks to redistribute income from high- to low-productivity individuals. In this paper, we add an additional dimension to the problem: the disutility of labour. It can receive two alternative interpretations: either taste for leisure or pain caused by disability (i.e., mental or physical activity limitation). Hence, individuals with the same productivity and disutility of labour may differ due to the reasons underlying their disutility of labour. The government may be willing to redistribute, among individuals with the same productivity, towards disabled individuals because they are not responsible for their impairment. The object of this paper is to provide some insights into the optimal redistributive policy within this context.

Our treatment of the problem follows the optimal non-linear income taxation literature, based on Mirrlees (1971). In other words, we analyze the optimal redistribution policy of a government that maximizes a social welfare function and is constrained by some asymmetry of information. There is a current strand in the literature that recognizes that individuals may differ in more than one relevant characteristic that the government cannot observe. Beaudry and Blackorby (1999) assume that individuals may participate in market and non-market activities and consider the possibility of their having different productivities in these two sectors, both unobservable to the government. However, the most common setting in the optimal taxation literature with two adverse selection parameters is that individuals participate in market activities and differ with respect to productivity and labor disutility.[1] The main objective is to capture the idea that earnings differences stem from two different sources: labor productivity and leisure taste. Optimal policy in such a setting departs from the standard Mirrlees' approach in two ways. First, with two unobservable characteristics, binding self-selection constraints are less predictable. Second, redistribution along the produc-

[1]Beaudry and Blackorby (1999) argue that differences in productivity in the household sector can be viewed as formally equivalent to different tastes for leisure.

tivity axis is often presented as more legitimate than redistribution along the taste axis. See, for instance, Boadway et al (2001).

In a contribution close to ours, Cuff (2000) analyzes the issue of optimal workfare in a setting where workers have different disutility of labor. She observes that high disutility of labor can receive two alternative interpretations: disability or laziness. She then argues that the government may or may not want to redistribute towards individuals with high disutility of labor depending on the interpretation. The gist of her argument is close to Roemer (1998)'s idea that redistribution is legitimate when individuals are not responsible for their needs.[2]

In this paper, we consider individuals that may differ in productivity but that have the same disutility of labor. However, among low-productivity individuals, there are simultaneously both disabled and lazy ones.[3] So we depart from Cuff (2000), where there are either disabled or lazy individuals but not both. We assume that in a first best setting, the government would like to redistribute from lazy to disabled individuals, even if they have the same productivity. This entails a non welfarist criterion as individual utilities are exactly alike. More precisely, the government is assumed to weight more heavily the disutility of labour of disabled individuals. However, in a second best setting, where asymmetry of information prevents the government from distinguishing these individuals, there is no possible redistribution except if lazy and disabled individuals use their otherwise identical disposable income differently and the government can observe their consumption choice. The use of the consumption as bundle screening device has already been treated in a related context by Blackorby and Donaldson (1988). We consider two types of consumption goods and show that, given that the consumption patterns of lazy and disabled individuals differ, commodity taxation may be desirable for redistributive purposes. This is in contrast to the Atkinson and Stiglitz (1976)'s proposition which shows that in their setting it is superfluous once optimal non-linear income taxes are in place.

[2]See also Fleurbay and Maniquet (1999) who discuss the issue of income taxation in a model with different productivities and tastes for leisure. They show that the tax system depends on whether preferences for leisure are the responsibility of individuals or not.

[3]We use these terms for short. We realize that they are questionable. Both have the same disutility of labor. The "lazy" enjoy leisure while the "disabled" find working very painful though their handicap is not readily observable. If we follow Roemer (1998)'s approach, we could say that the "disabled" are so because of bad luck and the "lazy" choose to enjoy life rather than get some training in an earlier stage of life and so to be less productive.

The paper is organized as follows. In Section 2, we describe the model and compare our setting to that of Cuff (2000). We also provide a characterization of the individuals' behaviour and discuss the solution to the first best problem of a government who seeks to redistribute from high- to low- productivity individuals as well as from lazy to disabled ones. We show that the first best solution is not attainable if the government lacks the necessary information to separate the individuals, in particular the lazy and the disabled ones. In Section 3, we investigate the use of income and commodity taxation in a second best framework where the government observes consumption and labour earnings. We draw some conclusions in Section 4.

2 Indistinguishable type

As mentioned in the introduction, we consider individuals who differ in productivity but have formally the same disutility of labor. However, among low-productivity individuals, we have both disabled and lazy ones. We assume that productivity can take two positive values w_ℓ and w_h with $w_h > w_\ell$. Type h individuals have thus a higher productivity in the private labour market than type l individuals. The distribution of w is common knowledge. Our society consists then of three types of individuals: disabled and lazy low-productivity individuals, and high-productivity individuals. We denote them by 1, 2 and 3 respectively.

In order to understand some of the implications of our assumptions, it may be worth contrasting our setting with that of Cuff (2000). For this purpose, let us use Table 1.

		Low productivity (w_ℓ)	High productivity (w_h)
High disutility of labour	Disability	1	
	Laziness	2	3
Low disutility of labour	Hardworking	4	5

Table 1: Comparison of our setting to that of Cuff (2000)

As already mentioned, Cuff considers a society in which individuals differ both in productivity and disutility of labor and in which the disutility of labor can receive two alternative interpretations: either disability or laziness. Her society consists of three types of individuals: high-productivity individuals have only low disutility of labour but low-productivity individuals may have either low or high disutility of labor. Depending on the interpretation given to high disutility of labor, there are two possible scenarios. When high disutility of labor stems from disability, the society consists of individuals of types 1, 4 and 5. In the maximin logic adopted by Cuff, the government tries to redistribute towards type-1 individuals (i.e., the disabled low-productivity individuals). When high disutility of labor stems from laziness, the society consists of individuals of types 2, 4 and 5. In this case, the worst-off individuals are of type 4 (i.e., the hardworking low-productivity individuals).

In our framework we have individuals of types 1, 2 and 3, assuming thus that both lazy and disabled individuals coexist. In addition, although they formally have the same disutility of labor, they may use their disposable income, which we denote by x_i, in different ways. In order to capture this idea, we use the following utility function:

$$U_i = c_i + u\left(d_i - \overline{d}_i\right) - v\left(\ell_i\right) \qquad i = 1, 2, 3 \tag{1}$$

where c_i and d_i represent two consumption goods and ℓ_i denotes labor supply. According to (1), type i individuals derive utility from only the units of the second good consumed above $\overline{d}_i$. This is a good like health care for which disabled individuals have relatively higher needs. Accordingly, we posit: $\overline{d}_1 = \overline{d} > \overline{d}_2 = \overline{d}_3 = 0$. In line with Table 1, we also have $w_1 = w_2 = w_\ell$ and $w_3 = w_h$. Furthermore, the utility function is quasilinear in the first consumption good,[4] $u(\cdot)$ is a continuous, differentiable, strictly increasing and strictly concave function and $v(\cdot)$ is strictly convex.

In a laissez-faire market economy, each individual maximizes:

$$U_i = \left(w_i\, \ell_i - d_i\right) + u\left(d_i - \overline{d}_i\right) - v\left(\ell_i\right)$$

where the per-unit costs of production are assumed to be constant with one unit of effective labor being necessary to produce one unit of either good. The disposable income, $x_i (= w_i\, \ell_i)$, is devoted to consumption of goods c_i and d_i. Clearly, in a laissez-faire economy, $\ell_1 = \ell_2 < \ell_3$, $d_1 - \overline{d} = d_2 = d_3$ (hence, $d_1 > d_2 = d_3$) and $c_1 < c_2 < c_3$, where $c_1 = c_2 - \overline{d}$. Note that the disposable incomes are such that $x_1 = x_2 < x_3$. That is, both disabled and lazy low-productivity individuals work and earn the same. The only difference is that they use their disposable income differently. Since disabled individuals

[4] This assumption is made for the sake of simplicity. It is line with Diamond (1998).

have higher needs of commodity d, they enjoy lower consumption of commodity c than lazy ones. This may seem unfair and provides some justification for redistribution from lazy to disabled individuals.

In order to analyze this redistributive issue, we consider now a social planner's solution where there is full observability of each individual's productivity and kind of labor disutility. Given the quasi-linearity of individual utilities, we use a concave social utility transformation $G(\cdot)$ in order to account for the redistribution concern. Further, the social planner acknowledges that the disutility of labor for disabled individuals (i.e., type 1) does not have the same social cost as the disutility for the two other types. It thus puts a higher weight $\lambda_1 > 1$ $(= \lambda_2 = \lambda_3)$ on it. In other words, the disutility of labour of disabled individuals is more heavily weighted in the social welfare function than that of lazy ones. Implicit to this approach is the idea that the disabled worker contrary to the lazy one ought to be compensated for his/her handicap. An alternative specification would be to put a higher weight on $G(U_1)$. Doing that is consistent with the Pareto efficiency principle but it implies that the disabled individual is not only entitled to work less in the first best optimality solution but also to consume more. By restricting the higher weight to the disabled worker's disutility, we avoid such an outcome but are open to the criticism of Pareto inefficiency. What is important to note is that the qualitative findings are independent on which one of these two specifications is chosen.

With full information, the problem of the planner – who controls each individual's labour supply and consumptions – can now be expressed by the following Lagrangean expression:

$$\pounds = \sum_{i=1}^{3} n_i \left[G\left(c_i + u\left(d_i - \overline{d}_i\right) - \lambda_i v\left(\ell_i\right)\right) + \mu\left(w_i \ell_i - c_i - d_i\right)\right] \qquad (2)$$

where n_i is the proportion of type i's individuals in the population and $\lambda_1 > 1 = \lambda_2 = \lambda_3$. In what follows, we will denote the argument for $i = 1$ of G by $\widetilde{U}_1$ which differs from U_1 due to the presence of weight $\lambda_1 > 1$.

The first order conditions imply:

$$G'\left(\widetilde{U}_i\right) = G'(U_2) = G'(U_3) = \mu \quad \text{and thus} \quad \widetilde{U}_1 = U_2 = U_3; \tag{3}$$

$$u'\left(d_1 - \overline{d}\right) = u'\left(d_2\right) = u'\left(d_3\right) = 1 \quad \text{and thus} \quad d_1 - \overline{d} = d_2 = d_3; \tag{4}$$

$$\lambda_1 \frac{v'\left(\ell_1\right)}{w_\ell} = \frac{v'\left(\ell_2\right)}{w_\ell} = \frac{v'\left(\ell_3\right)}{w_h} \quad \text{and thus} \quad \ell_1 < \ell_2 < \ell_3. \tag{5}$$

In contrast to the laissez-faire economy, disabled individuals work less than lazy ones. This follows from the fact that the government attaches more weight to the disutility of labor of disabled individuals (i.e., $\lambda_1 > 1$). Disposable incomes are such that $x_3 > x_2$ (i.e., they consume the same amount of commodity d but $c_3 > c_2$), but $x_2 \lesseqgtr x_1$ and $x_3 \lesseqgtr x_1$ depending on λ_1 and w_h/w_ℓ. Decentralization of this first best optimum requires some lump-sum taxes and transfers between individuals plus an ad valorem tax on individual 1's earnings.

We may contrast the social objective used here with alternative social objectives. If the planner did not attach more weight to the disutility of labour of disabled individuals (i.e., $\lambda_1 = 1$), the results concerning both low-productivity individuals would be: $\ell_1 = \ell_2$, $d_1 - \overline{d} = d_2$ and $c_1 = c_2$ (hence, $x_1 > x_2$) since lazy and disabled individuals have different preferences with respect to commodity d. Therefore, in the utilitarian framework, even when $\lambda_1 = 1$, the social planner will allocate more d to those individuals with higher needs. However, both low-productivity individuals work the same amount of time. If instead $\lambda_1 > 1$ is applied to the utility function of the disabled individual (and not just the disutility of labour), $\ell_1 < \ell_2$ and $d_1 - \overline{d} > d_2$, but the relationship between the c_i's and the x_i's remains ambiguous. With this specification, decentralization does not require any distortive tax; lump sum taxes and transfers would suffice to achieve the optimum.

To achieve the first best solution we need perfect observability of both individuals' characteristics. In the absence of perfect information, such a solution would clearly not be sustainable. Consider first a situation where the government observes only pre- and post-tax (or disposable) income. That is, $z_i = w_i\,\ell_i$ (but not w_i and ℓ_i separately) and x_i (but not c_i and d_i separately). With a nonlinear income tax schedule this is equivalent to say that the government controls them. It can be shown that high-productivity individuals would have incentives to mimic low-productivity ones. On the other hand, lazy individuals would not be distinguished from disabled ones.

The first problem can be solved at the expense of some efficiency following Mirrlees-Stiglitz approach. In the labour earnings-disposable income space, the indifference curves of individuals with different productivities differ (i.e., it is more costly for a low-productivity individual to earn an additional dollar of income and, accordingly, she needs to be compensated with a higher amount of disposable income to stay on the same indifference curve). This information can be exploited by the planner in order to separate high- from low-productivity individuals. However, the problem involving the two types of low-productivity individuals cannot be solved as long as the government only observes disposable income, and not its decomposition between consumption goods c and d. There are no observable variables which allow for sorting out disabled from lazy individuals. In other words, these two types are indistinguishable. One possibility is to consider the use of the consumption choices made by individuals assuming that this information is made available to the government. If disabled and lazy individuals use their disposable income differently and the government observes consumption of c and d, this information may be useful for redistributive purposes. This is the question we investigate in the following section.

3 Consumption as a screening device

We now consider the case where the government is able to observe the consumption levels of c_i and d_i, together with labour earnings z_i (that is, $z_i = w_i \ell_i$, but not w_i and ℓ_i separately). The first best can be shown to be not attainable: high-productivity individuals have incentives to mimic low-productivity ones and lazy individuals have incentives to mimic disabled ones. In the proof that follows, we express the utility functions in terms of the variables the government is able to observe (i.e., c_i, d_i and z_i).[5]

The proof is by contradiction. Let us then suppose that the above policy instruments enable the government to decentralize the first best. It can first be easily shown that in this first best allocation, low-productivity lazy individuals are strictly better off with the treatment designed for the disabled individuals and therefore mimic them. The

[5]This is standard use. In the second best framework it is convenient to express the problem in terms of the variables the government can observe (see Stiglitz (1982)).

first best implies:

$$c_1 + u\left(d_1 - \overline{d}\right) - \lambda_1 v\left(\frac{z_1}{w_\ell}\right) = c_2 + u\left(d_2\right) - v\left(\frac{z_2}{w_\ell}\right)$$

and $d_1 = d_2 + \overline{d}$. Hence, $u\left(d_1 - \overline{d}\right) = u\left(d_2\right)$ and $c_2 - v\left(z_2/w_\ell\right) = c_1 - \lambda_1 v\left(z_1/w_\ell\right)$. Since $\lambda_1 > 1$, $c_1 - \lambda_1 v\left(z_1/w_\ell\right) < c_1 - v\left(z_1/w_\ell\right)$ which, together with $u\left(d_1\right) > u\left(d_2\right)$, imply

$$c_2 + u\left(d_2\right) - v\left(z_2/w_\ell\right) < c_1 + u\left(d_1\right) - v\left(z_1/w_\ell\right).$$

Similarly, it can be shown that high-productivity individuals have incentives to mimic low-productivity lazy ones (i.e., the high-productivity individual is strictly better off with the treatment designed for the low-productivity lazy individual). The first best implies:

$$c_2 + u\left(d_2\right) - v\left(\frac{z_2}{w_l}\right) = c_3 + u\left(d_3\right) - v\left(\frac{z_3}{w_h}\right)$$

and $d_2 = d_3$. Hence, $u\left(d_2\right) = u\left(d_3\right)$ and $c_2 - v\left(z_2/w_\ell\right) = c_3 - v\left(z_3/w_h\right)$. Since $z_i = w_i\,\ell_i$ and $w_h > w_\ell$, $c_3 - v\left(z_3/w_h\right) < c_2 - v\left(z_2/w_h\right)$. Hence,

$$c_3 + u\left(d_3\right) - v\left(\frac{z_3}{w_h}\right) < c_2 + u\left(d_2\right) - v\left(\frac{z_2}{w_h}\right).$$

Accordingly, in an imperfect-information framework, we need to introduce two self-selection constraints in order to make this mimicking behavior unattractive, namely the constraints concerning type-2 individuals mimicking type-1 ones and type-3 individuals mimicking type-2 ones. The other self-selection constraints are not binding, in particular the one concerning type-3 individuals mimicking type-1 ones. If type-2 individuals are not induced to mimick type-1 ones, there is no way for type-3 individuals to be attracted by the consumption vector of type-1 ones. The second best problem is then the following:

$$\max_{c,d,z} \quad \sum_{i=1}^{3} n_i G\left(c_i + u\left(d_i - \overline{d}_i\right) - \lambda_i v\left(\frac{z_i}{w_i}\right)\right) \tag{6}$$

s.t.

$$(\mu) \quad : \quad \sum_{i=1}^{3} n_i\left(z_i - c_i - d_i\right) \geq 0 \tag{7}$$

$$(\gamma_1) \quad : \quad c_2 + u\left(d_2\right) - v\left(\frac{z_2}{w_\ell}\right) \geq c_1 + u\left(d_1\right) - v\left(\frac{z_1}{w_\ell}\right) \tag{8}$$

$$(\gamma_2) \quad : \quad c_3 + u\left(d_3\right) - v\left(\frac{z_3}{w_h}\right) \geq c_2 + u\left(d_2\right) - v\left(\frac{z_2}{w_h}\right) \tag{9}$$

where the non-negative dual variables of the budget and incentive-compatibility constraints are indicated on the left. Multiplier γ_1 is associated with the incentive-compatibility constraint that ensures that a low-productivity lazy individual has no incentives to mimic a low-productivity disabled one, and multiplier γ_2 is associated with the self-selection constraint that prevents a high-productivity individual from mimicking a low-productivity lazy one.

The first-order conditions for a maximum are:

$$c_1: \quad n_1[G'(\widetilde{U}_1) - \mu] - \gamma_1 = 0,$$

$$d_1: \quad n_1[G'(\widetilde{U}_1)u'(d_1 - \overline{d}) - \mu] - \gamma_1 u'(d_1) = 0,$$

$$z_1: \quad -n_1 \left[G'(\widetilde{U}_1)\frac{\lambda_1}{w_\ell}v'\left(\frac{z_1}{w_\ell}\right) - \mu\right] + \gamma_1 \frac{1}{w_\ell}v'\left(\frac{z_1}{w_\ell}\right) = 0,$$

$$c_2: \quad n_2[G'(U_2) - \mu] + \gamma_1 - \gamma_2 = 0,$$

$$d_2: \quad n_2[G'(U_2)u'(d_2) - \mu] + (\gamma_1 - \gamma_2)u'(d_2) = 0$$

$$z_2: \quad -n_2 \left[G'(U_2)\frac{1}{w_\ell}v\left(\frac{z_2}{w_\ell}\right) - \mu\right] - \gamma_1 \frac{1}{w_\ell}v'\left(\frac{z_2}{w_\ell}\right) + \gamma_2 \frac{1}{w_h}v'\left(\frac{z_2}{w_h}\right) = 0,$$

$$c_3: \quad n_3[G'(U_3) - \mu] + \gamma_2 = 0,$$

$$d_3: \quad n_3[G'(U_3)u'(d_3) - \mu] + \gamma_2 u'(d_3) = 0,$$

$$z_3: \quad -n_3 \left[G'(U_3)\frac{1}{w_h}v'\left(\frac{z_3}{w_h}\right) - \mu\right] - \gamma_2 \frac{1}{w_h}v'\left(\frac{z_3}{w_h}\right) = 0.$$

For the self-selection constraints to be satisfied, c_1, c_2 and c_3 must be chosen appropriately. Combining the first-order conditions for the c's yields:

$$\mu = \frac{n_1 G'\left(\widetilde{U}_1\right) + n_2 G'\left(U_2\right) + n_3 G'\left(U_3\right)}{n_1 + n_2 + n_3} \tag{10}$$

that provides the marginal cost of public funds. An additional unit of revenue is obtained by reducing uniformly the c's, which keeps satisfied the self-selection constraints (because of the quasi-linearity in c of utility functions). Furthermore,

$$G'\left(\widetilde{U}_1\right) = \mu + \frac{\gamma_1}{n_1} > \mu \tag{11}$$

and

$$G'\left(U_3\right) = \mu - \frac{\gamma_2}{n_3} < \mu, \tag{12}$$

which means that it would be welfare improving to reduce c_3 in order to increase c_1. However this would violate the self-selection constraints, which shows the limits to redistribution. The welfare-improving change in c_2 is of ambiguous direction because it depends on the sign of $\gamma_1 - \gamma_2$.

The optimality conditions for high-productivity individuals regarding consumption of commodity d and labour supply are the same as in the first best. Not surprisingly, there is no distortion at the top:

$$u'(d_3) = 1 \quad \text{and} \quad v'\left(\frac{z_3}{w_h}\right) = v'(\ell_3) = w_h. \tag{13}$$

Given the linearity of the individual utility function with respect to c_i, this means that the high-productivity individual consumes the same amount of d and provides the same amount of labour as in the first best.

For low-productivity lazy individuals, we have:

$$u'(d_2) = 1 \tag{14}$$

and

$$v'\left(\frac{z_2}{w_l}\right) = v'(\ell_2) = w_\ell \left[1 + \frac{\gamma_2}{\gamma_2 + \mu n_2}\left(\frac{v'\left(\frac{z_2}{w_h}\right)}{w_h} - 1\right)\right] < w_\ell. \tag{15}$$

They consume the same quantity of commodity d as in the first best, but they are induced to work less. This is in order to prevent high-productivity individuals from mimicking them.

For low-productivity disabled individuals, we obtain:

$$u'\left(d_1 - \overline{d}\right) = 1 - \frac{\gamma_1\left[u'\left(d_1 - \overline{d}\right) - u'(d_1)\right]}{n_1 \mu} < 1 \tag{16}$$

and

$$v'\left(\frac{z_1}{w_l}\right) = v'(\ell_1) = \frac{w_l}{\lambda_1 + \frac{\gamma_1}{n_1 \mu}(\lambda_1 - 1)} < \frac{w_l}{\lambda_1}. \tag{17}$$

In the second best d_1 is higher and ℓ_1 is smaller than in the first best. The reason why disabled individuals are induced to work less differs from the one just stated for low-productivity lazy ones. It stems from $\lambda_1 > 1$ (i.e., the concern of the government for the disabled's disutility of labor). Indeed, if we had $\lambda_1 = 1$, condition (17) would yield $v'(z_1/w_\ell) = w_\ell$.

These results deserve some further comments. In the second best with three types of individuals, both low-productivity types work less than in the first best. However, as mentioned above, they do so for different reasons. It may be worth contrasting this outcome with that obtained in a second best with only lazy and disabled low-productivity individuals. If society consisted of lazy and disabled individuals of the same productivity, the supply of labour of lazy individuals would not be distorted at the margin, whereas disabled individuals would be induced to work less than in the first best. Thus d_1 is higher and ℓ_1 is smaller than in the first best and yet this package is less attractive to lazy individuals than the one designed for them in which they work more ($\ell_2 > \ell_1$) and consume less of commodity d ($d_2 < d_1$). To insure that the self-selection constraint is satisfied we then need to have $c_2 > c_1$. Actually, it is not impossible that in this second best setting, disabled individuals do not work at all.

As is standard, the optimal allocation resulting from solving the above problem can be implemented by means of tax/subsidy schedules. Above we described the second best resource allocations. We posed the problem as if the government confronted the individual with a choice of three bundles, $\{c_i, d_i, z_i\}$, $i = 1, 2, 3$. To decentralize the optimal allocation, the tax function must pass through the points $\{c_i, d_i, z_i\}, i = 1, 2, 3$; and elsewhere must lie below the indifference curves through $\{c_i, d_i, z_i\}$. Given such a tax schedule, individual i $(= 1, 2, 3)$ will clearly choose the point $\{c_i, d_i, z_i\}$.

In the present case, the tax system consists of a combination of taxes/subsidies on labour earnings and on commodity d. The tax schedule with nonlinear income and nonlinear commodity taxes is:

$$T_i = T(z_i) + t(d_i).$$

Labour earnings are devoted to the consumption of commodities c and d and to the payment of income and commodity taxes:

$$c_i = z_i - T(z_i) - d_i - \overline{d}_i - t(d_i).$$

The individuals first order conditions yield:

$$-\frac{\partial U_i/\partial z_i}{\partial U_i/\partial c_i} = 1 - T'(z_i) \text{ and } -\frac{\partial U_i/\partial d_i}{\partial U_i/\partial c_i} = -1 - t'(d_i).$$

Since

$$-\frac{\partial U_i/\partial z_i}{\partial U_i/\partial c_i} = \frac{1}{w_i} v'\left(\frac{z_i}{w_i}\right) \text{ and } -\frac{\partial U_i/\partial d_i}{\partial U_i/\partial c_i} = -u'\left(d_i - \overline{d}_i\right),$$

we obtain the following expressions for the marginal tax rates on income and commodity d, respectively:

$$T'(z_i) = 1 - \frac{1}{w_i} v'\left(\frac{z_i}{w_i}\right) \text{ and } t'(d_i) = u'\left(d_i - \overline{d}_i\right) - 1.$$

Using (13), (14), (15), (16) and (17), we obtain

$$T'(z_3) = 0 \text{ and } t'(d_3) = 0, \quad T'(z_2) > 0 \text{ and } t'(d_2) = 0, \quad \text{and } T'(z_1) > 0 \text{ and } t'(d_1) < 0.$$

There is no marginal distortion on labour supply or consumption of d for high-productivity individuals. Low-productivity lazy individuals income is taxed at the margin to prevent high-productivity individuals from mimicking them. And disabled individuals face both a marginal tax on income and a marginal subsidy on consumption of good d. As noted above, the marginal tax on income for disabled individuals is due to the higher weight the government places on the disutility of labour of this type of individiduals.

4 Conclusions

The motivation of this paper stems from the observation that the disutility of labor can receive two different, though reasonable, interpretations: laziness (taste for leisure) or disability (i.e., mental or physical activity limitation). When this is the case, an optimal income tax cannot separate those two types of individuals if those types are not observable. And yet one would like to redistribute from those with taste for leisure to those with some sort of disability. We show that, given that their consumption pattern is likely to differ, we should use commodity taxation to achieve some redistribution. Indeed, one can design a tax/transfer package which results in the disabled individuals being induced to work less, or even not at all, whereas the lazy ones will be lead to work while being financially compensated for that.

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