

Health, Equity and Social Welfare^{*}

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ABSTRACT. – This article examines how issues of equity in health economics can receive new light from recent and less recent developments in welfare economics and the theory of fair allocation. This developments deal with multiple dimensions of individual well-being in particular, and suggest new alleys for the study of socio-economic health inequalities.

Santé, équité et bien-être social

RÉSUMÉ. – Cet article propose une lecture critique de l'économie de la santé, à la lumière de développements récents et moins récents de l'économie du bien-être et de la théorie de l'équité. Ces développements concernent en particulier la prise en compte de dimensions multiples du bien-être individuel et suggèrent des pistes nouvelles pour l'étude des inégalités socio-économiques de santé.

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1 Introduction

The purpose of this paper, in a nutshell, is to examine ethical issues in health economics in the light of recent developments in welfare economics. An impressive number of publications¹ have already made good and important connections between the two fields. In addition, a rich set of statistical measures of health and health inequalities has been developed and applied extensively.²

Is there anything to add to all this? Maybe. There is some ambiguity in various works about whether the best principle for health provision is equal health or equal opportunity for health, and it is worth exploring the latter in light of recent work in welfare economics about responsibility and fairness.³ Although one may rightly fret about introducing personal responsibility in health matters,⁴ it is now increasingly acknowledged in welfare economics that responsibility is always an important dimension of ethical analysis of social situations, if only because it has a strong link with freedom and freedom is a basic value.⁵ It turns out that this examination of the principle of equal opportunity for health is useful also to analyze the interpretation of some statistical devices such as the pseudo-Lorenz curve or the concentration curve which are commonly used in the health literature.

A second point which is discussed in this paper is the connection between the provision side and the finance side of the health system. As noted by Wagstaff and van Doorslaer (2000), the principle of ability-to-pay is widely accepted as far as financing health care is concerned, but has received less attention than the equity principles about health care delivery. This issue appears to be related to the broader question of the connection between the health sphere and social welfare in general. It is argued here that any good principle for the health system should be consistent with a broader criterion of social welfare. Various recent proposals for the definition of social welfare are reviewed here, and applied to a simple framework in which health, income and consumption are modelled. This is offered with the hope that some of these new tools developed in welfare economics may turn out to be useful in health economics.

The paper is structured as follows. The next section presents a simple framework that will make the analysis more concrete and more directly applicable to health issues. Three prominent principles for the delivery of health care are recalled and discussed in Section 3. Sections 4-7 examine the principle of equal opportunity for health in detail, discussing the critical issues involved and explaining the various ways in which it can be applied. Section 8 contains an examination of statistical devices such as the Lorenz curve and the concentration curve, focussing on their ethical underpinnings with the help of some theorems of welfare economics. Sections 9-14 deal with the integration of health into a general social welfare crite-

1. E.g. Culyer (1989), Wagstaff (1991), Whitehead (1992), Culyer and Wagstaff (1993), van Doorslaer *et al.* (1993), Olsen (1997), Wagstaff and van Doorslaer (2000), Williams and Cookson (2000), Bomnier and Stecklov (2002), Murray *et al.*, Eds (2002).

2. See Couffinhal *et al.* (2003), Gakidou *et al.* (2000), Kakwani *et al.* (1997), Murray *et al.* (2002), Wagstaff *et al.* (1991, 2003), Wagstaff and van Doorslaer (2004), among others.

3. It is reviewed in Fleurbaey and Maniquet (1999).

4. See in particular Wikler (1987).

5. See in particular Rawls (1982) and Sen (1992, 1999).

tion, emphasizing some recent approaches to the definition of social welfare. The last section concludes.

2 A Simple Framework

Consider individual i . Her current situation can be described by a vector (c_i, h_i) , where h_i is a vector describing her health, in the various dimensions of health (pain, bodily functions), in the past and present and also in the various possible states of the future. Similarly, c_i is a vector of her other functionings in the past, present and possible futures. In summary, the vector (c_i, h_i) describes the full vector of functionings for i .

Individual i 's health h_i is determined by a complex technology which involves at least five elements. First, some personal endowment (genetic predispositions). Second, medical resources used to treat i . Third, i 's other functionings, which influence her body (diet, exercise) or mental state (e.g. stress, self-esteem).⁶ Fourth, environmental variables, which include the general population's health. Fifth, a luck factor, which encapsulates the apparently irreducible random part in health (it might or might not disappear under conditions of full knowledge of the other factors).

Individual i 's behavior interferes with the determination of her health via two main factors. It affects the amount and effective use of medical resources, depending on how i makes use of the health system and of her own resources to get access to it. It also obviously affects the other functionings, and thereby health indirectly. There may also be an impact via the environment factor, when i can move to change her surroundings.

Public policy may also influence the three same factors, by making medical resources available, by influencing the social and economic state of the population, and by directly influencing individuals' behavior.

There is an important and interesting feed-back effect of h_i on c_i , because health is a precondition for a full realization of potentialities in various domains, in particular productivity and earnings in the labor market.⁷

The state of the population N , which is the object of normative evaluation, can be described as a vector $(c_i, h_i)_{i \in N}$. Interestingly, this does not involve an explicit description of the technology and of the various effects involving individual behavior and public policy. This means that information about the *feasible* set of population states may not be needed in the normative part of the analysis. But knowledge of the technology may actually turn out to be relevant to the *normative* exercise of evaluation, by providing relevant benchmarks. This will be discussed below.

6. The possibility of a direct psychosomatic effect of social status on health has been highlighted in the famous Whitehall studies (Marmot *et al.*, 1991) and in similar studies on male baboons (Sapolsky, 1993).

7. On the causal links between health and economic status, see Smith (1999).

This general framework is quite useful to bear in mind, but for the purpose of a more focused analysis, it is often convenient to refer to a simpler model, which is as follows. Both c_i and h_i are then real numbers, with $c_i \geq 0$ and $0 \leq h_i \leq 1$. Health is determined by a function

$$h_i = H(e_i, m_i, c_i)$$

where e_i is i 's health endowment and m_i the expenditure for i 's health care treatment. This function is increasing in every argument and concave in m_i . The variable c_i , which may then be interpreted as non-medical consumption (and taken as the numeraire in the model), appears in H because a good standard of living is good for health.⁸ It is subject to a budget constraint

$$c_i = I(h_i, a_i) + T(I(h_i, a_i), m_i) - m_i$$

where $I(h_i, a_i)$ is i 's income, positively influenced by her health h_i and some ability characteristic a_i . The term $T(I(h_i, a_i), m_i)$ represents a transfer, which may depend on income (redistributive policy, social security contributions) and on medical expenditure (reimbursement). The function T may be determined by public policy, but, more generally, it may be the object of a prior choice by i . There may be various coverage formulae T_1, T_2, \dots and i may have chosen one of them.⁹

Two extreme policies will be recurrently invoked below. One is the *laissez-faire*, in which the budget constraint is simply:

$$c_i = I(h_i, a_i) - m_i.$$

Figure 1 illustrates the typical shape of this budget set in (c, m) -space, taking account of the indirect effect of m_i over income appearing in the following equation:

$$c_i = I(H(e_i, m_i, c_i), a_i) - m_i,$$

and the corresponding "budget" set in (c, h) -space, defined as

$$A_i^{LF} = \{(c, h) \mid \exists m \geq 0, c \leq I(h, a_i) - m, h = H(e_i, m, c)\}.$$

The increasing part of these curves is obtained when first units of medical consumption cure health problems that dampen earnings and when earnings after recovery exceed the cost of medical care. The decreasing part is obtained when further medical expenses are less and less efficient in enhancing health and earnings.

8. At first glance, one might think that there is an optimal level of c_i beyond which negative health effects appear (such as obesity). But this is unlikely if the way in which c_i is spent on ordinary goods is decided by an individual with preferences that are increasing in health (the rich buy fitness machines, not big hamburgers).

9. This model is similar to Grossman's (1972), but in its simple version it ignores time and the notion of investment in health capital.

The other benchmark policy is a pure version of *National Health Service* (NHS), in which medical expenses are reimbursed fully, so that health care is in effect provided free of charge to everybody:

$$c_i = I(h_i, a_i) + T(I(h_i, a_i)).$$

Figure 2 illustrates the typical shapes of the related budget constraint (with indirect effect of m_i over income)

$$c_i = I(H(e_i, m_i, c_i), a_i) + T(I(H(e_i, m_i, c_i), a_i))$$

and of the consumption-health budget set

$$A_i^{NHS} = \{(c, h) \mid \exists m \geq 0, c \leq I(h, a_i) + TI(h, a_i), h = H(e_i, m, c)\}.$$

It is increasing throughout when the marginal tax rate is less than one (net income is increasing with earnings).

FIGURE 1

Laissez-faire policy

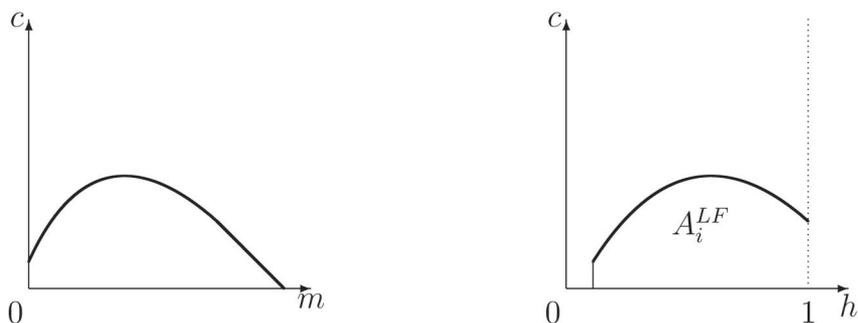
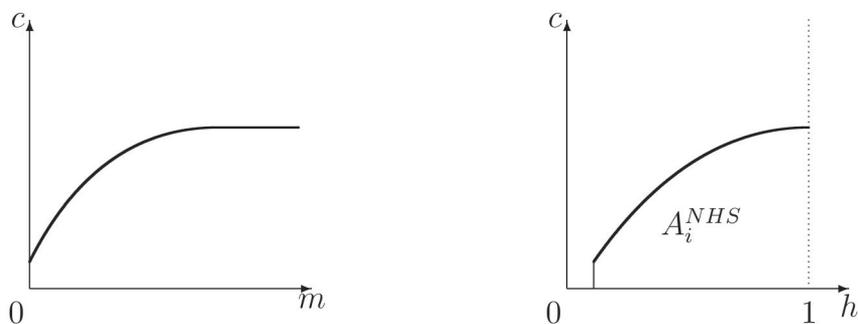


FIGURE 2

Pure NHS policy



3 Three Principles

Culyer and Wagstaff (1993) and Wagstaff and van Doorslaer (2000) discuss three equity principles for the delivery of health care.

The first principle says that health care should be allocated *according to need*. They critically examine and reject different possible definitions of “need”. Need ought not to be defined as ill-health, since incurable patients do not really need any health care. It may not be defined in terms of capacity to benefit from health care, since there is no simple relation between capacity to benefit and the amount of health care. They suggest instead to define need as the amount of health care required to exhaust the patient’s capacity to benefit.

$$need_i = \arg \max_m H(e_i, m, c_i)$$

If this full amount were distributed, everybody would reach his maximal achievable health state. For further reference, let us call this the maximal health allocation. Notice that since health h_i influences earnings and therefore consumption c_i , there is a feed-back effect which increases the level of maximum health when consumption is adjusted. But health is bounded and this process converges to a limit.

As Culyer and Wagstaff (1993) extensively analyze, when the total amount of health care falls short of the amount distributed at the maximal health allocation, it is dubious that this allocation is a useful benchmark. A proportional shortfall reduction of health care for all patients, for instance, may have quite egalitarian consequences regarding health.

The second principle is *equal access* to health care. Again, one has to provide an explicit definition of the concepts involved. Access is defined by Le Grand (1991) and Mooney (1983) in terms of money and time prices. Equal access then means equality of marginal price (in time and money). But this disregards inequalities of income, and Olsen and Rogers (1991) propose instead to equalize the maximum amount of health care that everybody can obtain from the health system. But even this equality does not entail equality of budget sets, and therefore poorer individuals may still be considered to have a lower access, since they obtain less of other goods for the same amount of health care. On the other hand, if equal access to health care requires complete equality of budget sets one loses the special status of health care over other goods such as skiing vacations or claret.

The only way in which health care can retain a special status and equal access can be provided in spite of income inequalities is to make health care a free good, as in the pure NHS policy. Truly equal access to health care is then compatible with unequal budget sets. Interestingly, an individual maximizing an increasing utility function $u_i(c_i, h_i)$ over the set A_i^{NHS} will choose the level of m_i so that no further improvement to health (and consumption, via earnings) is possible.¹⁰ One then obtains the maximal health allocation.

10. This individual might then consume an unlimited amount of health care, since once maximal health is reached extra health care has no consequence. If, more realistically, one assumes that m_i also has a direct negative impact on utility (because being treated is often unpleasant), then demand for health care may fall short of the amount needed to get maximal health.

The third principle is *equal health*, or, in a variant of it, *equal opportunity for health*. Let us first focus on the principle of equal health, postponing the discussion of opportunities to the next section. Equal health is advocated by Culyer and Wagstaff (1993) on the ground that health is a basic functioning that is necessary for any conception of human flourishing. The previous principles are focused on the distribution of health care, but health care is not important in itself, it is only a means to health. At this stage one may wonder why they stop at equal health and do not go all the way down to equal flourishing. This has to do with the idea of analyzing health as a separate sphere, and this point will be discussed later in this paper.

An obvious problem with health equality is that it is infeasible. Applying the maximin or the leximin criterion is then the proximate idea, although one may be worried that such criteria give an absolute priority to the worst-off, thereby entailing the possibility of demanding arbitrarily high sacrifices from the better-off. There is one configuration in which this worry disappears, namely, when the amount of resources is sufficient so that application of the leximin criterion yields the maximal health allocation.

The maximal health allocation, then, reconciles the three principles. It allocates health care according to need, it may be obtained via an equal access (free health) policy, and it is obtained with the leximin criterion when resources are sufficient. This allocation is probably feasible in an affluent economy (at least for a basic definition of health), and seems to capture the view of those in the medical profession who reject the idea of imposing economic constraints on the management of the health system. It is well known to economists, however, that the maximal health allocation is generally inefficient. Indeed, at this allocation, a small reduction of medical expenses $dm_i = \delta < 0$, for all i , does not affect anybody's health, because health reaches its peak at this amount of health care:

$$dh_i = \delta \frac{\partial}{\partial m_i} H(e_i, m_i, c_i) = 0.$$

If nobody's health is harmed, earnings are not affected either, so that the amount of resources in the economy remains the same. Therefore, the small reduction in health care may be used to increase consumption in other goods, and this yields a strict increase in welfare.¹¹

It is, then, not *scarcity* as such but, rather, *efficiency* which makes things complicated in health economics. Given that the total health budget will, and should indeed, fall short of the amount needed in the maximal health allocation, how should shortage be allocated among patients? The principle of equal health is attractive because it gives priority to those with lower health, independently of their income (contrary to the equal access principle) or of their distance to their maximum health (contrary to the need principle). But things may not be so simple.

11. This remains true under strong externalities in the production of health, *i.e.* when one has $h_i = H(s_i, m_i, c_i, h_{-i})$, where h_{-i} measures health for the rest of the population.

4 Equal Opportunity for Health?

Equal opportunity for health is advocated in Whitehead (1992). Mooney (1983) and Le Grand (1991) relate equal access to it in order to justify equal access. Wagstaff and van Doorslaer (2000) consider that this principle, as a distinct principle from equality of health, is acceptable in theory but they consider that in practice it will hardly make a real difference. This assessment is quite reasonable, but it is worth exploring these matters in more detail.

Focusing on opportunities requires drawing a distinction between what individuals are and are not responsible for. This is the issue of the “responsibility cut”. Can we say that a heavy smoker had an opportunity to preserve his lungs and is responsible for having failed to do so? These are complex philosophical questions, but, roughly, they may be summarized as follows. There are two main ways of delineating the responsibility cut. The “control” approach stipulates that individuals are responsible for their genuine choices and actions over which they had full control. This may include decisions made by pure negligence, when negligence itself may be viewed as the product of a peculiar exercise of control over one’s behavior. The control approach, in a nutshell, relates responsibility to free will, and thereby raises all the difficulties implied by this notion.¹² It can also be criticized as being particularly unforgiving. Any decision made in the past in conditions of full control commits the individual to bear the consequences, independently of any later change of mind. Under this approach, equal opportunity for health is compatible with a system in which the heavy smoker who has not taken health insurance is not treated for lung cancer when it is ascertained that his smoking and insurance decisions were fully controlled.

The second approach, which may be called the “preference” approach, defines responsibility as letting individuals have what they want when they are put in good conditions of choice. It also raises delicate issues about the soundness of individual preferences and the characterization of good conditions of choice. But it may be considered as more easily applicable. For instance, it is very well represented in the tradition of “consumer sovereignty” in economics, which sanctifies individual choice from a budget set. It may also be applied in a forgiving way, letting changes of preferences entail some adjustment in individual situations.¹³ The preference approach can be given a rather direct justification in terms of freedom, since it is impossible to give people freedom without letting them choose according to their preferences in some satisfactory set of options. In summary, the preference approach asks “is it what you want?”, whereas the control approach asks “is it what you’ve done?”.

There are variants of these two approaches which combine some of their elements in various ways, but for the present purpose it is enough to note that some version of the preference approach, at least, is likely to be compelling.

The idea of putting individuals in good conditions of choice implies trying to neutralize the influence of undesirable factors. But there is an interesting difficulty when full equalization of such factors is impossible. Consider socioeconomic

12. See Cohen (1989).

13. See Fleurbaey (2005a).

status, in particular. An important literature focuses on the undesirable correlation between health and socioeconomic status, and in particular on the undesirable influence of the latter on the former. If socioeconomic status could be roughly equalized, this problem would be radically solved indeed. But this is not the case and it seems to have gone unnoticed that the idea of reducing the influence of socioeconomic status on health may clash with the idea of respecting preferences. Indeed, it may be supposed that health is a normal good, so that people with lower income are less willing to trade income for health. Therefore, if individuals are given some freedom of choice in the access to health care, it may be expected that the less wealthy will tend to save part of their health expenses in order to increase other consumptions. In other words, it is normal and desirable, if we want to respect individual preferences, that the poor are less healthy than the rich. It may not be desirable that the poor are poor and the rich are rich, but given the unequal distribution of income, it seems a bad idea to nullify the correlation between health and socioeconomic status. Of course, the current level of correlation may be too high so that policies trying to reduce it would be desirable. My point is only that the optimal degree of correlation, for a given unequal distribution of income, is not likely to be zero.¹⁴

Formally, this argument may be developed as follows. Consider two individuals i and j who differ only in their productivity parameter, $a_i > a_j$. They have the same preferences over c_i and h_i , represented by a utility function u , the same health endowment e , etc. Consider an allocation in which their health is equal ($h_i = h_j$) but their consumption is unequal ($c_i > c_j$). Introduce a change in which a small portion of health expenditures m_i , for individual i , is reallocated to his consumption c_i , taking account of i 's greater health and income as a consequence: $dc_i = \left[\frac{\partial I}{\partial h_i} \frac{\partial H}{\partial m_i} - 1 \right] dm_i$, with $dm_i < 0$. One computes

$$\begin{aligned} du_i &= \frac{\partial u}{\partial c_i} dc_i + \frac{\partial u}{\partial h_i} \left[\frac{\partial H}{\partial m_i} dm_i + \frac{\partial H}{\partial c_i} dc_i \right] \\ &= \frac{\partial u}{\partial c_i} dc_i \left(1 + \frac{\partial u / \partial h_i}{\partial u / \partial c_i} \left[\frac{\partial H}{\partial m_i} \frac{dm_i}{dc_i} + \frac{\partial H}{\partial c_i} \right] \right). \end{aligned}$$

Let us focus on the relevant case when

$$\frac{dc_i}{dm_i} = \frac{\partial I}{\partial h_i} \frac{\partial H}{\partial m_i} - 1 < 0$$

(i.e. the effect of medical expenses over income via health is not too strong and $dc_i > 0$) and

$$\frac{\partial H}{\partial m_i} \frac{dm_i}{dc_i} + \frac{\partial H}{\partial c_i} < 0$$

14. Asheim *et al.* (2000) show that, ex ante, it is rational for a low-skilled individual to choose health insurance contracts that give partial medical treatment and partial compensation of income loss, whereas a high-ability individual will typically ask for full treatment and full insurance. Bleichrodt and Quiggin (1999) show how willingness-to-pay for additional QALYs (quality-adjusted life years) may depend on wealth.

(i.e. the effect of consumption over health is not too strong and

$$dh_i = \frac{\partial H}{\partial m_i} dm_i + \frac{\partial H}{\partial c_i} dc_i < 0).$$

A similar computation can be done for j . If health is a normal good, the fact that $h_i = h_j$ and $c_i > c_j$ entails

$$\frac{\partial u/\partial h_i}{\partial u/\partial c_i} > \frac{\partial u/\partial h_j}{\partial u/\partial c_j}.$$

It is very likely to have

$$\frac{\partial H}{\partial m_i} \frac{dm_i}{dc_i} + \frac{\partial H}{\partial c_i} < \frac{\partial H}{\partial m_j} \frac{dm_j}{dc_j} + \frac{\partial H}{\partial c_j},$$

for the following reasons. The fact that $h_i = H(e, m_i, c_i) = H(e, m_j, c_j) = h_j$ and $c_i > c_j$ implies $m_i \leq m_j$. Therefore, under the assumptions $\frac{\partial^2 H}{\partial m^2} < 0$ and $\frac{\partial^2 H}{\partial m \partial c} > 0$ one must have $\frac{\partial H}{\partial m_i} > \frac{\partial H}{\partial m_j}$ and $\frac{\partial H}{\partial c_i} < \frac{\partial H}{\partial c_j}$. One has

$$\frac{\partial H}{\partial m_i} \frac{dm_i}{dc_i} = -\frac{\frac{\partial H}{\partial m_i}}{1 - \frac{\partial I}{\partial h_i} \frac{\partial H}{\partial m_i}},$$

an expression which is decreasing in $\frac{\partial H}{\partial m_i}$ and $\frac{\partial I}{\partial h_i}$. Assuming that, due to higher ability, $\frac{\partial I}{\partial h_i} > \frac{\partial I}{\partial h_j}$, one obtains the above inequality.

As a consequence, one obtains

$$\frac{\partial u/\partial h_i}{\partial u/\partial c_i} \left[\frac{\partial H}{\partial m_i} \frac{dm_i}{dc_i} + \frac{\partial H}{\partial c_i} \right] < \frac{\partial u/\partial h_j}{\partial u/\partial c_j} \left[\frac{\partial H}{\partial m_j} \frac{dm_j}{dc_j} + \frac{\partial H}{\partial c_j} \right].$$

This implies that either du_i and du_j have the same sign, or $sign(du_i) < sign(du_j)$. If one finds $du_i > 0$ and $du_j > 0$ (resp., $du_i < 0$ and $du_j < 0$) then both individuals can be made better off by decreasing (resp., increasing) m_i and m_j and adjusting c_i and c_j as indicated above. The interesting case is $du_i < 0 < du_j$, when it is Pareto-improving to increase health for the rich (i) and to reduce it for the poor (j). In all cases, there is a Pareto-improving state in which the rich ends up with more health than the poor.

The statement that there is something acceptable about the correlation between health and wealth may sound shocking to some readers and is reminiscent about certain quarrels in health economics about the reference to market demand or cost-benefit analysis.¹⁵ There are three positions to be distinguished here. One says that we can rely on consumers' willingness-to-pay in order to allocate resources such

15. See e.g. Culyer (1989), Culyer and Evans (1996), Rice (1997).

as health care. This is clearly unacceptable because it makes the incorrect assumption that the distribution of wealth is socially optimal. When the distribution is not optimal, it may, for instance, be worth providing services that cost more than what the beneficiaries are willing to pay. Another position says that in order to take account of relevant societal concerns, a non-welfarist view must be adopted so that market demand and consumer preferences can largely be ignored. This is why, for instance, one might be right to try to suppress the correlation between health and socioeconomic status even though this goes against individual preferences. I think that both positions are ill-founded and that a third one needs to be constructed. Both positions confuse the respect of individual preferences and the satisfaction of market demand. The latter is warranted only when individual demands are backed by a just distribution of resources, and the former need not be rejected when the distribution is unfair. The third position that is defended and illustrated in the analysis of this paper is that the respect of individual preferences¹⁶ is compatible with distributive concerns. In other words, one can be an egalitarian and also want to avoid inefficiencies. If the choice is between an unequal distribution of well-being (depending on income and health) and a more equal distribution, the choice can be firmly in favor of the second. In particular, if income were totally fixed and only health could be somehow redistributed, then one should actually aim at a *negative* correlation, so that a greater health could compensate for a lower income. But if there is some possibility to substitute health for other goods, then individual preferences should be a priori influential in this trade-off.¹⁷ This issue will be examined in more detail in Section 11.

5 Talent, Luck and Peer Group Influence

Another factor creating unjust inequalities is health endowment e_i . Strangely enough, Whitehead (1992) puts “natural, biological variation” under the heading of factors which do not call for any effort of neutralization.¹⁸ This is a not uncommon mistake, which consists in believing that natural inequalities do not need any equalizing redress, and that only man-made inequalities are unjust. But the natural lottery is no less arbitrary than social inequalities, and if 5% of the GDP were enough to remove all genetic predispositions to sickness it would likely be well worth spending on that. As argued in Rawls (1971), for instance, injustice in social institutions is not related to the causes of situations but to the way in which institu-

16. Individual preferences are not always respectable. This is examined in Section 11.

17. There may, however, be limits to the acceptable preference implications of inequalities (Tobin, 1970). If a market for organs were created so that the poor could sell organs to the rich, this might be deemed so obnoxious that a prohibition would seem justified, even though it would imply an immediate inefficiency (see Kanbur, 2004; Fleurbaey, 2004). The concrete political economy of these problems is quite complex, as one may argue that the short-term inefficiency of such a policy is acceptable because it creates a climate in which better ways of helping the poor can be devised in the long run.

18. Alleyne *et al.* (2000) also reduce the scope of injustice similarly.

tions tackle the situations. A health system which would abandon the congenitally impaired and treat only the accidentally impaired would be utterly repugnant. A similar clash as above, between preferences and equalization, is however possible if health endowment affects people's preferences over the allocation of resources between health care and other consumptions. But, contrary to socioeconomic status, there is little reason to think of a systematic relation of that sort. The full neutralization goal seems therefore reasonable in this case.

Another factor calling for equalization is luck. It is sometimes argued¹⁹ that luck is spread randomly over the population without any systematic relation to other factors of advantage, so that the induced inequalities even out and can be neglected. This is, again, a simple mistake. Luck increases inequalities and makes things undoubtedly worse, so that it definitely calls for compensatory help and transfers. The difficulty with luck is that it is partly related to behavior and choice. To smoke, for instance, is like buying a negative lottery with an uncertain bad prize (various fatal diseases) and a certain low gain (the pleasure of smoking, when one likes it). There are lucky smokers and unlucky ones. Le Grand (1991) suggests, for this example, to make all smokers pay the expected value of their treatment, so as to finance the extra health care needed by unlucky smokers. This seems intuitively reasonable, but it is worth noting that it goes against some theories of responsibility, for instance Dworkin's (2000). Dworkin proposes to make a distinction between "brute luck" and "option luck". Option luck is observed in a lottery that the responsible individual could have avoided at low cost, whereas brute luck is unavoidable, uninsurable luck. Consider the application of Le Grand's solution to money lotteries. It implies that all gamblers should have the expected value of the lotteries they take, removing all ex post inequalities. In other words, Le Grand treats all kinds of luck as brute luck. In the example of smokers, one can consider that the unlucky smokers, albeit freely treated, still incur psychological costs (and in reality treatment is not always efficient). But if the risky behavior of smokers were categorized as option luck, then it would be possible to make them pay a part of their extra health care when they fall sick.²⁰

The distinction between option luck and brute luck is, however, quite questionable, and this may be shown with simple money lotteries. Suppose that individuals are offered, at price p , a lottery which yields a prize of \$1000 with a one percent probability. Are those who buy it submitting themselves to brute luck or to option luck? This appears to depend on the level of the price p . If $p = \$1000$, certainly this is option luck, since they deliberately take the risk of losing \$1000 with 99 percent probability. The problem is that their decision is then so stupid that one may doubt about their rationality. If $p = 0$, on the contrary, presumably everybody should accept the lottery, but then it is hard to consider the resulting inequalities as due to option luck.²¹ Therefore, when p is low, the gamblers seem less responsible and inequalities between winners and losers are more a matter of brute luck,

19. E.g. in Gakidou *et al.* (2000), Roemer (1998).

20. Roemer (1998, ch. 8) follows Le Grand in assuming that all unlucky smokers are treated free of charge, but he considers policies in which the heavy smokers pay more than the expected value of their treatment.

21. No matter how risk averse, it would be silly to refuse a free lottery ticket. Considering that there is option luck when people accept a free lottery ticket would imply that every risk is option luck when people have the option of making sure that the worst outcome occurs. A risk of fire in your house would be option luck even when insurance is not available because you can always "avoid" the risk by burning your house.

whereas when p is high, the gamblers seem more responsible. But they also seem less rational, and one may question the soundness of offering a bad lottery in which there is only loss to expect.²² The upshot of this example is that there is little reason to believe that rational risk-taking may ever be a pure matter of option luck. A safely generous policy should therefore, as suggested by Le Grand, treat all luck as brute luck. Admittedly, this kind of policy may be viewed as paternalistic since it is likely to introduce more insurance than spontaneously desired by individuals. But in the case of health paternalism is very often accepted and risk aversion is plausibly quite high anyway. This generous policy, however, is compatible with charging extra insurance premiums on risky activities (bad food, tobacco, sport, mountaineering, etc.).

A fourth factor which may possibly call for neutralization is the influence of the peer group on behavior. This is a rather delicate issue. Various social groups have different life-styles, and this difference is not solely due to income and wealth but also to cultural specificity. According to the control approach, no one is responsible for his social origin and this kind of influence is not part of the individual's responsibility. For the preference approach, individuals may be considered responsible for such specific behavior insofar as it relates to preferences they really endorse as part of their identity. Adopting the control approach, Roemer (1998) proposes to measure the degree of responsibility of individuals in terms of their relative position in the distribution of their group. For instance, considering the quantity of tobacco (or number of years smoking), he suggests that all individuals at a given percentile in their respective groups may be viewed as having exercised an equivalent degree of responsibility. This is a quite intuitive measurement device, and it makes perfect sense in simple cases, for instance when the fact of belonging to a group increases smoking by a fixed amount independently of other characteristics. Things are more tricky when there is interaction between responsible and non-responsible factors. For instance, suppose that smoking depends on the peer group and on a more or less submissive attitude adopted by individuals. Suppose moreover that individuals may be held responsible for this attitude. We may then have the following configuration. Those who belong to group G smoke more only if they have the submissive attitude, and belonging to G has no influence on the others. Even if individuals are not responsible for their affiliation to G, it is arguable that they may be treated as if they were fully responsible for their extra smoking. To submit oneself to influences, responsibly, may be viewed as incorporating such influences into the responsibility sphere. This is, however, very similar to the notion of option luck, in which one responsibly submits oneself to the influence of a random factor. The more general notion of "option influence" may be criticized similarly. Namely, if individuals choose to submit to influences, it is because they see some advantage to it, and therefore, presumably, they cannot be held fully responsible for this choice. And if there is no advantage to it, then they are irrational and presumably irresponsible as well, or at least there is no reason to offer them such bad options. The generous policy is then to count all influences as "brute influence". Roemer's method records the variations in smoking in the G subgroup as a responsible behavior, but records the variations in smoking in the submissive subgroup as a non-responsible behavior.²³

22. For a detailed analysis of this issue, see Lippert-Rasmussen (2000), Fleurbaey (2001).

23. Things are even more problematic when there is a statistical correlation between responsible and non-responsible factors. See Hild and Voorhoeve (2004).

6 Compensation and Reward

The interaction between responsible and non-responsible factors also leads to difficulties in the definition of the appropriate relation between responsible factors and final achievement. Suppose that, after sorting out the various factors influencing an individual's health, one ends up with a function

$$h_i = H^*(P_i, C_i, R_i),$$

in which P_i is the policy to which i is submitted, C_i her non-responsible circumstances and R_i her variable of responsibility. These three variables may belong to multidimensional spaces.

The easy case for an equal-opportunity policy is when the H^* function can be written as

$$H^*(P_i, C_i, R_i) = F(G(P_i, C_i), R_i),$$

such that $G(P_i, C_i) \in \mathbb{R}$ and F is monotonic (say, increasing) in $G(P_i, C_i)$. In this case, equalizing opportunities is perfectly achieved under the "natural" policy which equalizes $G(P_i, C_i)$ across individuals. When such perfect equality cannot be achieved, applying some inequality-averse criterion, such as the maximin, to the distribution of $G(P_i, C_i)$ may be appropriate.

The natural policy has two interesting features: 1) h_i does not depend on C_i but only on R_i ; 2) P_i does not depend on R_i but only on C_i . The first corresponds to the "compensation principle", *i.e.* the idea that the influence of C_i should be neutralized. The second implements a "natural reward principle", *i.e.* the idea that social policy should be neutral with respect to R_i and not try to compensate further than the influence of C_i . These two principles are independent and the first one can be satisfied by other kinds of policy. For instance, the policy achieving complete equality of health also neutralizes the influence of C_i .

Another example of alternative policy is related to modifications of the utilitarian social welfare function (SWF) proposed by Roemer (1998) and Van de gaer (1993). Suppose that policy P_i may be described as a function $P(C_i, R_i)$, which is true of any anonymous policy. The Van de gaer SWF can be defined as follows

$$W_{VDG} = \min_C E \left[H^*(P(C, R), C, R) | C \right]$$

where the expected value operator $E[\cdot]$ is computed over the distribution of characteristics in the population and $E[\cdot | C]$ computes the expected value conditional on C . The Roemer SWF is defined as²⁴

24. This is computed after the responsibility variable R has been suitably normalized by the statistical method described above, so that it has the same uniform distribution in all C groups. The Van de gaer SWF is invariant to this normalization and therefore does not need it.

$$W_R = E \left[\min_C H^* (P(C, R), C, R) \right].$$

These SWFs can be simply justified in the following way: they exhibit an infinite aversion to inequality within R subgroups (the maximin criterion is applied for individuals who differ only in C), and no aversion to inequality within C subgroups (the expected value is computed for individuals who differ only in R). This dual aversion to inequality is similar to the duality between compensation and natural reward, except that natural reward is replaced by a utilitarian approach. As a consequence, this kind of criterion does not yield the natural policy in the easy separable case. For instance, suppose P_i is some resource, C_i and R_i are real numbers, and

$$F(G(P, C), R) = PCR.$$

In this case the natural policy is such that $P_i C_i$ is equalized across individuals. In other words, $P(C, R) = P_0/C$ for some constant P_0 . The value of the Van de gaer and the Roemer SWFs is then

$$W_{VDG} = W_R = P_0 E[R],$$

and it can be improved substantially by a policy which gives resources only (and twice the amount) to those with above-median R : $P(C, R) = 2P_0/C$ if $R \geq \text{med}R$ and $P(C, R) = 0$ otherwise. The result is

$$W_{VDG} = W_R = P_0 E[R | R \geq \text{med}R],$$

and any policy which goes further in the direction of favoring the high R individuals is even better. In summary, the modified utilitarian criteria advocate policies which neutralize the influence of C and reward the values of R which increase the marginal social utility of resources. This strong non-neutrality about R appears somewhat questionable, but its consequences depend very much on the particular functional form of H^* and of the informational constraints (if R_i is not observable, it is harder to favor individuals with particular values of R).

The functional form of H^* is also important for extensions of the natural policy. When H^* cannot be written in the separable form $F(G(P, C), R)$, compensation and natural reward enter in conflict. Indeed, neutralizing the influence of C may then require different compensation policies depending on R .²⁵ The natural policy then splits into two different kinds of policies. The first kind implements some “conditional equality”, and can often be described in the following way. It consists in choosing a benchmark value \tilde{R} and equalizing (or maximinizing)

$$H^*(P_i, C_i, \tilde{R}).$$

25. As an illustration, imagine $H = P + CR$, where $P, C, R \in \mathbb{R}$. Then a high R requires a great compensation in P for a low C , whereas with a small R compensation in P for a low C may suffice.

Conditional equality is quite good in terms of neutrality with respect to R_i , but usually rather poor as far as compensation is concerned. In this respect one should prefer the second kind of policy, which may be called “egalitarian-equivalent”. In one version, it consists in choosing a benchmark value \tilde{C} and in trying to achieve the equality

$$H^*(P_i, C_i, R_i) = H^*(P_0, \tilde{C}, R_i),$$

or in applying some maximin version of it.²⁶

7 The Health Function

At this stage it is interesting to examine the functional form of $H^*(P_i, C_i, R_i)$ for some plausible characterization of the variables (P_i, C_i, R_i) . For instance, suppose the health system is such that every individual i maximizes a utility function $u_i(c_i, h_i)$ under the constraints that:

- (i) $h_i = H(e_i, m_i, c_i)$;
- (ii) $c_i = I(h_i, a_i) + T(I(h_i, a_i), m_i) - m_i$;
- (iii) $m_i \leq M(e_i, c_i)$.

The first two constraints have been explained in Section 2. The third one describes the amount of health care that is made available by doctors in view of the patient's initial health state, which is itself determined by (e_i, c_i) . This medical authority prevents the patient from demanding any arbitrary amount of health care he might wish (even when he can afford it).

We may rank e_i and a_i among the C_i variables. This is questionable for a_i , since it may itself be the result of some preferences and choice over education and jobs, but this is a convenient assumption here. Obviously P_i corresponds to the T and M functions. We may put u_i , or the preferences it represents, into the R_i heading. This is again questionable, because there may be different attitudes with respect to health and health care, which entail that with the same income and access to health care some individuals do not obtain the same achievement. It would possibly appear harsh to hold them responsible for such inequalities when these different attitudes are due to subcultures in which people have a lower self-esteem or have difficulties and preventions in interacting with the medical personnel.

26. For a detailed presentation of the conflict between compensation and natural reward, and these two extensions of the natural policy, see Fleurbaey and Maniquet (1999).

This gives us a $H^*(P_i, C_i, R_i)$ function which is not separable in (P_i, C_i) , although it is separable in a weaker sense. Indeed, the (P_i, C_i) variables determine a set of vectors (c_i, h_i) which are attainable by the individual,

$$A(P_i, C_i) = \{(c_i, h_i) \mid \text{constraints (i), (ii), (iii)}\}$$

and the R_i variable then fixes the vector in this set which is chosen, and therefore the level of health h_i eventually achieved. The natural solution is not applicable, since $A(P_i, C_i)$ is not a real number, but a two-dimensional set which may be transformed in various ways by changes in T and M . We then have to resort to the extensions of the natural policy (or to the utilitarian alternatives).

Here is a possibility for the definition of a conditional equality criterion. Fix some reference \tilde{u} , and let $h_i^{\tilde{u}}$ be the amount chosen from the set $A(P_i, C_i)$ by maximization of \tilde{u} . Then apply the maximin (or some inequality-averse) criterion to the vector $(h_1^{\tilde{u}}, \dots, h_n^{\tilde{u}})$. In other words, this criterion focuses not on people's actual health, but on the health level they would achieve with "standard" preferences. One sees that this solution may sound harsh when the difference between reference and actual preferences, for some social subgroups, are due to subcultures of humiliation and lack of education.

The egalitarian-equivalent solution may be applied as follows. Choose a family of sets $(A_\lambda)_{\lambda \in \mathbb{R}}$ in the (c, h) space, such that for all $\lambda < \lambda'$, $A_\lambda \subset A_{\lambda'}$, and such that for any utility function u , and any health level h , there is a $\lambda \in \mathbb{R}$ and a $c \geq 0$ such that (c, h) maximizes u over the set A_λ .²⁷ Then the criterion is defined as follows. For individual i in the situation (c_i, h_i) let λ_i be such that for some c , (c, h_i) maximizes u_i over the set A_{λ_i} . Then apply the maximin (or some inequality-averse) criterion to the vector $(\lambda_1, \dots, \lambda_n)$. This criterion is less intuitive than the previous one, but can be explained as assessing i 's situation by the reference set A_{λ_i} which would lead anyone with i 's preferences to obtain the same health level as i . For instance, a well-off but sick person might then have a low set A_{λ_i} if he cares about health, because it is only under bad "standard" circumstances that someone with his preferences would end up with this low level of health.

The egalitarian-equivalent solution is more generous than conditional equality, regarding compensation. Consider two individuals i and j with the same preferences but unequal circumstances, leading them to unequal health levels. It is possible that \tilde{u} would choose the same level of health in sets $A(P_i, C_i)$ and $A(P_j, C_j)$, so that the conditional equality criterion does not see any inequality between i and j . In contrast, the egalitarian-equivalent solution will always assign them different

27. This requirement is demanding and is satisfied only by families $(A_\lambda)_{\lambda \in \mathbb{R}_+}$ such that small sets contain little more than $(0, 0)$ and large sets have flat or positive slopes.

λ_i and λ_j , recognizing the difference. This is because it relies on their common preferences to assess their situation.²⁸

It is worth examining the case in which one always has $m_i = M(e_i, c_i)$, *i.e.* when the patient always follows the doctor's advice passively (which supposes he can afford it). This removes any personal responsibility in the determination of health. The vector (c_i, h_i) is then the solution to the system

$$\begin{cases} h_i = H(e_i, M(e_i, c_i), c_i) \\ c_i = I(h_i, a_i) + T(I(h_i, a_i), M(e_i, c_i)) - M(e_i, c_i) \end{cases}$$

and equal opportunity for health then reduces to equal health.²⁹ This simple reduction of equal opportunity for health to equal health occurs only when the possibility for individuals to make a trade-off between health and other goods vanishes or becomes irrelevant.

This is one of the main points of this section and the previous two: Trade-offs between health and other goods make equal health a questionable goal and render the idea of equal opportunity for health non-trivially different from equal health. But, as shown below, in this perspective the focus on health itself should also be questioned.

8 Charting Inequalities

In the empirical literature, health inequalities are commonly studied with the Lorenz curve and the concentration curve. This section briefly reviews the ethical underpinnings of such statistical devices, in light of some of the concepts introduced above. This analysis will provide an interesting transition to the last part of the paper, in which health is integrated into a more general notion of social welfare.

The Lorenz curve and the generalized Lorenz curve for health are used for the analysis of pure health inequalities. The former plots the percentage of total health obtained by any given percentage of the less healthy among the population. The latter plots the average level of health obtained by any given percentage of the less healthy among the population. The former is sensitive only to inequalities, whereas

28. Notice that if, for instance,

$$A_i = \{(c, h) | c \leq I_0, h \leq \lambda\},$$

then for all i , $\lambda_i = h_i$ and the egalitarian-equivalent boils down to maximin on health levels.

29. But this would not be true, even with this passive behavior, if c_i was multi-dimensional. In this case, the responsibility of the individual may lie in her choice of c_i (like diet), with the corresponding consequences on health.

the latter is also sensitive to increases in the level of health in any portion of the population.³⁰

An important result about these curves relates them to social welfare. One variant of this result³¹ says that when the generalized Lorenz curve for a distribution (h_1, \dots, h_n) is above that of another distribution (h'_1, \dots, h'_n) , then

$$\sum_{i=1}^n U(h_i) > \sum_{i=1}^n U(h'_i)$$

for any increasing and strictly concave function U .

This result is quite illuminating about one limitation of the generalized Lorenz curve. Checking the dominance of such curves is equivalent to checking unanimity for SWFs in a very large family, which includes SWFs with arbitrarily low inequality aversion. For any reasonably egalitarian conception of social welfare, this family contains SWFs which are irrelevant because they fail to be sufficiently egalitarian. This problem may be alleviated as follows. Suppose there is an accepted minimally egalitarian SWF

$$W_0(h_1, \dots, h_n) = \sum_{i=1}^n U_0(h_i).$$

Then computing the generalized Lorenz curve not on (h_1, \dots, h_n) but on $(U_0(h_1), \dots, U_0(h_n))$, ensures that one checks unanimity only for the SWFs which are no less egalitarian than W_0 , *i.e.* such that

$$W(h_1, \dots, h_n) = \sum_{i=1}^n \varphi[U_0(h_i)]$$

for some increasing concave transformation φ . Admittedly, this solution requires the choice of a particular W_0 , and there is a risk of arbitrariness. In the case of health data which are normalized between 0 and 1, it is reasonable to pick an iso-elastic function $U_0(h) = \frac{1}{1-\rho} h^{1-\rho}$, for $\rho > 0$, $\rho \neq 1$. Notice that for $\rho > 1$ (sufficiently high inequality aversion), $U_0(h) < 0$. The generalized Lorenz curve can be computed without any difficulty on negative data, it is then decreasing instead of increasing, but it remains convex and a higher curve remains the dominance criterion. With negative data, the Lorenz curve can also be computed, dividing the data by the absolute value of the total. One then obtains also a decreasing convex curve.

30. For a detailed presentation of these curves in a general framework, see Lambert (1989).

31. Due to Kolm (1969) and popularized by Shorrocks (1983).

An important literature focuses on socioeconomic inequalities in health.³² The concentration curve has become a prominent tool in this field.³³ It plots the percentage of total health obtained by any given percentage of the less well-off among the population. The generalized concentration curve differs from the concentration curve in the same way as the generalized Lorenz curve differs from the Lorenz curve. It plots the average level of health obtained by any given percentage of the less well-off among the population. How well-off people are may be evaluated in terms of some variable of socioeconomic status such as occupation, income, etc. When individuals are clustered in a smaller number of socioeconomic classes, one can actually draw two curves. One is the concentration curve when one attributes to every individual the average health level in his socioeconomic class; the other is the concentration-Lorenz curve when individuals are ranked, within every socioeconomic class, by increasing order of health (the curve is then a chain of normalized Lorenz curves, one for each class). The former is above the latter. And concentration curves are always above the health Lorenz curve.

A slightly different tool is the pseudo-Lorenz curve, which ranks socioeconomic classes according to average health, or equivalently computes the Lorenz curve (or generalized Lorenz curve) by attributing to every individual the average health level in his socioeconomic class.³⁴ The pseudo-Lorenz curve is always above the health Lorenz curve, and coincides with it when the socioeconomic variable is continuous and every individual forms a separate class. This is what happens in many recent studies, so that the Pseudo-Lorenz curve is now less popular in applied work. Nonetheless, it might deserve not to be forgotten because of its connection with concepts of fairness.

The pseudo-Lorenz curve can indeed be interpreted in terms of dominance for social welfare defined as

$$W_S = \sum_{i=1}^n U(E[h|S_i]),$$

where S_i is the socioeconomic class to which i belongs. This social welfare function, which is defended by Bommier and Stecklov (2002), bears some similarity with the Van de gaer SWF introduced above. The pseudo-Lorenz curve is also formally similar to “opportunity Lorenz dominance” in Peragine (2004). There is an important difference, however. The Van de gaer SWF, as well as the Peragine Lorenz ordering, focuses on $E[h|C_i]$, where C_i includes all variables for which individuals are not responsible. Using the notations of our simple model, the Van de gaer SWF is about $E[h|a_i, e_i]$ whereas the above SWF, W_S , is about $E[h|a_i]$ or $E[h|I(h_i, a_i)]$.³⁵ The latter would make sense in relation to the idea of equal

32. See in particular the survey in Wagstaff and van Doorslaer (2000).

33. See Wagstaff *et al.* (1991), Kakwani *et al.* (1997). See also Koolman and van Doorslaer (2004) and Wagstaff (2002) about the concentration index, which is computed like the Gini coefficient for the Lorenz curve.

34. It is used in Preston *et al.* (1981) and Leclerc *et al.* (1990).

35. Notice that inequalities in $E[h|I(h_i, a_i)]$ across classes of income do not tell anything about the relative importance of the $a_i \rightarrow h_i$ and $h_i \rightarrow I(h_i, a_i)$ causal links. The influence of health on income may suffice to generate inequalities in $E[h|I(h_i, a_i)]$. Relying only on the concentration curve for $E[h|I(h_i, a_i)]$, Wagstaff and van Doorslaer's (2004) rejoinder to Smith (1999) seems therefore inconclusive.

opportunity for health only if individuals could be held responsible for their health endowment e_p , a very questionable idea, as explained in Section 5.

Notice that one can also in principle draw the Lorenz curve for the vector $(h_1^{\bar{u}}, \dots, h_n^{\bar{u}})$ of health levels that people would have with reference preferences. In the case when $h_i^{\bar{u}}$ is not very different from $E[h|C_i]$, there is a convergence between the Van de gaer approach and the conditional equality approach.

In what sense exactly can a higher concentration curve be the sign of a better situation? Let $S < S'$ mean that socioeconomic class S is lower than S' and, for a function $U(x_1, x_2)$, let $U_1 = \partial U / \partial x_1$, $U_{11} = \partial^2 U / \partial x_1^2$, etc. A rather straightforward adaptation of the basic dominance theorem says that, if the distribution of the population among socioeconomic classes remains the same, a higher generalized concentration curve is equivalent to a greater social welfare for all SWFs of the kind:

$$W_{HS} = \sum_{i=1}^n U(E[h|S_i], S_i),$$

with U a function such that $U_1 \geq 0$, $U_{11} < 0$, and $U_1(h, S) > U_1(h', S')$ for all h, h' and $S < S'$. The latter property is quite problematic. It means that it is always good to reduce health in higher classes in order to increase it in lower classes (keeping average health constant over the whole population). Imagine for instance two contiguous classes $S < S'$ such that $E[h|S] > E[h|S']$ by a great margin.³⁶ Then, it is an improvement, according to the concentration curve, to increase the health inequality between these two groups. This may happen even when the concentration curve is everywhere below the diagonal. This property ($U_1(h, S) > U_1(h', S')$ for all h, h' and $S < S'$) is so extreme that it is not even possible, for a function U that is continuously differentiable and strictly concave in h , to satisfy it when S is a continuous variable like income. This seems a quite implausible approach to social welfare.³⁷

There is, however, another possible interpretation of the concentration curve. As explained in Kakwani (1980), the concentration curve can be used in the decomposition of the Lorenz curve into factors. Suppose that social welfare is based on the measurement of individual well-being by a linear function

$$W_{CHS} = \sum_{i=1}^n U(E[\alpha c + \beta h|S_i])$$

and suppose that $E[\alpha c + \beta h|S_i]$ is increasing in S_i . Then the Lorenz curve for $E[\alpha c + \beta h|S_i]$ (which is also the pseudo-Lorenz curve for $\alpha c_i + \beta h_i$) can be decomposed into two concentration curves, one for $E[c|S_i]$ and one for $E[h|S_i]$. Provided that the ranking in S_i corresponds to the ranking in $E[\alpha c + \beta h|S_i]$,

36. For instance, S is the group of lower-rank clerks and S' is the group of better paid miners.

37. A similar observation is made in Bleichrodt and van Doorslaer (2005).

then an increase in the concentration curve for $E[h|S_i]$ guarantees an increase in the Lorenz curve for $E[\alpha c + \beta h|S_i]$, and therefore an increase in social welfare according to W_{CHS} . This is probably the most plausible interpretation of the health concentration curve which can be conceived. Interestingly, however, it firmly pushes us in the direction of considering health as part of social welfare, among other dimensions of consumption, and not in isolation.

9 Is there a Separate Health Sphere?

There is indeed a big conceptual shift, from the pseudo-Lorenz curve to the concentration curve. As shown above, the pseudo-Lorenz curve can be (loosely) related to the idea of equal opportunity for health and is totally indifferent to inequalities in income and the sign of the correlation between income and health. The concentration curve is also indifferent to the level of inequalities in income, but is sensitive to the sign of the correlation. Such sensitivity makes sense only if one abandons the narrow purpose of evaluating the distribution of health separately from other goods and enlarges the perspective over the social situation. As shown above, the concentration curve can be (loosely) related to the idea of equal opportunity for welfare. Its focus on the sign of the correlation can be understood only in terms of inequalities in a broader set of goods than health.

This raises an important question. Is it legitimate to study health inequalities, and more generally equity principles, as if health was a separate sphere? It seems that the answer combines a yes and a no, at two different levels. There is a big no against the idea that the sphere of health can be analyzed in total independence of general social welfare. Suppose we have a good criterion for the general evaluation of social situations, and also a good criterion for the evaluation of the health situation. If the two criteria are in conflict, that is, if some improvement in the health sphere (according to one criterion) may worsen the general social situation (according to the other), then it is the health criterion that must be abandoned. Social welfare is more important than health, because it encompasses it. In other words, a criterion for the health sphere is acceptable only if it is consistent with a good criterion of social welfare. This implies that a separate analysis of equity in health that does not check such consistency is dubious.

On the other hand, there is also a yes, if the question is only about the desirability of criteria about health. If the general criterion of social welfare could be split into subcriteria for various spheres, that would make its implementation easier. But this is, obviously, a minor point compared to the previous one.

The need to encompass health evaluation in general welfare evaluations is made more pressing when one thinks of the financing part of the health system. It is quite telling, for instance, that in a chapter entitled "Equal opportunity for health", Roemer (1998) defines individual well-being in terms of a money utility, which subtracts the health insurance premium from the utility of health. The

opportunities he attempts to equalize are defined with respect to this measure of well-being, not with respect to health only. The health system affects the distribution of income in two important ways. It directly changes it with the tax and contribution system, and it indirectly affects it via the influence of health on productivity and earnings. Broome (2002) strongly argues in favor of the incorporation of health in the whole set of goods, in ethical analysis.³⁸

At this point one may be afraid that defining a general criterion of social welfare is such a daunting task that these strong pronouncements lead nowhere. But such pessimism is misplaced. The next sections rely on the simple framework introduced in Section 2 in order to examine various plausible approaches. That is, the social situation is described by a vector $((c_1, h_1), \dots, (c_n, h_n))$, and the problem is to define a social welfare function, or at least a possibly partial ranking over such vectors. Recall that c_i is not income, but non-medical consumption (or income net of all transfers and of out-of-pocket payments). Certainly, this bivariate framework is too simple to take account of all that matters in the definition of social welfare in a comprehensive sense. Individual well-being is also quite relevantly affected by leisure, security, basic freedoms, social relations, public goods, etc. But in this field the big difficulty is to go from one dimension to several, and at least for the second approach studied below the difference between two and more is not essential.

10 Social Welfare I

The most standard approach is to adopt an additively separable SWF

$$W((c_1, h_1), \dots, (c_n, h_n)) = \sum_{i=1}^n U_i(c_i, h_i),$$

where U_i may incorporate any relevant characteristics about i and about the social preferences of the ethical observer (such as inequality aversion). The well-known difficulty with this approach is to pin down some precise choice of functions U_i .

One method is to impose or assume that all U_i are the same U , and to look for a partial ranking of vectors, ensuring unanimity over a relevant family of functions U . This is the dominance approach extended to bi-dimensional inequalities. Atkinson and Bourguignon (1982) have initiated this extension and they focused on two families of functions, defined by conditions on the partial derivatives of U :³⁹

38. See also Sen (2002). Bleichrodt and Quiggin (1999) examine under what conditions on individual preferences the health-utility (or QALY) analysis is compatible with the respect of such preferences.

39. Notation: $U_1 = \partial U / \partial c$, $U_{12} = \partial^2 U / \partial c \partial h$, etc.

$$\mathbf{AB1} \quad U_1, U_2 \geq 0, U_{12} \leq 0.$$

$$\mathbf{AB2} \quad U_1, U_2 \geq 0, U_{11}, U_{22}, U_{12} \leq 0, U_{121}, U_{212} \geq 0, U_{1122} \leq 0.$$

The condition $U_{12} \leq 0$ means that a negative correlation between c and h is better than a positive correlation (in a less extreme way than the condition related to the concentration curve). It may be related to a variant of Sen's Weak Equity axiom (Sen 1973). This axiom says that if $U(c, h_i) \leq U(c, h_j)$ for all c , then the optimal distribution of a fixed $X = c_i + c_j$ is such that $c_i \geq c_j$. In other words, a disadvantaged individual should ideally receive more resources. When $U_2 \geq 0$, $U(c, h_i) \leq U(c, h_j)$ for all c if and only if $h_i \leq h_j$, implying, under $U_{12} \leq 0$, that $U_1(c, h_i) \geq U_1(c, h_j)$ for all c , and this in turn implies that the Weak Equity Axiom is satisfied at the optimal distribution of c . It must be emphasized that this axiom does not guarantee anything about the appropriate degree of compensation. The condition $U_{12} \leq 0$ is compatible with too low or too high a compensation.⁴⁰

The higher order conditions are slightly more difficult to interpret. The condition $U_{121}, U_{212} \geq 0$ means that the priority (measured by the difference in marginal utility U_1) of a sick person, for redistribution of c , decreases with c and with h . The condition $U_{1122} \leq 0$ means that this decrease with c is slower for healthier people (or equivalently, the decrease with h is slower for richer people).⁴¹

Atkinson and Bourguignon provide dominance criteria for these two families. But the criterion for the first corresponds to first-degree stochastic dominance and therefore yields a very partial ordering of distributions. And the second family looks a little restrictive. In particular, the last condition $U_{1122} \leq 0$ is not very compelling. Recently, Muller and Trannoy (2003) have focused on the following more intuitive family, that is in between AB1 and AB2:

$$\mathbf{MT} \quad U_1, U_2 \geq 0, U_{11}, U_{22}, U_{12} \leq 0, U_{121} \geq 0.$$

The dominance criterion they provide for this family is quite interesting. It consists in two conditions. The first is simply the dominance in terms of generalized Lorenz curve for h . The second condition, according to Muller and Trannoy, does not have such a simple graphical representation, and requires that⁴²

$$\sum_{i \in N(c, h)} (c - c_i)$$

40. This can be remedied by introducing a more restrictive set of conditions. This has been done in Fleurbaey *et al.* (2003) for the case of discrete values of needs, but remains to be done for the continuous case.

41. See Eeckhoudt, Rey and Schlesinger (2005) for alternative interpretations involving risk-taking.

42. As is usual for second-degree stochastic dominance, this condition has a simple interpretation in terms of income poverty gap. See Foster and Shorrocks (1988). It can actually be graphically represented in a 3D figure.

does not increase for any c, h , where

$$N(c, h) = \{i | (c_i, h_i) \leq (c, h)\}.$$

This second condition,⁴³ in particular, implies dominance in terms of generalized Lorenz curve for c as well.⁴⁴ These results enrich the set of statistical tools that may be used in empirical analysis and the dominance conditions can be readily tried on existing data (except for the fact that c_i is theoretically not income, but this complication can be ignored in a first step).

It remains, however, to assess the exact ethical content of such notions, and this approach may be interpreted in several ways. The most plausible is to consider that $\sum_i U(c_i, h_i)$ measures social welfare for an ethical observer who has some objective measure of well-being U . This measure may loosely rely on people's preferences, but it certainly cannot represent individuals' diverse preferences. The focus on dominance may then be understood as a way of coping with the difficulty for the ethical observer to have a more precise ethical view than that encapsulated in the properties which characterize the family of functions U considered. The fact that wide families of functions are considered means in particular that one does not restrict attention to functions U which are close to the preferences of the population. This raises again the question of the role of individual preferences in the analysis of health distributions.

11 Should Individual Preferences Matter?

Individual preferences over (c, h) vectors (or the Pareto principle) have been repeatedly invoked above, in Sections 3, 4 and 10. Their relevance is, however, controversial, as it has been noted at the end of section 4. Culyer (1989) argues

43. The above description of the condition is the translation for the discrete case of the general condition stated by Muller and Trannoy:

$$\Delta H(c; h) \leq 0 \text{ for all } c, h$$

where

$$H(c; h) = \int_0^c F(x, h) dx,$$

$F(c, h)$ being the cumulative distribution function of (c, h) .

44. There is a symmetric set of conditions for the family of utility functions satisfying

$$\mathbf{MT}^* \quad U_1, U_2 \geq 0, U_{11}, U_{22}, U_{12} \leq 0, I_{212} \geq 0.$$

This is also an interesting set of functions. See Trannoy (2004) for a discussion of the two families MT and MT*.

in favor of an “extra-welfarist” approach, while Culyer and Wagstaff (1993) and Wagstaff and van Doorslaer (2000) reject the Pareto principle on the ground that policy-makers commonly ignore it.⁴⁵ On the other hand, Mooney *et al.* (1991), Mooney (1994) firmly use the authority of the Pareto principle in order to favor “access” against “utilization” in the measure of health care equity.

There are obviously many arguments against relying on individual ordinary preferences. In particular, popular opinions about justice and equity, personal levels of benevolence and malevolence toward fellow citizens, cannot directly edict the equity principles for the allocation of resources and for public policy. Therefore the non-personal part of individual preferences can safely be ignored in the definition of equity, although obviously the prevailing values of a given culture do have an impact on the ethical judgements performed by experts within this culture. But this influence operates at a different level. Roughly speaking, your income or access to health care should not depend on your neighbor’s degree of altruism or jealousy, but it may depend on the equity principles adopted after due deliberation by the relevant democratic authorities of your society. As a consequence, relying on Pareto improvements linked to “caring” externalities in order to design public policy⁴⁶ is quite questionable.

Even self-centered preferences may not be reliable. Deliberation and pondering are needed before anyone makes a valuable judgement about how to trade-off comfort against curing, risk of relapse against risk of surgical failure, and more broadly health against other goods.

But even if one rejects the relevance of caring externalities for health care design, of willingness-to-pay for health care delivery or of immediate preferences for evaluation of personal situations, one is not compelled to completely abandon the principle that for any decision affecting how various kinds of life plans may be pursued, a certain kind of preferences over life plans held by the concerned individuals should be the ultimate guide. To say otherwise means that there is some fixed truth about what the good life is, a truth that applies to everybody and that public authorities can legitimately impose upon the population by whatever means appropriate. In particular, it is hard to see how the trade-off between health and other consumptions can be decided without relying on a particular conception of the good life, a conception that may vary from individual to individual. An individual whose plans involve a lot of physical performance is in greater need of a healthy body, someone who wants to exert authority over others is in greater need of a healthy mind, whereas someone who wants to have a Nobel prize in physics may very well operate from a wheel-chair. Ultimately, the share of health expenses in GDP should depend on the importance of health as against other goods in the population preferences.

45. In addition, Wagstaff and van Doorslaer (2000) seem to equate Paretianism and libertarianism, which is totally unwarranted, as it has been explained in Section 4. See also Rice (1997).

46. Some literature on caring externalities in health provision is reviewed in Culyer (1989).

12 Social Welfare II

This section introduces a second approach to social welfare, which derives a particular measure of individual well-being from individual preferences and equity conditions. It is based on Fleurbaey (2005b).

The main equity condition is about inequality reduction. In the theory of inequality measurement, one possible rendering of the Pigou-Dalton principle of transfer is that a transfer of a fixed amount of income from an individual to another which reduces the gap without reversing their ranking improves social welfare. In the bi-dimensional context, it would be questionable to apply this principle directly, since inequalities in health also matter, so that it may not be desirable to transfer from rich to poor if the rich is sick and the poor is healthy. One may therefore restrict the application of the Pigou-Dalton principle to cases when the two individuals involved have the same fixed health, and moreover have the same preferences unless they are perfectly healthy (in which case preferences over sickness do not matter).

Secondly, if one wants to respect individual preferences over (c_i, h_i) , it is natural to require the social ranking to satisfy the (so-called weak) Pareto principle, which says that any situation unanimously preferred to another is indeed strictly better.

A third condition that seems to be justified in this context is a condition of independence of irrelevant alternatives saying that the ranking of two situations should be invariant to changes of individual indifference curves other than those considered in these two situations. This condition is quite natural, since it is satisfied for instance by all criteria of cost-benefit analysis which rely on expenditure functions. It is also satisfied by all standard solutions in the theory of fair allocation.

Under these three requirements, the social ordering must be of the maximin kind and a precise utility function is singled out.⁴⁷ Namely, a situation must be judged strictly better whenever

$$\min_i U_i^*(c_i, h_i)$$

is greater, where $U_i^*(c_i, h_i)$ is defined as the quantity which satisfies the property

$$u_i(c_i, h_i) = u_i(U_i^*(c_i, h_i), 1),$$

where u_i is any utility function representing i 's preferences. In other words, $U_i^*(c_i, h_i)$ is the level of c which, combined with perfect health, would be equivalent to (c_i, h_i) for i . It may be called the “*healthy-equivalent consumption*”. Notice that U_i^* , as a function of (c_i, h_i) , also represents i 's preferences.

One may interpret $c_i - U_i^*(c_i, h_i)$ as i 's willingness-to-pay for a perfect health, if income remained constant. The full willingness-to-pay, indeed, involves the additional income that a better health makes i able to earn. The role of willingness

47. See Theorem 1 in Fleurbaey (2005b).

to pay in this approach is quite different from that in cost-benefit analysis. In the latter, one adds up (possibly with weights) the individual amounts of willingness-to-pay. Here, the object of aggregation (actually, maximin) is not the willingness-to-pay, but current consumption c_i minus the willingness-to-pay:

$$U_i^*(c_i, h_i) = c_i - (c_i - U_i^*(c_i, h_i)).$$

In other words, a change from a social situation to another is not evaluated by how much individuals would pay for *this change*, but by how it affects individual situations obtained *after paying* for a perfect health. Notice that this notion depends only on individual ordinal preferences and is therefore as observable as any willingness-to-pay. Even though current statistics do not yet provide direct information about the distribution of healthy-equivalent consumption, there is no conceptual barrier to the production of such data.⁴⁸

There is also a direct connection between this concept and equivalence scales. An equivalence scale, in multiplicative form, could be computed by the formula

$$u_i(c_i, h_i) = u_i\left(\frac{c_i}{\alpha_i(c_i, h_i)}, 1\right),$$

where u_i is any utility function representing i 's preferences and $\alpha_i(c_i, h_i)$ is the equivalence scale factor. This immediately yields

$$U_i^*(c_i, h_i) = \frac{c_i}{\alpha_i(c_i, h_i)}.$$

One may take issue, however, with one particular approach to measuring equivalence scales. It relies on observing the composition of household demand for ordinary commodities and on trying to find similar patterns (like the percentage of food in total expenses) in households with different characteristics and income.⁴⁹ There is no reason in general why this method should produce the correct estimation. In order to see this, imagine a case in which preferences over ordinary commodities are not affected by health. Then, according to this empirical method, one should conclude that the equivalence scale is invariably equal to one, but this is an obviously wrong conclusion.⁵⁰ There is no logical connection between how health

48. There is a growing literature on measuring average willingness-to-pay for a QALY (see e.g. Gyrd-Hansen, 2003).

49. An application of the concept of equivalence scales to disability has been made by Jones and O'Donnell (1995), and they rely on this method (focusing on the share of fuel and transport, and other necessities, in expenditures).

50. For a more detailed discussion, see Fleurbaey and Hammond (2004). Jones and O'Donnell (1995) suggest that "if it is accepted that the direct effect of disability is to reduce welfare, then equivalence scales derived from observed demands will give a lower bound for the costs of disability" (p. 276). It remains conceptually unclear what part of the cost of disability is really recorded by this way of measuring equivalence scales. Suppose that a particular disability has no direct effect on utility (it is not unpleasant) but simply requires consuming ten percent more of everything for the same production of ordinary functionings. Since it does not affect the composition of demand, the demand approach would measure a zero cost of the disability, which would be mistaken even in absence of

causally influences preferences over commodities and how it directly affects utility. Alternative methods commonly used for the estimation of willingness-to-pay (such as contingent valuation) would be much more appropriate.

The above SWF is an example of the egalitarian-equivalent solution, applied to i 's preferences over (c_i, h_i) rather than to the level of h_i . Define

$$A_\lambda = \left\{ (c, h) \mid c \leq I(h, \tilde{a}) + \lambda - I(1, \tilde{a}) \right\}.$$

This is a health-consumption budget set such that the maximal net consumption c is λ , obtained for $h = 1$.⁵¹ When preferences are monotonic in health, individual i is indifferent between (c_i, h_i) and the best bundle he would choose in $A_{U_i^*(c_i, h_i)}$. Note that this solution relies on individual preferences but does not need any additional information about subjective satisfaction, such as cardinal utility or interpersonal comparable utility. The “utility function” U_i^* is only an index of indifference curves, measured in the same units as c_i .

There is another, simpler way to give U_i^* a special role. Suppose that for the simple one-dimensional case of a healthy population which only has economic inequalities, one has a well-defined SWF

$$W((c_1, 1), \dots, (c_n, 1)) = \sum_{i=1}^n U(c_i).$$

Again, it makes sense to disregard preferences about sickness when everybody is healthy. Add to this the requirement that, for the general case when health may vary, a situation is deemed equivalent to another when every individual is indifferent between the two. This is known as the Pareto-indifference condition, and it is again a natural condition when one wants to respect people's preferences. Now, there is only one SWF which satisfies this condition and coincides with the above for vectors $((c_1, 1), \dots, (c_n, 1))$, namely:

$$W((c_1, h_1), \dots, (c_n, h_n)) = \sum_{i=1}^n U(U_i^*(c_i, h_i)).$$

This suggests that, if one is afraid of the extreme egalitarianism implied by the maximin criterion, one may draw Lorenz curves for vectors $(U_1^*(c_1, h_1), \dots, U_n^*(c_n, h_n))$. Interestingly, if the function can be written in a linear form

$$U_i^*(c_i, h_i) = c_i - \alpha(1 - h_i),$$

direct effect on utility.

51. This is the opportunity set that an individual with reference talent \tilde{a} would enjoy under a pure NHS system and with a lump-sum transfer $\lambda - I(1, \tilde{a})$ which makes his full-health net consumption equal λ .

then the Lorenz curve for $U_i^*(c_i, h_i)$ can be decomposed into a concentration curve for c_i and a concentration curve for illness $(1-h_i)$.⁵² The latter is another common tool in the empirical health literature (except that individuals, here, have to be ranked according to $U_i^*(c_i, h_i)$, not according to their income or socioeconomic status).

13 Social Welfare, an Overview

Sections 10 and 12 have only presented two examples of possible approaches, and there are many others. Let us for instance examine how the conditional equality solution can be adapted from the health dimension for which it has been defined in Section 6 to a broader notion of well-being. There are several possible versions of it, one of them relies on the “market-equivalent” budget sets $A_{\lambda_i}^M$ defined by⁵³

$$u_i(c_i, h_i) = u_i(A_{\lambda_i}^M)$$

$$A_{\lambda_i}^M = \{(c, h) \mid \exists m \geq 0, c \leq I(h, a_i) - m + \lambda_i, h = H(e_i, m, c)\},$$

and computes social welfare as

$$\min_i \tilde{u}(A_{\lambda_i}^M).$$

The reason for the introduction of the hypothetical budget sets $A_{\lambda_i}^M$, instead of individual actual budget sets, is that this makes it possible to satisfy the Pareto principle. A higher $A_{\lambda_i}^M$ means a higher satisfaction for i . Therefore $\tilde{u}(A_{\lambda_i}^M)$ is ordinarily equivalent to $u_i(c_i, h_i)$. In addition, this criterion is such that when all agents have the same e_i, a_i , the *laissez-faire* is the best policy. This would not be the case with $\tilde{u}(A_i)$, where A_i is i 's actual budget set.

Interestingly, the egalitarian-equivalent criterion of the previous section is formally similar to the conditional equality criterion, which is a rather exceptional case. The healthy-equivalent criterion may indeed, equivalently, be defined in terms of

$$\min_i \tilde{u}(A_{\lambda_i}^{NHS}),$$

52. In practice, concentration curves for illness often rely on different morbidity data than concentration curves for health, but $1-h_i$ is the correct measure of illness in our model. Another possibility is to write $U_i^*(c_i, h_i) = c_i + \alpha h_i - \alpha$, which can lead to a decomposition of the Lorenz curve involving the concentration curve for health, once again.

53. Let $u_i(X) = \max_{x \in X} u_i(x)$, *i.e.* this is the indirect utility of the set X .

for “national-health-service-equivalent” sets which are defined as

$$A_{\lambda_i}^{NHS} = \{(c, h) \mid c \leq I(h, a_i) + \lambda_i - I(1, a_i)\}.$$

These expressive labels are meant to provide intuition about these equivalent budget sets and do not give any clue about the health policies which are ultimately favored by such criteria.

More generally, the various possibilities in the definition of social welfare criteria may be related to answers to a small set of basic ethical questions which may be listed as follows.

First question: *What should individuals be responsible for?* As argued above, even when one is very reluctant about the concept of opportunity and the unforgiving policies it may justify, it is impossible not to admit the need for a sphere of freedom and choice in people’s lives. Moreover, all approaches make social welfare invariant to some dimensions of individual well-being, which automatically implies that individuals are left to their own means regarding such dimensions. The criteria described in the previous sections have in common that they ignore individual utility functions (as distinct from ordinal preferences), and the dominance criterion of Section 10 even ignores preferences completely.

It is quite appealing to ignore cardinal or comparable information about satisfaction, since this is very hard to define, observe and measure. In addition it is arguable that the level of satisfaction, which depends in particular on the comparison between personal goals in life and achievements, should be treated as a private matter, in particular because personal goals are generally incommensurable (Rawls 1971, 1982, Dworkin 2000). On the other hand, there exist surveys about happiness in which individuals give information about their “level” of happiness.⁵⁴ Assuming that this information is comparable across individuals is daring, but considering that it is totally non-comparable would be excessive. In view of the highly socialized processes by which ambitions and satisfaction are formed, it is not unreasonable to say that raising the level of happiness should be part of the goals of public policy. There is a deep ethical divide here.

The question of ordinal non-comparable preferences (as distinct from utility functions, satisfaction level or happiness) is slightly different. Ignoring preferences in a radical way, as in the dominance criteria, may lead to violations of Pareto principles. Personal responsibility for preferences seems compatible with individuals being given sets of options and being left free to choose.⁵⁵

Second question: *What kind of reward for variables of responsibility?* As explained in Section 6, the two main kinds of reward are the natural reward, based on the idea of neutrality, and the utilitarian reward, based on the idea of zero inequality aversion. When responsibility variables are simply ignored in the social welfare criterion (such as, for instance, utility functions in the above dominance and egalitarian-equivalent criteria), this corresponds to the natural reward. Roughly, the choice

54. Surveys on this have been written by Oswald (1997) and Frey and Stutzer (2002).

55. An egalitarian-equivalent criterion, like that of the previous section, refers to such sets in a special way (A_λ), since individuals do not actually choose in these sets but their hypothetical choices only are considered. The corresponding degree of responsibility depends on how much the choice from such sets may depend on preferences. One sees that in the case of U_i^* , the choice is the same in A_λ for all preferences, so that one may consider that this particular criterion contains very little responsibility for personal preferences.

of natural reward leads to adopting conditional equality or egalitarian-equivalent criteria, whereas the choice of utilitarian reward leads to relying on the Van de gaer or Roemer SWFs.

This is again a deep ethical divide, which is not unrelated to the above one, and may be summarized as follows. When individuals are responsible for their differences, is the *laissez-faire* the best policy or should public policy seek to maximize their total outcome? Natural reward is related to the neutrality ideal of liberal approaches, and is therefore obviously more attuned to the prevailing ideology in Western countries, whereas the utilitarian reward is connected to the leading utilitarian tradition of welfare economics.

Third question: *What degree of compensation for non-responsibility variables?* The conditional equality, egalitarian-equivalent, Van de gaer and Roemer social welfare criteria all involve the maximin criterion and therefore give absolute priority to those who have the worst-off circumstances. In contrast, the dominance criteria allow for any arbitrarily positive degree of inequality aversion. The ethical questions related to the choice of a degree of inequality aversion are well known in welfare economics⁵⁶ and need not be developed here.

14 Justifying Ability-to-Pay

Once a criterion of social welfare is adopted, it may be used to assess in the same breath the organization of health provision and the financing of the health system. Unsurprisingly, all reasonable criteria advocate giving priority to the sick and poor. The justification for the ability-to-pay principle is then automatic. It is just part of the general scheme of redistributive income taxation. Financing the public health insurance system by a poll tax, for instance, would not contribute to improving the distribution of (c, h) in any sensible way since it would add a regressive component to the tax system.

In the simple model used in this paper, it is actually more difficult to justify that the financial help to the sick consists in reimbursements of medical expenses, or in-kind provision, instead of cash allowances. In other words, the difficulty of ethical justification is reversed. In the standard ethical approach to health, it is easy to justify subsidizing health care since the goal is to promote health, and it is harder to justify the ability-to-pay principle for the financing side. In the social welfare approach, ability-to-pay is obvious but it is less clear why individuals should not be free to allocate their wealth as they wish. For any given amount of reimbursement, the patient would be better-off receiving this money before treatment and having the choice to reduce the treatment in order to save part of the expense.

This is a very well-known conundrum since Arrow (1963) and the answer is to be sought, probably, not in equity principles but in incentive problems in insurance.⁵⁷ The role of doctors is not only to cure the sick but also to check that they are really sick. It is more efficient to perform the two tasks simultaneously rather than

56. For an application to health economics, see Wagstaff (1991).

57. See e.g. Ching-to and McGuire (1997).

sequentially. In addition, the absence of initial cash payments drastically reduces the risk of manipulation and bribing. Of course, health externalities and individual myopia also provide reasons for subsidizing health care.

15 Conclusion

Applications of the most recent among the social welfare criteria listed above are still scarce,⁵⁸ but they open new possibilities for the evaluation of health policies. The traditional approach in public economics⁵⁹ relies on a separately additive social welfare function $\sum_i u(\cdot)$ and assumes that all individuals have the same preferences, represented by u . The conclusions about optimal policy which are obtained in this vein depend on the shape of u , and in a sense the results which are sought are “dominance” results, namely, results which are robust to the specification of u . Usually, such results are limited and this is not surprising. Moreover, the failure to take account of the diversity of individual preferences is a serious drawback.

The two approaches described in the “Social welfare I” and “II” sections above take another tack at the difficulty of making precise recommendations. The dominance approach cannot easily be used for the identification of optimal policies, but it is useful, especially in applied studies, for the evaluation of reforms or the comparison of different places or times. The partial criteria it proposes are too restrictive, since they take care of SWFs $\sum_i U(\cdot)$ which are unacceptable either because they have too little inequality aversion, too little or too much compensation, or because the function U departs too much from the preferences of the concerned population. But, if, as is plausible, the family of utility functions underlying the dominance criterion contains at least some reasonable SWFs, then observing that a distribution dominates another is certainly a strong argument in its favor.

The egalitarian-equivalent approach is attractive in a different way. It proposes a precise measurement of individual well-being, which substantially reduces the range of possible conclusions of normative analysis. In addition, it respects the diversity of individual preferences and, contrary to the dominance approach which ignores individual preferences, it is Paretian with respect to self-centered preferences. It also shows that ordinal non-comparable preferences may be sufficient input for the construction of sensible and even equitable social criteria.⁶⁰

58. Roemer (1998) applies the Roemer SWF to the design of a special tax on smokers, depending on years of smoking. Fleurbaey (2005b) applies the egalitarian-equivalent criterion to the evaluation of health policies in which social security contributions are proportional to income and reimbursements are proportional to medical expenses.

59. See e.g. Blomqvist and Horn (1984), Besley (1988), Blomqvist (1997), Chernen *et al.* (2000), Henriet and Rochet (2004).

60. This revises an old controversy of welfare economics. Bergson (1938, 1966) and Samuelson (1947, 1977) have claimed that ordinal non-comparable preferences were a sufficient basis for the construction of a SWF. Arrow (1951), Kemp and Ng (1976) and Sen (1986) have argued otherwise. Bergson and Samuelson are generally considered to have been on the losing side of the controversy. The recent developments suggest that they were actually right (see Fleurbaey and Mongin, 2004).

The economic literature on health provision has generally focused on the insurance dimension of the health system. This feature has been largely ignored here, although the discussion of option luck would be relevant to it. The problem with emphasizing the insurance part of the health system is that it cannot cover the whole system. Some characteristics of individual health situations are certain and unequal, and no insurance in the ordinary sense can do anything about it. Yet, there is a priori no reason to treat the congenitally impaired differently from the accidentally impaired. Now, it is tempting to think of the insurance model as a useful benchmark for thinking about all kinds of compensatory transfers. As in Dworkin (2000), one may think of reproducing, via public transfers, the hypothetical allocation that would be produced by a perfect insurance market that would operate behind a "veil of ignorance", that is, in absence of knowledge of all innate talents and handicaps. It is easy to see, however, that if agents maximize their expected utility on such a market, the resulting transfers will simply reproduce a utilitarian kind of allocation in which individuals with a low marginal utility of income are deprived of resources at the benefit of individuals with a high marginal utility.⁶¹ If a low health endowment may be the cause of a lower marginal utility, the insurance market seems a poor reference for the design of the health system. It seems therefore rather sensible, for broad analyses of the health system, to evaluate social situations *ex post*, even though this may entail some paternalism about risk prevention.

There are other topics which have been ignored in this paper. Egalitarian principles about health equity have been the focus of the discussion, but there are also utilitarian kinds of principles about health, such as maximizing total QALYs or minimizing total DALYs, an objective recently promoted by the WHO in its evaluation of the cost-effectiveness of health care.⁶² Such objectives simply add up years of life, adjusting for the quality of life in various health conditions but disregarding the distribution of years across individuals. There have been controversies about this purely additive approach, and several authors have argued against it and in favor of an inequality averse criterion.⁶³ Interestingly, the question of inequality aversion is not independent of the choice of a method of measurement of health, another topic which has been ignored here. If a healthy year has the value 1, what is the value v of a year with paraplegia? In the QALY or DALY approach, this value v cannot be high, because this would imply that the gain of curing paraplegia is low; but it cannot be low either, because this would imply that the value of extending the life of a paraplegic is much lower than extending the life of a healthy person. Introducing inequality aversion partly solves this moral dilemma, since extending the life of a paraplegic may add little to his life but this is compensated by the fact that he is given priority, as a badly-off person.⁶⁴

61. This is the essence of the Vickrey-Harsanyi impartial observer argument. For a recent development of the controversy about hypothetical insurance, see Roemer (2002), Fleurbaey (2002). See also Kolm (1998). This issue is discussed in the context of health insurance by Zweifel and Breyer (1997).

62. Murray (1996), Murray *et al.* (1999, 2002). For an alternative approach, see Torrance *et al.* (1995).

63. See Wagstaff (1991), Anand and Hanson (1997), Sen and Foster (1997), Fleurbaey (1999). See also Broome (1993). A related issue is that of "fair innings", namely the controversial idea that younger patients have a greater priority so that they can have their fair amount of life (or more generally that those with lower quality or quantity of life have greater priority). See e.g. Williams (1997), Rivlin (2000), and in particular Bleichrodt (1997), Bleichrodt *et al.* (2004).

64. For further discussion of this problem, see Sen and Foster (1997), Fleurbaey (1999), Broome (2002).

The analysis has focused here on a consequentialist approach, although procedures are also commonly deemed ethically relevant independently of their distributional consequences. It is however possible to incorporate a concern for how individuals are treated by procedures in the definition of their well-being. It also appears that many deontological issues have to do with practices at the micro level rather than with general issues of social situations and public policies. Nonetheless, such observations do not close the topic and a thorough examination of non-consequentialist considerations in relation to the above kind of social welfare analysis would certainly be worthwhile.

Finally, the issue of population size has been ignored also, in spite of the glaring fact that health policies have primarily an impact on the size of the population (as is measured by QALYs statistics, for instance). In welfare economics there is an important literature on this topic, but it has so far taken its inspiration from classical utilitarian SWFs,⁶⁵ and the theory of fairness, which has inspired the egalitarian-equivalent and conditional equality criteria presented above, has not yet addressed this issue. Whether it will provide new perspectives on this difficult issue remains to be seen.

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65. For recent and magistral contributions to this topic, see Blackorby *et al.* (2005) and Broome (2004).

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