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ON THE DESIGN OF EQUAL-OPPORTUNITY POLICIES

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We study in this paper mechanisms to construct equal-opportunity policies for resource allocation. In a model where individuals enjoy welfare as a function of the effort they expend, and the amount of a socially provided resource they consume, the aim is to allocate the social resource so that the inequality of welfare across individuals at the same relative effort level is minimized. In doing so, and as opposed to other existing mechanisms for the design of equal-opportunity policies, we account for the hypothetical relative deprivation among equally-deserving individuals. Besides studying these mechanisms generically, we analyze their performance in the context of the delivery of health care resources.

Keywords: Equality of opportunity, relative deprivation, responsibility, compensation, inequality indices.

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1. Introduction

Most advanced democracies present as a goal the achievement of equality of opportunity, probably the most universally supported conception of distributive justice. The precise meaning of this concept has

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evolved over time, especially in the last four decades, thanks to the contributions of distinguished political philosophers and economists.

Traditionally, equality of opportunity was understood as the absence of legal bar to access to education, to all positions and jobs, and the fact that all hiring was meritocratic. John Rawls (e.g., Rawls, 1971) and Amartya Sen (e.g., Sen, 1980; 1985) challenged this traditional view to invoke a more radical notion. They argued that real equality of opportunity requires compensating persons for a variety of circumstances whose distribution is morally arbitrary. For Rawls, this is attained when social class and family background do not affect people's opportunities for social positions, whereas for Sen, this is attained when the personal sets of vectors of functionings (e.g., nourishment, health, happiness, self-respect, etc.) are equal.

The next step is due to Ronald Dworkin who in his two celebrated articles (Dworkin, 1981a; 1981b) highlighted an important issue that was germinal, although incompletely developed, in the works of Rawls and Sen: *personal responsibility.* According to Dworkin, justice requires compensating individuals for aspects of their situation for which they are not responsible (and that hamper their achievement of whatever is valuable in life). However, differences between aspects of their situations for which they are responsible should not be a concern for justice.[1]

The path-breaking contribution to translate these philosophical ideas into an economic framework comes from John Roemer (e.g., Roemer, 1993, 1998, 2002b). Roemer formalizes a precise definition of equality of opportunity as an explicit method to design policies. In general, a policy can be reduced to a proposal for the allocation of some finite amount of resource across types of individuals sharing *circumstances* (i.e., aspects beyond the individual's control that influence her status) as a function of the *effort* (i.e., aspects that also influence the individual's status but over which she has at least some control) they exert. An equal-opportunity policy, with respect to an objective, should allocate the resource so that it makes the degree to which an individual achieves the objective a function only of her effort, and therefore independent of her circumstances. In general, it will not be feasible to reach this goal for a given finite amount of resources. Consequently,

[1] Nevertheless, the line separating those aspects for which a person should be held accountable from those for which he should not is a controversial aspect of Dworkin's theory (e.g., Arneson, 1989; Cohen, 1989).

Roemer adjusts this ideal goal proposing to implement the policy that maximizes a social welfare function (consisting of the average of the advantage enjoyed by the worst-off type at each possible effort level). Thus, he shifts from a pure equity framework to a more general framework with a welfare objective.

The aim of this paper is to present an alternative mechanism to design equal-opportunity policies from a pure equity framework, without resorting to a welfare objective. In Roemer's parlance, suppose we were only concerned with equalizing the advantage of all individual, across types, who expended a given degree of relative effort. Roemer postulates that the selected policy should be the one that maximizes the minimum level of advantage (across all types) of these individuals. We postulate, however, that the selected policy should be a policy minimizing the inequality of the levels of advantage enjoyed by these individuals. As usual in inequality measurement, we deal with this task by means of an inequality index, to be applied to the resulting distributions of advantage levels in the cohort of individuals who expend the same degree of effort. By using an inequality index we reflect a concern for the whole pattern of the distribution (or at least a reference level of it such as its mean). In doing so, we are able to address the *relative deprivation* among equally deserving individuals, an issue that is absent in Roemer's proposal.[2]

The proposal outlined in the previous paragraph is effort-level specific, i.e., it selects a policy for a given level of relative effort. If, by chance, the same policy were obtained for each existing level of relative effort, that would be, unambiguously, the equal-opportunity policy recommended. This will not be the case, in general, and therefore we need to adopt a compromise solution. We propose two alternatives to deal with this task. The first one follows Roemer (1998) and replaces the objective for a social objective function consisting of the average of the objectives in each of the (effort-level) programs. The second al-

[2] The concept of relative deprivation was first described by Adam Smith in "The Wealth of Nations," in a passage on the "necessaries" of daily life. For decades, economists overlooked Smith's analysis, and it was left to sociologists and anthropologists to study the impact of relative deprivation (e.g., Runciman, 1966). It was not till recently that economists turned to focus on this issue establishing, among other things, the close connection between inequality indices and relative deprivation (e.g., Yitzhaki, 1979; Berresi and Silber, 1985) and documenting instances of relative deprivation in real life (e.g., Clark and Oswald, 1996; Luttmer, 2005).

ternative minimizes the maximum inequality throughout the different levels of relative effort.

A different, but somewhat related, approach to Roemer's theory of equality of opportunity, has been developed by Dirk Van de gaer (e.g., Van de gaer, 1993). This approach, rather than focusing on the outcomes of individuals in different types (at the same relative level of effort) focuses on the set of outcomes available to the members of each type. (One might call this their opportunity set). Van de gaer determines the value of this opportunity set by taking the average outcome for each type, and then maximizes the value of the least valuable opportunity set. The proposal outlined above also allows us to modify Van de gaer's approach to reflect a concern for relative deprivation. More precisely, we would first take the average outcome of each type, and then we would seek to minimize the inequality among these averages.

To conclude with this introduction, it is worth mentioning that this paper could be considered as part of the fast-expanding literature on compensation and responsibility in fair allocation rules (see Fleurbaey and Maniquet (2004) for an excellent survey) in which the idea of minimizing inequality across individuals in a same *effort group* has also been studied, albeit to a different extent and in slightly different contexts. Bossert et al., (1999), for instance, propose social criteria for second-best models of compensation based on agents' talents and responsibilities. Hild and Voorhoeve (2004) concentrate on a shortcoming of Roemer's 'relative effort' metric that might fail to correctly identify the choices for which individuals should be held responsible. Peragine (2004) provides conditions to rank income distributions and characterizes classes of opportunity-egalitarian social evaluation functions, extending the well-known Lorenz ordering. Ooghe et al., (2007) present an exhaustive comparison of the social orderings derived from Roemer's proposal and Van de gaer's proposal (as well as some generalizations) from an axiomatic approach.

The rest of the paper is organized as follows. In Section 2, we introduce the preliminaries of the model. In Section 3, we present the mechanisms to construct equal-opportunity policies. In Section 4, we provide an application to obtain equal-opportunity policies from each mechanism and we compare them. Section 5 concludes.

2. The model

The preliminaries of the model presented here follow those in Roemer (1998, Chapter 4). Consider a population whose members enjoy welfare as a result of two features: the amount of a socially provided resource they consume and the amount of effort they expend. The amount of effort an individual expends comes determined, not only by her autonomous volition, but also by her circumstances. By circumstances we mean those aspects beyond individual's control that influence her pursuit of welfare. For instance, a circumstance could be the parental socioeconomic status, the level of formal education attained by the parents, the race, the gender, etc. We assume society has fixed a set of circumstances for which their individuals should not be held responsible. Each individual will be identified with a profile of circumstances, leading to a population partition.

Formally, let $T = \{1, ..., n\}$ be a set of types, where each type reflects a particular profile of circumstances. Two individuals in the same type share the same profile of circumstances, whereas individuals in different types will have different profiles of circumstances. We denote by p^t the frequency of type $t \in T$ in the population. Each type is characterized by a function denoted $u^t(\cdot, \cdot)$ representing the welfare of an individual of type t, as a function of the amount of the resource she consumes and the effort she expends. We assume that these utility functions are fully interpersonally comparable. That is, $u^t(x, e) \geq u^{t'}(x', e')$ means that an individual in type t, who receives an amount of resource x and expends a level of effort e enjoys at least the same welfare level than an individual in type t', who receives an amount of resource x' and expends a level of effort e'.

Suppose that there exists an amount ω (per capita) of the resource to allocate among individuals in the population. The issue is to determine how to allocate ω properly to achieve equality of opportunity. In order to do that, society must choose a policy for allocating ω among the population. For each $t \in T$, let $\varphi^t : \mathcal{R}_+ \longmapsto \mathcal{R}_+$ be the function that indicates the amount of resource that an individual of type t receives with respect to the effort she expends. An $n-$tuple $\varphi = (\varphi^1, ..., \varphi^n)$ of such functions will be called a *policy* and each of its components φ^t will be called an *allocation rule*. Let Φ be the set of available policies for which the budget balance is reached.

Suppose that the distribution of effort expended by members of type t is given by the probability measure $F^t_{\varphi^t}$. Let $e^t(\pi, \varphi^t)$ be the level of effort expended by the individual at the π^{th} quantile of that effort distribution. Formally, $e^t(\pi, \varphi^t)$ is such that

$$\pi = \int_0^{e^t(\pi,\varphi^t)} dF^t_{\varphi^t}.$$

Now, we define the indirect utility function $v^t(\pi, \varphi^t)$, i.e., the level of welfare enjoyed by an individual of type t who reached the π^{th} degree of effort and faced the allocation rule φ^t, as follows:

$$v^t(\pi, \varphi^t) = u^t(\varphi^t(e^t(\pi, \varphi^t)), e^t(\pi, \varphi^t)).$$

Let $\pi \in [0, 1]$ and $\varphi = (\varphi^1, ..., \varphi^n) \in \Phi$ be given and consider

$$v(\pi, \varphi) = (v^1(\pi, \varphi^1), v^2(\pi, \varphi^2), ..., v^n(\pi, \varphi^n)),$$

the vector of indirect utilities of the individuals at the π^{th} degree of effort of each type, after implementing policy φ.

3. The mechanisms

The issue now is to construct a mechanism that yields for each environment a particular policy in Φ.

3.1 Opportunity mechanisms

For a given quantile π of effort expended, suppose we are only concerned with equalizing the advantage of all individual, across types, who expended the π^{th} degree of effort. For this case, Roemer (1998, page 27) proposes choosing the policy that maximizes the minimum level of advantage of these individuals. Formally,

$$\varphi^R_\pi = \arg\max_{\varphi \in \Phi} R(v(\pi, \varphi)), \qquad [1]$$

where $R(v(\pi, \varphi)) = \min_{t \in T}\{v^t(\pi, \varphi^t)\}$.

As Roemer states, his aim is "[t]o choose the policy that equalizes advantage across types, for given centiles of effort expended" (e.g., Roemer, 1998; page 26). We argue that, in order to follow Roemer's aim more closely, the selected policy should minimize the inequality of advantage, across all types, of individuals who expend the π^{th} degree of effort for their type, rather than maximize the level of the worst-off type. Formally, let I be an inequality index. Then, our recommended policy would be

$$\varphi_\pi^{IR} = \arg\min_{\varphi\in\Phi} I(v(\pi,\varphi)). \quad [2]$$

Program [2] differs from program [1] in a main aspect. Whereas program [1] is only concerned with the advantage achieved by the worst-off individual, out of those at the same (relative) level of effort, program [2] is concerned with the whole distribution of advantage levels within the group, or at least with a reference level of it (such as its mean). In doing so, we allow for addressing the well-documented (see, for instance, the discussion section of this paper and the literature cited therein) phenomenon of *relative deprivation* that individuals might feel, as well as their *status seeking*.[3] There is, however, a possible way of modifying program [1] to capture the concern for relative deprivation and individual status seeking. More precisely, we would modify program [1] to impose that the selected policy $\varphi_\pi^{R^*}$ would be the one maximizing the *relative* minimum level of advantage, across all types, of individuals who expend the π^{th} degree of effort for their type. Formally,

$$\varphi_\pi^{R^*} = \arg\max_{\varphi\in\Phi} R^*(v(\pi,\varphi)), \quad [3]$$

where

$$R^*(v(\pi,\varphi)) = \min_{t\in T}\left\{\frac{v^t(\pi,\varphi)}{\sum_{t\in T} v^t(\pi,\varphi)}\right\}.$$

Note that program [3] is actually a particular case of program [2]: that in which the inequality index is the so-called (relative) *maximin* index. Formally,

$$\varphi_\pi^{R^*} = \arg\max_{\varphi\in\Phi} R^*(v(\pi,\varphi)) = \arg\min_{\varphi\in\Phi} I(v(\pi,\varphi)),$$

where

$$I(v(\pi,\varphi)) = 1 - \min_{t\in T}\left\{\frac{n\cdot v^t(\pi,\varphi)}{\sum_{t\in T} v^t(\pi,\varphi)}\right\}.$$

Now, if we wish to equalize advantage across types for every π, either using program [1] or program [2], we would have in general a continuum of different policies, $\{\varphi_\pi^R : \pi \in [0,1]\}$ or $\{\varphi_\pi^{IR} : \pi \in [0,1]\}$. If, by

[3]Note that, since we have assumed that policies in the set Φ are efficient (in the sense that they are budget balanced) and therefore distribute the available amount of resource completely, we rule out as solution for program [2] the policy that gives zero to every group, that might reach a higher (but undesirable) degree of equality.

chance, all the programs would provide the same policy, that would be, unambiguously, the equal-opportunity policy recommended. In general, this will not be the case and therefore we need to adopt a compromise solution. To do so, Roemer (1998) proposes a modification of program [1] upon replacing the maximandum for a social objective function consisting of the average of the maximanda in each of the programs. More precisely,

$$\varphi^R = \arg\max_{\varphi\in\Phi} R(v,\varphi), \qquad [4]$$

where $R(v,\varphi) = \int_0^1 R(v(\pi,\varphi))d\pi = \int_0^1 \min_{t\in T}\{v^t(\pi,\varphi)\}d\pi$.

The analogous extension of our proposal would generate the following program:

$$\varphi^{IR} = \arg\min_{\varphi\in\Phi} I(v,\varphi), \qquad [5]$$

where $I(v,\varphi) = \int_0^1 I(v(\pi,\varphi))d\pi$.[4] Another feasible option, however, comes to mind. Given that we are dealing with inequality indices for each effort level, we can consider instead minimizing the maximum inequality throughout the different levels of relative effort. This would lead to the following program:

$$\varphi^{II} = \arg\min_{\varphi\in\Phi} II(v,\varphi), \qquad [6]$$

where $II(v,\varphi) = \max_{\pi\in[0,1]} I(v(\pi,\varphi))$.

3.2 Opportunity-set mechanisms

There is a second approach to equality of opportunity, that departs from Roemer's approach, that focuses on the opportunity set to which people have access, and tries to make these sets as equal as possible. Compensation is defined in terms of opportunity sets. The concern for responsibility implies that only the set matters, while individuals remain responsible for their choice. A rule which starts from this inspiration has been proposed by Van de gaer (1993) and is further explored in Bossert et al., (1999) and Ooghe et al., (2007). Van de gaer's rule can be easily described making use of the model presented above.

[4] See Kolm (2003) for the elaboration of a related point. See also Rodríguez (2007).

For $\varphi \in \Phi$, we construct its representative vector v_φ as the average of the indirect utilities of each type at each degree of effort, after implementing policy φ, i.e.,

$$v_\varphi = \left(\int_0^1 v^1(\pi, \varphi) \cdot d\pi, ..., \int_0^1 v^n(\pi, \varphi) \cdot d\pi \right).$$

Each component of the representative vector v_φ can be interpreted as the opportunity set of each type. In order to equalize these sets, Van de gaer proposes a maximin mechanism. More precisely, Van de gaer's mechanism would select the following policy:

$$\varphi^V = \arg\max_{\varphi \in \Phi} V(v_\varphi), \qquad [7]$$

where $V(v_\varphi) = \min_{t \in T} \left\{ \int_0^1 v^t(\pi, \varphi) \cdot d\pi \right\}$.

As in the above section, we propose an alternative mechanism to achieve the equality of opportunity sets more accurately. Formally, let I be an inequality index. Our proposal would recommend implementing the following policy:

$$\varphi^{IV} = \arg\min_{\varphi \in \Phi} I(v_\varphi). \qquad [8]$$

As before, the main advantage of program [8] with respect to program [7] is that of being concerned with the whole distribution of opportunity sets, rather than just with its worst-off component, hence allowing for a concern on relative deprivation and individual status seeking. Nevertheless, there is also a possible way of modifying program [7] to capture this concern. More precisely, we would modify program [7] to impose that the selected policy φ^{V^*} would be the one maximizing the *relative* worst-off opportunity set. Formally,

$$\varphi^{V^*} = \arg\max_{\varphi \in \Phi} V^*(v_\varphi), \qquad [9]$$

where

$$V^*(v_\varphi) = \min_{t \in T} \left\{ \frac{\int_0^1 v^t(\pi, \varphi) \cdot d\pi}{\sum_{t \in T} \int_0^1 v^t(\pi, \varphi) \cdot d\pi} \right\}.$$

Note that, similarly to the case of the previous section, program [9] is actually a particular case of program [8]: that in which the inequality index is the (relative) *maximin* index.

4. Application: equal-opportunity policies for health care

In the present section, we show, by means of a stylized application, that the mechanisms we propose in this paper typically yield different equal-opportunity policies to Roemer's and Van de gaer's mechanisms. This example comes from Roemer (2002a) and it is presented here with some slight modifications. It consists of a framework to select equal-opportunity policies for the delivery of health care resources.

Assume a society with two types of individuals, the rich and the poor, where we suppose that a person is not to be held accountable for her socioeconomic status in regard to her health. Let us say that one half of the population is poor whilst the other half is rich. The rich have, on average, more healthy life styles than the poor. This is formalized by assuming that the poor have life-style qualities uniformly distributed on the interval $[0, 1]$, while the rich have life-style qualities that are uniformly distributed on the interval $[0.5, 1.5]$.

We suppose that members of the population die from cancer or tuberculosis. The probability of contracting cancer, as a function of life-style quality (q), is the same for both types, and given by:

$$\rho_R^C(q) = \rho_P^C(q) = 1 - \frac{2q}{3},$$

whereas the probability of contracting tuberculosis is only positive for the poor people and given by:

$$\rho_P^T(q) = 1 - \frac{q}{3}.$$

In particular, the rich do not contract tuberculosis at all. Suppose that life expectancy for a rich individual has the following expression:

- 70 if cancer is not contracted,
- $60 + 10\frac{x_c - 1000}{x_c + 1000}$ if cancer is contracted and x_c is spent on its treatment.

Thus, if the disease is contracted, life expectancy will lie between 50 and 70, depending on how much is spent on treatment (from zero to an infinite amount). This is a simple way of modeling the fact that nobody dies of cancer before age 50. Suppose that life expectancy for a poor individual is

- 70 if neither disease is contracted,
- $60 + 10\frac{x_c - 1000}{x_c + 1000}$ if cancer is contracted and x_c is spent on its treatment.
- $50 + 20\frac{x_t - 10000}{x_t + 10000}$ if tuberculosis is contracted and x_t is spent on its treatment.
- $\min\left\{60 + 10\frac{x_c - 1000}{x_c + 1000}, 50 + 20\frac{x_t - 10000}{x_t + 10000}\right\}$ if both diseases are contracted.

Thus, the poor can die at age 30 if they contract tuberculosis and it is not treated. With large expenditures, an individual who contracts tuberculosis can live to age 70. We also assume that if a poor individual contracts both cancer and tuberculosis then her life expectancy will be the minimum of the above two numbers.

Finally, assume that national health care budget is \$4000 per capita.

The instrument is (x_c, x_t), the schedule of how much will be spent on treating an occurrence of each disease. The objective is to equalize opportunities, for the rich and the poor, for life expectancy.

With the data mentioned above, one can easily compute that 1/3 of the rich will contract cancer, 1/9 of the poor will contract only cancer, 5/18 of the poor will contract only tuberculosis and 5/9 of the poor will contract both tuberculosis and cancer. Hence, the budget constraint can be expressed as

$$\left(\frac{1}{2}\cdot\frac{1}{3}+\frac{1}{2}\cdot\frac{2}{3}\right)x_c+\frac{1}{2}\cdot\frac{5}{6}\cdot x_t=4000,$$

or equivalently, $6x_c + 5x_t = 48000$.

It is also straightforward to see that the probability that individuals at quantile π of their effort distribution contract a disease is:

	CANCER	TUBERCULOSIS
RICH	$1-\frac{2}{3}(\pi+0.5)$	0
POOR	$1-\frac{2}{3}\pi$	$1-\frac{\pi}{3}$

Thus, life expectancies are

$$v_R(\pi, x_c)=\frac{2}{3}(\pi+0.5)\cdot 70+\left(\frac{2}{3}(1-\pi)\right)\left(60+10\frac{x_c-1000}{x_c+1000}\right),$$

and

$$\begin{aligned} v_P(\pi, x_c, x_t) = {} & \frac{2\pi^2}{9}\cdot 70+(1-\frac{\pi}{3})\frac{2\pi}{3}\left(50+20\frac{x_t-10000}{x_t+10000}\right)+ \\ & (1-\frac{2\pi}{3})\frac{\pi}{3}\left(60+10\frac{x_c-1000}{x_c+1000}\right)+ \\ & (1-\frac{\pi}{3})(1-\frac{2\pi}{3})\min\left\{60+10\frac{x_c-1000}{x_c+1000}, 50+20\frac{x_t-10000}{x_t+10000}\right\}. \end{aligned}$$

The solution that Roemer's mechanism would propose is obtained by solving the problem:

$$\max_{\{x_c,x_t\}} \left\{ \int_0^1 \min\{v_R(\pi,x_c), v_P(\pi,x_c,x_t)\} \cdot d\pi \right\}$$
$$\text{s.t. } 6x_c + 5x_t = 48000$$

Van de gaer's mechanism would propose, however, to solve the problem:

$$\max_{\{x_c,x_t\}} \left\{ \min\{\int_0^1 v_R(\pi,x_c) \cdot d\pi, \int_0^1 v_P(\pi,x_c,x_t) \cdot d\pi\} \right\}$$
$$\text{s.t. } 6x_c + 5x_t = 48000$$

It can be shown that, for (x_c,x_t) given, $v_R(\pi,x_c) \geq v_P(\pi,x_c,x_t)$ for all $\pi \in [0,1]$. Thus, both programs become

$$\max_{\{x_c,x_t\}} \left\{ \int_0^1 v_P(\pi,x_c,x_t) \cdot d\pi \right\}$$
$$\text{s.t. } 6x_c + 5x_t = 48000$$

whose solution turns out to be

$$(x_c^R, x_t^R) = (\$310, \$9230),$$

i.e., \$310 spent in the treatment of cancer and \$9230 in the treatment of tuberculosis.

Let us now turn to the mechanisms proposed in this model. Program [5] translates into

$$\min_{\{x_c,x_t\}} \left\{ \int_0^1 I(v_P(\pi,x_c,x_t), v_R(\pi,x_c)) \cdot d\pi \right\}$$
$$\text{s.t. } 6x_c + 5x_t = 48000$$

Program [8] translates into

$$\min_{\{x_c,x_t\}} I\left(\int_0^1 v_P(\pi,x_c,x_t) \cdot d\pi, \int_0^1 v_R(\pi,x_c) \cdot d\pi \right)$$
$$\text{s.t. } 6x_c + 5x_t = 48000$$

Since this example consists of only two types, any sensible inequality index will provide the same solution. In particular, the last two programs amount to solving:

$$\max_{\{x_c,x_t\}} \left\{ \int_0^1 \frac{v_P(\pi,x_c,x_t)}{v_R(\pi,x_c)+v_P(\pi,x_c,x_t)} \cdot d\pi \right\}$$
$$\text{s.t. } 6x_c + 5x_t = 48000$$

and

$$\max_{\{x_c,x_t\}}\left\{\frac{\int_0^1 v_P(\pi,x_c,x_t)}{\int_0^1 v_P(\pi,x_c,x_t)\cdot d\pi+\int_0^1 v_R(\pi,x_c)\cdot d\pi}\right\}$$
$$\text{s.t. } 6x_c+5x_t=48000$$

The solution to both programs turns out to be

$$(x_c^I, x_t^I) = (\$0, \$9600),$$

i.e., everything is spent in the treatment of tuberculosis.[5] Thus, the solution would be more radical than the one proposed by Roemer's original mechanism.[6] Indeed, this would be precisely the so-called *Rawlsian* policy (the policy that maximizes the condition of the worst-off individual) for this example.[7]

Finally, we deal with the mechanism in which we minimize the maximum inequality throughout the different levels of relative effort (i.e., program [6]). For this example, this mechanism yields the following problem:

$$\min_{\{x_c,x_t\}}\max_{\pi\in[0,1]}\left\{\frac{v_R(\pi,x_c)}{v_R(\pi,x_c)+v_P(\pi,x_c,x_t)}\right\}$$
$$\text{s.t. } 6x_c+5x_t=48000$$

whose solution is given by

$$(x_c^{II}, x_t^{II}) = (\$285, \$9260),$$

which is less radical than the Rawlsian policy, but more radical than Roemer's (or Van de gaer's) original proposal.

[5] Note that, in particular, this would also be the solution to programs [3] and [9] which are the adequate extensions of the original proposals by Roemer and Van de gaer, to capture relative deprivation.

[6] It is worth noting that this feature is also obtained under more general conditions, namely, a higher average life expectancy of the rich and single-peakedness in the average life expectancy of the poor.

[7] Formally, the Rawlsian policy (φ^{RW}) is given by the solution to the program

$$\max_{\varphi\in\Phi}\ \min_{(t,\pi)\in T\times[0,1]}\{v^t(\pi,\varphi)\}.$$

It is not difficult to show that the solution of this program, for the example of this section, is obtained by solving the problem:

$$\max_{\{x_c,x_t\}}\{v_P(0,x_c,x_t)\}$$
$$\text{s.t. } 6x_c+5x_t=48000$$

whose solution turns out to be $(x_c^{RW}, x_t^{RW}) = (\$0, \$9600)$.

Now, as mentioned above, for two-type societies all inequality indices coincide and therefore the choice of an index becomes irrelevant. This is not the case for more than two types, as the literature on inequality measurement has (extensively) shown us. Let us, nonetheless, extend the previous example to a three-type society so that we can see that, even in such a case, there is considerable room for agreement regarding the recommended equal-opportunity policy.

Again, we assume a society where a person is not to be held accountable for her socioeconomic status in regard to her health. Individuals are divided now in three types: the rich, the poor, and a new type called the *mid-class*. Mid-class life styles are in between those of the rich and the poor. As before, members of the population die from cancer or tuberculosis. The three types can contract cancer and the probability of doing so depends on their life styles. Thus, mid-class individuals are more likely to contract cancer than the rich. We assume that both poor and mid-class are equally likely to contract cancer. Finally, we assume that neither rich nor mid-class contract tuberculosis at all. To summarize, the following table shows the probabilities that individuals at quantile π of their effort distribution contract a disease.

	CANCER	TUBERCULOSIS
RICH	$\frac{1-\pi}{2}$	0
MID-CLASS	$1-\frac{\pi}{2}$	0
POOR	$1-\frac{\pi}{2}$	$1-\frac{\pi}{4}$

We assume that 10% of the population is poor and 30% is rich. The health care budget is also \$4000. Hence, the budget constraint can be expressed as

$$\left(\frac{1}{10}\cdot\frac{3}{4}+\frac{3}{5}\cdot\frac{3}{4}+\frac{3}{10}\cdot\frac{1}{4}\right)x_c+\frac{7}{8}\cdot\frac{1}{10}\cdot x_t=4000,$$

or equivalently, $48x_c+7x_t=320000$.

Finally, the last difference with respect to the previous case is that now treating tuberculosis is more expensive. More precisely, life expectancies are

- 70 if cancer is not contracted,
- $60+10\frac{x_c-1000}{x_c+1000}$ if cancer is contracted and x_c is spent on its treatment,

for the rich and mid-class and

- 70 if neither disease is contracted,
- $60+10\frac{x_c-1000}{x_c+1000}$ if cancer is contracted and x_c is spent on its treatment.
- $50+20\frac{x_t-100000}{x_t+100000}$ if tuberculosis is contracted and x_t is spent on its treatment.
- $\min\left\{60+10\frac{x_c-1000}{x_c+1000}, 50+20\frac{x_t-100000}{x_t+100000}\right\}$ if both diseases are contracted,

for the poor. Upon replacing in these expressions the above probabilities, we have the following:

$$v_R(\pi,x_c)=\frac{1+\pi}{2}\cdot 70+\left(\frac{1}{2}(1-\pi)\right)\left(60+10\frac{x_c-1000}{x_c+1000}\right),$$

$$v_M(\pi,x_c)=\frac{\pi}{2}\cdot 70+\left(1-\frac{\pi}{2}\right)\left(60+10\frac{x_c-1000}{x_c+1000}\right),$$

and

$$\begin{aligned}v_P(\pi,x_c,x_t)=\frac{\pi^2}{8}\cdot 70+(1-\frac{\pi}{2})\frac{\pi}{4}\left(60+10\frac{x_c-1000}{x_c+1000}\right)+\\ (1-\frac{\pi}{4})\frac{\pi}{2}\left(50+20\frac{x_t-100000}{x_t+100000}\right)+\\ (1-\frac{\pi}{2})(1-\frac{\pi}{4})\min\left\{60+10\frac{x_c-1000}{x_c+1000}, 50+20\frac{x_t-100000}{x_t+100000}\right\}.\end{aligned}$$

We start using our mechanism for the particular case in which we fix the inequality index as the *Gini* index. If so, programs [5] and [7] translate into:

$$\begin{array}{c}\min_{\{x_c,x_t\}}\left\{\int_0^1 \frac{v_R(\pi,x_c)-v_P(\pi,x_c,x_t)}{v_P(\pi,x_c,x_t)+v_M(\pi,x_c)+v_R(\pi,x_c)}\cdot d\pi\right\}\\ \text{s.t. } 48x_c+7x_t=320000,\end{array}$$

and

$$\begin{array}{c}\min_{\{x_c,x_t\}}\left\{\frac{\int_0^1 v_R(\pi,x_c)\cdot d\pi-\int_0^1 v_P(\pi,x_c,x_t)\cdot d\pi}{\int_0^1 v_P(\pi,x_c,x_t)\cdot d\pi+\int_0^1 v_M(\pi,x_c)\cdot d\pi+\int_0^1 v_R(\pi,x_c)\cdot d\pi}\right\}\\ \text{s.t. } 48x_c+7x_t=320000,\end{array}$$

The solution to both programs is, again, the Rawlsian solution for this problem:

$$(x_c^I, x_t^I)=(\$0,\$45715),$$

i.e., spending everything in the treatment of tuberculosis. This would also be the solution for the maximin index and hence for the adaptation of Roemer's and Van de gaer's proposals (i.e., programs [3] and [9]) to capture the concern for relative deprivation. Surprisingly enough, this would also be the solution for all the *S-Gini* indices, between the Gini index and the maximin index.[8] The same solution would also be obtained for all the indices within the *Atkinson-Kolm-Sen* family of relative indices.[9] This broad agreement among the solutions proposed by the mechanisms based on inequality indices does not include Roemer's (or Van de gaer's) original mechanism, whose solution is obtained by solving the problem,

$$\max_{\{x_c,x_t\}}\left\{\int_0^1 \min\{v_R(\pi,x_c), v_M(\pi,x_c), v_P(\pi,x_c,x_t)\}\cdot d\pi\right\}$$
$$\text{s.t. } 48x_c+7x_t=320000,$$

which turns out to be:

$$(x_c^R,x_t^R)=(\$205,\$44310).$$

[8] The so-called *S-Gini* indices (e.g., Donaldson and Weymark, 1980) are a one-parameter family of indices generalizing the Gini index that has the maximin index as an extreme member. Formally, let $\mathcal{D}^n=\{x\in\mathcal{R}_+^n:\sum_{i=1}^n x_i>0\}$, $\mathcal{D}=\cup_{n\in\mathcal{N}}\mathcal{D}^n$ and $\delta\in(1,+\infty)$. For a vector $x\in\mathcal{D}$, we denote by $n(x)$ its dimension and by $\mu(x)$ its mean. Let $x[i]$ be the ith smallest component of x, with ties broken arbitrarily, and let $x^{\uparrow}=(x[1],...,x[n(x)])$ be a permutation of x in which the components of x have been rank ordered from smallest to largest. Let

$$\xi_\delta(x)=\frac{\sum_{i=1}^n c_i^\delta\cdot x[i]}{\sum_{i=1}^n c_i^\delta},$$

where $c_i^\delta=(n+1-i)^\delta-(n-i)^\delta$. Then, the (relative) S-Gini index is the function $G_\delta^R:\mathcal{D}\mapsto\mathcal{R}$, defined as $G_\delta^R(x)=1-\frac{\xi_\delta(x)}{\mu(x)}$ for all $x\in\mathcal{D}$. When $\delta=2$ then the S-Gini index coincides with the Gini index, whereas if $\delta\to\infty$ then the maximin index emerges.

[9] This is a family of indices generated by a parameter that can be interpreted as the equality's distributional value of the index. Formally, let $\varepsilon\in(0,+\infty)$. Then, the *AKS* index is the function $A_\varepsilon:\mathcal{D}\mapsto\mathcal{R}$, defined as

$$A_\varepsilon(y)=1-\left(\frac{1}{n}\sum_{i=1}^n\left(\frac{y_i}{\mu(y)}\right)^{1-\varepsilon}\right)^{\frac{1}{1-\varepsilon}}$$

for all $y\in\mathcal{D}$ and $\varepsilon\neq1$. For $\varepsilon=1$,

$$A_\varepsilon(y)=1-\frac{1}{\mu(y)}\left(\Pi_{i=1}^n y_i^{\frac{1}{n}}\right)$$

for all $y\in\mathcal{D}$. Note that, for low values of the parameter ε, no distributional considerations are made, whereas for high values only the worst-off type matters, leading in the limit to the maximin index, as in the case of the S-Gini indices. See Blackorby et al., (1999) for further details.

Finally, we deal with the mechanism in which we minimize the maximum inequality throughout the different levels of relative effort (i.e., program [6]). For the case of the Gini index in this example, this mechanism yields the following program:

$$\min_{\{x_c,x_t\}} \max_{\pi\in[0,1]} \left\{ \frac{v_R(\pi,x_c)-v_P(\pi,x_c,x_t)}{v_R(\pi,x_c)+v_M(\pi,x_c)+v_P(\pi,x_c,x_t)} \right\}$$
$$\text{s.t. } 48x_c + 7x_t = 320000,$$

whose solution is given by

$$(x_c^{II}, x_t^{II}) = (\$155, \$44650),$$

thus also breaking the agreement mentioned above.

5. Discussion

The combination of the concept of responsibility with the idea of compensation has become a prominent theme in some of the recent developments in political philosophy and welfare economics (see, e.g., Fleurbaey (2007) and the literature cited therein). Roemer's theory of equality of opportunity is a very important contribution in this direction, providing perhaps the first workable proposal (in an economic model) to design equal-opportunity policies. This theory has generated an extensive debate since its birth (see, for instance, Roemer (1995) and the subsequent comments in the same issue of the Boston Review). Most of the discussion within this debate has focused on philosophical aspects of the theory, such as, the distinction between effort and circumstances, the scope and extent of the theory and the underlying notion of responsibility, or the informational requirements of the scheme. In this paper, we have tried to incorporate a new aspect to the debate, arguing that there is a mechanism more consonant with the idea of equality of opportunity that Roemer formalizes. Our mechanism, that can also be adapted to provide an alternative to Van de gaer's approach regarding equality of opportunity sets, aims to incorporate a concern for the issue of relative deprivation and individual status seeking in the design of equal-opportunity policies.

During the Second World War, Stouffer et al., (1949) compared the levels of job satisfaction reported by members of the military police, a profession in which few people were promoted, and members of the Army Air Force, where there were frequent opportunities for advancement. To their surprise, the policemen reported greater happiness in their jobs than the airmen. One possible explanation, they speculated, is that the policemen tended to compare themselves with colleagues who had not been promoted, whereas the "reference group" for the airmen was colleagues who had been promoted. This was a first instance of the idea of relative deprivation formalized later by Runciman (1966), who wrote that "the more people a man sees promoted when he is not promoted himself, the more people he may compare himself to in a situation where the comparison will make him feel relatively deprived." More recently, Luttmer (2005) found that people with rich neighbors tend to be less happy than people whose neighbors earn about as much money as they do. Brown et al., (2006) published the results of a survey of sixteen thousand workers in a range of industries, in which they found that the workers' reported levels of job satisfaction had less to do with their salaries than with how their salaries compared with those of co-workers.

The above evidence suggests that relative payoffs crucially affect people's well-being and behavior. Thus, focusing on relative (rather than absolute) levels of advantage to design equal-opportunity policies seems to be appropriate. If the goal of providing a same level of advantage to equally deserving individuals (with different circumstances) cannot be achieved, one might think of maximizing the level of relative advantage of the worst-off as a reasonable second-best. This would actually be a special (and extreme) case of the mechanisms presented in this paper, in which one would use the maximin index. If, instead, other (less extreme) inequality indices were used we would still keep a concern for relative deprivation albeit to a lesser extent.

Another possibility to address this issue would be to incorporate directly a concern for status seeking in individuals' utility functions. In this respect, a fast-expanding (and influential) literature on social preferences and inequality aversion has recently emerged (see, for instance, Sobel (2005) and the literature cited therein). A feature that most of the models in this literature share is that individuals dislike inequality. Fehr and Schmidt (1999), for instance, assume an individual utility specification under which an agent cares about his own monetary payoff and, in addition, would like to reduce the inequality in payoffs across all agents.[10] Bolton and Ockenfels (2000) introduce a

[10] More recently, Cabrales et al., (2007) have proposed an extreme version of this model to analyze the earning structure in the labor market. In their case, workers, in addition to the utility they obtain from their own wage, experience disutility

model with a similar motivation, but assume agents' preferences are an increasing (possibly nonlinear) function of their own payoff and their *relative* payoff. It turns out that the proposal made in this paper could also be justified on the grounds of this literature. More precisely, following the model of Section 2, assume that the indirect utility function of an individual of type t, who reached the π^{th} degree of effort in a society facing policy φ, is given by

$$\tilde{v}^t(\pi, \varphi) = f^t\left(v^t(\pi, \varphi^t), \frac{v^t(\pi, \varphi^t)}{\sum_{t\in T} v^t(\pi, \varphi)}\right),$$

where $f^t(\cdot, \cdot)$ is a (type-specific) function obeying the axioms in Bolton and Ockenfels (2000).[11] If we assume that f^t is the same function for each type and that this function is sufficiently close to the *vertical projection function*, while preserving the mentioned axioms, then Program [1] over these extended utilities would give rise precisely to Program [3].[12] In other words, if we modify the objective function in Roemer's original program to allow for extended individual preferences, with a sufficiently high concern for inequality aversion, then we obtain a particular case of the mechanisms presented in this paper.

We have also provided an application of these mechanisms to the case of designing equal-opportunity policies for the delivery of health care resources in a stylized example. We have shown in this example (although these conclusions are fairly robust to changes in the specific context described therein) that the mechanisms introduced in this paper recommend more radical solutions than the ones advocated by Roemer's and Van de gaer's mechanisms, leading in some cases to the Rawlsian recommendations for this setting. Rawlsian policies have often been criticized for not invoking any concern for individual responsibility. The results of the application in this paper, however, show how the Rawlsian recommendations can actually be supported by a responsibility-sensitive theory of egalitarianism, such as the one proposed here.

We conclude by addressing several concerns that the proposal made in this paper might generate.

from the wage of firm mates that enjoyed similar circumstances in the near past and have a higher wage than their own.

[11] Namely, continuity, differentiability, narrow self-interest and comparative effect.

[12] By the vertical projection function we mean $\Pi : \mathcal{R}^2 \longmapsto \mathcal{R}$, such that $\Pi(x, y) = y$, for all $(x, y) \in \mathcal{R}^2$.

The first one refers to the *price to pay* for implementing this proposal. It is clear from the example analyzed in the paper (especially in the two-type case) that the reduction of inequality among equally deserving agents this proposal offers, usually entails a higher reduction of advantage of the most advantaged type than the subsequent increase of advantage of the least advantaged type. For instance, and to be more precise, in the two-type case of our example, for agents at $\pi = 0$, the difference in life expectancy is reduced from 10.6 (in Roemer's solution) to 7.1 years. This is achieved after reducing life expectancy of the rich in 3.1 years, while the rise for the poor is around 5 months. Nevertheless, this is not an exclusive feature of the proposal made in this paper. A similar situation occurs, for instance, when we move from the so-called *utilitarian* solution (the expenditure schedule at which life expectancy in the population as a whole is maximized) to Roemer's solution. More precisely, in the utilitarian solution for the same example, the difference in life expectancy for agents at $\pi = 0$ is 17.4 years. Roemer's solution reduces this difference to 10.6 years. This is achieved by reducing life expectancy of the rich in 5 years, while the rise for the poor is around 1.8 years. This is not more than another instance of the so-called equality-efficiency trade-off (e.g., Okun, 1975).

A somewhat related issue is the hypothetical existence of unethical measures leading to lower levels of inequality. One might think, for instance, of investing part of the resources in diminishing directly the advantage of the most advantaged type (e.g., assuming the existence of a third cause of death in the example of the paper, that only affect the rich). The assumption that policies are budget balanced imposes an external restriction on the use of resources that should prevent some of these hypothetical unethical situations. If this were not enough to prevent all of them, we would simply limit the scope of the mechanism to cases in which these situations would not be likely to arise.[13]

Another issue is that one might argue that the application considered in the paper is not adequate for ignoring effort-specific policies. Let us note that the framework of the paper does admit the

[13] We should note, nonetheless, that insofar as we care about inequality per se, *leveling down* could certainly be an option. We would then interpret the mechanisms of this paper as a way of identifying *one* value among many (well-being being another value, which may require sacrificing equality). We do not want to explore this road further, given the obvious ethical problems that a recommendation of this sort would create.

use of effort-specific (and also type-specific) policies. It is certainly the case that, from the equal-opportunity viewpoint, a better possible result could be achieved with more general policies of this category. Nevertheless, there are some practical reasons (besides ethical ones) to restrict ourselves to the category of only type-specific policies for this particular context of health care delivery. First, it may compromise the relationship between the health care providers and the patient if the former must make decisions on the nature of treatment by considering effort. Second, the necessity to use more information introduces the possibility of errors: it is not easy to gather information on effort and type, and therefore one might consider a non effort-specific policy as an error-proof policy (see Roemer (2002b) for an elaboration of this point).

Finally, we should acknowledge that the proposal made here might have a weak predictive power. On the one hand, we have to deal with the multiplicity of inequality indices in the general case of more than two types (although, as we have seen in our example, chances are to get a good unique compromise among them) even for those cases. On the other hand (and this is especially true in the case of effort-specific policies for a discrete set of effort levels, which is not the case of the example considered in this paper) it might well be the case that even for a unique inequality index we come up with a variety of solutions. If such were the case, we would need to resort to other considerations (of either an equity nature or an efficiency nature) to agree on a unique policy as the recommended equal-opportunity policy.

References

Arneson, R. (1989): "Equality and equal opportunity for welfare", *Philosophical Studies* 56, pp. 77-93.

Berrebi, Z. M., J. Silber (1985): "Income inequality indices and deprivation: A generalization", *Quarterly Journal of Economics* 100, pp. 807-810.

Blackorby, C., W. Bossert and D. Donaldson (1999), Income inequality measurement: The normative approach, chapter 3 of J. Silber (ed.) *The Handbook of Income Inequality Measurement.* Kluwer Academy Publishers.

Blackorby, C. and D. Donaldson (1978): "Measures of relative equality and their meaning in terms of social welfare", *Journal of Economic Theory* 18, pp. 59-80.

Bolton, G. and A. Ockenfels (2000: "Erc: A theory of equity, reciprocity and competition", *American Economic Review* 90, pp. 166-193.

Bossert, W., M. Fleurbaey and D. Van de Gaer (1999): "Responsability, talent, and compensation: A second-best analysis", *Review of Economic Design* 4, pp. 35-55.

Brown, G., J. Gardner, A. Oswald and J. Qian (2006): "Does Wage Rank Affect Employees' Wellbeing?", IZA Discussion Papers 1505.

Cabrales, A., A. Calvó-Armengol and N. Pavoni (2007): "Social preferences, skill segregation and wage dynamics", *Review of Economic Studies,* Forthcoming.

Clark, A. and A. Oswald (1996): "Satisfaction and Comparison Income", *Journal of Public Economics* 61, pp. 359-381.

Cohen, G. A. (1989): "On the currency of egalitarian justice", *Ethics* 99, pp. 906-944.

Donaldson, D. and J. Weymark (1980): "A single-parameter generalization of Gini indices of inequality", *Journal of Economic Theory* 22, pp. 67-86.

Dworkin, R. (1981a): "What is equality? Part 1: Equality of welfare", *Philosophy & Public Affairs* 10, pp. 185-246.

Dworkin, R. (1981a): "What is equality? Part 2: Equality of welfare", *Philosophy & Public Affairs* 10, pp. 283-345.

Fehr, E. and K. Schmidt (1999): "A theory of fairness, competition and cooperation", *Quarterly Journal of Economics* 114, pp. 817-868.

Fleurbaey, M. (2007), *Fairness, responsibility and welfare,* Book Manuscript.

Fleurbaey, M. and F. Maniquet (2004): "Compensation and Responsability", Forthcoming in *The Handbook for Social choice and Welfare,* Arrow, K.; Sen, A.; Suzumura, K. (eds.).

Hild, M. and A. Voorhoeve (2004): "Equality of opportunity and opportunity dominance", *Economics and Philosophy* 20, pp. 117-145.

Kolm, S. (2001): "To each according to her work? Just entitlement from action: Desert, merit, responsibility and equal opportunities", Mimeo (available at http://mora.rent.nhh.no/projects/EqualityExchange/Manuscripts/tabid/57/Default.aspx).

Luttmer, E. (2005): "Neighbors as negatives: Relative earnings and Well-Being", *Quarterly Journal of Economics* 120, pp. 963-1002.

Okun, A. (1975), *Equality and Efficiency: The Big Trade-off,* Brookings Institution Press.

Ooghe, E., E. Schokkaert and D. Van de Gaer (2007): "Equality of opportunity versus equality of opportunity sets", *Social Choice and Welfare* 28, pp. 209-230.

Peragine, V. (2004): "Ranking income distributions according to equality of opportunity", *Journal of Economic Inequality* 2, pp. 11-30.

Rawls, J. (1971), *A Theory of Justice,* Harvard University Press. Cambridge, Ma.

Rodríguez, J. (2007): "Partial and complete equality-of-opportunity orderings", Mimeo. Universidad Rey Juan Carlos de Madrid.

Roemer, J. E. (1993): "A pragmatic theory of responsibility for the egalitarian planner", *Philosophy & Public Affairs* 22, pp. 146-166.

Roemer, J. E. (1995): "Equality and Responsibility", A Debate on *Can egalitarians take the idea of personal responsability seriously?* with T. M. Scanon, R. M. Solow, S. Scheffler, R. A. Epstein, Fox-Genovese, E. S. Maskin, A. Epstein, S. L. Hurely and N. L. Rosenblum. *Boston Review* Vol. 20, 2.

Roemer, J. E. (1998), *Equality of Opportunity,* Harvard University Press. Cambridge, Ma.

Roemer, J. E. (2002a): "Equity in health care delivery", Mimeo. Yale University.

Roemer, J. E. (2002b): "Equality of opportunity: A progress report", *Social Choice and Welfare* 19, pp. 455-471.

Runciman, W. G. (1966), *Relative Deprivation and Social Justice* Routledge.

Sen, A. (1980): "Equality of what?", in *Tanner Lectures on Human Values,* Vol. I, Crambridge University Press.

Sen, A. (1985), *Commodities and Capabilities* Amsterdam. North Holland.

Smith, A. (2003) [1776], *The Wealth of Nations* Mantam Classics; Bantam Cla edition.

Sobel, J. (2005): "Interdependent preferences and reciprocity", *Journal of Economic Literature* 43, pp. 392-436.

Stouffer, S. A., A. Lumsdaine, M. Lumsdaine, R. M. Williams Jr., M. Smith, I. L. Janis, S. A. Star and L. S. Cottrell (1949), *The American Soldier: Combat and Its Aftermath* Princeton University Press.

Van de Gaer, D. (1993): "Equality of opportunity and Investment in Human Capital", Ph. D thesis, K. U. Leuven.

Yitzhaki, S. (1979): "Relative deprivation and the Gini coefficient", *Quarterly Journal of Economics* 94, pp. 321-324.

Resumen

En este artículo, estudiamos mecanismos con los que construir políticas de igualdad de oportunidades para el reparto de recursos. En un modelo en el que los individuos gozan de bienestar en función del esfuerzo que realizan, y la cantidad que consumen de un recurso distribuido socialmente, el objetivo es distribuir el recurso de manera que se reduzca al mínimo la desigualdad de bienestar entre individuos con el mismo nivel relativo de esfuerzo. Con ello, y a diferencia de lo que ocurre con otros mecanismos existentes para el diseño de políticas de igualdad de oportunidades, contemplamos la hipotética privación relativa existente entre individuos con méritos equivalentes. Además de estudiar estos mecanismos genéricamente, analizamos su comportamiento en el contexto de reparto de recursos en atención sanitaria.

Palabras clave: igualdad de oportunidades, privación relativa, responsabilidad, compensación, índices de desigualdad.

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