Measuring Equity in Health Care Financing: Reflections on and Alternatives to the World Health Organization's Fairness of Financing Index

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Summary

In its latest World Health Report, the World Health Organization argues that a key dimension of a health system's performance is the fairness of its financing system. In addition to discussing the ways policymakers can improve this aspect of performance, the report proposes an index of fairness, discusses how it should be operationalized, and presents a league table of countries ranked by the fairness with which their health services are financed. This paper provides a critical assessment of the WHO index. It shows that the index cannot discriminate between health financing systems that are regressive and those that are progressive, and cannot discriminate between horizontal inequity and progressivity/regressivity. The paper compares the WHO index to an alternative and more illuminating approach developed in the income redistribution literature in the early 1990s and used in the late 1990s to study the fairness of various OECD countries' health financing systems. It ends with an illustrative empirical comparison of the two approaches using data on out-of-pocket payments for health services in Vietnam for two years—1993 and 1998. This analysis is of some interest in its own right, given the large share of health spending from out-of-pocket payments in Vietnam, and the changes in fees and drug prices over the 1990s.

I. Introduction

In its latest World Health Report (WHR) *Health Systems: Improving Performance*, the World Health Organization [1] breaks new ground not only by focusing attention on the performance of health systems, but also by arguing that a key dimension of a health system's performance is the fairness of its financing system. In addition to discussing the ways policymakers can improve fairness in health financing, the report proposes an index of fairness, discusses how it should be operationalized, and goes on to present a league table of the world's 191 countries ranked by the fairness with which their health services are financed. Apparently, the report has been the subject of a good deal of comment—favorable and unfavorable, it seems—but for the most part this appears to have been amongst journalists and policymakers. Critical assessments by researchers of the report's methods and results have been limited to date. Such assessments are, however, clearly important, given the potential impact the report and its league tables may have on policymakers and the international development community.

The aim of this paper is to provide an assessment of the report's quantitative work on the fairness of health care financing. Regrettably, the focus of the paper has been confined to the properties of WHO's fairness index, since no details are available about the empirical work on financing presented in the report.[1] The only thing that can be said with any certainty is that although values of the WHO fairness index are presented for 191 countries, *in only 19 of these was the index computed from household survey data*. Indeed, in all but one of the countries ranked in the top 40 (Colombia) the FFC index was "estimated". Whilst it is not unheard of to interpolate "missing" data in this way, it is surprising that no documentation is available setting out the methods used. Perhaps even more surprising is that WHO should attach so much importance to the values of the index for the 172 countries where index values were estimated.[2] The concerns that several health ministers have expressed about the WHR rankings are, in such circumstances, understandable.

The paper begins in section II with a discussion of the ethical premise underlying the WHO index—that households ought to be expected to pay for health care in line with their ability to pay. The paper suggests that the ability-to-pay principle is best understood in terms of a desire on the part of policymakers to limit the impact of health care payments on the distribution of disposable income. Whilst there appears to be a good deal of support for the general principle, the proportionality version of it adopted by the WHO is harder to defend. The paper goes on in section III to draw out the properties of the WHO index and in section IV argues that they are highly unattractive. The index is unable to distinguish between progressive and regressive payments, and is also unable to distinguish between cases where households on

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[1] Discussion papers have been promised but have yet to appear on the WHO website. One might even have hoped that they would have been written and distributed in time to provide the basis for a discussion of the methods prior to the work being undertaken.

[2] In the 1991 World Bank's *World Development Report*, for example, poverty indices were estimated for 22 countries out of 86, but the 22 countries covered 76% of the population of the 86 countries, and only regional aggregates were published (the country-specific values were never made public precisely because they were felt to be too imprecise) (cf. Ravallion et al. 1991).

different incomes pay different shares of their income in health care payments and cases where households at the same income pay different amounts for health care. The index is also sensitive to the overall average share of income spent on health care. Section V outlines an alternative approach developed in the income redistribution literature and used in the health economics literature in the late 1990s. This approach explicitly approaches the fairness of health financing in terms of its impact on the distribution of income, and allows one to show the separate redistributive effects of the average proportion of income spent on health care, the progressivity or regressiveness of the payment structure, the horizontal inequities in the financing system, and the extent of reranking generated by it (well-off households becoming poor, and vice versa). The paper ends in section VI with an empirical illustration of this method using data on out-of-pocket payments from Vietnam for two years—1993 and 1998. Though this is intended simply as an illustration of the two approaches, the analysis is of some interest from a policy perspective. A recent assessment of the Vietnamese health sector [2] highlighted Vietnam's heavy reliance on out-of-pocket payments to finance health care—81% of health spending in Vietnam was financed privately in 1997, and this was almost entirely paid out-of-pocket. The assessment also highlighted, however, two important changes over the course of the 1990s: rising user fees (even at supposedly free commune health centers), offset—at least in part—by reductions in the cost of medicines.

II. Health Care Payments and Ability to Pay

WHO calls its index an index of fairness of financial contribution (FFC). The index aims to capture empirically the financial protection issue highlighted in chapter 5 of the WHR. This is evidently only one aspect of fairness in health financing, since the way a country finances its health care—and in particular the balance it strikes between pre-payments and out-of-pocket payments—has implications not just for how people pay for health care (the focus of the FFC index) but also for who uses health services, how often and how much. The FFC index does not capture—*and does not purport to capture*—how fair a financing system is in terms of its impact on the distribution of access to and utilization of health services. The limited objective of the FFC index—and the alternative suggested below—needs to be borne in mind.

LINKING PAYMENTS TO ABILITY TO PAY—WHY?

The WHR argues that a key dimension of performance in a health care system is how fairly it protects households financially. Underlying the FFC index is one particular interpretation of the term "fairness in financial protection", namely that *households ought to be required to pay for health care in line with their ability-to-pay* (ATP). There appears, in fact, to be widespread support amongst policymakers and the public at large for the principle of linking health care payments to ability to pay [3]. There has, however, been relatively little discussion of the rationale underlying this. As Culyer [4] notes, one obvious, reason that might be advanced in support of the principle is that policymakers are concerned that payments for health care affect people's ability to seek health care when ill. This concern stems from a more fundamental concern of policymakers with the distribution of health service utilization and ultimately with the distribution of health itself. But this simply provides a rationale for de-linking payments and utilization—it does not provide a rationale for linking payments to ATP [5]. A flat-rate tax, for

example, would de-link payments from service utilization but would not link payments to ability to pay.

There is, however, as Culyer notes, another reason why policymakers may be concerned to link payments for health services to ATP rather than to service usage, namely that payments for health services reduce households' ability to buy other goods and services (e.g. food), and policymakers are concerned about the distribution of these *as well as about the distribution of health services*. Policymakers, in other words, are not so much concerned about the distribution of health care payments *per se*. Rather they are concerned to ensure that this the distribution does not have an unduly adverse effect on the distribution of disposable income. It is in this sense that policymakers appear to wish to link payments for health care to households' ATP.

This begs the question, of course, of why policymakers appear to take the view that it is *not* fair for a household's disposable income to be compromised by payments for health care but that it *is* fair for a household's disposable income to be compromised by spending on, say, a skiing vacation, or a gas-guzzling sports utility vehicle. The reason for this is probably that policymakers see health care payments as an involuntary item of expenditure, brought about by an unwanted health shock and required in order to restore health status to its previous level, or as close to it as is possible, and take the view that the community as a whole should jointly bear the financial burden of such shocks in order that the distributions of health status *and* disposable income are not worsened.[3]

LINKING PAYMENTS TO ABILITY TO PAY—HOW?

Requiring that health care payments be linked to ability to pay can be interpreted in terms of *vertical equity* (in this case the requirement that households of unequal ability to pay make appropriately dissimilar payments) and *horizontal equity* (the requirement that households of the same ability to pay make the same contribution) [3]. In the case of vertical equity, consideration has to be given to the precise form that the differential treatment should take. Should better-off households be paying more than worse-off households in absolute terms or in proportional terms? In the latter case, vertical equity would require that payments be progressive. In the former case, payments could be proportional to ability-to-pay, or even regressive (poorer households paying a larger share of their income than better-off households). Though many policymakers appear to support the application of the ability-to-pay principle to health care finance, rarely—if ever—do policies and policymakers specify the "appropriate" degree of progressivity.

In constructing its FFC index, the WHO starts from the premise that health care payments ought to be *proportional* to ATP. In other words, everyone—irrespective of their ATP—ought to pay the same proportion of their ATP on health care. We discuss below the appropriateness of this premise. Suffice to say for the moment that its adoption allows WHO to construct an index that simply focuses on disproportionality.

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[3] There are other possibilities with respect to the impact on incomes. One is that policymakers wish to reduce the impact on poverty rather than income inequality—cf. Wagstaff, Watanabe and van Doorslaer (2000).

III. WHO's FFC Index and its Properties

Let us suppose for the moment that we have some measure of ability to pay. (Below we will have something to say about WHO's approach to measuring ATP. We can safely put these concerns aside for the moment—if the index makes sense, it should not hinge on one particular operationalization of the concept of ability to pay.) The WHO index computes, for each household, health care spending expressed as a proportion of the household's ability to pay. The report calls this ratio *HFC*—health financing contribution. The WHO index of fairness of this contribution captures the variation of HFC around its mean. Specifically, the index for a given country is the third absolute moment around the mean of HFC:

$$(1) \qquad FFC = 1 - 4\frac{\sum_{h=1}^{H}\left|HFC_h - \overline{HFC}\right|^3}{0.125H}$$

where FFC is fairness of financial contribution, *h* indexes households, and *H* is the number of households in the sample. The index is similar to the variance, but gives a greater weight to values far from the mean. It is expressed in such a way that it takes a value of one when everyone pays the same proportion of their ATP in health care payments, and has a value of less than one when there is inequality in health care payments as a proportion of ATP.

The FFC index has three noteworthy properties. The rest of this section sets these out. The next section discusses their desirability.

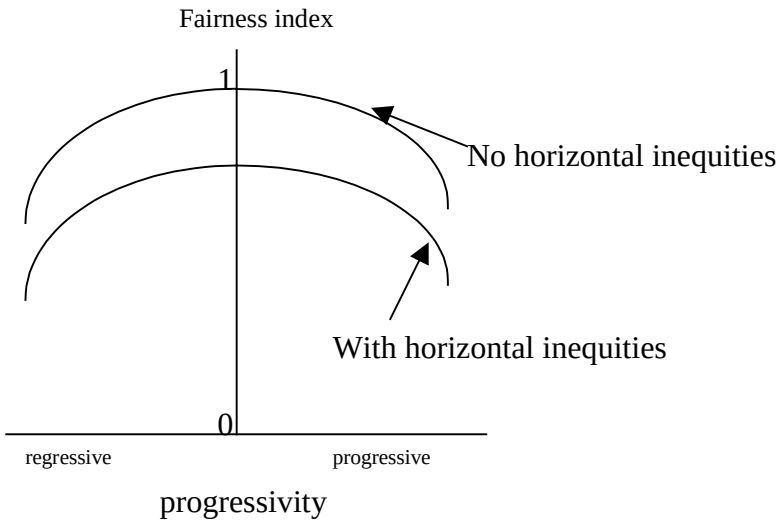
First, the FFC index reflects *both* vertical *and* horizontal inequity. If the index's value is less than one, this could be for one or both of two reasons. It could be that households with *similar* ATPs are spending different proportions of their ATP on health care (a violation of the principle of horizontal equity) or that households with *different* ATPs are spending different proportions of their ATP on health care (a violation of the principle of vertical equity). A value of FFC that is different from one could be because the system is horizontally inequitable, or vertically inequitable, or both.

The second property worth noting is that the index treats progressivity and regressiveness symmetrically. The index is based on the premise that *any* violation of the vertical equity principle is bad. A value of FFC below one could arise because the better-off who pay a larger proportion of their ATP than the poor (the case of progressive payments), or because the poor pay a larger proportion of their ATP than the better-off (the case of regressive payments). The index does not allow us to know which.

The third noteworthy property is that, in general, the index will also reflect the average proportion of ATP absorbed by health care payments. Except in the extreme case where everyone pays the same proportion of their ATP towards health care, the index is sensitive to the average proportion of ATP spent on health care. The index thus reflects not just vertical and horizontal inequity, but also the proportion of ATP absorbed by health care. The index shares this property with the variance, which is sensitive to the mean of the variable whose variation is being measured.

These three properties are illustrated in Fig 1. The inverted u-shaped curves illustrate the fact that moving towards proportionality—by either reducing regresssiveness or by reducing progressivity—moves the index towards its upper limit of one. The effect of reducing horizontal inequity is to push these curves upwards. In the limit, as horizontal inequities are eliminated altogether, the curve touches one at its upper point (i.e. where proportionality is achieved).

Fig 1: WHO Fair financing index



IV. Are the Properties of WHO's FFC Index Attractive?

OUGHT PROGRESSIVITY TO BE TREATED SYMMETRICALLY TO REGRESSIVENESS?

It is convenient to take the second property first—the fact that the index treats progressivity and regressiveness symmetrically. This property follows logically from the proportionality version of the ability-to-pay principle, but it takes only a moment's reflection to realize just how unattractive it is. Progressive and regressive payments have opposite effects on the distribution of income—progressive payments reduce income inequality, while regressive payments increase it [6, 7]. In other words, under progressive payments, there will be less inequality in postpayment income (i.e. the income households have available *after* paying for health care) than in prepayment income (i.e. the income they have available *before* paying for health care). Under regressive payments, there will be *more* inequality in postpayment income than in prepayment income.

It is hard to see why policymakers should view increases and decreases in income inequality brought about by health care payments as just as bad as one another. There is good evidence that *regressive* payments are perceived by policymakers and the public at large as being unfair. It is not at all clear that policymakers and the general public feel that progressive payments are automatically unfair.

For one thing, *the better-off may choose to spend a higher proportion of their income than the poor*. Indeed, the WHR acknowledges this and concedes that this would probably not—at least for health financing purposes—be viewed as inequitable.[4] Despite this, the fact remains that the FFC index treats progressive payments as automatically unfair. Thus two countries could have the same value of the WHO index, but in one country the shortfall from one could be due to the poor paying a larger proportion of their income in health care payments (presumably "involuntarily"), whilst in the other country, the shortfall from one could be due to the better-off spending (to a degree, presumably, voluntarily) a larger share of their income on health care than the poor.

There is another reason to think that policymakers and the public do not treat progressive and regressive payments symmetrically, namely that *they may want to see health care payments exerting an equalizing impact on the income distribution*. If health care payments are proportional to prepayment income, all this means is that health care payments absorb the same share of a rich household's prepayment income as a poor household's. Both households, in other words, have the same percentage drop in their incomes, moving from the prepayment to postpayment distributions. Policymakers may quite reasonably take the view that even this may compromise too much poor households' ability to purchase food and other key goods and services. They might feel that a fairer scheme would be one in which the poor are not expected to contribute anything to the financing of health care but the nonpoor are expected to shoulder the burden of financing health care at least in proportion to their income.

All this suggests that an index that is blind between progressive and regressive health care payments is not especially useful. Having said, this it seems wise not to prejudge the issue too much. What seems best is to employ an index that allows policymakers to see how progressive or regressive their health care financing system is. The approach outlined below allows one to do precisely this.

SHOULD VERTICAL AND HORIZONTAL INEQUITY BE TREATED SIMILARLY?

As defined, the FFC index can take a value of less than one either because households with *similar* ATPs are spending different proportions of their ATP on health care (horizontal inequity) or because households with *different* ATPs are spending different proportions of their ATP on health care (vertical inequity, given the proportionality requirement). There are various reasons why one would like to be able to discriminate empirically between these two types of disproportionality.

First, whilst horizontal inequity necessarily increases income inequality [8], vertical inequity (defined *à la* WHO) can—as has been seen above—either reduce it or increase it, depending on whether payments are progressive or regressive. Suppose Transylvania has a health care financing system that displays a lot of horizontal inequity but is progressive. The disequalizing effect of the horizontal differences might well be offset by the equalizing effect of the progressive payment structure, so that distribution of postpayment income is no more unequal than the distribution of prepayment income. The policymaker's fairness objective of

[4] Confusingly, the report suggests that it is not inequitable, *providing it is prepaid and not paid out-of-pocket*.

ensuring that the health care financing system does not worsen the distribution of income is thus satisfied. And yet the FFC index classifies the Transylvanian system as unfair. Indeed, the index would classify the system as more unfair than a proportional financing system that contains as much horizontal inequity as the Transylvanian system, and more unfair than a horizontally equitable system with the same degree of progressivity as the Translyvanian system. If the concern ultimately is to know how a health care financing system impacts on the distribution of disposable income, then disproportionality arising from horizontal inequity needs to be capable of being distinguished empirically from disproportionality arising from progressivity or regressiveness.

Second, even both types of disproportionality reinforce one another (i.e. horizontal inequity is reinforced by or reinforces regressiveness), it is important to be able to distinguish empirically between the cases. One reason is that horizontal equity and regressiveness typically imply different policy responses. Consider, for example, the case of social insurance. Reducing horizontal inequity might involve reducing disparities in sickness fund contribution schedules, by for example applying the same contribution schedule to civil servants as applies to state enterprise workers, or by mandating that competing sickness funds use a national contribution schedule. By contrast, reducing regressiveness might involve turning a regressive schedule with a contribution ceiling into a proportional schedule without a contribution ceiling.

Another reason for wanting to distinguish between regressiveness and horizontal inequity is that some may argue that not all horizontal differences are inequitable. In the context of health care financing, horizontal differences might rise for a variety of different reasons. In direct taxation, which often contributes a sizeable share to public financing, equals can be treated unequally due to, for example, tax deductibility of mortgage interest payments and health insurance premiums. In indirect tax payments, horizontal differences might arise through different spending levels at a given prepayment income level, but also through different spending patterns (some commodities attract higher indirect tax rates than others). In social insurance, different schemes sometimes have different contribution schedules, whilst in private insurance premiums paid at a given income level may vary due to different risks, as well as different levels of and type of coverage (including, of course non-coverage). In the context of out-of-pocket payments, horizontal differences might arise because of different utilization levels at a given prepayment income level (in part, of course, due to differences in illness), or because of different prices paid per unit of service. The latter may reflect differences in quality, or—especially in the charitable and public sectors—the existence of fee exemptions that are not income-related (e.g. linked to the existence of chronic conditions, pregnancy, or membership of certain groups such as the armed services).

The issue arises as to whether all of these reasons for horizontal differences are likely to be regarded as equally unfair by policymakers, or even unfair at all. One might argue that whilst tax relief on mortgage interest payments is inequitable, it is not inequitable if, in the context of *indirect* taxation, some households spend more of their income than others, or that some households at a given income level spend a lot on goods and services attracting high tax rates whilst others at the same income spend much less on these high-tax goods and services. One might argue that it *was* inequitable that, in China in the early 1990s, the cost of social health insurance coverage for civil servants was covered out of general taxation, whilst the social insurance scheme for state enterprise employees (which actually had less generous coverage)

was funded largely through contributions from the enterprises (with presumably some backwards shifting onto wages). And one might argue that it is also inequitable if households struck by illness spend more out-of-pocket than households not struck by illness, but that it is *not* inequitable if an ill person on a given income wants to spend more on health care than a similarly ill person on the same income.

On other hand, it might be argued that it is the totality of health care payments that matters. Health care is financed from a mixture of taxes, social insurance, private insurance and out-of-pocket payments, and the concern is with the impact of all these payments *combined* on the distribution of postpayment income. If horizontal differences increase the degree of inequality in postpayment income, then all such differences are of equal concern. According to this view, it does matter that a health care system relying almost entirely on indirect taxes to finance it shows up as having a larger degree of horizontal inequity, other things equal, than a system relying almost entirely on direct taxes. If we want to avoid an unduly large impact of health care payments on the income distribution, then all horizontal differences in health care payments are to be avoided *wherever they arise in the health care financing system*.

These two viewpoints obviously point towards different approaches, at least insofar as data make this possible. The case-by-case approach points towards separating out horizontal differences that arise from unequal treatment of equals, and focusing only on these. The second approach points towards focusing on all horizontal differences and treating all on an equal footing. The WHR takes the second approach. This is not an unreasonable position to adopt, but it is not uncontroversial.

SHOULD THE AVERAGE PAYMENT RATE BE SUBSUMED WITH THE OTHER INFLUENCES?

As it stands, the index is sensitive to the average payment rate. Except in the extreme case where everyone pays the same proportion of their ATP towards health care, the index will reflect not just the extent of horizontal and vertical equity, but also the average proportion of income (or ATP) spent on health care. So, one cannot be sure how far countries have different values of FFC because they have different degrees of inequality in the proportion of income spent on health care or because the average proportion of income spent differs. As with the previous two properties, this seems unattractive. It would seem much better to have an index that allowed one to separate out these two issues.

V. An Alternative Approach

There are, then, at least three unattractive features of WHO's FFC index: it does not distinguish between progressivity and regressiveness; it does not distinguish between horizontal and vertical differences in the proportion of ATP spent on health care; nor does it allow the analyst to discern how far countries differ in their indices because of different degrees of inequality in payment rates or different average proportions of income spent on health care. What is called for is an approach that separates clearly these different issues and embeds the measurement of fairness in financial contribution firmly in the overall policy concern, which appears to be a concern to avoid health care payments having an undue adverse effect on the

distribution of income. Fortunately, an approach is available that does just this. Developed in the public finance and income redistribution literature in the early 1990s [8], the approach was used to measure equity in health care finance in several OECD countries in the latter part of the 1990s [6, 7]. This section outlines the approach, and the next section applies it data on out-of-pocket payments from Vietnam.

DECOMPOSING REDISTRIBUTIVE EFFECT

The redistributive effect of a tax—i.e. the impact of a tax on the distribution of income—depends on four key factors [8]. The same reasoning can be applied to health care payments. In the case where income inequality is measured using the Gini coefficient, redistributive effect, *RE*, is simply the difference between the Gini coefficient for prepayment income G_{pre}, and the Gini coefficient for postpayment income, G_{post}. This has been shown by Aronson et al. to be equal to:

(2) $$RE = V - H - R,$$

where

$$V \equiv \left(\frac{g}{1-g}\right)K,$$

$$H \equiv \alpha_x G_{F(x)},$$

and

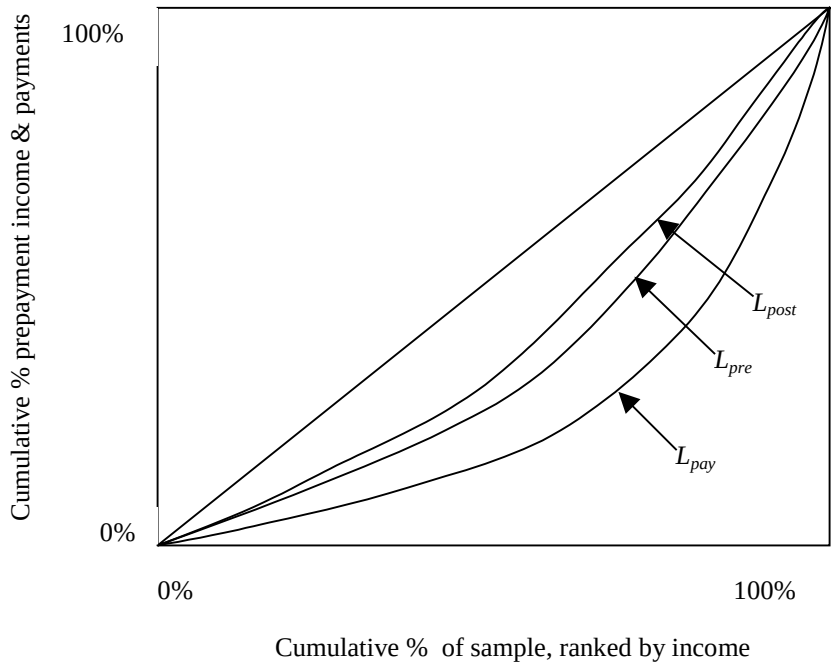
$$R \equiv G_{X-P} - C_{X-P}.$$

An explanation of these various indices and their interpretation follows.

VERTICAL INCOME REDISTRIBUTION—THE ROLE OF PROGRESSIVITY

The term *V* in eqn (2) represents *vertical* income redistribution—the change in income inequality that would have been brought about by health care payments if everyone at each prepayment income level had paid the same amount towards health care. *V* depends on two things, one of which is *K*. This is Kakwani's [9] index of progressivity, but computed on the assumption that at each income level everyone spends the same amount on health care. Kakwani's index, illustrated in Fig 3, is defined as twice the area between the prepayment Lorenz curve, L_{pre}, and the payment concentration curve, L_{pay}, the latter being the graph of the cumulative share of health care payments against the cumulative share of the population, ranked by prepayment income. Equivalently, *K* is the difference between the payment concentration index (defined analogously to the Gini coefficient but with reference to the payment concentration curve) and the Gini coefficient. A positive value of *K* indicates a progressive payment structure (the case illustrated in Fig 2), whilst a negative value indicates a regressive structure.

Fig 2:
Kakwani index of progressivity, and the equalizing effect of progressive payments



Payments that are progressive on prepayment income will exert an equalizing effect on the income distribution—the Lorenz curve for postpayment income, L_{post}, will lie above the Lorenz curve for prepayment income, L_{pre}. By contrast, payments that are regressive on prepayment income will exert a disequalizing effect on the income distribution, so that L_{post} will lie below L_{pre}. So, a policymaker who is concerned to ensure that health care payments do not adversely affect the distribution of postpayment income will clearly disfavor regressive health care payments.

It is thus the progressivity of payments *on prepayment income* that will determine, other things equal, the degree of inequality in postpayment income—i.e. the degree of inequality in households' ability to purchase things other than health care, such as food. This draws attention to another defect of the WHO work, namely its definition of ATP in terms of income *after food spending*. Clearly, in the light of the above, one needs to measure both prepayment and postpayment income *before* food outlays. Knowing how progressive health care payments are on prepayment income defined *net of food outlays* tells us how health care payments influence the distribution of income available to spend on things other than health care *including food*. But that misses the policymaker's concern entirely, which is precisely that poor households may have too little left after health care costs to purchase food. Looking at households' income after food expenses have been netted out conceals from us completely their ability to afford food.

VERTICAL INCOME REDISTRIBUTION—THE ROLE OF THE INCOME SHARE ABSORBED BY PAYMENTS

The second component of V is g. This is the share of pre-payment income absorbed by health care payments. Other things equal, and except in the case where payments are proportional to prepayment income, the larger the share of prepayment income absorbed by health payments, the greater the impact of health care payments on the distribution of income. Thus, for example, in their study of redistributive effect of the health care financing systems of the OECD countries, van Doorslaer et al. [7] highlight the fact that although the share of health care payments financed out of general taxation in the United States is low by comparison with other OECD countries, because the US spends such a large proportion of its GDP on health care, the share of income spent on health care through the tax system (i.e. g) is relatively large. This, coupled with the fact that the progressivity of general taxation in the US appears to be fairly high by international standards, produces the somewhat surprising result that the taxes used to finance health care produce more vertical income redistribution in the US than in other OECD countries.

The WHO index reflects the average proportion of prepayment income spent on health care. This is to be welcomed inasmuch as g is an important influence on redistributive effect not captured by progressivity. It is, however, clearly a separate issue from progressivity, and policies can be drawn up that alter g but not K, and vice versa. Thus the fact that, unlike Aronson et al.'s decomposition, the WHO index does not allow the analyst to know how far cross-country differences in FFC reflects differences in g or differences in departures from proportionality seems an unattractive feature of the index.

HORIZONTAL INEQUITY

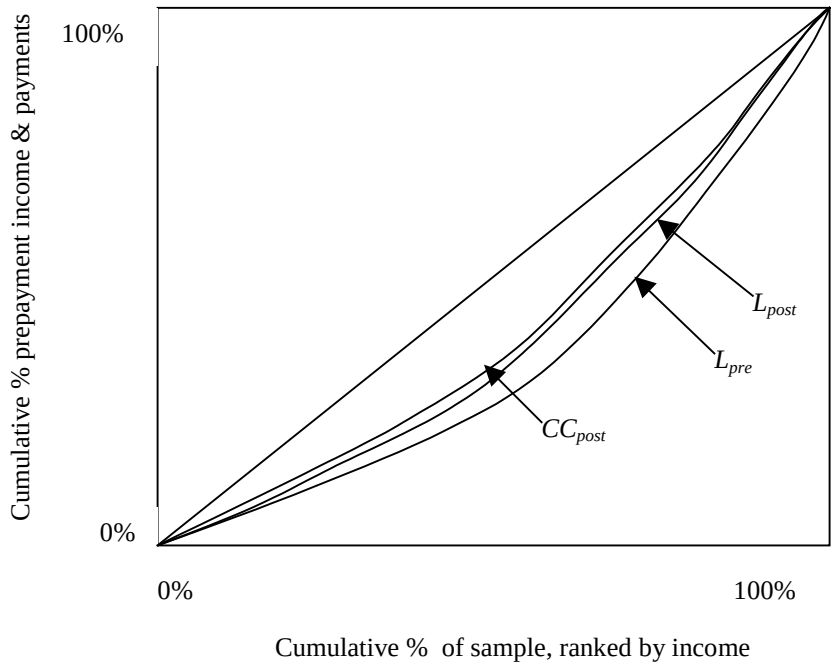
In eqn (2), H is classical horizontal inequity. In the Aronson et al. decomposition, households are divided into groups of prepayment equals, and then horizontal inequity is assessed in terms of the extent of inequality in postpayment income within each group. In eqn (2), α_x is the product of the population share and postpayment income share of households with prepayment income x, while $G_{F(x)}$ is Gini coefficient for postpayment income for these households. If at each prepayment income level, all households pay the same towards health care, inequality in postpayment income will be zero for each group of prepayment income equals. Any inequality within any group counts as horizontal inequity. Inequality in postpayment income within each group is measured by the Gini coefficient $G_{F(x)}$, and a weighted sum of these Gini coefficients is constructed, where the weights are the α_x's. This weighted sum is H. Note that, because the Gini coefficients for each group of prepayment equals is non-negative, H is also non-negative. Note too that H appears in eqn (2) with a minus sign in front of it. In other words, horizontal inequity necessarily reduces RE. This is simply a reflection of the fact that since horizontal inequity entails inequality in postpayment incomes within at least some groups of prepayment equals, it will always leave the postpayment income distribution more unequal than would have been the case in the absence of horizontal inequity.

AND WHAT OF RERANKING?

The V term in eqn (2) tells us how income inequality is reduced by virtue of the progressivity or regressiveness of health care payments, *on the assumption everyone at each prepayment income level pays the same towards health care*. The H term tells us that with horizontal differences at each income level, the postpayment income distribution will be less equal than V would suggest. In the case of regressive payments, H reinforces the disequalizing effect of V, while in the case of progressive payments it offsets it.

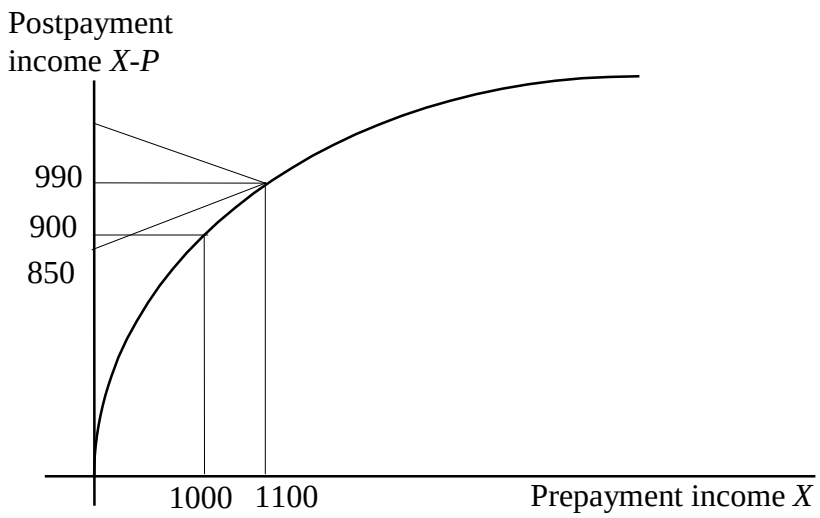
The terms V and H together take us from the prepayment Lorenz curve to a new curve, where households are still ranked by their prepayment income, but where the value on the vertical axis tells us their postpayment income. This is the postpayment concentration curve, labeled CC_{post} in Fig 3, and the index corresponding to it is $C_{X\text{-}P}$ in eqn (2). This curve will only coincide with the Lorenz curve for postpayment income—in which, in contrast to the postpayment *concentration* curve, households are ranked by postpayment income—if households do not move up or down the income distribution as a result of health care payments. If there is some reranking in the move from the prepayment to postpayment distribution, the postpayment concentration curve will lie above the postpayment Lorenz curve. The reason is simple [10]. Suppose there is reranking at all percentiles of the income distribution. Then some of the households who amongst the poorest 20% of households in the prepayment income distribution may well *not* be amongst the poorest 20% of households in the postpayment income distribution. If this is the case, the share of total postpayment income accruing to the households who were the poorest 20% in the *pre*payment distribution will be larger than the share of total postpayment income accruing to the households in the poorest fifth in the *post*payment distribution. Thus the concentration curve for postpayment income can never lie below the Lorenz curve for postpayment income, and insofar as there is reranking will lie above the Lorenz curve. Thus $C_{X\text{-}P}$ will never be larger than G_{post}, and R will always be nonnegative.

Fig 3:
Reranking, concentration and Lorenz curves



Reranking is quite likely. In principle, reranking could be for one or both of two reasons. The first, is that the marginal "tax" rate may exceed 100%. This is unlikely to be a very common problem. The more common reason for reranking is horizontal inequality. This is shown in Fig 4 in the case where payments are progressive on prepayment income, *X*, and hence postpayment income, *X-P*, increases in prepayment income but at a decreasing rate. The average postpayment income at any level of prepayment income can be read off the function in Fig 4. There will, however, be variations around this mean. These variations are reflected in a "fan" emanating from the point on the postpayment income function corresponding to the prepayment income level in question, branching out to the postpayment income axis. For example, a household with a prepayment income of $1100 might pay $250 in health care payments, ending up in the postpayment distribution behind the average household with a prepayment income of $1000, which spends only $1000.

Fig 4:
Horizontal inequity and reranking



In short, differences in health care payments at each income level be sufficiently large for households starting off close to one another in the prepayment distribution to change their positions in the move to the postpayment distribution. This possibility was illustrated vividly in the World Bank's *Voices of the Poor* exercise [11], which reported that in Lao Cai, Vietnam, a 26 year-old man had moved from being the richest man in his community to one of the poorest as a result of the large health care costs necessitated by his daughter's severe illness.

Such rerankings are captured in the move from the postpayment concentration curve to the postpayment Lorenz curve. They are captured numerically by R in eqn (3). The overlapping of fans (causing households to move up or down the income distribution as a result of health care payments) is conceptually distinct from horizontal inequity (the existence of fans). However, if horizontal differences are the usual source of non-zero values of R, it seems unwise to try to make too much of the distinction between R and H. This is reinforced by the fact that although in the population at large there will be households on the same prepayment income, in a household survey such instances are rare. In empirical work, it therefore becomes necessary to define equals by reference to *bands* of prepayment income, within which, for the purpose of the exercise, households are deemed to be equal. The choice of bandwidth inevitably affects the computed value of H, but also affects the computed value of R. Specifically, it seems to be the case that as the bandwidth is widened, H falls and R rises. However, the sum of H and R does not seem to change much. This coupled with the fact that it is typically horizontal differences that produce reranking, suggests that it may make sense to focus on the sum of H and R, and to treat the sum as capturing horizontal differences.

PUTTING IT ALL TOGETHER

This section suggested that the most sensible way to approach equity in health care financing is to treat it explicitly as an income redistribution problem—policymakers are not

concerned with the distribution of health care payments *per se*, but rather with their effect on the distribution of income. The decomposition proposed by Aronson et al. provides a useful framework for assessing the merits of WHO's index. The decomposition emphasizes that progressive and regressive payments have different effects on income inequality, the former reducing income inequality, the latter increasing it. The WHO index's inability to distinguish between progressive and regressive payments thus renders it incapable of distinguishing between a health care financing system that reduces income inequality and one that increases it. If it is true that the concern of policymakers lies with the impact of health care payments on income inequality, this is a serious limitation of the index. The decomposition also emphasizes that if we wish to examine the influence of health care payments on household's ability to purchase food and other key goods and services, we need to assess the progressivity of health payments on prepayment income *before food spending*. Assessing the impact of health care payments on income *after* food has already been netted out, as the WHR does, makes little sense. In addition, the decomposition provides a framework for empirically disentangling (a) the vertical redistribution associated with progressivity (K) from vertical redistribution associated with health care absorbing a larger share of income (g), and (b) redistribution attributable to vertical differences (V) from redistribution attributable to horizontal differences (H). Since the policy issues in each case are different, this seems to be a major advantage of the Aronson et al. decomposition and a major limitation of the WHO index.

VI. An Empirical Illustration: Out-of-Pocket Payments in Vietnam, 1993-98

In this final section, we compare empirically the usefulness of WHO's FFC index and the alternative Aronson et al. approach, using data on out-of-pocket payments in Vietnam as an illustration. As indicated in the Introduction, this is not an uninteresting case study, since around 80% of health spending in Vietnam is paid out-of-pocket [2]. Furthermore, three key changes occurred during the 1990s [2]. First, user fees in the public sector rose. The increase was especially pronounced for hospital care, where fees appear to have risen by over 1000% in real terms between 1993 and 1998, but were also noticeable in commune health centers even though these were still supposed to be free in 1998. Second, there was a large rise in fees for private clinics and doctors. These apparently rose by nearly 600% over the period 1993-98. Third, expenditures on drugs actually *fell* over the period 1993-98, due to a 30% fall in the real price of medicines during the period in question. The latter seems to have been due in part to deregulation of the pharmaceutical sector and in part to increased donor assistance in drug supplies.

DATA, VARIABLE DEFINITIONS AND COMPUTATIONS

The data are taken from the 1992-93 and 1997-98 Living Standards Measurement Surveys (LSMS) undertaken jointly by the government of Vietnam and the World Bank. For the purpose of this exercise, the household is taken as the unit of analysis. After deletion of cases with missing information, the sample contained 4800 households in 1993 and 5999 in 1998. Household prepayment income is measured by total household consumption, gross of out-of-pocket payments for health services. Household postpayment income is simply prepayment

income so defined *net* of out-of-pocket payments. For reasons indicated in section V, prepayment and postpayment income are both defined to be gross of food consumption—this enables us to see in the case of postpayment income what households have available to spend on food after paying for health services. Both prepayment and postpayment income are defined on a per capita basis. Out-of-pocket payments are derived in both years from two questions on health spending over the last 12 months, one specifically on hospital care, the other on all other goods and services associated with the treatment and diagnosis of illness and injury.

The WHO FFC index is computed on the same data to provide the comparison with the Aronson et al. approach. The FFC index is straightforward to compute. The Aronson et al. decomposition is more involved. *RE* can be computed simply as the difference between G_{pre} and G_{post}. In each case, the convenient covariance approach was used on household-level data [12]. The out-of-pocket share g is computed simply as mean out-of-pocket payments divided by mean prepayment income. To compute K (or more precisely the concentration index for out-of-pocket payments, C_P) and $C_{X\text{-}P}$ one has to decide on appropriate groups of prepayment equals.[5] In this illustration, prepayment equals were defined by expressing prepayment income as a multiple of the poverty lines derived by Glewwe, Gragnolati and Zaman [13]. Households below the poverty line were divided into eight groups, the first comprising households with a prepayment income between 0% and 12.5% of the poverty line, the second comprising households with a prepayment income between 12.5% and 25% of the poverty line, and so on. Households with a prepayment income of between 100% and 200% of the poverty line were divided into just four groups, along similar lines, while those with prepayment incomes in excess of 200% of the poverty line were divided into just three groups. To put this into perspective, nearly 60% of households fell below the poverty line in 1993, and nearly 40% did in 1998. Obviously, other groupings of prepayment equals are possible. If this were intended as anything other than an illustration, one would want to assess the sensitivity of the results to alternative groupings, though it seems likely that in this case as in other cases where the Aronson et al. decomposition has been used, widening the bandwidth would be likely to reduce H, increase R, but probably leave their sum relatively unaffected. With groups of prepayment equals defined, it is straightforward to compute C_P on the grouped data, and to form the ranking variable to compute $C_{X\text{-}P}$. Using the former and G_{pre}, one can compute K, and using the latter and G_{post} one can compute R. This leaves H, which can be computed as a residual.

RESULTS

Using the definitions indicated above, the values of the WHO FFC index for out-of-pocket payments in Vietnam in 1993 and 1998 are 0.9557 and 0.9617 respectively (cf. Table 1). These are different from the number published in the WHR, in part because the FFC index here is computed only for out-of-pocket payments (the WHR claims to allocate health revenues from *all* sources) and in part because food consumption has not been netted out from total consumption in this exercise for the reasons indicated above. The change in the FFC index suggests a move towards greater fairness in the out-of-pocket payment component of the

[5] Recall that the Kakwani index in eqn (2) needs to be computed on the assumption that everyone at each level of prepayment income pays the same amount in health care. Hence the need for groups of prepayment equals even in the computation of K.

Vietnamese health care financing system. However, the figures give us no clue as to the reasons for this change. Moreover, given that the index is blind as to who pays more as a share of their income, the increase in FFC is consistent with a change from quite progressive out-of-pocket payments to slightly regressive out-of-pocket payments (cf. Fig 1).

Table 1 also shows the values of the components of the Aronson et al. decomposition of redistributive effect. The Gini coefficient for prepayment income increased somewhat (a 7% rise) between 1993 and 1998. In both years, out-of-pocket payments exerted a disequalizing effect on the income distribution, but in neither year was the impact especially large. To put these figures in perspective, van Doorslaer et al. [7], using somewhat different definitions, obtained values of *RE* for out-of-pocket payments for Portugal and the US of -0.0111 and -0.0128 respectively. However, although the magnitude of *RE* is not especially high in Table 1, what is noteworthy is that that it fell dramatically (by nearly 50%) between 1993 and 1998. This was attributable to both changes in vertical redistribution (*V*) and changes in horizontal differences and reranking (*H* and *R*).

Table 1:
FFC and RE decomposition for out-of-pocket payments in Vietnam, 1993 and 1998

	1993	1998	% change
FFC	0.9557	0.9617	1%
G_{pre}	0.3444	0.3700	7%
RE	-0.0053	-0.0028	-48%
g	6.0%	5.5%	-8%
K	-0.0325	-0.0139	-57%
V	-0.0021	-0.0008	-61%
H	0.0014	0.0007	-52%
R	0.0019	0.0013	-31%
H+R	0.0033	0.0020	-40%
V %	38.5%	29.2%	
H %	-25.8%	-23.7%	
R %	-35.6%	-47.1%	
H+R %	-61.5%	-70.8%	

The reduction in pro-rich redistribution was due in part to a reduction in the overall share of prepayment income absorbed by out-of-pocket payments—from 6.0% of prepayment income to 5.5%, a reduction of 8%. This is presumably a reflection of higher user fees at public facilities being more than offset by smaller outlays on medicines, the latter being due to the 30% reduction in their real price. But by far the bigger change was the reduction in the regressiveness of out-of-pocket payments. Over the period in question, the Kakwani index changed (became less regressive) by nearly 60%. This presumably reflects the large share of out-of-pocket expenditures absorbed by drugs (especially for the poor) and the fall in the real price of drugs. The offsetting effect of increased fees in public facilities may well have had little impact on the financing burden. By 1998 the fees in the public sector had become so high relative to the

average poor household's income that it seems likely that the rise in fees will simply have deterred the poor from using services. This does not get reflected, of course, in the assessment of financial fairness. Overall, *V* changed by 61% between 1993 and 1998—a larger percentage change than in the case of *RE*.

The other determinants of redistributive effect were also important during the period in question, and also changed. In both years, there was more pro-rich income redistribution caused by horizontal inequity and reranking than there was caused by regressiveness. The term labeled *V*% in Table 1 expresses *V* as a percentage of *RE* and helps us get a feel for the importance of horizontal differences and reranking. *V* tells us what *RE* would have been in the absence of horizontal differences and reranking. A value of *V*% of, say, 50% tells us that in absence of horizontal differences and reranking, the pro-rich income redistribution associated with out-of-pocket payments would have been only 50% of its actual value. In the event, the values of *V*% are between 30-40%, indicating that horizontal differences and reranking combined are responsible for well over half of the pro-rich income redistribution associated with out-of-pocket payments. Both figures are far smaller than the figures reported for the OECD countries in van Doorslaer et al. (op. cit.)—70-97%. It is also worth noting that in both years, the majority of the additional redistributive effect (i.e. that not due to progressivity) is due to reranking rather than horizontal inequity. The aforementioned *Voices of the Poor* tale of the impoverished Lao Cai does not appear to be an isolated example by any means. The greater importance of reranking over horizontal inequity is consistent with the results for out-of-pocket payments in the Netherlands reported in Wagstaff and van Doorslaer [6]. Also of note in Table 1 are the reductions in the values of *H* and *R*. The percentage reduction in *H* is larger, so that reranking accounts for an even larger share of the additional redistributive effect in 1998. Although *H* and *R* both decline, their overall decline (40%) is smaller than the change in *V*. Their contribution to redistributive effect, reflected in *V*%, inevitably therefore rises—horizontal differences and reranking were more important as sources of redistributive effect in 1998 than they were in 1993.

The overall picture, then, is one in which out-of-pocket payments absorb a sizeable share of prepayment income but are not associated with a major impact on income inequality. (It should be emphasized that this statement refers to the impact of out-of-pocket payments on income inequality, *not on poverty*.) Much of the impact of out-of-pocket payments on income inequality stem not from their regressiveness but rather from horizontal differences and reranking. Between 1993 and 1998, the share of prepayment income absorbed by out-of-pocket payments fell somewhat and their regressiveness was reduced by a much larger percentage. Over the same period, the redistributive effect associated with horizontal differences and reranking also fell but by smaller percentages, so that these were even more important sources of redistributive effect in 1998 than in 1993.

Results such as these can help shape policy. Strengthening the user-fee exemption system in Vietnam—especially as far as poor households are concerned—would reduce further the degree of regressiveness of out-of-pocket payments. It would not, however, alter *H* and *R*, and it is these that remain the major factors behind the adverse effect of out-of-pocket payments on income inequality in Vietnam. They tend to be driven largely by the unpredictability of illness and by the size of payments involved when illness strikes. Additional reductions in the real cost of drugs and medicines will help to further reduce *H* and *R*, but far bigger reductions seem likely to come through a shifting away from out-of-pocket payments to pre-payment.

Though (social) insurance developed considerably in Vietnam between 1993 and 1998, it remains relatively small-scale and is more common amongst the better-off. Further expansion can be expected to result in the less well-off being covered, and this in turn can be expected to reduce further the values of *H* and *R* for out-of-pocket payments, as well as making out-of-pocket payments less regressive.

VII. Conclusions

This paper has argued that the index of financial fairness proposed in the WHR is unattractive. It cannot allow the policymaker to know whether the index deviates from one (complete fairness) because households on similar incomes pay different amounts towards health care (horizontal inequity) or because households on different incomes pay different proportions of their income on health care (vertical inequity, given WHO's interpretation of the ability-to-pay principle). And yet the two have quite different policy implications. Furthermore, and more controversially, the index treats progressivity as just as unfair as regressiveness. This is highly unattractive, since though policymakers may be strongly averse to regressive payments (since they worsen the income distribution), they may—from a fairness in financing perspective—be quite willing to see progressive payments. Such payments may come about as the result of a choice by the better-off to spend proportionally more on health care than the worse-off, or as the result of a deliberate policy to *require* that that the better-off pay more in proportional terms. In other words, whilst it is probably accurate say that most policymakers feel comfortable with the ability-to-pay principle as the underlying principle of health care finance, it seems most unlikely that most—if any—interpret this in terms of a hard-and-fast rule on proportionality.

A more useful approach would be one that allows the policymaker to distinguish between horizontal and vertical equity, and to see the degree of progressivity in the existing system *without having had the analyst specify in advance how large this should be*. Such an approach is provided by the decomposition framework proposed by Aronson et al. [8] in the early 1990s, and used in the health finance literature in the late 1990s [6, 7]. In this framework fairness is assessed explicitly in terms of the impact of health care financing on the distribution of income, since this is, after all, the ultimate concern amongst policymakers when they think about financial protection. In the approach, the change in the Gini coefficient for income caused by health care payments is decomposed into terms corresponding to changes attributable to overall share of income absorbed by health care payments, changes brought about by the progressivity (or regressiveness) of the payment structure, changes brought about by horizontal inequities in the system, and changes brought about by households changing their position in the income distribution as a result of health care payments.

In the last part of the paper, this method was illustrated using data on out-of-pocket payments in Vietnam for the years 1993 and 1998. The WHO index simply indicated a move towards greater fairness over the period in question, but this could have been because payments became more progressive, or became less regressive, or became progressive having been regressive, or became regressive having been progressive, or because of greater differences in payments at each income level. With the Aronson et al. approach, a much clearer picture emerged. Over the period in question, health care payments impacted adversely on the income distribution in both years, but the degree of impact was smaller in 1998. This was due in part to

a reduction in the share of income absorbed by out-of-pocket payments, in part to a reduction in the regressiveness of out-of-pocket payments, but also in part to reductions in horizontal inequity and reranking. Of the two broad components of redistributive effect—vertical and horizontal redistribution—it was the reduction in vertical redistribution that was more pronounced.

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