Chapter 34

EQUITY IN HEALTH CARE FINANCE AND DELIVERY*

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Contents

Abstract

The paper surveys the economics literature on equity in health care financing and delivery. The focus is, for the most part, on empirical work, especially that involving international and temporal comparisons. There is, however, some discussion of the concept and definition of equity. The empirical sections cover the literature on equity in health care financing (progressivity and horizontal equity of health care financing arrangements), equity in health care delivery (horizontal equity in the sense of treating persons in equal need similarly), and equality of health.

Keywords

1. Introduction

Equity is usually recognized by economists to be an important policy objective in the health care field. Indeed, some go so far as to suggest that amongst the population at large, equity takes precedence over other objectives, even efficiency.[1] The interest shown by economists in the equity issue seems to vary from one country to the next and over time within countries. These variations and changes no doubt reflect in part the variations and changes in the attitudes of policy-makers. The relatively low level of interest amongst economists in the US in equity issues, at least on a per capita basis, probably reflects the fact that policy-makers in the US have, on the whole, attached less importance to equity than their counterparts have in most other OECD countries. The recent growth of studies of equity in the US probably also reflects the commitment – at least in its early days – of the Clinton administration to improving equity in health care in the US. The views of policy-makers are probably only one factor that accounts for the cross-country and temporal variation in the quantity of work by economists on equity. Another is the variation in views amongst economists about the status of research on equity. There was until fairly recently, and in some countries there still is, a perception amongst many economists that research on equity must necessarily be normative in character. Many seemed to shy away from the area because of this. Fortunately, it is increasingly being recognized that while the question of what equity is all about is indeed a normative question, the questions of whether equity, defined in a specific sense, has been achieved, or has increased, or tends to be higher in one type of health care system than other, lie firmly within the realm of positive economics. This, along with the changing political climate, may well have accounted for the upswing in research on equity.[2]

Whatever the reason, there is now a good deal of interest, amongst both policy-makers and economists, in equity in health care financing and delivery, as well as a good deal of literature. This chapter provides a review of this literature. The review is not comprehensive in a number of respects. First, it excludes work by non-economists on – and only on – the grounds that this is a chapter in a *Handbook of Health Economics*. This decision inevitably results in a partial coverage of the field and we have almost certainly lost more material through this decision than we would have done had we been writing a chapter on, say, the health insurance market. Non-economists have written on almost all the areas we touch on in our review: political and medical philosophers have written extensively about the question of what equity is in the health field; medical sociologists and epidemiologists have written extensively about equity in access to and the receipt of health care, as well as about health inequalities. The "market share" of economists

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[1] See e.g. MacLachlan and Maynard (1982) and Mooney (1986).

[2] Another factor undoubtedly is the revolution in computer hardware and software over the last 15 years. This has made distributional analyses of large household surveys far easier than was hitherto the case.

varies from sector to sector within the equity "industry", as does the degree of differentiation between the products of economists and of non-economists.[3] The partial nature of our review should be kept in mind. The second respect in which our review is partial is that it is heavily oriented towards empirical work, and *comparative* empirical work to boot. We do offer a discussion of the nature of equity, but this is not a comprehensive overview of the field and is intended simply to provide something of a philosophical backdrop to the empirical material. Our focus on comparative empirical work stems from a belief that studies examining a system in isolation are less helpful for policy purposes than comparative studies, unless a study of a single system manages to unpack the factors contributing to any observed inequity, which is typically not the case. The third respect in which our review is partial is that its focus is on industrialized countries – the study by economists of equity in the health sectors of developing countries is still in its infancy, though a good deal of work is currently underway.[4] The fourth respect in which our review is partial is that we ignore completely the issue of geographical equity. This is a large literature to which economists have contributed, though often in conjunction with non-economists. Finally, we have tended to restrict our attention to published studies or forthcoming articles or books in English.[5]

We start in Section 2 with a discussion of the nature of equity. As indicated above, this is not a comprehensive overview and aims simply to provide a philosophical backdrop to the empirical material in the following sections. Our discussion is different from and complements that of Williams and Cookson (2000). Sections 3, 4 and 5 concern empirical material on equity in the financing of health care, the delivery of health care and health inequalities. Section 6 offers some conclusions.

2. What is equity?

2.1. What is equity? A first pass

On the face of it, there would appear to be a good deal of agreement as to what equity in health care entails. Of the various theories of social justice that might be brought to bear

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[3] The economists' market share is probably largest in the area of equity in health care finance, and probably smallest in the area of inequalities in health. The product differentiation is probably least in the area of equity in access to and the delivery of health care, but even here is sizeable (not least because of the different quantitative techniques used). In the area of the nature of equity, there is an appreciable degree of product differentiation, partly in analytical techniques (philosophers are prone to use the case approach whilst economists are keener on developing the general story), as there is in the area of health inequalities (economists are more likely to rank people by income, whilst non-economists prefer to rank by occupation and education).

[4] Studies in books or journal articles include those of Baker and van der Gaag (1993), Deolaalikar (1995), Hammer, Nabi and Cercone (1995), Pannarunothai and Mills (1997), and van de Walle (1995).

[5] Literature searches for the empirical material were undertaken in Econlit and BIDS (based on the Social Science Index). Not all the material unearthed in these searches was included in the survey.

on the issue of equity in health care, it has been argued by one eminent medical ethicist [Gillon (1986)] that some have a greater applicability and acceptability than others. Moreover, examining the policy statements on equity in several OECD countries suggests that policy-makers are in broad agreement over what they mean by equity [OECD (1992), Wagstaff and van Doorslaer (1993)]. Finally, in empirical work, researchers from countries with such different health care systems as Britain and the United States have adopted much the same notions of equity in their analysis.

2.1.1. Equity versus altruism

Before going into each of these areas, however, it is important to be clear that distributional objectives in health care, and in social policy generally, can arise from *two* sources: equity or social justice, on the one hand, and altruism or caring, on the other. The concepts of equity and altruism are often confused. However, they are, as Culyer (1980) and Goodin and Le Grand (1987) emphasize, quite distinct and have quite different implications for health policy.

Caring and altruism are matters of preference. In the context of health care a caring individual might be one who derives utility – i.e. an external benefit – from seeing another person receiving health care [Culyer (1980)]. In this case, the caring individual *prefers* that the person in question receives health care and is prepared to sacrifice resources to ensure that the person actually obtains treatment. Quite how much they are prepared to sacrifice will depend on how much they care (which will depend on, *inter alia*, their income) and on the cost of providing health care. Alternatively a caring individual might be one who derives utility from the *act* of providing health care for others [Mooney (1986)]. Quite how much of their income the individual will be prepared to sacrifice to provide health care for others will depend on the utility they derive from the act of providing medical care (which again will depend on their income) and on the cost of providing health care. With caring preferences of either type, therefore, "costs and benefits are balanced at the margin and ... the level of provision is ... determined by the wealth of the community" [Culyer (1980, p. 70)]. The language of caring is thus, as Culyer (1989) notes, the language of *efficiency*. Hence the term "Pareto optimal redistribution" [Hochman and Rodgers (1969)].

Social justice (or equity), on the other hand, is not a matter of preference. As Culyer (1980) puts it: "... the source of value for making judgements about equity lies outside, or is extrinsic to, preferences... The whole point of making a judgement about justice is so to frame it that it is (and can be seen to be) a judgement made independently of the interests of the individual making it" (p. 60). Social justice thus derives from a set of principles concerning what a person ought to have *as of right*. The difficulty, of course, is how to obtain views about social justice in a way that ensures that they are not contaminated by the interests of the individuals concerned. A straightforward survey, for example, whilst sometimes proposed, seems unlikely to elicit responses that pass this test. One ingenious device that has been used to ensure that principles of justice are genuinely impartial is the "veil of ignorance" [Rawls (1971)]. This puts self-interested

individuals in an "original position" where they are ignorant about the positions they will occupy in society. The rules of justice agreed upon by individuals in these circumstances are argued to be genuinely impartial. The "veil of ignorance" is not, however, the only means of arriving at a set of just rules.[6] Barry (1989) has argued that justice can more simply be construed as the set of rules that can be justified on an impartial basis.

The different motivations behind equity and caring have at least three important implications for health care policy. First, distributional decisions regarding health care provision prompted by considerations of social justice ought not to be influenced by cost: justice requires that an equitable pattern of provision be ensured, *irrespective of the sacrifice to the rest of society* [Culyer (1980, pp. 69–70)]. Second, there is scope for conflict between efficiency and equity: an efficient redistributional programme prompted by caring preferences need not be equitable, and vice versa [Culyer (1980, p. 98)]. Third, the distributional "rules" derived from the two approaches are likely to be different. Indeed, differences emerge even within the two approaches, depending on the precise stance adopted. For example, different rules emerge in the caring approach, depending on whether caring is postulated to relate to a person's absolute level of medical care consumption [Culyer (1971)], to the deviation of their consumption from the mean [Lindsay (1969)], or to health itself [Culyer (1980)].

2.1.2. Equity, social justice and ideology

The upshot of the foregoing is that, when studying equity, one would like to analyse equity objectives independently of any distributional objectives that are motivated by altruism. The philosophy literature contains, at least on the face of it, some useful pointers in this respect.

Gillon (1986) provides a helpful summary of the various theories of social justice and discusses their applicability to health care.[7] Libertarians, he notes, emphasize a respect for natural rights, focusing in particular on two of Locke's natural rights – the rights to life (i.e. not to be unjustly killed) and to possessions. Providing people acquire and transfer their "holdings" without violating others' rights, their holdings are regarded by libertarians as just. Hence Nozick's (1974) claim that taxation is warranted only to maintain a "minimal state". Utilitarians, by contrast, aim at maximizing the sum of individual utilities or welfare, though some utilitarian writers have incorporated a concern for individual autonomy into this maximand. Marxists emphasize "needs". Hence the principle of "distribution according to need". In Marxist writings, this principle is often coupled with the principle of "from each according to his ability", which, in the present context, can be interpreted as "from each according to his ability to pay". Rawls

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[6] Indeed, there is some debate about precisely what would be agreed behind such a veil and how far strategic behaviour might limit the usefulness of the approach.

[7] See also the annexe to Williams and Cookson's paper in this Volume.

(1971) proposes two principles of social justice, namely that individuals should have the maximal liberty compatible with the same degree of liberty for everyone and that deliberate inequalities are unjust unless they work to the advantage of the least well off. Yet another view of social justice is that justice should reward merit.

Which of these theories of justice appear to command the greatest support in the context of medical care? Gillon suggests that "allocation of medical resources on the basis of non-medical merits is widely regarded as repugnant" (p. 97) but argues that the principle of "distribution according to need" commands widespread support amongst physicians and others working in the medical field. He challenges the extreme libertarian position, pointing out that if Locke's right to health were to be included in the libertarian list of natural rights, writers like Nozick would be forced to accept the legitimacy of taxation to benefit the poor and sick. Gillon also notes that utilitarianism, with its emphasis on maximizing the sum of welfare, has much in common with the notion of efficiency as allocating resources according to the likelihood of medical success.

2.1.3. Equity, ideology and health care systems

The two theories of justice most frequently encountered in the philosophy literature in the context of medical care are, in fact, the libertarian and the Marxist approaches [Donabedian (1971)]. As Gillon notes, however, the principle of "distribution according to need" is not exclusively Marxist. Indeed, it is a key component of 20th century egalitarianism [cf. Sugden (1983)]. Williams (1993) compares and contrasts the libertarian and egalitarian positions.[8] He notes that in the egalitarian view, "access to health care is every citizen's right (like access to the ballot box or to courts of justice), and this ought not to be influenced by income and wealth" (p. 291). In the libertarian view, by contrast, access to health care is viewed as "part of society's reward system". As Williams puts it, "at the margin at least, people should be able to use their income and wealth to get more or better health care than their fellow citizens if they so wish".

The egalitarian and libertarian viewpoints point, as Williams (1993) notes, towards quite different health care systems. The egalitarian viewpoint suggests that a publicly financed system should predominate, with health care being distributed according to "need" and financed according to "ability to pay". The libertarian viewpoint, by contrast, points towards a mainly privately financed health care sector, with health care being rationed primarily according to willingness (and ability) to pay. Public involvement should be minimal and limited to providing a minimum standard of care for the poor. In practice, in most countries health care is financed and delivered by a mixture of systems and there are traces of both ideologies in policy-making, with the emphasis often changing with changes of government.

Broadly-speaking, however, policy-makers in Europe give the impression of being much more inclined towards the egalitarian viewpoint in health care matters than the

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[8] Cf. Culyer et al. (1981), Maynard and Williams (1984).

libertarian.[9] There appears to be less agreement amongst American policy-makers about equity objectives in the health care field. There appears to be broad agreement amongst policy-makers in several European countries that payments towards health care should be related to ability to pay rather than to use of medical facilities.[10] The commitment to linking health care payments to ability to pay is much less in evidence in the United States, though as is apparent from Davis (1993), much of the debate prior to the ill-fated Clinton reforms in the 1990s focused on the link or lack of it. The bipartisan Pepper Commission, for example, in its *Blueprint for Health Care Reform* [Rockefeller (1991)] urged that progressive taxation be used to raise new revenues to finance the Commission's proposed reforms. It is also evident that policy-makers in the European countries are committed to the notion that all citizens should have access to health care.[11] In many countries this is taken further, it being made clear that access to and receipt of health care should depend on *need*, rather than on ability to pay. The commitment to the notion of universal and equal access is less evident in countries like the United States. Despite this, it is apparent from Davis (1993) that much of the debate about reform in the US in the early 1990s was motivated by a concern about growing inequalities in access. Hence the Pepper Commission's desire to "guarantee all Americans, no matter what their income, employment status, or place of residence, access to affordable insurance protection" [Rockefeller (1991, p. 2509)]. A number of countries have also shown a concern to reduce inequalities in health status. In Britain, governments have set up two working groups to examine health inequalities in the last twenty years.[12] In the Scandinavian countries too, health inequalities have been widely discussed in policy documents, as has also been the case in the Netherlands.[13]

2.1.4. Ideology and the empirical literature on equity in health care

The empirical work to date on equity in health care reflects the apparently pro-egalitarian bias amongst policy-makers.

Many studies of equity in the delivery of health care – in both Europe and the United States – start from the premise that health care ought to be distributed according to need rather than willingness and ability to pay. Andersen (1975) (an American) suggests that an equitable distribution of health care is one in which the amount of health care received correlates highly with indicators of need and is independent of variables such as income, which are irrelevant to need. This definition is adopted by Benham and Benham (1975) in their study of equity in the delivery of health care in the US before and after

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[9] Cf. e.g. Table 2.1 in Wagstaff and van Doorslaer (1993), which reproduces quotations from policy statements in a number of OECD countries.

[10] The OECD (1992) concludes the same in its comparison of the health care systems of Belgium, France, Germany, the Netherlands, Ireland, Spain and the United Kingdom.

[11] Again, the same conclusion has been reached by the OECD (1992) in its comparative study.

[12] Cf. the groups chaired by Sir Douglas Black [Townsend and Davidson (1982)] and Sir Donald Acheson.

[13] Wetenschappelijke Raad voor het Regeringsbeleid (1987).

the introduction of Medicare and Medicaid. Rosenzweig and Schultz (1991), in their analysis of the distribution of medical care to pregnant women in the US, test various hypotheses including the hypothesis that these services are allocated solely on the basis of medical need. Le Grand (1978) (a Briton) also starts from the premise that receipt of health care should depend on need and not on socioeconomic status. In addition to these studies, a large number of studies have explored the issue of inequalities in health, many of which come from non-economists. The concern here is how far health is distributed unequally, especially across socioeconomic groups such as income groups.

Studies of equity in the finance of health care, by contrast, have tended to take as their starting point the premise that health care ought to be financed according to ability to pay.[14] An exception to this is a group of studies seeking to establish the extent of *net* income redistribution associated with a particular mode of financing health care – i.e. examining the combined redistributive effect of financing and utilization of public health care. Such studies have been undertaken in Finland, France, Germany, Italy, the Netherlands, Portugal, Switzerland and the United Kingdom.[15] It appears that these studies start from a variant of the egalitarian viewpoint, where reducing inequality in "final" incomes is regarded as the equity goal. The usefulness of these studies is somewhat unclear, as there is little evidence that equity objectives in the health field are couched in terms of *net* income redistribution.[16]

2.1.5. Some interim conclusions

On the face of it, then, there appears to be a reasonably clear picture emerging on the issue of what equity entails in the context of health care. There are the libertarians whose concern, if they have one, is with ensuring that minimum standards are achieved. And there are the egalitarians who are concerned to ensure that health care is financed according to ability to pay and that the delivery of health care is organized in such a way that everyone enjoys the same access to care and that the care is allocated on the basis of need with a view to promoting equality of health.

2.2. What is equity? A closer look

Appearances can, however, be deceptive. The conclusions reached in the last subsection, while useful, leave a number of key questions unanswered. Over the last few years, economists have helped to answer them. One set of questions relates to definitions. What

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[14] Early studies include those of Hurst (1985), who compares the American, British and Canadian financing systems, and Gottschalk et al. (1989), who compare the American, British and Dutch systems. A number of recent studies reviewed below have taken this as their starting point.

[15] For a thorough study, in English, see Leu and Frey (1985).

[16] Insofar as the poor also tend to be the sick, such redistribution is, of course, implied by a commitment to financing health care according to ability to pay. But it is not income redistribution that is the equity goal being pursued.

exactly is meant by "access" to health care? Is it different from receipt of health care? If so, how? What is meant by "need"? Another set of questions concerns the compatibility of the various interpretations of equity. For example, is equalizing access consistent with seeking to equalize health? A final set of questions concerns justification. What is the justification for financing health care according to ability to pay? Or equalizing access? Or allocating care according to need? Or equalizing health? If the last three objectives are mutually incompatible, what cases can be made for pursuing one rather than the others?

2.2.1. Sorting out definitions

When the term "access" is used in policy statements and in much of the academic litera-ture (including much of the literature written by economists) it is clear that what is often meant – indeed perhaps what is *usually* meant – is "receipt of treatment". This is well illustrated by Tobin's (1970) remarks, where, after noting Americans' apparent concern with equality of access, he suggests that equality in health care might be taken to mean that "the *treatment* of an individual depends on his medical condition and symptoms, not on his ability or willingness to pay" (emphasis added).[17] In a similar vein, although the so-called RAWP formula used to allocate resources to NHS regions[18] claims to attempt to equalize access, in practice the focus is firmly on expenditures, or – more precisely – resources [cf. Mooney and McGuire (1987)]. Finally, several American and British empirical studies of equity[19] claim to examine the extent to which access to health care is linked to need, but actually interpret access in terms of treatment received.

Le Grand (1982) and Mooney (1983, 1994) argue that *access* to treatment and *receipt* of treatment are not the same thing. The former refers to the opportunities open to peo-ple, while the latter concerns both whether these opportunities exist and if so whether people have availed themselves of them. But how can access, so conceived, best be de-fined? One possibility, suggested by Le Grand (1982) and strongly endorsed by Mooney (1983), is that access be thought of in terms of the money and time costs that people incur in obtaining health care. There is an implication of defining access in this way that some find unsatisfactory, including Le Grand (1991), namely that if two people face the same time and money costs, they are said to have the same access *irrespective of their income*. It is, indeed, far from obvious whether it makes sense to say that someone with virtually no income at all has the same access to health care as a millionaire simply because they both face the same time and money prices. An alternative approach that does not have this implication is suggested by Olson and Rodgers (1991). They sug-gest defining access as the maximum attainable level of consumption of medical care, given the individual's income, and the time and money prices associated with consum-ing medical care. In this approach whether someone has access to a service, and if so

[17] Cf. also Andersen (1975).
[18] RAWP is the abbreviation of 'Resource Allocation Working Party'.
[19] Cf. Aday et al. (1980), Collins and Klein (1980) and Puffer (1986).

how much access they have, depends not only on the time and money prices they face, but also on their income.

Another term whose meaning is far from self-evident is "need". Often it is equated with ill-health – people who are relatively ill are held to have a relatively high need for medical care. This, as several writers have suggested [cf. e.g. Culyer and Wagstaff (1993)], is over-simplistic. Someone can be said to need medical care when ill only if there is medical care available that can improve their health. Need is an inherently instrumental concept and one that ought to permit the non-ill to be said to be in need of medical care, in the sense that their health in the future could be better than it would otherwise be if they received (preventive) care now. Defining need in terms of one's current health state is thus unattractive. An alternative, suggested by Culyer (1976) and Williams (1974, 1978), is to define need in terms of one's capacity to benefit from health care. This tackles the instrumentality of need head on, but is unsatisfactory in that it measures need in terms of the entity the care will affect (health) rather than in terms of the entity that is needed (health care). A technological breakthrough, such as keyhole surgery, that leaves a person's capacity to benefit (i.e. potential health improvement) the same, but requires far fewer resources leaves need unchanged according to the capacity-to-benefit definition. Culyer and Wagstaff (1993) therefore suggest an alternative definition of need as *the minimum amount of resources required to exhaust capacity to benefit*. If capacity to benefit is, at the margin, zero, so too is need. Where marginal capacity to benefit is positive, assessment of need requires an assessment of the amount of expenditure required to reduce capacity to benefit to zero.

2.2.2. Conflicts between equity principles

Policy-makers in particular talk as if the three most frequently encountered interpretations of equity in health care delivery – equality of access, allocation according to need, and equality of health – are all compatible with one another. But are they?

Consider first the compatibility between equality of access and the other two definitions. As Mooney (1983) emphasizes, access is but one of the factors influencing receipt of medical care. Other factors include the individual's perception of the benefits associated with the treatment and the incentives facing the physician – in short, anything affecting the demand for health care as opposed to its cost. Two people may thus enjoy the same access to health care and be in the same degree of "need", and yet the treatment they receive may differ. A poorly educated person may, for example, perceive the health benefits to be lower than a well educated peer, with the result that the poorly educated person does not contact a physician whilst the well educated person does. Conversely, access may differ across individuals and yet the amount of medical care received may be the same. It follows immediately [cf. Culyer and Wagstaff (1993)] that equality of access will not necessarily result in health care being allocated according to need, or in the attainment of – or even promotion of – equality of health.

The remaining potential conflict to be considered is that between allocation according to need and equality of health. It is, in fact, often claimed by Marxists and some egalitarians that allocating medical care according to need will promote equality of health,

if not result in equality of health. Indeed, this is the principal justification offered for adoption of the principle of allocation according to need [cf. e.g. Miller (1976)]. Culyer and Wagstaff (1993) investigate the validity of this claim using the three definitions of need discussed in Section 2.2.1. They show that allocating medical care according to need will result in differing degrees of inequality in final health, depending on which of the definitions one adopts and that, in general, it will not be the case that allocating health care expenditures according to need will result in equality of health, or that such an allocation rule will even *promote* equality of health.

2.2.3. *Justifying equity principles in the delivery of health care*

Contrary to what appears to be believed in many policy-making circles, then, one cannot logically espouse simultaneously equality of access, allocation according to need, and equality of health. A choice has to be made. Given what we have just said, we can already, it would seem, dispose of one of the contenders: allocation according to need. The justification for this – that its adoption will promote equality of health – has already found to be wanting. This leaves two contenders: equality of access and equality of health.

Mooney et al. (1991, 1992) and Mooney (1994) argue strongly for the adoption of equality of access. They argue that allocating care according to need or seeking to attain equality of health would imply a willingness to override consumer preferences and hence to depart from the premises underlying Paretian welfare economics.[20] It would require, for example, that individuals' preferences concerning the consumption of medical care be ignored. Such a departure from Paretian welfare economics would, in their view, be ethically unjustified. According to Mooney et al., one should equalize access and then accept whatever distribution of utilization and health the market throws up.

Let us put on one side for a moment the question of whether equalizing access is compatible with an acceptance of the value judgements underlying Paretian welfare economics. A difficulty with the argument of Mooney et al. is that it seems to take it for granted that departing from the Paretian value judgements is ethically unacceptable – something that economists and policy-makers would find anathema. This is surprising, since there is widespread evidence that policy-makers in the health field and the public at large do *not* accept the Paretian value judgements in the context of health and medical care.[21] Thus even if it *were* the case that a concern with equalizing access to medical care is consistent with the Paretian value judgements, this would not necessarily be a point in its favour.[22]

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[20] Cf. Mooney et al. (1991, 1992).

[21] The writings of several economists reflect this viewpoint. Williams has been one of the staunchest critics of the Paretian value judgements in the health context – see e.g. Williams (1976, 1981). These ideas have also been developed by Culyer – see e.g. Culyer (1976), Williams (1981), Culyer (1989, 1990). See also Rice (1997, 1998).

[22] Cf. Culyer et al. (1992a, 1992b).

As it is, it is far from obvious why someone who is wedded to the value judgements underlying Paretian welfare economics would want to ensure equal access to medical care. If these value judgements appeal to anyone in this context, they are likely to appeal to someone of a libertarian disposition. But, as we have noted in Section 2.1, part and parcel of such a viewpoint is a view that access to medical care ought to be seen as part of society's reward system with people being able, at the margin at least, to use their income and wealth to get more or better health care than their fellow citizens if they want.[23] A libertarian might, as we have noted, be willing to use taxation to ensure some minimum standards are put in place, but it seems unlikely they would feel compelled to equalize access. On the Le Grand–Mooney interpretation, that would mean equalizing money *and* time prices; the latter would probably entail providing more facilities in low-income areas to ensure that waiting times and accessibility are similar. Equalizing access in the Olson–Rodgers sense would require even higher taxes and a substantial narrowing of the income distribution – if not complete equality of income. This is likely to appeal even less to a libertarian. In short, acceptance of the Paretian value judgements seems to be inconsistent with a desire to equalize access to medical care. Or, to put it the other way round, a desire to equalize access suggests a rejection of the Paretian value judgements.[24]

The argument in favour of equalizing access also begs the question: Why medical care? Why not equalize access to skiing holidays, or swimming pools? To our minds it is hard to defend according special ethical status to access and utilization without acknowledging the role of medical care in promoting good health.[25] What makes access to medical care special is that it influences the utilization of medical care, and this, in turn, influences health. It is hard to justify being concerned about the distribution of access to medical care, or about the distribution of medical care, without having a more fundamental concern about the distribution of the ultimate upstream variable – health. The distributions of access and utilization matter, but not in their own right; they are merely instruments to achieving a desired distribution of health in whose distribution our interest ultimately lies.

What is it, then, that makes health special? And why is it that the favoured distribution of it is an equal distribution? Moral philosophers in the Aristotelian tradition[26] suggest that what makes entities such as health special is that they are necessary for an individual to "flourish" as a human being. Insofar as medical care is necessary to good health, this provides a strong ethical justification for being concerned with the distribution of medical care and not with the distribution of, say, skiing holidays. It also provides a justification for using the word "need" in the context of medical care and not in the context of, say, skiing holidays [Culyer and Wagstaff (1993)]. But this argument also adds a new angle to "need": the extent to which medical care is needed is to be

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[23] Cf. Donabedian (1971), Maynard and Williams (1984), Wiliams (1988, 1993).
[24] Cf. Rice (1997, pp. 396–397) on this point.
[25] Cf. e.g. Daniels (1985).
[26] Miller (1976), Daniels (1985), Gillon (1986), Braybrooke (1987), Wiggins (1987), Lockwood (1988).

judged not so much in terms of its impact on health, as reflected in, say, freedom from pain and mobility, but rather more generally in terms of its ability to enable individuals to flourish. A hip replacement, for example, aids mobility and enables a person to flourish. But some items of care, such as IVF, might do little to improve a person's health narrowly defined and yet might make a big impact on their ability to flourish as a human being.

Whatever its implications for the interpretation of "need", the flourishing argument seems to point towards the pursuit of health equality, or at least as close to it as one can get, since giving some a better chance to flourish as human beings than others would seem hard to defend. The work of Sen (1992) lends support to this view. It also adds a twist to the tale. Sen draws a distinction between *functionings* and *capabilities* to function. *Functionings* concern what people *do* or *are* and are seen as constitutive of person's well-being. Together they determine the extent to which a person flourishes. Sen offers being in good health – via, for example, avoiding premature mortality or avoiding morbidity – as an example of a functioning. Other examples include being well nourished, having self-respect and taking part in the life of the community. *Capabilities* to function are the various combinations of functionings from which a person can choose. For example, a person may have the *opportunity* to be in good health or to participate in the life of the community. Sen argues for equality of capabilities.

Sen's argument raises a couple of issues. His argument, like the flourishing argument, provides a rationale for talking of medical care "needs". But it is not obvious that the set of medical care services that might be deemed necessary in order to enable a person to flourish as a human being would always coincide with the set deemed necessary to provide the person with whatever set of capabilities is considered appropriate. If functionings are interpreted narrowly, the two former sets might well be considerably larger than the latter, and the set of medical care services deemed to be "needed" from a functionings perspective might well end up as a fairly narrow set of basic services. Whether or not this is the case will depend crucially on how large the set of capabilities is on which one wants to define equality. The other issue relates to the distinction between functionings and capabilities. Two people may have the same capabilities – i.e. the same set of functionings from which to choose – and yet end up with different functionings. One of them may choose not to participate in the life of the community at all even though there was the opportunity to do so. The other may choose to eat junk food and be under-nourished even though there was the opportunity to be well nourished. This has an important implication – one cannot infer that because the level of one particular functioning is low, the person necessarily had a low level of capability relative to that functioning. This prompts the question: Is it functionings which should be distributed equally (the conclusion we were leaning towards above following the discussion of flourishing) or capabilities? Sen, in fact, comes down firmly in favour of the latter, on the grounds that people may, quite legitimately, have different objectives and they should be free to choose whichever they want.

This has an important implication in the present context – we may accept that being in good health is an important element of a person's functioning or flourishing, but if

people have the opportunity to achieve this functioning and yet choose not to do so, we cannot infer automatically that all inequalities in health are inequitable. What is important is not that everyone achieves the same level of health but rather that everyone has the *opportunity* to achieve the same level. This distinction is fine in theory, but working out *in practice* whether people are in poor health or seem set to die at a young age because they had the necessary capabilities but chose not to avail themselwes of them, or because they didn't have them in the first place, will be hard work. It is no surprise, then, that in the applied work that Sen and others have undertaken using the capabilities approach, the focus has been firmly on what people *achieve* in terms of life expectancy, literacy, and so on, rather than on what they *might* have achieved [cf. e.g. UNDP (1993, p.100 ff.)].

2.2.4. Justifying the ability to pay principle

The widespread commitment amongst policy-makers in the OECD countries to financing health care according to ability to pay raises the question: What underlies this commitment? One motivation that is sometimes advanced for financing health care according to ability to pay is a desire to promote equity in the *delivery* of medical care [Culyer (1993)]. For example, linking payments for medical care to utilization in the spirit of the benefit principle would go against the principle of equality of access, if we interpret access along any of the lines indicated in Section 2.2.1 above. Or alternatively, one might believe that linking payments to the utilization of medical care would deter people from using medical care facilities and that this would therefore reduce one's chances of seeing medical care distributed equitably. Whichever of these justifications for decoupling payments from utilization one offers, it is important to realize that one is only providing a justification for the decoupling. These arguments provide a justification for rejecting the benefit principle, not for accepting the ability-to-pay principle. One could, for example, decouple payments from utilization by financing health care through a lump-sum tax. This would ensure equal access to health care and would not generate any deterrence effects. But it would not result in health care being financed according to people's ability to pay.[27]

A justification of the ability-to-pay principle – i.e. a justification for relating payments for protection against out-of-pocket payments to ability to pay – must, therefore, come from elsewhere. Another possibility is that it may stem from a concern about the distribution of income after health care payments have been netted out [Culyer (1993)]. For example, a reason for wanting to decouple payments from utilization might stem from a desire to protect patients from health care payments that would threaten their ability to purchase other goods and services that have a special ethical status, or that

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[27] Of course, if linking utilization to payments does *not* deter use, the case for the ability-to-pay principle becomes even weaker. However, empirical evidence – e.g. from the RAND Health Insurance Experiment in the US – suggests that cost-sharing does deter usage [cf. e.g. Newhouse et al. (1993, pp. 338–340)].

are used to produce household commodities that have a special ethical status. Housing and education are examples that spring to mind. Given that utilization of medical care is frequently concentrated amongst the lowest income groups, a failure to decouple payments from utilization would result in households at the bottom end of the income distribution suffering the largest proportionate reductions in their disposable income as a result of health care utilization. But this argument too provides a justification only for decoupling payments from utilization. Financing health care via a lump-sum tax, or via an insurance scheme with flat-rate premiums, would ensure that the users of health services would not face a disproportionately high reduction in their incomes as a result of falling ill. But neither would result in payments for health care being linked to ability to pay. Rationalizing the widespread commitment to the ability-to-pay principle in health care financing appears, therefore, to be harder than might at first be imagined.[28]

2.2.5. Where does this leave equity?

The recent debate amongst economists on the nature of equity in the health field has raised but not resolved a number of questions left unanswered by the earlier discussions in the literature. Some useful things have been written about the problems involved in defining terms such as "access" and "need", though it is not obvious that any of the definitions proposed commands widespread – let alone universal – support amongst economists. For example, as Le Grand (1991) notes, the general thrust of the argument of Olsen and Rodgers leads one to wonder whether equalizing access to health care should not logically lead to equalizing entire budget sets. Yet this makes a mockery of the idea that one can equalize access to some commodities but not to others. The recent debate has also explored the compatibility of the various interpretations of equity, though here too it is most unlikely that the final word has been said. For example, even if it is the case that allocating care according to need does not necessarily result in equality of health, it may well be that, given that patients present themselves for treatment *sequentially*, allocating care on the basis of need (suitably defined) might be the best that providers of health *care* can do to reduce health inequalities. The recent debate has generated a somewhat heated discussion about which interpretation of equity in health care delivery has the greatest appeal. The debate has helped to clarify the issues but has certainly not led to any meeting of minds. There are those who firmly believe in equality of access, and those who champion equality of health. The allocation-according-to-need rule has rather fewer supporters but if it is true that allocating care according to need might give providers the best chance of helping reducing health inequalities, then in practice it might not be such a poor rule of thumb to adopt in the allocation of health *care*. There has been less discussion of the ethics of the ability-to-pay principle, which

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[28] Another issue that merits discussion is: Why do policy-makers make such a point about wanting payments for health care to be linked to ability to pay rather than looking more broadly at the impact on the income distribution of the financing of a range of services?

is somewhat surprising: one can easily mount a case for divorcing payments from utilization, but it does not logically follow that payments ought to be related to ability to pay.

Overall, then, despite the recent literature, there are still a number of issues relating to the meaning of "equity" that are unresolved. Moreover, although in some respects the recent literature has helped to place the empirical work on firmer conceptual and theoretical foundations, this is not true of all the recent literature, some of which has left the conceptual foundations of some of the empirical work looking somewhat shaky. It is to the empirical work that we now turn.

3. Equity in health care finance

The empirical literature to date on equity in health care financing has focused on the issue of how far health care is financed according to ability to pay. This can be interpreted in terms of both *vertical equity* (in this case, persons or families of unequal ability to pay making appropriately dissimilar payments for health care) and *horizontal equity* (persons or families of the same ability to pay making the same contribution).[29] Most of the empirical work to date has focused on the former; more specifically, it has focused on the issue of progressivity.[30] This work, which aims to measure the progressivity of the various financing sources in different countries, is surveyed in Section 3.2. Recently, some work has been done on horizontal equity in health care finance in the context of a broader study of the income redistribution associated with health care financing arrangements. This work is reviewed in Section 3.3. This section starts, however, with a discussion of health care financing arrangements and their variation across countries.

3.1. Health care financing typologies

Health care is typically financed from a mixture of four sources – taxes, social insurance, private insurance and out-of-pocket payments. Social insurance is like income tax

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[29] The work reviewed here interprets this in terms of the link between payments in a specific year and payments in the same year. It might be argued that taking a lifetime perspective is more appropriate. For some purposes this may be true, but it is not at all obvious that this is always true. One study that takes a lifetime perspective is that of Propper (1995). To anticipate the conclusions of the empirical work reviewed later in the paper, she concludes: "Results from LIFEMOD indicate that the shift from cross-sectional to a lifetime analysis results in more equal distributions of income and morbidity, but the distributions of health care finance relative to income, and of health care receipt relative to need, are relatively unchanged by this move in perspective. The reason is these latter distributions are functions of two distributions, both of which are flatter across the lifetime than in the cross-section" (p. 202).

[30] The progressivity of a health care financing system refers to the extent to which payments for health care rise or fall as a proportion of a person's income as his or her income rises. A *progressive* system is one in which health care payments rise as a proportion of income as income rises, whilst a *regressive* system is one in which payments fall as a proportion of income as income rises. A *proportional* system is one in which health care payments account for the same proportion of income for everyone, irrespective of their income.

in that it is compulsory; it is therefore unlike private insurance, which is usually voluntary. Social insurance is levied on earnings; this distinguishes it from income tax, which is assessed on the basis of taxable income, and from private insurance, which in some countries is sometimes assessed on the basis of risk factors, such as age, smoking behaviour, etc.

The roles that each of the four financing sources plays varies across countries. In the context of taxation, the principal source of variation is in the degree of earmarking involved. In some countries, such as the UK, the taxes that go towards funding health care are simply general tax revenues. In others, such as the Scandinavian countries, the taxes that finance health care are largely local income taxes whose purpose is almost entirely to raise revenues for health care. The degree of earmarking involved in social insurance also varies from country to country. In some countries, the social insurance contributions that go to fund health care are general contributions. In many countries, however, social insurance is earmarked. This is true not only of the countries with sickness funds, such as Germany and the Netherlands, but also countries such as Italy, which used to have a system of sickness funds, and countries like Ireland, which did not. It is also true of the US in respect of Medicare Part A. The role of private insurance also varies from one country to the next. In some cases (e.g. Ireland, Switzerland and the US) it provides cover for sections of the population without any public cover.[31] In the case of Germany, it provides cover to persons who have chosen not to have public cover – i.e. who have opted out of the public sickness fund scheme. In countries, such as the Netherlands, it provides cover to sections of the population with less-than-comprehensive public cover. In some countries (e.g. Denmark, France, and again Ireland) it provides cover against copayments levied by the public sector. In some countries, such as Ireland (yet again), Italy, Portugal, Spain and the UK, private insurance provides double cover to those who have comprehensive public cover. As is clear from the examples given, the private insurance industry sometimes fulfills more than one of these functions at a time. Finally, the role of out-of-pocket payments varies across countries, sometimes taking the form of copayments (e.g. Denmark and the UK), there being large differences across countries in the relative importance of copayments, extra billing and direct payments for services.

Table 1 shows the financing mixes in thirteen OECD countries for a recent year. The clustering of countries is best seen via the "health care financing triangle" (Figure 1). At the bottom right corner are the social insurance countries: France, Germany and the Netherlands. Countries such as Denmark, Finland and Sweden belong to the tax-financed cluster of countries in the top left corner, while countries such as Switzerland and the US lie in the predominantly private cluster at the bottom left corner. Some countries, such as Italy, are a half-way house between a social insurance system and a tax-financed system. Figure 1 does not, of course, show the mix between private insurance and out-of-pocket payments. In most countries, the majority of private health expenditures are out-of-pocket, this being especially true of the Nordic countries and

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[31] In the Swiss case, this is almost the entire population.

Table 1
Financing mixes – thirteen countries

| Country	Direct taxes	Indirect taxes	General taxes	Social insurance	Total public	Private insurance	Direct payments	Total private
Denmark (1987)	72.5%	12.2%	84.7%	0.0%	84.7%	1.5%	13.8%	15.3%
Finland (1990)	51.0%	24.0%	75.0%	11.0%	86.0%	0.0%	14.0%	14.0%
France (1989)			0.0%	73.6%	73.6%	6.3%	20.1%	26.4%
Germany (1989)	10.5%	7.2%	17.7%	65.0%	82.7%	7.1%	10.2%	17.3%
Ireland (1987)	28.5%	39.3%	67.8%	7.3%	75.1%	10.0%	14.9%	24.9%
Italy (1991)	21.0%	17.2%	38.2%	39.2%	77.4%	1.8%	20.9%	22.6%
Netherlands (1992)	6.3%	5.0%	11.3%	64.6%	75.9%	16.3%	7.7%	24.1%
Portugal (1990)	20.7%	34.5%	55.2%	6.0%	61.2%	1.4%	37.4%	38.8%
Spain (1990)	30.8%	25.5%	56.3%	22.0%	78.3%	2.4%	19.3%	21.7%
Sweden (1990)	63.5%	8.4%	71.9%	17.8%	89.7%	0.0%	10.3%	10.3%
Switzerland (1992)	23.9%	4.8%	28.7%	6.9%	35.6%	40.5%	23.9%	64.4%
UK (1993)	29.0%	35.0%	64.0%	20.0%	84.0%	7.0%	9.0%	16.0%
US (1987)	28.1%	7.4%	35.5%	13.3%	48.7%	29.2%	22.1%	51.3%
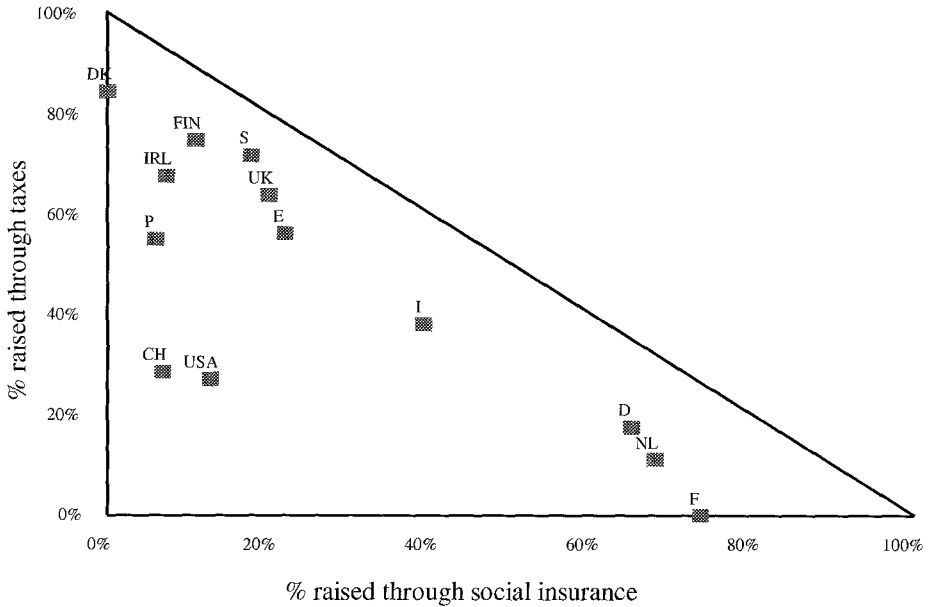
Figure 1. The health care financing triangle [Wagstaff et al. (1999)].

the southern European countries, where private insurance is still relatively uncommon. The Netherlands, Switzerland and the US stand out as the three countries where the majority of private expenditures are on private insurance premiums rather than on out-

of-pocket payments. Germany, Ireland and the UK come close behind in terms of the relative importance of private insurance vis-à-vis out-of-pocket payments.

3.2. Vertical equity and progressivity of health care finance

Early work on progressivity in the finance of health care was based on tabulations of health care payments by income group. In his comparison of Britain, Canada and the United States, Hurst (1985), for example, presents tables indicating average payments for health care by income group for each country. Payments are, however, presented in absolute terms rather than as a proportion of income, so that it is impossible to assess from the tables the degree of progressivity of each country's financing system.[32] Cantor's (1988) results for the United States – reported in Figure 18.13 of Davis (1993) – are easier to interpret. They show that the proportion of income spent on health care in the United States falls continuously as one moves up the income distribution, implying that the American financing system is regressive. An implication of a progressive financing system is that the share of the total financing burden borne by the lower income groups is less than their share of society's income, whilst the share borne by the top income groups exceeds their share of society's income. Comparing the share of income received by each income decile with its share of health care payments thus provides an alternative way of assessing progressivity. This is the approach adopted by Gottschalk et al. (1989) in their comparison of the health care financing systems of the Netherlands, the UK and the US. Their results for the US show that the American system is regressive: thus, for example, the bottom income decile in 1981 received 1.4% of (post-tax) income but made 3.9% of health care payments.

Tabulations of the proportion of income spent on health care and of the shares of income and health care payments received and borne by different income groups do not enable one to answer the question of how much more (or less) progressive one system (or source of finance) is than another. At best they can indicate whether a system is progressive, regressive or proportional. A more illuminating approach to assessing the progressivity of health care financing systems is to employ progressivity indices [Wagstaff et al. (1989)]. A variety of such indices have been proposed in the literature on tax progressivity [Lambert (1993)]. The work to date seeking to measure the progressivity of health care financing has tended to employ just one of these, namely, that of Kakwani (1977).[33]

3.2.1. Kakwani's progressivity index

Kakwani's index is based on the extent to which a tax – or, more generally, source of finance – departs from proportionality. It can be illustrated using Figure 2. The curve la-

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[32] In the text Hurst does remark that in Britain "household income rises about $4\frac{1}{2}$ times between the second and ninth deciles whereas household tax contributions rose about seven-fold over this range" [Hurst (1985, p. 117)].

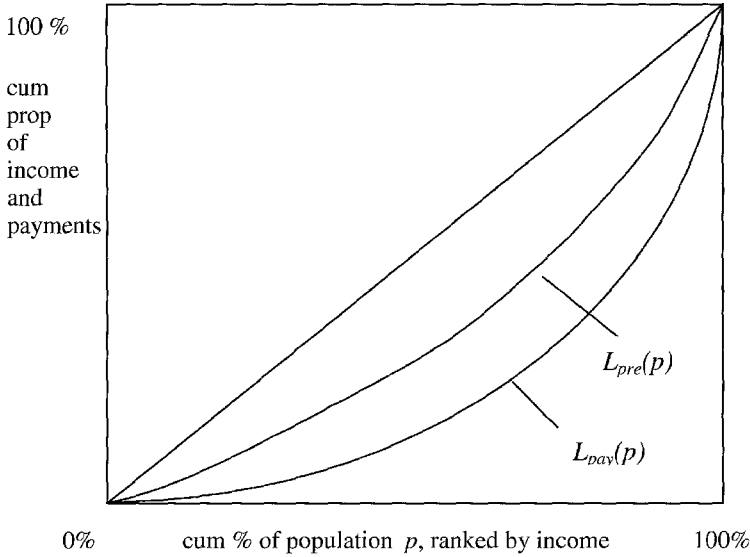[33] Wagstaff et al. (1992) also use Suits' (1977) index.

Figure 2. Lorenz curve for pre-payment income and concentration curve for payments.

belled $L_{\mathrm{pre}}(p)$ is the Lorenz curve for pre-payment income. The second curve – labelled $L_{\mathrm{pay}}(p)$ – is the payment concentration curve, which plots the cumulative proportion of the population [ranked according to pre-payment income as with $L_{\mathrm{pre}}(p)$] against the cumulative proportion of health care payments. If payments are levied strictly in proportion to income, $L_{\mathrm{pay}}(p)$ and $L_{\mathrm{pre}}(p)$ coincide. If payments as a proportion of income rise with income (so that the source of finance is progressive), $L_{\mathrm{pay}}(p)$ lies below $L_{\mathrm{pre}}(p)$. The opposite is true if payments are regressive. The degree of progressivity can therefore be assessed by looking at the size of the area between $L_{\mathrm{pre}}(p)$ and $L_{\mathrm{pay}}(p)$. If G_{pre} is the Gini coefficient for pre-payment income, and C_{pay} is the concentration index for payments,[34] Kakwani's index of progressivity, π_K, is defined as

$$\pi_{\mathrm{K}} = C_{\mathrm{pay}} - G_{\mathrm{pre}}, \tag{1}$$

which is twice the area between $L_{\mathrm{pre}}(p)$ and $L_{\mathrm{pay}}(p)$. If the system is progressive, as in Figure 2, π_K is positive. If, by contrast, the system is regressive, so that $L_{\mathrm{pay}}(p)$ lies *above* $L_{\mathrm{pre}}(p)$, π_K is negative. The value of π_{K} ranges from $-(1 + G_{\mathrm{pre}})$ (the entire tax burden is concentrated in the hands on the poorest person and hence $C_{\mathrm{pay}} = -1$) to $1 - G_{\mathrm{pre}}$ (the tax burden is concentrated in the hands of the richest person and hence $C_{\mathrm{pay}} = 1$) [Lambert (1993, p. 178)].

[34] The Gini coefficient is twice the area between the Lorenz curve and the line of equality (the diagonal), whilst the concentration index is analogously defined but with reference to the concentration curve.

A useful property of Kakwani's index is that the overall index for a financing system consisting of two or more sources of finance is a weighted average of the indices for the individual sources, where the weights are the proportions of each source in total revenue [cf. e.g. Suits (1977)]. Thus the progressivity characteristics of a health care financing system depend on the proportion of total revenues raised from each source and the degree of progressivity of each of these sources. Another feature of the index is worth mentioning. It is perfectly possible for a source of finance (or a tax) to be progressive (or regressive) at low income levels but regressive (or progressive) at high income levels. Suppose, for example, that pensioners are exempt from social insurance contributions and tend to be located in the lower income groups. Suppose too that contributions are proportional (assume for simplicity to income) but only up to a ceiling. The exemption of pensioners makes the system progressive at low income levels (the bottom income groups will tend to pay a relatively small fraction of their income towards health care) but regressive at high income levels (as a person's income rises above the ceiling, the proportion of their income they pay towards health will fall). The result is that $L_{pay}(p)$ will cross $L_{pre}(p)$ from below. Calculating the Kakwani index as the difference between C_{pay} and G_{pre} in such cases implies that the regressivity at high incomes offsets – at least partially – the progressivity at low incomes. The result could, of course, be a zero value for the progressivity index.

3.2.2. Empirical work on progressivity and health care finance

Two recent papers [Wagstaff et al. (1992, 1999)] present estimates of progressivity by source of finance for a number of OECD countries.[35] Both aim to apply a common methodology and common definitions of income and health care payments to micro-level data to attribute payments at the household level. The second paper is more successful than the first in achieving comparable definitions and the summary here is of these results. The progressivity indices for all financing sources are shown in Table 2 for all countries for selected years. Indices for total and subtotal payments were calculated using the revenue shares in Table 1 as weights.[36]

The direct taxes used to finance health care are progressive in all countries. They are especially progressive in the UK, Ireland and Germany, but far less progressive in the two Scandinavian countries (Denmark and Sweden), reflecting the reliance in health care financing there on the local income tax which is close to proportional. Indirect taxes

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[35] See the country reports in Van Doorslaer et al. (1993), for detailed results for specific countries.

[36] Inevitably incidence assumptions have to be made in this analysis. In both of the aforementioned papers, the same incidence assumptions have been employed in all countries. There are arguments for and against doing this, of course, Wherever possible, personal income tax and property taxes have been assumed to be borne by the taxpayers concerned, corporate income taxes by shareholders, sales and excise taxes by consumers, and employee and employer social insurance contributions by employees. Private insurance premiums, whether individual or group, have been assumed to be borne by the individual concerned. There are arguments for and against these assumptions individually and collectively.

Table 2
Progressivity indices – by country and source

Country	Direct taxes	Indirect taxes	General taxes	Social insurance	Total public	Private insurance	Direct payments	Total private	Total payments
Denmark (1987)	0.0624	-0.1126	0.0372		0.0372	0.0313	-0.2654	-0.2363	-0.0047
Finland (1990)	0.1272	-0.0969	0.0555	0.0937	0.0604	0.0000	-0.2419	-0.2419	0.0181
France (1989)				0.1112	0.1112	-0.1956	-0.3396	-0.3054	0.0012
Germany (1989)	0.2488	-0.0922	0.1100	-0.0977	-0.0533	0.1219	-0.0963	-0.0067	-0.0452
Ireland (1987)	0.2666	n.a.	n.a.	0.1263	n.a.	-0.0210	-0.1472	-0.0965	n.a.
Italy (1991)	0.1554	-0.1135	0.0343	0.1072	0.0712	0.1705	-0.0807	-0.0612	0.0413
Netherlands (1992)	0.2003	-0.0885	0.0714	-0.1286	-0.1003	0.0833	-0.0377	0.0434	-0.0703
Portugal (1990)	0.2180	-0.0347	0.0601	0.1845	0.0723	0.1371	-0.2424	-0.2287	-0.0445
Spain (1990)	0.2125	-0.1533	0.0486	0.0615	0.0509	-0.0224	-0.1801	-0.1627	0.0004
Sweden (1990)	0.0529	-0.0827	0.0371	0.0100	0.0100		-0.2402	-0.2402	-0.0158
Switzerland (1992)	0.2055	-0.0722	0.1590	0.0551	0.1389	-0.2548	-0.3619	-0.2945	-0.1402
United Kingdom (1993)	0.2843	-0.1522	0.0456	0.1867	0.0792	0.0766	-0.2229	-0.0919	0.0518
United States (1987)	0.2104	-0.0674	0.1487	0.0181	0.1060	-0.2374	-0.3874	-0.3168	-0.1303

are regressive in all thirteen countries, but especially regressive in Spain and the UK. General taxation, computed as a weighted average of direct and indirect, is progressive in all countries. Interestingly, the general taxes used to finance health care appear to be especially progressive in the two private financing countries, Switzerland and the US, and also, albeit to a lesser extent, in Germany.

Social insurance emerges as progressive in all countries except the Netherlands and Germany, two countries which exclude the higher income groups from the compulsory sickness fund insurance. In contrast to Dutch and German social insurance schemes, the French scheme (the *Régime Générale*) is almost universal and does not exclude high earners; furthermore, pensioners and the unemployed, who are more likely to be in the bottom income groups, pay much lower contribution rates. Also in countries such as Ireland, Italy, Spain, and the UK, where it raises a not insignificant proportion of revenues, social insurance emerges as a progressive source of revenue. This is probably due to exemptions amongst the lower income groups and the fact that contributions are assessed on the individual's own earnings rather than on their household's equivalent income.

For the interpretation of the progressivity indices for private health insurance it is important to bear in mind the cover that private insurance buys in each country. Broadly-speaking, countries belong to one of three groups, the exception being Ireland, and to a lesser extent Switzerland and the US. The first comprises countries where private insurance buys cover against public sector copayments and includes Denmark and France. Private insurance is progressive in Denmark but regressive in France. This reflects the fact that private insurance against public sector copayments is more widespread among the lower income groups in France than it is in Denmark, which, in turn, probably reflects in part the higher copayments in France. The second group of countries comprises those where private insurance is mostly taken out as supplementary cover (mostly "double" cover) to that provided by the state and includes Italy, Portugal, Spain and the UK. Private insurance of this type emerges as progressive, except in Spain, suggesting that in Italy, Portugal and the UK, this insurance is a "luxury" good. The third group comprises countries where, for the individuals concerned, private insurance – albeit often subsidized – is (or is nearly) the sole source of cover. This group includes Germany, the Netherlands, Switzerland and the US. Switzerland is unusual in this group in that private insurance is bought by almost everyone. In the other countries, only persons with restricted or non-existent public cover generally take out private insurance.[37] In the US, persons purchasing private insurance as their sole source of cover make up the bulk of the population, whilst in the Netherlands they comprised (in 1992) 36% of the population. Where it is relied upon by the majority of the population for cover, as in Switzerland and the US, private insurance is highly regressive. The positive Dutch and German indices stem from the fact that private insurance in these countries is almost

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[37] In the US a small proportion of expenditures on private insurance is accounted for by persons with public cover purchasing supplementary insurance.

exclusively bought by the higher income groups. Ireland, and to some degree Switzerland and the US, span two or more of these groupings. In these three countries, private insurance emerges as regressive. In Ireland this reflects the fact that private insurance premium payments are computed net of tax relief, which benefits the better-off households most. The surprisingly small value – in absolute terms – of the Kakwani index for private insurance for the US is attributable to coverage gaps and under-insurance amongst the lower income groups [cf. Rasell and Tang (1994)].

Out-of-pocket payments are a regressive means of raising revenue. They are not particularly regressive in Ireland and the Netherlands, reflecting the incomplete cover of the better-off privately insured in these countries. The very high regressiveness of out-of-pocket payments in Switzerland and the US reflects the fact that persons on low incomes in these countries are liable in full for any out-of-pocket payments, whereas their counterparts in many European countries would be exempt from charges, either because of their low income or because of other exempting factors (e.g. chronic ill-health, pensioner status, etc.) that are often correlated with income.

The broad conclusions from this study concerning the overall progressivity of health care financing systems confirm the earlier findings of Wagstaff et al. (1992). Health care finance in two of the three social insurance countries (Germany and the Netherlands) is regressive, whilst it is progressive in the third (France). In the tax-financed systems, by contrast, health care finance typically emerges as proportional or mildly progressive. The exception to this is Portugal, where the system overall emerges as regressive – this reflects the high share of out-of-pocket payments in that country in 1990. Finally, in the two predominantly privately financed systems (Switzerland and the US), health care finance emerges as regressive.

In addition to the cross-country comparisons and cross-source comparisons reported above, work has also been undertaken on the progressivity consequences of country-specific trends or simulated proposed health reforms. Several studies[38] have analysed the progressivity of the US health care financing system and some of these have considered the progressivity consequences of alternative reform packages. These studies all confirm that the US health care financing system is highly regressive[39] and that out-of-pocket payments are especially regressive. Rasell and Tang (1994) consider several proposals for reform that aim at universal coverage. They find that all the proposals would make the system less regressive, but that those relying more on taxes would do so to a greater extent than those relying mainly on employer-paid insurance premiums. Similar findings are reported by Holahan and Zedlewski (1992).

Janssen et al. (1994) assess the progressivity implications of the ill-fated Dekker health insurance reform. The net effects of this scheme are unclear a priori. On the one hand, the extension of the compulsory basic insurance with income-related payments might be expected to increase the relative contribution of the higher income groups.

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[38] See, for example, Rasell et al. (1994), Rasell and Tang (1994) and Holahan and Zedlewski (1992).
[39] Rasell and Tang (1994) report a Kakwani index of −0.114 for 1992.

On the other hand, the introduction of flat-rate premiums (these were to cover the gap between the cost of insurance and the value of the voucher received from the State) is clearly likely to work in the opposite direction. In the event, Janssen et al. find that the overall regressiveness of the Dutch financing system would have been reduced by the implementation of the Dekker Plan, but the system overall would still have been regressive.

Lairson et al. (1995) analyse changes in the progressivity of the Australian health insurance system. This provides an interesting mix of public and private finance. After the inception of the universal public-coverage Medicare system in 1984, the overall financing burden was found to be strongly progressive ($\pi_K = 0.10$), mainly as a result of progressive taxation and Medicare levies. Due to the expansion of private insurance and direct payments over the 1980s, progressivity was reduced and the overall financing was roughly proportional in 1989.

3.3. Horizontal equity and income redistribution

The issue of horizontal equity in the finance of health care has received relatively little attention. Horizontal equity can be defined in terms of the extent to which those of equal ability to pay actually end up making equal payments, regardless of, for example, gender, marital status, trade union membership, place of residence, etc. Horizontal *inequity* might arise for a number of reasons. In private insurance, high-risk groups (e.g. the elderly, those with pre-existing conditions, smokers) often pay higher premiums than lower-risk persons of the same ability to pay. In the direct taxation part of the system, horizontal inequity can arise through anomalies in the personal income tax system (e.g. tax reliefs on mortgage interest payments, or on private health insurance premiums). In a social insurance system, different groups may be eligible for different health insurance schemes and hence may face different contribution schedules. In some cases the groups may be defined in terms of earnings or income but it may be that this measure does not properly reflect the individual's or household's ability to pay, in which case households with similar abilities to pay may end up paying quite different amounts for similar levels of cover. Rutten and Janssen (1987), for example, find that in the Netherlands, because of the diversity of arrangements for different categories of persons, single persons on an income of Dfl 17,000 in 1981 could have ended up paying as little as 2% of their income towards health care if they were over 65 but as much as 13% if they were under 65 but self-employed.[40] Horizontal differences of this kind, especially between the privately and publicly insured, have been a major factor underlying the pressure to reform health care financing arrangements in countries such as Germany and the Netherlands.

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[40] See Von der Schulenburg (1994) for variations in contribution rates between and within the sickness funds in Germany.

3.3.1. Measuring horizontal equity

A number of measures of horizontal inequity have been developed in the literature on public finance and income distribution, but with the exception of that proposed by Aronson et al. (1994), none is entirely satisfactory. The most popular is the measure proposed by Atkinson (1980), Plotnick (1981) and King (1983), which involves assessing the number of rerankings in the move from the pre-tax income distribution to the post-tax distribution. As Aronson et al. emphasize, however, horizontal inequity refers to the (unequal) treatment of *equals*, whilst reranking refers to the treatment of *unequals*.

The approach suggested by Aronson et al. (1994) enables – at least in principle – a clear distinction to be made between reranking and horizontal inequity. The latter is measured in terms of the variation in tax (or health care payments) amongst groups of pre-tax (or pre-payment) equals. If there is no variation, there is no horizontal inequity. The variation in each group of pre-tax equals is measured using the Gini coefficient and then an overall index of horizontal inequity is constructed by taking a weighted sum of the Gini coefficients for each group of pre-tax equals. The weights chosen are the products of the square of the population share of the group of pre-tax equals and the post-tax income share of these households. The reason for choosing these weights is that the degree of horizontal inequity can then be measured in terms of its impact on the distribution of income. This effect can then be compared to the impact on the distribution of income attributable to the progressivity of and the reranking associated with the tax in question.

More formally, the redistributive impact associated with a tax can be measured by the reduction in the Gini coefficient caused by the tax. Thus

$$RE = G_X - G_{X-T}, \tag{2}$$

where G_X and G_{X-T} are the pre-tax and post-tax Gini coefficients, respectively. In a world where everyone faces the same tax schedule, irrespective of their non-income characteristics (e.g. whether or not they are married, whether or not they own a home), we have

$$RE = \left(\frac{g}{1-g}\right) K_T, \tag{3}$$

where g is the share of income taken in tax and K_T is the Kakwani (1977) index of tax progressivity. Equation (3) clarifies the role of progressivity in the redistribution of income: a progressive health care finance system will result in there being less inequality in income after payments for health care have been made, and, in this sense, the payments will have a pro-poor redistributive effect. As is clear from Equation (3), however, the extent of redistributive effect depends not only the degree of progressivity of the tax but also on its importance, in terms of the average share of income taken up by the tax. So, countries' health care systems may have similar degrees of progressivity and

yet be associated with quite different levels of income redistribution simply because in one country health care payments absorb a larger share of income. The analysis in this section, in addition to shedding light on the issue of horizontal equity, sheds light on this important issue too.

Suppose, in contrast to what was assumed above, that people do *not* face the same tax schedule and that the tax liability of household h is equal to

$$T^h = T(x) + \varepsilon^h(x), \tag{4}$$

where $T(x)$ is the common amount of tax paid by all households with income x and $\varepsilon^h(x)$ is household h's deviation from this amount. It is assumed that these deviations average to zero across all households – as Aronson et al. put it, "on average, at each x, the tax system gets it right". The presence of $\varepsilon^h(x)$ in Equation (4) means that households with the same income x can end up paying different amounts of tax. This is the classical notion of *horizontal inequity*. Only if $\varepsilon^h(x)$ is zero for all h and x, is the tax system horizontally equitable. Furthermore, the presence of $\varepsilon^h(x)$ in Equation (4) may result in households moving up or down the income distribution after they have paid their taxes. There may, in other words, be *reranking* as one moves from the pre-tax income distribution to the post-tax distribution.

These two possibilities are illustrated in Figure 3, which shows the relationship between post-tax income, $x - T^h$, and pre-tax income, x, for a progressive tax. The "fans" show the effect of differential tax treatment – for example, households starting off with pre-tax income x_3 will, on average, end up paying $x_3 - T(x_3)$ in tax, but there will be variation about this amount reflecting the presence of $\varepsilon^h(x)$ in Equation (4). The existence of fans thus indicates the presence of horizontal inequity. If the fans overlap (as they do in the case of households starting out with pre-tax incomes of x_1 and x_2), then reranking occurs – the shaded region of the fans indicate that the household that was richer before tax has become the poorer after tax.

The presence of differential tax treatment means that Equation (3) is no longer valid. Aronson et al. (1994) show that it can be replaced by

$$RE = \left(\frac{g}{1-g}\right) K_T - \sum \alpha_x G_{F(x)} - [G_{X-T} - C_{X-T}], \tag{5}$$

where K_T is the Kakwani index computed on the assumption that everyone faces the same tax schedule, α_X is the product of the population share squared and the post-tax income share of households with income x, $G_{F(x)}$ is the Gini coefficient for post-tax income for households with pre-tax income x and C_{X-T} is the post-tax concentration index obtained by ranking households first according to their pre-tax income and then within each group of pre-tax equals by their post-tax income. The first term, which Aronson et al. call V, measures the inequality reduction that would have obtained if there had been no differential tax treatment. The second term, which they call H, measures the extent of classic horizontal inequity – i.e. the unequal treatment of equals –
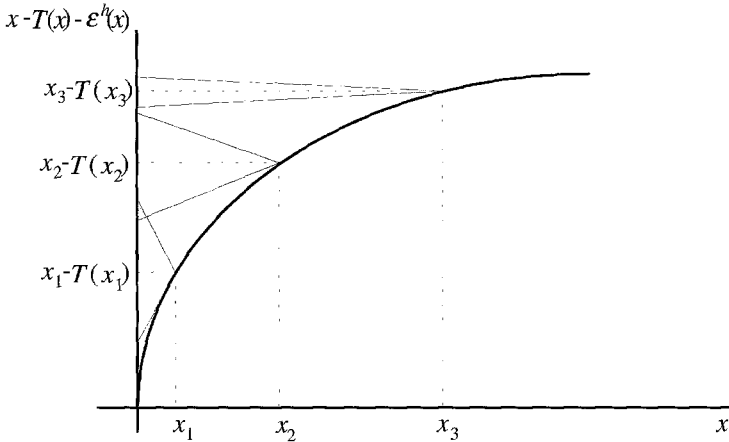
Figure 3. Horizontal inequity and reranking [Wagstaff and van Doorslaer (1994)].

by taking a weighted sum of the Gini coefficients $G_{F(x)}$ of the fans. These Gini coefficients are zero only if the $\varepsilon^h(x)$ are zero for all x and h. The third term, which Aronson et al. call R, measures the extent of reranking in the move from the pre-tax distribution to the post-tax distribution by comparing the post-tax Gini coefficient with the post-tax concentration coefficient.[41] If there is no reranking, R is zero.

The decomposition in Equation (5) helps – at least on the face of it – to clarify the distinction between horizontal inequity and reranking. As Figure 3 makes clear, horizontal inequity (the existence of fans) does not necessarily give rise to reranking (the existence of fan overlap). Furthermore, if reranking is to be deemed inequitable, then it must be on the basis of *vertical* equity considerations *not* horizontal equity considerations. This much is clear. Things get less clear when one considers the possible *sources* of reranking. In Figure 3 the only possible source of reranking is the existence of differential treatment – i.e. the fans. Thus an occurrence which offends the principle of *vertical* equity – if it offends any equity principle – can arise solely through the existence of *horizontal* inequity. As Aronson et al. point out, there is, however, another possible source of reranking – a marginal tax rate in excess of 100%, which may occur over limited ranges of actual tax schedules.[42] This could cause reranking even if everyone faces the same tax schedule.

The terms H and R are always non-negative, so differential treatment always reduces the vertical effect. Empirically, Aronson et al. show that H increases and R decreases when the income range used to define "equals" is expanded, but the total differential

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[41] This is similar to the measure of reranking proposed by Atkinson (1980) and Plotnick (1981).
[42] This would give rise to a downward-sloping section of the relationship between x and $x - T(x)$ and may result in a household to the left of the peak swapping places with a household to the right of the peak in the move from the pre-tax distribution to the post-tax distribution.

treatment $(H + R)$ remains fairly constant. Thus, whilst conceptually distinct, H and R seem likely to be difficult to disentangle in practice. Expressing V as a percentage of RE facilitates a comparison of the relative importance of vertical effects versus horizontal inequity and reranking.

3.3.2. Empirical work on horizontal equity

Wagstaff and van Doorslaer (1994) have illustrated the application of Aronson et al.'s methods to health care financing by decomposing the pro-rich redistributive effect of the Dutch health care financing system. They that most of this effect is due to the duality of the system's insurance payments, with income-related payments mainly for the lower two thirds of the income distribution and non-income-related premiums for the higher income groups. They show, however, that some of the redistributive effect is due to horizontal inequity and reranking, and that redistributive effect would have been 14% lower than it was in 1987 if all households at each level of (equivalent) income had made exactly the same (equivalent) health care payments. They also illustrate – by means of a microsimulation exercise – the effects of changing the contribution rules of one of the social insurance schemes on each of the components of the redistributive effect. The abolition of exemptions and contribution ceilings is shown to reduce the gap between the actual and potential redistributive effect.

Van Doorslaer et al. (1999) provide a comparison of the income redistribution consequences of the health care financing mixes adopted in twelve OECD countries using the methods described in Section 3.3.1. Figure 4 illustrates how the various components of
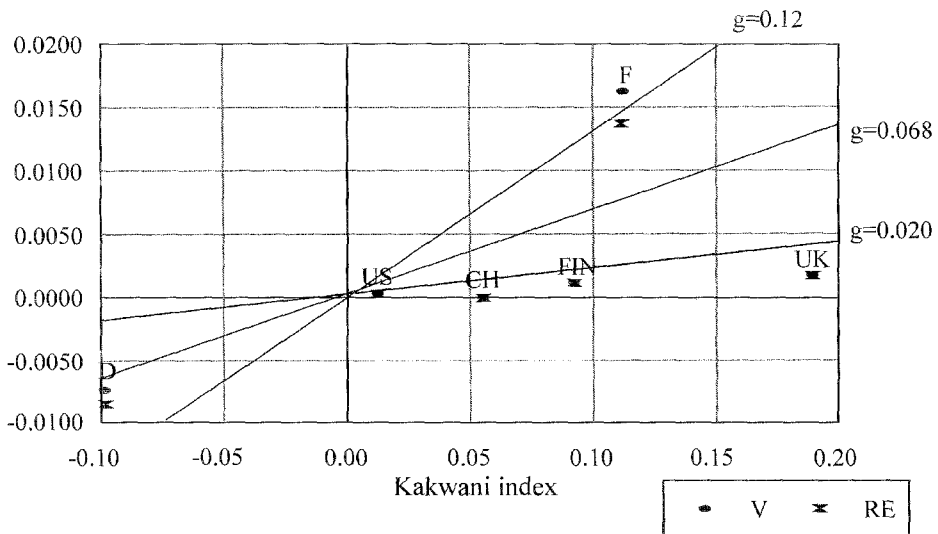

Figure 4. Redistributive effect of social insurance as a function of K_T and g.

redistributive effect are related for the six countries for just one source: social insurance payments. It shows RE as well as V as a function of g and K_T. At any given level of funding (i.e. g), the vertical effect V is proportional to progressivity (or regressiveness). Similarly, at any given level of progressivity, V can be seen to increase with g. For example, social insurance payments are only slightly more progressive in France than in Finland, but generate a much larger redistributive effect in France because there they represent about 12% of gross income whereas in Finland they are less than 2% of gross income. The graph also shows that the presence of differential treatment of equals $(H + R)$ can substantially reduce the vertical redistributive effect. This is not visible for the four countries where social insurance payments only represent a very small share of income, but in the two countries with important shares of social insurance financing, RE is well below V. In France, $(H + R)$ lowers the positive redistributive effect, and in Germany, it increases the negative redistribution. Horizontal inequity and reranking in these two countries are mainly generated by the differences in sickness fund premiums between households with similar gross incomes due to premium exemptions or reductions (e.g. among elderly in France) or variation in contribution rates (e.g. among *Krankenkassen* in Germany). In other words: in the absence of this differential treatment of households with equal incomes, the Gini reduction would have been a lot higher in France and the Gini increase somewhat lower in Germany.

Van Doorslaer et al. (1999) also find that unequal treatment of unequals (the vertical effect V) is far more important in terms of redistributive effect than differential treatment. There are, however, differences across sources, as can be seen from Table 3 which shows V^{100}, the vertical redistributive effect V expressed as a percentage of the total RE. In general, and not surprisingly, large discrepancies between V and RE occur in the voluntary private payments, where there is little or no relationship between payment and ability to pay. Smaller discrepancies occur in public payments, where, at least in the cases of direct taxes and social insurance, there is a link between payments and ability to pay. Within public sources, there is, however, some variation. The discrepancy between V and RE is very small in the case of taxation, despite the well-known anomalies in personal income tax systems (such as tax relief on mortgage interest payments and health insurance) and the inevitable differences at a given income level in household spending levels and patterns. By contrast, social insurance payments show a non-negligible degree of differential treatment, mainly due to varying contribution rates and exemptions on the basis of criteria other than income. There are also variations across countries. Surprisingly, perhaps, the discrepancy between RE and V is fairly small in the case of the direct taxes used to finance health care in the Nordic countries. By contrast, and less surprisingly, the discrepancy is fairly high in the case of the social insurance scheme operating in France and (to a lesser extent) in Germany.

4. Equity in health care utilization

The interest in the work reported in this section is whether, on average, persons in equal need of treatment receive similar treatment, regardless of their income. The issue of ver-

Table 3

V^{100} – Vertical redistributive effect as a percentage of total redistributive effect

Country	Direct taxes	Indirect taxes	General taxes	Social insurance	Total public	Private insurance	Direct payments	Total private	Total payments
Denmark (1987)	104.0%	92.2%	104.4%		104.4%	110.6%			
Finland (1990)	101.3%	96.8%	104.3%	100.0%	104.3%			93.4%	
France (1989)				120.3%		93.0%			
Germany (1988)	100.4%	98.5%	101.7%	85.8%	62.5%	124.3%	70.4%	–75.0%	83.2%
Ireland (1987)	100.9%			103.3%		75.0%	90.2%		
Italy (1991)	100.4%	99.3%	101.7%	108.3%	107.7%	120.0%	73.1%	69.8%	128.2%
Netherlands (1992)	102.3%	100.0%	105.1%	94.5%	93.4%	134.0%	72.0%	216.3%	93.2%
Portugal (1990)	109.6%	86.1%	93.0%	136.1%	127.8%	133.3%	75.9%	75.2%	52.9%
Sweden (1990)	103.1%	100.0%		107.1%					
Switzerland (1992)	101.6%	94.7%	101.8%	175.3%	101.8%	98.0%	96.9%	98.1%	96.6%
United Kingdom (1992)	101.3%	95.6%	102.3%	103.4%	102.3%	218.1%			
United States (1987)	103.7%	95.8%	104.5%	128.7%	105.0%	91.8%	84.9%	87.5%	80.3%

tical equity — whether persons in different degrees of need are treated in appropriately different ways – has hardly been the subject of any research by economists.[43]

4.1. Regression-based tests of inequity in health care utilization

4.1.1. Testing for inequity

Suppose there are two income groups, "rich" and "poor" and we measure "need" (setting aside our earlier objections to this definition) by the presence or absence of illness, so that we have two illness categories, "ill" and "not ill". Let m_i be the medical expenditure received by person i, and h_i be a dummy taking a value of 1 if person i is ill (and therefore in need of medical care) and zero otherwise. Suppose we estimate the following model:

$$m_i = \begin{cases} \alpha_r + \beta_r h_i + u_{ri} & \text{if rich,} \\ \alpha_p + \beta_p h_i + u_{pi} & \text{if poor,} \end{cases} \tag{6}$$

where the α's and β's are coefficients and the u's error terms. If, on average, people who are not ill are treated the same, irrespective of whether they are rich or poor, we would find $\alpha_r = \alpha_p$. If, on average, people who are ill are treated alike, whether they be rich or poor, then we would find $\alpha_r + \beta_r = \alpha_p + \beta_p$. If equity obtains amongst both need categories, then obviously we have both $\alpha_r = \alpha_p$ and $\beta_r = \beta_p$. One could estimate the parameters of interest either by running two separate regressions – one for the rich group, one for the poor – or by running a single equation with the appropriate interactions:

$$m_i = \pi_0 + \pi_1 y_i + \pi_2 h_i + \pi_3 y_i h_i + u_i, \tag{7}$$

where y_i is a dummy taking a value of one if person i is rich and zero otherwise. The relationships between the parameters in Equation (6) and those in Equation (7) are simply: $\pi_0 = \alpha_p$, $\pi_1 = \alpha_r - \alpha_p$, $\pi_2 = \beta_p$, and $\pi_3 = \beta_r - \beta_p$. Thus Wagstaff et al. (1991b) propose testing for inequity by testing the joint hypothesis

$$H_0: \quad \alpha_r = \alpha_p \quad \text{and} \quad \beta_r = \beta_p, \tag{8}$$

or, alternatively, by testing the null hypothesis[44]

$$H_0: \quad \pi_1 = 0 \quad \text{and} \quad \pi_3 = 0. \tag{9}$$

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[43] See, however, Cullis and West [(1979, pp. 237–239)] and Mooney (1996).

[44] Essentially the same test is proposed by Birch et al. (1993) but they propose to use it not only for income-related inequity but also for inequity arising with respect to region of residence, education and even the level of community contact.

It is important to note that estimating Equation (7) without the interaction between y_i and h_i – as is often done in the literature – is tantamount to assuming that the extra care received by the ill is the same, irrespective of whether they are rich or poor. The general approach outlined here can obviously be extended to the case where h_i is a *vector* of need indicators (not even necessarily dummy variables).[45]

There is a parallel here with the literature on discrimination in the labour market. There the aim is to detect whether workers of equal productivity are paid the same, irrespective of whether they are male or female, or Black or White. Empirical analysis of this issue proceeds by estimating a model of the type in Equation (6), in which m_i is hourly wages (or the log thereof), h_i is a productivity proxy (or vector of proxies) and the sample is split by gender or by race. It is concluded that discrimination is absent if the intercepts and slopes are the same across the two groups and to exist if they differ. Discrimination would be measured either as $(\alpha_r - \alpha_p) + h_p(\beta_r - \beta_p)$ or as $(\alpha_r - \alpha_p) + h_r(\beta_r - \beta_p)$, depending on which group was used as the reference group.[46]

One issue that merits discussion is the appropriate specification of Equation (6). As specified above, the model includes only variables that are proxies for need. Ought one to include factors other than need that may influence medical care utilization? And if one does, what then is the appropriate test of inequity? There is a good deal of confusion in the literature on both points.

The first of these points has been the subject of some debate in the discrimination literature.[47] The view there is that one should include in one's wage equation only those factors that are legitimate sources of variation in average hourly wages between men and women. All agree that the core set of variables to be included are those capturing human capital, because these capture productivity and differences in productivity are a legitimate source of wage differences. This is not to say that there are not influences on wages other than human capital, but rather that these are probably not legitimate reasons for men and women having, on average, different hourly wages. By omitting such factors from one's wage equation, one forces their effects to get channelled into different intercepts or different slope coefficients on the productivity proxies. Including these other factors would result in an unwarranted reduction in the estimate of discrimination, since one would be taking out of one's estimate some differences that should not taken out because they are not legitimate sources of wage differences. There are a couple of twists to this story. One is that there may be variables other than human capital that could, depending on one's view, be regarded as legitimate influences on wages but are hard to measure. One could argue that women have a preference for jobs with flexible hours to make raising children easy, even though such jobs are badly paid. Some argue that this preference ought to be netted out of the discrimination measure but acknowledge that in practice it cannot be done since this preference is hard to measure. The

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[45] It is worth noting that since we are using regression analysis simply to obtain group means, the approach is not undermined by poor health reducing income.

[46] Cf. e.g. Joshi and Paci (1998).

[47] Cf. Joshi and Paci (1998) and Gill (1994).

other twist is that there may be variables that are neither wholly legitimate nor wholly illegitimate sources of wage differences between men and women. Occupation is an example.[48] It may be that women prefer certain occupations even though they are not well paid because they are attractive for other reasons. This might be argued to be a legitimate source of wage differences. On the other hand, it may instead be the case that employers *force* women into these occupations by segregating workers (*employment discrimination*). This would not be viewed as a legitimate source of wage differences. Omitting occupation would result in discrimination being overestimated, but including it would lower the estimate of discrimination by too much.

The logic of these arguments applies, it would seem, with equal force to the measurement of inequity in the delivery of health care. In one's estimating equation one ought to include *only* those variables that are regarded as legitimate sources of differences in medical care utilization across income groups. If one is interested in testing for equal treatment for equal need, this means including only indicators of need: not only measures of health but also demographic variables, since most health indicators must be used in conjunction with demographic variables if they are to capture need properly. Non-need variables, by contrast, ought to be excluded from the estimating equations.

This leaves the question: How should inequity be assessed if non-need variables *are* included in the estimating equations? Suppose, for the moment, that one estimates Equation (6). Then the difference between the mean medical care utilization of rich and poor is equal to:

$$m_r - m_p = (\alpha_r - \alpha_p) + h_r(\beta_r - \beta_p) + \beta_p(h_r - h_p). \tag{10}$$

The first and second terms reflect inequity, while the last is the legitimate source of difference between rich and poor due to the fact that the two groups differ in their need for care. Now, suppose that instead of estimating Equation (6), one estimates the pair of equations:

$$m_i = \begin{cases} \alpha_r + b_r h_i + c_r x_i + \varepsilon_{ri} & \text{if rich,} \\ \alpha_p + b_p h_i + c_p x_i + \varepsilon_{pi} & \text{if poor,} \end{cases} \tag{11}$$

where x_i is a variable that does not reflect medical need. The individual's area of residence would be an example. The difference in expected values between the mean medical care utilization of rich and poor is equal to:

$$\begin{aligned} m_r - m_p &= (a_r - a_p) + h_r(b_r - b_p) + b_p(h_r - h_p) \\ &\quad + x_r(c_r - c_p) + c_p(x_r - x_p). \end{aligned} \tag{12}$$

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[48] Cf. Gill (1994).

The first and second terms reflect inequity, as before, while the third, as before, does not. What of the fourth and fifth terms? The fourth clearly reflects inequity – it captures differences between rich and poor in the effects on utilization of a variable that does not reflect medical need. The variable x_i ought not, of course, to influence utilization in *either* group, so that the fifth term should also count as inequity. Thus the only legitimate source of difference between rich and poor in their mean medical utilization is the term capturing need differences – the third term. All the rest is inequity.

What does this imply about testing for inequity in a model containing both h_i and x_i? It indicates that, at a minimum, one ought to include in one's assessment of inequity differences across income groups in the a's, b's and c's – not simply differences in the a's and b's, or worse still only differences in the a's. But even if one *does* include differences in c's in one's assessment, one would still get an inaccurate estimate the degree of inequity, since one would have captured only the first, second and fourth terms in Equation (12), not the last term. In a study where there are just two income groups, including the last term is straightforward. But in studies where income is measured in terms of quintiles, it is far from obvious how one ought to proceed. Furthermore, unless h_i and x_i are uncorrelated, the estimates of β_r and β_p obtained from Equation (6) will differ from the estimates of b_r and b_p obtained from Equation (11). So, if one were to seek to assess inequity by focusing on the term capturing the legitimate source of difference in utilization [the third term in Equations (10) and (12)], one would get a different picture depending on whether one estimated Equation (6) or Equation (11). In general, the best that can be hoped from studies that include x-variables is some tests of differences in the a's, b's and c's.

This is not to say that including x-variables is totally counter-productive. Their inclusion could shed light on the channels through which discrimination occurs, providing one has estimated first a model with only the h-variables in it. Suppose that one estimates Equation (6) and rejects the null hypothesis of no inequity in Equation (8). Suppose one then estimates a model along the lines of Equation (11) with private insurance coverage as the x-variable. Suppose this turns out to be significant and one cannot reject the hypothesis:

$$H_0: \quad a_r = a_p, \quad b_r = b_p \quad \text{and} \quad c_r = c_p = 0. \tag{13}$$

Then a reasonable inference would be that the rejection of the hypothesis in Equation (8) was due to differential private insurance coverage ($x_r \neq x_p$) and that it was this that was accounting for the difference in intercepts and slope coefficients in the first model. Again, a single-equation version of Equation (12) could be devised. The analogue of Equation (7) for Equation (12) is:

$$m_i = \pi_0 + \pi_1 y_i + \pi_2 h_i + \pi_3 y_i h_i + \pi_4 x_i + \pi_5 x_i y_i + u_i. \tag{14}$$

The null hypothesis of no inequity equivalent to that in Equation (13) then becomes

$$H_0: \quad \pi_1 = 0, \quad \pi_3 = 0, \quad \pi_4 = 0 \quad \text{and} \quad \pi_5 = 0. \tag{15}$$

4.1.2. Empirical tests of inequity

Benham and Benham (1975) estimate an equation similar to Equation (7) with y_i as a continuous variable but π_3 constrained to be zero. They find that the t-statistic on their estimate of π_1 is just below the critical value in their 1963 equation but is well below the critical value in their 1970 equation. They conclude that "the US has moved in the direction of greater equity" (p. 101). However, since π_3 is set equal to zero, this is an incomplete test.

Puffer (1986) estimates equations similar to Equation (7) for the UK and US, where m_i is a categorical variable defined over the number of primary care physician visits and y_i is one if the respondent is in the bottom income quartile.[49] In the case of the UK, π_1 and π_3 are typically zero, but the coefficient in the π_3 vector pertaining to gender is significant: the probability of contact is lower amongst those in the bottom quartile simply because being female has a smaller impact on contact probability amongst persons in the lower quartile. In the case of the US, π_1 and π_3 are insignificant except in the specification where excellent health is interacted with the bottom income quartile dummy; in this case, π_1 turns out to be significantly negative, implying that the care received by those not in excellent health is less if the person is in the bottom income quartile than otherwise.

Van Doorslaer et al. (1992) report results for eight countries of regressions along the lines of Equation (6). In their study, m_i is imputed medical care expenditures, based on the number of primary care visits, specialist/outpatient visits and hospital days, and separate regressions along the lines of Equation (1) are estimated for the five income quintiles. A two part model is run with the first part (zero versus positive imputed expenditures) being estimated as a logit model and the second part (the amount of imputed expenditures conditional on the figure being positive) by truncated OLS. The likelihood ratio tests of inequity in the first part are rejected in all countries except Denmark. By contrast, in all but two countries the hypothesis of no inequity is rejected in the second part and in all but two countries the null hypothesis is rejected for the two-part model overall. The rejection is especially decisive in the case of the US, but the intercepts and the coefficients on the health and demographic variables do not increase or decline monotonically across income quintiles.[50]

Birch et al. (1993, p. 96) estimate a two-part model version of Equation (7) for the use of family physician visits in Canada. They impose the constraint $\pi_5 = 0$ and correct for sample selectivity. Household income is entered as a continuous variable and need is proxied by self-assessed health status dummies. They find that the coefficients π_1 and

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[49] Comparing the UK and US in this area is difficult, of course, because primary care physicians in the US deliver care in some specialties that in the UK would be delivered by specialists.

[50] The largest intercept, for example, is the bottom quintile's. The smallest is the 2nd bottom quintile's.

π_3 are not significantly different from zero and conclude that "household income is not associated in any significant way with utilization" (p. 99).[51]

Hamilton et al. (1997) estimate ordered probability models for physician visits for both Canada and the US along the lines of Equation (14). In their paper, x-variables include variables such as years of education, marital status, race and doctors per 1000 population in the individual's local area. The income variable y_i is specified as income, income squared and income cubed. The coefficients π_3 and π_5 are constrained to be equal to zero, thereby ruling out some aspects of inequity – i.e. differences in the a's are allowed for, but not differences in the b's or c's. In the US, but not in Canada, the π_1 coefficient on income is significantly positive in the positive visits equation for males, and in the positive visits equation for females. The π_1 coefficients on all three income variables are significant in the US but not in Canada. However, given the inclusion of the x-variables in the models, and the zero restrictions placed on the π_3 and π_5 coefficients, one has to be careful about reading too much into the results.

The same is true of the results reported by Grytten et al. (1995), who estimate logistic regression models for patient- and physician-initiated visits in Norway for 1975 and 1985. Their models contain no interactions and their test of inequity is simply whether or not π_1 is significantly different from zero. They find that it is not and conclude from this "that equality of utilization has been achieved within a publicly financed primary health service" (p. 950). A fuller test would of course be to remove the zero restrictions on the interactions and test the restrictions in Equation (15).

In his study of equity in Sweden, Gerdtham (1997) also estimates a restricted model and tests only a subset of the restrictions implied by an equitable system. He estimates a variant of the single-equation version of Equation (14), where the x-variables include variables such as years of education, whether the individual lives in a large city and marital status, the income variable y_i is specified as a vector of quintile dummies, and as in Hamilton et al.'s paper, the coefficients π_3 and π_5 are constrained to be equal to zero. The model is estimated separately for different types of care using count-data methods. Some of the π_1 coefficients were significant in some of the physician contact regressions but not all.

Rosenzweig and Schultz (1991) also use a model along the lines of Equation (14) to test the hypothesis that prenatal medical services are provided to pregnant married women on the basis of medical need in the United States in 1980. They constrain π_3 and π_5 to be zero and test the joint hypothesis $\pi_1 = \pi_4 = 0$. They reject the hypothesis except in the case of amniocentesis. Their analysis goes further than the other literature in this area because (i) they attempt to control for unobserved initial health endowment of the child, and (ii) they attempt to infer which of four implicit pricing regimes prevails (including the allocation-according-to-need regime). With respect to (i), it has

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[51] The authors then estimate a variant of Equation (7) with $\pi_3 = 0$. They find some significant π_5 coefficients on x variables such as education, social support and region of residence and interpret this as pointing towards "non-income-related barriers to reasonable access" (p. 99).

been shown by Manning et al. (1982) that using subjective health measures ascertained *subsequent* to the use of medical services may lead to significant biases in the estimates of income or schooling effects. However, Rosenzweig and Schultz show that even the use of objective health indicators prior to treatment as need indicators may lead to inconsistent estimates if they are correlated with unmeasured initial health endowments. They get round this by employing instrumental variables for the child's birth endowment. With respect to (ii), they show that the difference between the income effect as estimated in the unconditional equations and in those conditional on endogenous health can distinguish which of four different regimes dominates prenatal care allocations: (a) the normal market regime where all consumers face the same care prices, (b) one in which implicit prices are lower for higher income groups because of tax deductibility of medical care expenses under progressive taxation, (c) a regime in which the poor face lower prices because of subsidy programmes such as Medicaid, and (d) a regime in which nobody pays user fees and health care is allocated on the basis of need. For all four prenatal services they examine (amniocentesis, Caesarian, ultrasound and X-ray) their estimates are consistent with regime (b): the conditional income effect is lower than the unconditional one, which means that the implicit price for these services is lower for the rich than the poor. According to these results, then, not only is it the case that prenatal care in the US is not allocated according to need; it is also the case that access to these services, defined in terms of prices, is unequal, with the rich enjoying better access than the poor. This, the authors argue, is because the distributional effects of tax subsidies, which benefit the better-off most, offset the distributional effects of Medicaid and other public programmes aimed at assisting the poor.[52]

4.2. Measuring inequity

The discussion of the previous section was concerned with *testing* for inequity. It does not enable inequity to be *quantified* – something that is essential if cross-country comparisons or comparisons over time are to be performed. The regression approach can, however, be extended to allow an index of inequity to be derived, providing one is prepared to accept a more general definition of horizontal equity.[53] So far, equity has been taken to mean that the intercepts and slope coefficients in the medical utilization equations should be the same for all income groups, i.e. in the case of Equation (6), $\alpha_r = \alpha_p$ and $\beta_r = \beta_p$. In other words a health care delivery system cannot be said to be horizontally equitable if the rich and poor are treated differently in *any* morbidity category. But what if the rich are treated favourably in one morbidity category (e.g. the non-sick category) but the poor are treated favourably in the other (e.g. the sick category)? A less restrictive definition of equity would regard such a situation as horizontally equitable

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[52] The relative weakness of the latter effects may have something to do with the low fees paid by Medicaid for the procedures analysed by Rozenzweig and Schultz (1991).
[53] What follows draws heavily on Wagstaff et al. (1991b) and Wagstaff and Van Doorslaer (2000).

on balance, providing any favourable treatment afforded to the poor amongst the sick was sufficiently large to offset the favourable treatment afforded to the rich amongst the non-sick. But how large does "sufficiently large" have to be before one can say that, on balance, no inequity exists?

4.2.1. A direct standardization-based index

One approach, suggested by Wagstaff, van Doorslaer and Paci (1991b), is to divide one's sample into income groups and then compute need-standardized medical care figures for each income group using the direct standardization method [cf. e.g. Rothman (1986)]. These figures indicate how much medical care people in each income group would have received if they had been in the same degree of need as the sample as a whole. The figures are obtained by applying the need characteristics of the sample to the mean medical care figures of the income group in question.

Let m_i denote the amount of medical care received by individual i in a given period. The distribution of medical care by income is captured by the medical care concentration curve $L_M(p)$ in Figure 5, which graphs the cumulative proportion of medical care against the cumulative proportion p of the sample, ranked by income. The concentration index, C_M, corresponding to $L_M(p)$ indicates the degree of *inequality* in the distribution of medical care but will tell us something about the degree of *inequity* only in the unlikely event that need for medical care does not vary with income. The extent of horizontal inequity can then be assessed by comparing the standardized concentration
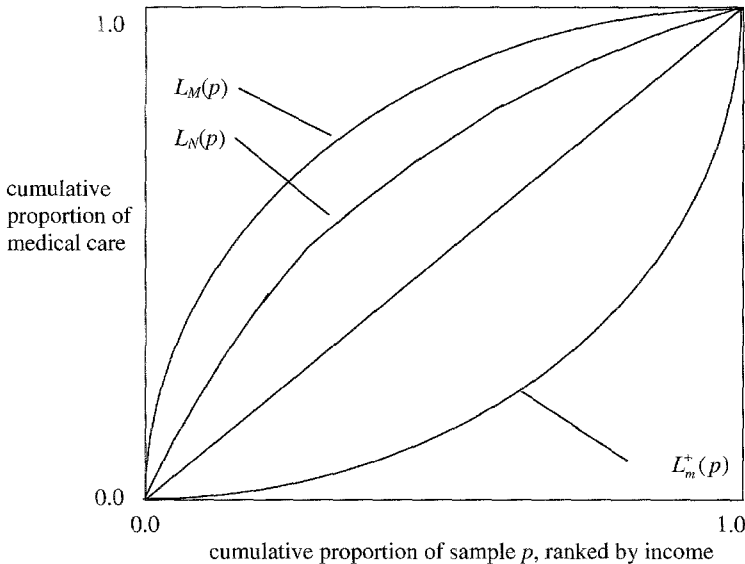

Figure 5. Concentration curves of medical care and need. Source: Wagstaff and van Doorslaer (2000).

curve, labelled in $L_M^+(p)$ Figure 5, with the diagonal. If $L_M^+(p)$ lies below (above) the diagonal, inequity exists and favours the better-off (worse-off). Two conditions can arise under which there is no inequity: (i) if $L_M^+(p)$ coincides with the diagonal (and the standardized medical care use is the same for all income groups) or (ii) if $L_M^+(p)$ crosses the diagonal (and inequity favouring the rich exactly compensates inequity favouring the poor). The degree of inequity can be measured as twice the area between $L_M^+(p)$ and the diagonal, or equivalently as:

$$HI_{\text{WVP}} = 1 - 2 \int_0^1 L_M^+(p)\,\mathrm{d}p = C_M^+, \tag{16}$$

where C_M^+ is the concentration index for directly standardized medical care, defined as twice the area between $L_M^+(p)$ and the diagonal. A positive (negative) value of C_M^+ indicates horizontal inequity favouring the better-off (worse-off). The standardized values of medical care can be computed simply by running a regression of m_i on x_i for each income group and then applying the population average value of x_i to the gth group's regression coefficients.

The discussion of statistical inference in Section 4.1 focused on testing the significance of differences across income groups in the regression coefficients used to compute the directly standardized medical care values underlying the HI_{WVP} index [cf. Van Doorslaer et al. (1992)]. This provides only a partial answer to the statistical inference question, since non-rejection of the null hypothesis is only a *sufficient* condition for HI_{WVP} to be zero. HI_{WVP} can also be zero if the concentration curve crosses the diagonal. Furthermore, no such test is available in the indirect standardization method discussed below. A complementary test of the *necessary* condition for no inequity requires a test of the index itself to be zero. Wagstaff and van Doorslaer (2000) present both convenient and more accurate estimators for the standard error of HI_{WVP} based on the work of Kakwani et al. (1997) that allow for the statistical testing of the index itself to be zero or to be different from other indices.

4.2.2. Empirical work using the direct-standardization-based index

Van Doorslaer et al. (1992) report HI_{WVP} indices for eight countries using a measure of imputed expenditures for GP visits, specialist visits and inpatient days.[54] In the direct standardization they include various indicators classified as either belonging to a medical, functional or subjective model of ill-health [cf. Blaxter (1989)]. However, not all indicators are available for each country and there is substantial variation in those that were included. Their results indicate that, in general, when multiple indicators are used in the standardization, the standardized medical expenditure distributions are less

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[54] More detailed results for each of these eight countries, and for France and Portugal, can be found in the country-specific chapters of Van Doorslaer et al. (1993).

pro-poor, or more pro-rich, than when only one indicator is included at a time. This suggests that inequalities in morbidity also exist within some of the morbidity categories used. When the most general need standardization specification available per country was used, four countries show a positive index (the Netherlands, Spain, UK and US) and four countries (Denmark, Ireland, Italy, Switzerland) show a negative index. But the authors warn against reading too much into these results in view of their sensitivity to the need indicators used in the standardization. Given their suspicion that the inequity values reported are likely to understate any inequity favouring the well-off, they conclude that pro-rich inequity almost certainly exists only in countries where inequity favouring the well-off was detected and the null-hypothesis was rejected (i.e. Spain, the UK and the US).

Propper and Upward (1992) report HI_{WVP} indices for the UK for the years 1974, 1982, 1985 and 1987. The measure of utilization is imputed expenditures as in the study by van Doorslaer et al. (1992) and the standardizing variables are age and gender, and the presence or absence of acute, limiting and non-limiting chronic illness. In each year the authors find inequity favouring the poor, but with an apparent trend upwards in the HI_{WVP} index from 1982 onwards ($HI_{WVP} = -0.06$ in 1987).

Lairson et al. (1995) analyse inequity in the delivery of health care in Australia in 1990 employing the same methods. They compute the HI_{WVP} index separately for the imputed expenditures for physician consultations (both GP and specialist), outpatient and inpatient care, and for the total of these three types of care. They too observe a sensitivity of their findings to the indicators used in the standardization. When using self-assessed health in the need standardization, they find substantial inequity favouring the rich ($HI_{WVP} = 0.06$), mainly as a result of the rich using more physician consultations and inpatient care than the poor, given their need. Inequity favouring the poor is found for outpatient care, and for all types of care if serious or chronic illness is included in the standardization.

4.2.3. An indirect standardization-based index

The method based on the direct standardization has a major disadvantage: it requires the use of grouped data and its usefulness is therefore limited by the fact that the value of C_M^+ will depend on the number of income groups G. An alternative [Wagstaff and van Doorslaer (2000)] is to employ the method of indirect standardization, which can be employed on individual-level data, as well as on grouped data. The indirect standardization generates a figure for each individual indicating the amount of medical care she would have received if she had been treated as others with the same need characteristics were, on average, treated. Wagstaff and van Doorslaer interpret this as her need for medical care.

The extent of horizontal inequity can be assessed by comparing the concentration curve of actual medical care utilization $L_M(p)$ with the need concentration curve, labelled $L_N(p)$ in Figure 5: if the latter lies above (below) the former, there is horizontal inequity favouring the better-off (worse-off). They define an alternative measure of hor-

izontal inequity (HI_{WV}) as twice the area between the need and medical care concentration curves:

$$HI_{WV} = 2 \int_0^1 \left[L_N(p) - L_M(p) \right] dp = C_M - C_N, \tag{17}$$

where C_N is the concentration index for need (i.e. indirectly standardized medical care). A positive (negative) value of HI_{WV} indicates horizontal inequity favouring the better-off (worse-off), whilst a zero value indicates that the factor of proportionality (between medical care and need) is the same irrespective of income. The indirectly standardized medical care figure, m_i^*, can also easily be computed using regression methods. Only one regression model needs to be estimated, rather than G. The standardized values are computed as the predicted values saved from an equation where medical care use is regressed on a vector of need indicators. Wagstaff and van Doorslaer (2000) show how both convenient-regression based and more accurate standard errors for HI_{WV} can be used for statistical inference.

4.2.4. Empirical work using the indirect standardization-based index

Wagstaff and van Doorslaer (2000) illustrate the use of the indirect standardization-based index using data from the Netherlands for 1992. Using a two-part model, they estimate standardized values for GP care, outpatient care and inpatient care utilization. They find mild pro-poor and non-significant inequity indices for GP and inpatient care, but high and significant pro-rich inequity for specialist outpatient care.

Van Doorslaer et al. (2000) have applied the indirect standardization approach to measuring and testing for horizontal inequity in the health care delivery systems in eleven countries. They compute HI_{WV} inequity indices for the imputed expenditures for two types of medical care utilization (physician visits and inpatient days) and for the total of these two. For some countries, total physician visits are further subdivided into GP and specialist visits. Some selected results for eight of the eleven countries – which are presented in Table 4 – illustrate their main conclusions.[55] They find little or no significant inequity in the distribution of total medical care expenditures, though the disaggregation shows that this is the result of opposite utilization patterns for inpatient care and physician consultations. Significant pro-rich inequity emerges for physician visits in four countries: Denmark, Finland, Sweden and the US. Further disaggregation for those countries for which it was feasible shows that this in turn results from even higher pro-rich inequity in specialist visits: the higher income groups use a lot more specialist services than is to be expected on the basis of need. Some pro-poor inequity is found for GP visits, but this is much smaller and only significant in the case of Belgium. Inpatient care is also distributed pro-poor but significantly so only in the cases of Belgium and

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[55] Results for Ireland and for East and West Germany have been excluded because the surveys used for these countries did not have all need indicators used in the specification reported here.

Table 4
HI_{WV} indices of horizontal inequity – selected countries

Country	Type of medical care utilization				
	GP visits	Specialist visits	All physician visits	Inpatient days	Total medical care
Belgium (1995)	**−0.033**	**0.039**	−0.013	**−0.090**	**−0.071**
Denmark (1994)	−0.003	**0.0834**	**0.049**	−0.065	−0.060
Finland (1996)	0.005	**0.056**	**0.036**	−0.070	−0.029
Netherlands (1992)	−0.006	**0.079**	0.021	−0.070	−0.038
Sweden (1990)	n.a.	n.a.	**0.030**	−0.029	−0.014
Switzerland (1992)	—	—	−0.004	0.056	0.040
UK (1989)	0.001	0.0275	0.014	**−0.051**	−0.016
US (1987)	n.a.	n.a.	**0.043**	−0.007	0.009

Notes:
(i) HI_{WV} indices are for need specification including age, sex, SAH vector and dummy chronic illness;
(ii) significant indices in bold ($p < 0.05$).
   Source: Van Doorslaer, Wagstaff et al. (1999).

the UK. Because of the importance of inpatient care utilization in overall expenditures, the latter is also distributed pro-poor in all countries except the US and Switzerland. It is, however, never significant except in the case of Belgium. Surprisingly, the finding of significant pro-rich inequity in the utilization of physician visits, especially in specialist visits, does not seem to be clearly associated with specific delivery system character-istics. It seems to occur in countries with universal coverage (e.g. the Scandinavian countries) as well as in those with incomplete coverage (e.g. the US), in countries with (e.g. Denmark, Netherlands) and without (e.g. Belgium) a GP gatekeeper role, and in countries with (e.g. Belgium) and without (e.g. Denmark) substantial cost sharing by patients. On the other hand, it does not emerge in two countries (Switzerland and the UK) which seem to have few system characteristics in common.

5. Equality of health

As indicated in Section 2, it can plausibly be argued that all concerns about the distribu-tion of health care – or access to health care – stem ultimately from a more fundamental concern about the distribution of health itself. The absence of any health inequality at all may well be an unattainable goal but health care systems *can* influence the extent to which health inequalities exist and the extent to which they are systematically related to characteristics such as socioeconomic status, place of residence, race, etc. In any dis-cussion of equity in health care delivery it is of some interest, therefore, to consider (if not focus on) the extent to which existing delivery systems bring health distributions

closer to an equal distribution. Any attempt to measure such an impact encounters the problems of how to measure health, how to measure inequalities in its distribution and how to establish the marginal impact on this distribution of the various determinants of health inequality. The problem is compounded by the well-known fact that variations in health seem to be largely determined by factors outside of the health care system – some known, some not known – which have to be adequately controlled for when trying to single out the impact of a particular system's characteristics.[56]

There is, in fact, a large literature on inequalities in health, some of which comes from economists. It is this part of the literature that is the subject of this section. Some of this work is concerned with *pure* inequalities in health – i.e. the variation in health within a country at any particular time. The rest of the work, like most of the work in this area by non-economists, concerns *socioeconomic* inequalities in health – i.e. the variation in health which is systematically related to socioeconomic status. We survey both types of work and report the results of efforts to see whether there is any systematic variation in health inequalities across countries, and if so, whether there seems to be any relationship between health inequalities and country characteristics, especially those relating to the features of their health care systems.

5.1. Pure inequalities in health

The literature here is concerned with pure inequality, in much the same way as the economics literature on income inequality is largely concerned with pure inequality. The aim is simply to see how far there is inequality in measures of health or ill-health across people, irrespective of where they happen to be on the socioeconomic ladder. This approach does not, in contrast to the approach considered in Section 5.2, capture whether persons in poor health are rich or poor, or professionals or unskilled manual workers, or highly educated or educated only to school-leaving age. That, argue the advocates of the pure inequality approach, is properly viewed as part of the process of *explaining* health inequalities, not part of the process of *measuring* them [cf. e.g. Illsley and Le Grand (1987)].

5.1.1. Measurement of pure health inequality

The approach proceeds using standard measures of inequality developed in the income inequality literature. For example, suppose that health is being measured in terms of the number of years a person lives. One then lines people up according to their age at death and plots on the horizontal axis the cumulative percentage of the population and on the vertical axis the cumulative percentage of years of life. Since not everyone dies at the same age, the resultant graph will be a Lorenz curve along the lines of Figure 6.[57]

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[56] For a recent account of the wide spectrum of determinants of population health, see e.g. Evans et al. (1994).

[57] The use of the Lorenz curve to measure inequalities in age at death was first proposed by Le Grand (1985).
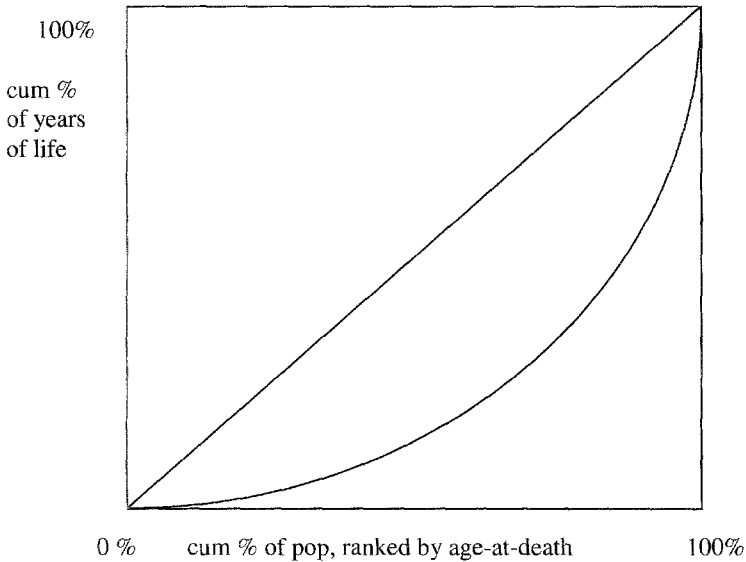
Figure 6. Lorenz curve of inequality in age-at-death.

This can be compared with the diagonal to assess the extent of inequality and the Gini coefficient thus provides a measure of pure inequality in age at death.[58] It takes a value of zero when everyone dies at the same age and a value of one when all but one person die at birth. This is a measure of *relative* inequality – if everyone's age at death doubles, the Gini coefficient doesn't change. By multiplying the Gini coefficient by the mean age a death, one obtains a measure of *absolute* inequality – the absolute Gini coefficient or the average mean deviation. This *doubles* if everyone's age at death doubles. Alternatives to the Gini index could, of course, be used. Amongst those used in this literature are the variance and Atkinson's (1970) index, but in principle one could use any of the other measures of inequality used in the income inequality literature [cf. Cowell (1995), Lambert (1993)].

5.1.2. Empirical work on pure health inequalities

Illsley and Le Grand (1987) report mean age-at-death and the Gini coefficient for mean age-at-death for England and Wales. They find that mean age-at-death has risen almost continuously over the period 1921–1983: from 60 to 70 in the case of males, and from

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[58] Or equivalently it is equal to the area between the Lorenz curve and the diagonal expressed as a proportion of the area underneath the diagonal. The two are equivalent because the area under the diagonal is equal to one half.

69 to 77 in the case of females. Over the same period, the Gini coefficient for age-at-death has fallen almost continuously, from 0.24 to 0.12 for males and from 0.18 to 0.11 for females. They also find that inequality varies across causes of death (the causes with the lowest variance in age-at-death in 1981 are cancer and circulatory diseases and those with the highest variance are accidents and infectious diseases) and that for some causes of death the level of inequality has changed considerably over time (the variance in age-at-death for infectious diseases fell dramatically over the period in question).

Le Grand (1987, 1989) reports the results of an international comparison of inequalities in age at death using the Gini coefficient, the absolute Gini and Atkinson's index. Le Grand presents both unstandardized and standardized results. The former are based on crude death rates. The latter are obtained using the indirect standardization: the resultant rates thus give the number of deaths that would have occurred at each age in the country in question, if it had had the same population distribution as the standard country (England and Wales). Le Grand (1989) finds low Ginis for the standardized values in Finland, Germany, Ireland, Luxembourg, the Netherlands and the UK, and high Ginis in France, Poland, Portugal, Romania, the US and Yugoslavia.

Given what is known about the importance of non-medical determinants of health, one cannot conclude that all of the cross-country differences in inequality in age-at-death are attributable to differences in the health care system. Le Grand (1987) reports some rather interesting regression results that shed some light on the sources of differences in inequality in age-at-death. Surprisingly, he finds that the more a country spends on medical care per capita, the *higher* is its inequality in age-at-death but the degree of inequality does *not* depend on the share of medical care expenditure that is publicly financed. What *does* seem to be important is a country's GNP *per capita* (the higher this is, the less inequality there is in age-at-death) and the degree of inequality in income (the lower this is, the less inequality there is).

5.2. Socioeconomic inequalities in health

The pure inequality approach does not pick up the socioeconomic dimension to health inequalities: it does not pick up whether the people in bad health are rich or poor. This aspect of the approach has been criticized by non-economists who feel the socioeconomic dimension is an integral part of the measurement exercise and should not be pushed back to the explanation exercise.

5.2.1. Measuring socioeconomic inequalities in health

An alternative to the Gini coefficient that takes into account each person's rank in the socioeconomic distribution is the concentration curve approach.[59] Suppose, as before, health is measured in terms of the number of years a person lives. This time people are

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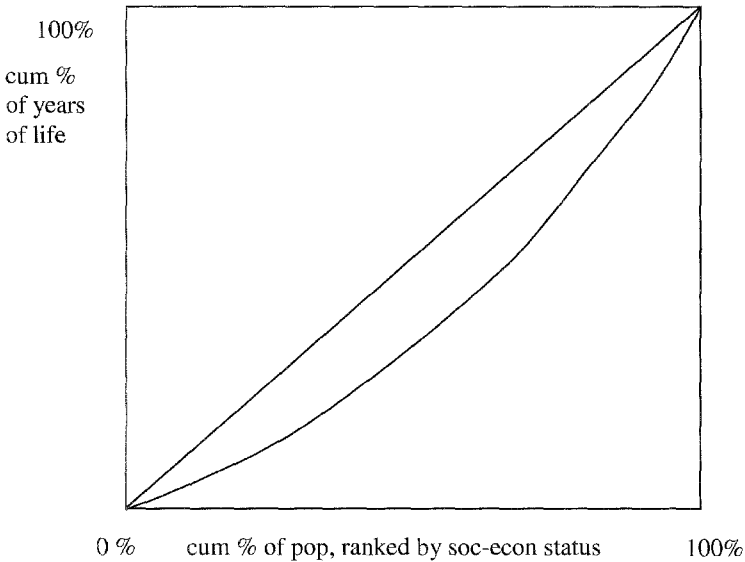[59] Wagstaff et al. (1989, 1991a), Kakwani et al. (1997).

Figure 7. Concentration curve of age-at-death.

lined up not according to their age at death but according to their socioeconomic status, beginning with the most disadvantaged.[60] We might measure socioeconomic status in terms of social (i.e. occupational) class, or educational attainment, or income, or whatever. We then plot on the horizontal axis the cumulative percentage of the population (ranked by socioeconomic status) and on the vertical axis the cumulative percentage of years of life. Insofar as those towards the bottom of the socioeconomic ladder die earlier than those at the top, the resultant graph will look like Figure 7. This concentration curve differs from the Lorenz curve in Figure 6 in that, unlike the latter, it remembers people's socioeconomic status.

The concentration curve can be compared with the diagonal to assess the extent of socioeconomic inequality in health. If country X has a concentration curve that lies everywhere closer to the diagonal than country Y, we can reasonably say that X has a lower level of socioeconomic inequality in health than Y. The concentration index provides a measure of socioeconomic inequality in health, being defined as twice the area between the concentration curve and the diagonal and taking a value of zero when everyone dies at the same age and a value of one when all but the least disadvantaged

[60] The procedure outlined in this paragraph and the next was proposed by Wagstaff et al. (1989). See Wagstaff et al. (1991a) for further details.

person die at birth.[61] Like the Gini coefficient, this is a measure of relative inequality – if everyone's age at death doubles, the concentration index doesn't change. By multiplying the concentration index by the mean age a death, one obtains a measure of absolute inequality – the absolute concentration index. This, of course, doubles if everyone's age at death doubles. The concentration index will give the same result as the Gini coefficient only if people's order in the health parade is the same as their position in their socioeconomic status parade.

It is possible, as we shall see below, to adapt the concentration index for *any* measure of health or indeed ill-health. In the case of ill-health, the concentration curve will lie above the diagonal if ill-health is concentrated amongst those at the bottom of the socioeconomic ladder. In this case, the concentration index is negative. The concentration curve approach can also be used with grouped data. For example, the data may refer to differences by social class or by some other categorical measure of socioeconomic status.

The approach can be used with unstandardized or standardized data [Kakwani et al. (1997)]. In the case where the direct standardization is used, one has to work necessarily with grouped data (e.g. income groups) and one obtains age–sex standardized values of one's health or ill-health variable for each group from which a new concentration curve can be constructed. To assess the degree of inequality, this is compared to the diagonal. Twice the area between the concentration curve and the diagonal is the directly standardized concentration index and is denoted in Kakwani et al. by C^+. If the indirect standardization is used, one obtains a concentration curve that indicates the distribution of health or ill-health by socioeconomic status that would be observed simply through the covariance between demographic factors and socio-economic status. Twice the area between the actual concentration curve and this counterfactual curve gives the inequality index appropriate for measuring inequalities using the indirect standardization. This is denoted by I^* in Kakwani et al.

The concentration index has a number of attractions as a measure of socioeconomic inequalities in health. Unlike the range, used often by non-economists, it reflects the experiences of the entire population and not just those of the two extreme groups. It is also sensitive to the distribution of the population across socioeconomic groups – unlike the range, for example, the index would change if the sizes of the various groups changed even if their mean age at death did not. Furthermore, since the concentration curve remembers people's socioeconomic status, the index ensures that the socioeconomic dimension to inequalities is taken into account. This distinguishes the concentration index from the Gini coefficient as well as several other inequality measures that have been

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[61] Or equivalently it is equal to the area between the Lorenz curve and the diagonal expressed as a proportion of the area underneath the diagonal. The two are equivalent because the area under the diagonal is equal to one half.

used by non-economists in the mistaken belief that their index does indeed capture the socioeconomic dimension.[62]

One index used by non-economists that *does* capture the socioeconomic dimension to health inequalities is the slope index of inequality (*SII*). This, it turns out, is closely related to the concentration index.[63] As in that approach, people are ranked by their socioeconomic status, beginning with the most disadvantaged. A bar is then drawn for each socioeconomic group whose height is equal to the class's mean health (or age at death or whatever) and whose width is equal to the proportion of the population in the class in question. The midpoints of each bar measured on the horizontal axis indicate the relative rank of each class. For example, if the bottom class contains 20% of the population, its relative rank is 0.1, and so on. A regression line is then estimated with the observations being the midpoints of the *top* of each bar.[64] The slope of this line is the *SII* – it indicates the change in health associated with moving from the bottom of the parade to the top. The *SII* is a measure of absolute inequality – if everyone's health doubles, the *SII* doubles. A variation on the *SII* which is a measure of relative inequality is the relative index of inequality (*RII*), which is simply the *SII* divided by mean health. Clearly, if everyone's health doubles, the *RII* remains unaffected.

It turns out that the *RII* is equal to the concentration index, divided by twice the variance of the relative rank variable, and the absolute concentration index is equal to the *RII*, multiplied by the same amount.[65] So, the concentration index and the *RII* ought to produce identical rankings when comparisons are being made over time or across countries, as will the absolute concentration index and the *SII*. The equivalence between the concentration index and the SII also suggests a quick way of computing the concentration index – line people up by their socioeconomic status and run a regression of their health or ill-health on their relative rank. This in turn suggests a straightforward way of obtaining standard errors for the concentration index. However, as Kakwani et al. (1997) have shown, such standard errors are potentially unreliable due to the serial correlation induced by the ranking variable. They develop alternative standard error estimators.

5.2.2. Empirical work on socioeconomic inequalities in health

A large number of studies of socioeconomic inequalities in morbidity and mortality has been undertaken by non-economists using the *SII* or *RII*. These are not surveyed here. We focus instead on contributions to this field from economists; this has, for the most part, been based on concentration indices.

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[62] This is true of the pseudo Lorenz curves used by Preston et al. (1981) and Leclerc et al. (1990), the index of dissimilarity used by Preston et al. (1981), and Koskinen (1985), and the index of inequality used by Pappas et al. (1993). See Wagstaff et al. (1991a) for further details.

[63] Wagstaff et al. (1991a), Kakwani et al. (1997).

[64] To ensure homoscedasticity the equation has to be estimated using weighted least squares rather than ordinary least squares. See Wagstaff et al. (1991a) for details.

[65] Wagstaff et al. (1991a), Kakwani et al. (1997).

Propper and Upward (1992) use the concentration index approach to analyse health inequalities in the UK for the years 1974, 1982, 1985 and 1987. They employ four different measures of health: the presence or absence of acute illness (illness or injury restricting activity in the previous two weeks); the presence or absence of non-limiting chronic illness; the presence or absence of limiting chronic illness; and whether or not people rate their health as "not good" on a scale including "not good", "fairly good" and "good". Individuals were ranked by equivalent household income and the analysis was restricted to adults. With the exception of non-limiting chronic illness in 1985 and 1987, pro-rich inequalities were found in each year for each indicator. Inequalities were most pronounced for the self-assessed health variable, but were also fairly pronounced for the limiting chronic illness variable. Except in the case of non-limiting chronic illness, inequalities increased between 1974 and 1982, and then again between 1982 and 1985. Between 1985 and 1987, however, they fell – in the cases of acute illness and limiting chronic illness, back to their 1982 levels; in the case of self-assessed health, even further.

Van Doorslaer et al. (1997) present the results of an analysis of inequalities in self-assessed health for nine countries. As in the study of Propper and Upward, individuals were ranked by equivalent household income. Ill-health was measured by the multiple-category responses from a question in which respondents were asked to rate their general health status, with categories such as Excellent, Very Good, Good, Fair and Poor. Responses to this question have been found to be good predictors of subsequent mortality in a variety of industrialized countries [Idler and Benyamini (1997)]. A difficulty in an comparative context is that the number of categories is not always the same in all surveys. In any case, converting the variable into a dichotomous one by dividing the sample into those whose health is, say, at least good, and the rest, by choosing some arbitrary cut-off point, as is often done,[66] is problematic, since it can lead to different conclusions concerning trends in or differences in inequalities in health, depending on where the cut-off point is chosen.[67] Instead of dichotomizing the self-assessed health question, it was assumed that underlying the responses to it is a latent variable with a standard lognormal distribution.[68] In effect, the latent health scores for each of the response categories are obtained by dividing up the area under the standard lognormal distribution according to sample proportions falling into each of the response categories. Each respondent is assigned the latent health score corresponding to their response. This score is increasing in ill health, since the best response category is put at the left-hand tail of the distribution. The lognormality assumption means that the difference between Excellent and Good is smaller than the difference between Good and Fair, which is, in turn, smaller than the difference between Fair and Poor, and so on. Individuals were ranked by equivalent household income and the direct method of standardization was used. The study found pro-rich inequalities in latent ill-health in all nine countries, with

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[66] Cf. e.g. Wagstaff et al. (1989).
[67] Cf. Kunst (1992), Kunst et al. (1995) and Wagstaff and Van Doorslaer (1994).
[68] This method was proposed by Wagstaff and Van Doorslaer (1994).

low levels of inequality in Sweden and East Germany and high levels in the UK and
US. In all countries inequality was found to be significant. The US was found to have a
significantly higher level of inequality than the UK, which, in turn, had a significantly
higher level of inequality than the remaining countries, amongst which no significant
differences in inequality were found. Dominance-checking was also undertaken. The
results showed that the US concentration curve lay everywhere outside the UK's, which
in turn lay everywhere outside all the remaining curves apart from that of the Nether-
lands.

Van Doorslaer et al. go on to explore the statistical association between health in-
equality indices and two measures of health spending and the level and distribution of
income for the nine countries in the study.[69] Neither total health care expenditure per
capita, nor the percentage of total expenditure spent publicly appear to have any sta-
tistical association with health inequality, suggesting that neither higher spending, nor
higher public sector shares are associated with lower health inequality. Of the two other
variables – the GDP per capita and the Gini coefficient of income inequality – only
the latter proved to bear a consistent and significant positive association with health
inequality. It appears, therefore, that income-related inequality in health is more associ-
ated – in these countries, at least – with the distribution of income in a society than to
its aggregate income level or its levels of health spending.

The results reported in the study by van Doorslaer et al. may be sensitive to the
choice of transformation of the self-assessed health responses. Two recent studies shed
light on this issue. Gerdtham et al. (1998) obtain, by means of a survey undertaken
in Uppsala County, information on income, self-assessed health and two measures of
quality of life (QoL) – a visual analogue rating scale (RS) measure and a time trade-off
(TTO) measure. They then compare the average QoL scores of persons reporting their
health as Excellent, Very Good, Good, Fair and Poor. They find that for both the RS
and TTO results, the difference between Excellent and Very Good is smaller than the
difference between Very Good and Good, which is, in turn, smaller than the difference
between Good and Fair, which is, in turn, smaller than the difference between Fair and
Poor. This lends some support to the lognormal transformation. Gerdtham et al. go on to
compute concentration indices for self-assessed health and the two QoL measures. They
find no statistically significant differences between the three inequality index values. A
similar finding is reported by Humphries and van Doorslaer (1998). They compute the
directly standardized concentration index for two alternative measures of health: the
self-assessed health question, with responses scored using the latent variable approach,
and the McMaster Health Utility Index, a generic health index that captures both quan-
titative and qualitative aspects of eight dimensions of health, namely vision, hearing,

[69] These variables were chosen because they had been used before in a cross-country comparison of (non-
income-related) health inequality by Le Grand (1987). One rationale for including aggregate health spending
would be that its coefficient would capture any differences across the income distribution in the impact of
health spending on health [cf. Bidani and Ravallion (1997)].

speech, ambulation, dexterity, emotion, cognition, and pain. The authors find that in-equalities in ill-health are slightly higher when measured using the self-assessed health variable than when measured using the HUI, but not significantly so.

6. Conclusions

In all of the areas covered by the survey, useful progress has been made and important conclusions have been reached. There are, of course, important issues that remain unre-solved – both at the conceptual and empirical levels – but work in the area has advanced, especially over the last 15 years or so, and is continuing to do so.

On the issue of the nature of equity, a number of useful lessons have been learnt, but a number of questions remain unanswered. These have been outlined in Section 2.2.5 and do not need repeating here. Important contributions have been made by economists in this area, with the issues now being more sharply focused than was the case 10 or 15 years ago. Nonetheless, there is still a divergence of views on key normative issues. It seems quite probable that such differences will persist. Differences persist amongst philosophers and others on these issues, and it seems unrealistic to expect economists – who are, after all, not noted for their ability to agree with one another – to agree on them. On the empirical work reviewed in Sections 3–5, a clearer picture is emerging. This work has continued apace, with substantial but successful importation from other areas of economics, notably the fields of public finance, income distribution and redis-tribution, and labour economics. Like other areas on the microeconomic side of health economics, the work has benefitted from the huge advances in personal computer tech-nology over the last 15 years.

What, then, has been learnt from this empirical work? On the issue of health care financing, there is now a body of evidence showing the regressiveness of out-of-pocket payments, especially in countries such as the US. Clear pictures have emerged concern-ing the progressivity of other financing sources. Taxation tends to be a progressive way of raising revenues, but the degree of progressivity depends on the mix between direct and indirect taxes, and whether the direct taxes are general taxes or semi-earmarked local taxes of the type used in Scandinavia. Social insurance emerges as progressive in countries where the higher income groups are included in the scheme, and regres-sive where they are not; in such countries, this is partially offset by a more progressive private insurance structure than would otherwise be the case. Private insurance is regres-sive in countries such as the US where the bulk of the population relies on it for cover. The literature has also produced useful insights into the progressivity consequences of financing reforms and changes: the reforms proposed for the US in the early 1990s would have reduced the system's overall regressiveness; the increase in private insur-ance and out-of-pocket payments in Australia between 1984 and 1989 moved the system from progressive to broadly proportional; and the ill-fated Dekker proposals would have reduced but not eliminated the regressiveness of the Dutch health care financing system. Useful results have also been produced on the issue of horizontal equity in health care

finance. These suggest that although horizontal inequity does have an impact on the distribution of income, the impact is very small compared to the effect of progressivity: in cases where the source in question is progressive, horizontal equity reduces the pro-poor redistributive effect, but not by much. The results also point to cross-source and cross-country variation: horizontal inequity in social insurance is more pronounced in absolute and relative terms in France and Germany than in the UK and US; horizontal differences are more pronounced in the case of private payments than public payments, reflecting in part the greater degree of voluntariness (some choose to privately insure, whilst others choose not to), but also the randomness associated with ill-health which is part of the cause of the large horizontal differences observed in out-of-pocket payments.

Studies *testing* for inequity in the delivery of health care (i.e. unequal treatment for equal need) have varied somewhat in their model specifications and methods, but nonetheless some tentative conclusions can be drawn. There is growing evidence that in the US the distribution of health care by income is *not* consistent with health care being allocated according to need: this emerges in studies just of the US, as well as in comparative studies in which other countries (Canada and various of the EU countries) typically emerge in a more favourable light. Studies that have sought to *measure* the degree of inequity have reached much the same conclusion, though there is some evidence that in some countries (including the US) pro-poor inequities in inpatient care are compensating for pro-rich inequity in specialist and outpatient care. Interestingly, this does not seem to be true of Australia where, overall, there appears to be substantial pro-rich inequity in the delivery of health care. Interestingly, too, there does not appear to be any straightforward link within the EU countries between the degree of inequity overall and the features of the system (e.g. whether GPs have a gatekeeper role, whether copayments are high, etc.).

The research by economists on health inequalities has examined both pure inequalities and socioeconomic inequalities in health. Unsurprisingly, given that the rank correlation between health and socioeconomic status is not unity, the results produce rather different findings. The UK, for example, appears to have a relatively low level of pure inequality in age-at-death but a relatively high level of income-related inequality in self-assessed health. The US, by contrast, has high levels of both types of inequality. Work on both areas has also shed light on the *causes* of cross-country variations in health inequality; interestingly, in both exercises, income inequality emerges as an important predictor of health inequality.

In all three empirical areas, then, important lessons have been learnt. There is clearly scope for more work in all areas, especially work aimed at unravelling the *causes* of inequity. We know a fair amount about the factors responsible for the cross-country and cross-source variation in the progressivity of health care finance. We know much less about the relative contributions of factors that give rise to differences in horizontal equity in this area. Nor do we know much about the ultimate causes of inequity in health care delivery – what the principle factors are within countries that prevent equals being treated equally by the health care system, or what role system differences have in accounting for cross-country variations in inequity. We also need to know more about

the economic causes of health inequalities and the factors accounting for cross-country differences. Given the progress that has been made over the last 15 years, it would not seem forlorn to hope that these issues will be much better understood by the time the second edition of the *Handbook of Health Economics* is published.

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