
Chapter 38

ASSESSING THE DISTRIBUTION OF HOUSEHOLD FINANCIAL CONTRIBUTIONS TO THE HEALTH SYSTEM: CONCEPTS AND EMPIRICAL APPLICATION

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INTRODUCTION

In the past decade, there has been considerable interest in analysing and understanding the distribution of health system contributions across households (1–11). The fairness in financial contribution measure presented in *The World Health Report 2000* (12) contributed to this heightened attention towards health system financing arrangements (9;13–19). Protecting households from excessively large or catastrophic health payments has also played a prominent role recently in national policy debates in a number of countries (20–23).

The analysis of the consequences of household health system contributions can be divided into two broad approaches: the income approach and the burden approach. The former examines the effect of health system payments in the space of income. The key concern is the marginal effect of health systems financing arrangements on the broader construct of total household income. The effects in the space of income have been measured in terms of changes in its distribution (5–7;18) and more recently on changes in levels of poverty (10). The latter examines health system payments in terms of the impact or disutility experienced by households because of these payments.

The WHO measures of the fairness in financial contribution (2;11) and studies of catastrophic health payments (24) are examples of the burden approach.

To further clarify the conceptual distinction between the income and the burden approaches, Table 38.1 summarizes the main approaches and types of measurements that are possible. The effects of health system payments on households in the space of income can be assessed in terms of changes in the full distribution of income, most commonly reported using the redistributive effect (RE), or in terms of differences in the number of households falling below the poverty line (DH) before and after health system payments.

In the burden space, the complete distribution of disutility or impact of financial payment on households requires a distributional measure analogous to the ones used in the income space; the WHO fairness in financial contribution index (FFC) was developed for this purpose. The fraction of households facing a burden above a fixed threshold (%CAT), considered to involve catastrophic payments, is analogous to the DH in the income space and focuses attention on one tail of the distribution of household financial burden.

The purpose of this chapter is to use household survey data from 59 countries to illustrate the two different approaches to analysing the consequences

Table 38.1 Main indicators used in the income and burden approaches to analysing the consequences of household health system payments

| Approach | Complete distribution | Threshold |
|----------|--|--|
| Income | Change in the distribution of income due to health system payments (redistributive effect or RE) | Change in the number of households falling below the poverty line due to health system payments (DH) |
| Burden | Distribution of disutility or burden due to health system payments (fairness in financial contribution index or FFC) | Households above a threshold level of disutility or burden due to health system payments (Percentage of households with catastrophic payments or %CAT) |

of household health system contributions. This empirical assessment helps to illustrate how changes in income distribution, changes in the percentage of households below the poverty line, the FFC, and the fraction of households facing catastrophic health payments all capture different dimensions of health financing arrangements. Through this analysis, it is argued that the different approaches for analysing the distribution of health system payments can be seen as complementary and useful in different ways for policy review and formulation.

The chapter is organized as follows. The next section reviews some core principles that underlie both the income and burden approaches. Section three reviews the income approach and gives an overview of the statistical indices that are used in this context to summarize the distribution. It also proposes an important modification of the standard methods used in this work that we believe will enhance the conceptual clarity of the measurements. The following section examines the burden approach towards health system contributions with a presentation of the respective summary distributional measures. Sections three and four also present the threshold measures of poverty or catastrophic payments associated with these two measurement approaches. Section five shows the empirical results based on an extensive database comprising household survey data from 59 countries. The last section concludes and discusses the findings.

COMMON CONCEPTUAL UNDERPINNINGS OF THE INCOME AND BURDEN APPROACHES

Analysis of the consequences of household health system contributions whether using the income or burden approach, examines the distribution of contributions to the financing of the health system in isolation from the distribution of the benefits of the health system. This is in keeping with a long tradition of analyses of the equity of public finance systems (25–30). The underlying principle is that any given distribution of benefits delivered by health systems could be financed in many different ways with various households contributing more or less to the overall resources that are raised. Because the distribution of household contributions can be considered as an independent policy choice to the distribution of benefits, it is interesting and important from a social policy perspective to investigate the consequences of this component by itself. Of course, analysing the distribution of the

benefits in terms of the coverage of interventions or their impact on health outcomes is also a critical issue which is addressed in detail elsewhere (31–33).

In both approaches health payments comprise four main sources: taxation, social security contributions, private health insurance premiums, and out-of-pocket payments. The methods and assumptions used in the context of estimating tax and social security contributions are the same. The differences between the approaches presented in the empirical section of this paper, therefore, do not reflect differences in the practical methods used to attribute financial contributions to particular households.

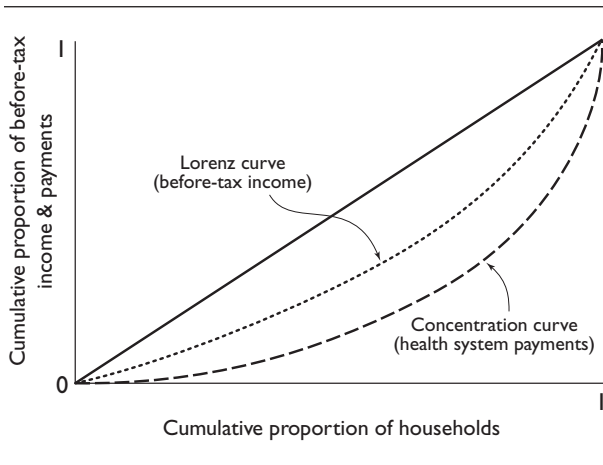
As a result of the distinction between health payments and health benefits, it is possible that in a situation where poorer households do not purchase health care because they cannot afford it, health payments appear relatively progressive in the income approach and relatively fair in the burden approach. Such an outcome could emerge if, for example, out-of-pocket payments for health services were concentrated in the upper income groups because the lower income groups chose not to use the services even though they needed them. The lack of available health services for the poor because of inadequate resources or because of a lack of financial protection mechanisms are important determinants of non-use and access to health services. It is important to identify non-users and the reasons for non-use, but for policy relevance they merit separate analysis.

MEASUREMENT OF THE IMPACT OF HEALTH SYSTEM PAYMENTS IN THE SPACE OF INCOME

PUBLIC FINANCE ORIGINS OF MEASURING TAX DISTRIBUTION

The literature on the distribution of government revenue collection has developed a standard set of measurement tools. These tools are built on one important approach to analysing the distribution of income, namely the Lorenz curve $L_x(p)$. It can be defined as the proportion of total income, x , received by the lowest p th fraction of the population, arranged in ascending order of income. It is shown in Figure 38.1. Perfect equality—each successive percentile of the population receiving 1% of the income—is denoted by the 45-degree line from the origin (the diagonal).

The Gini coefficient G_x is the proportion between the diagonal and the Lorenz curve (the observed devia-

Figure 38.1 Illustration of the progressivity index


tion from perfect equality) divided by the total area under the diagonal (the maximum possible deviation from perfect equality). Because of the symmetry between the areas above and below the diagonal, it can be defined as one minus twice the area under the Lorenz curve:

$$G_x = 1 - 2 \int_0^1 L_x(p) dp \quad [1]$$

Here the subscript x is used to refer to before-tax income. The Gini coefficient can have values in the range $[0,1]$, with the degree of inequality increasing as the coefficient approaches unity—as the area between the Lorenz curve and the diagonal gets closer to the total area below the diagonal.

The concentration curve of a tax $C_t(p)$ is defined similarly to the Lorenz curve, replacing the cumulative proportion of income received by each fraction p , by the cumulative proportion of taxes or other payments contributed by each fraction of the population ordered by income (Figure 38.1). The concentration curve can be above or below the diagonal—when payments are progressive (e.g. the bottom 1% of income earners pay less than 1% of tax) it lies below, and when they are regressive it is above.

The tax concentration index C_t corresponds to the Gini coefficient—the area between the diagonal and the concentration curve divided by the area under the diagonal. Because the curve can lie above or below the diagonal, it can have values between -1 and 1 . It is important to note that the concentration index of a tax is a bivariate function of both tax payments and household income. As it is not uniquely related to either distribution, the underlying income distribution could change substantially with no effect on

the concentration index, as long as the income ranks are preserved.¹ Clearly then, the distribution of tax payments needs to be related more concretely to the income distribution and the degree of income inequality that prevails in different countries or at different periods of time than is possible using the concentration index alone.

In a progressive tax system the average tax rate increases with income, while the opposite defines a regressive system. Progressive tax payments reduce income inequality while regressive taxes increase it. The Kakwani index of tax progressivity is given by the difference between the concentration index of taxes and the Gini coefficient of income:

$$K_t = C_t - G_x = 2 \int_0^1 [L_x(p) - C_t(p)] dp \quad [2]$$

The subscript t refers to taxes and the subscript x refers to before-tax income. Graphically the Kakwani index is represented as twice the area between the concentration curve of taxes and the Lorenz curve of before-tax income. If the tax system is progressive and $C_t(p)$ lies below $L_x(p)$, (i.e. C_t has a higher value than G_x), K_t is positive. Where taxes are regressive or $C_t(p)$ lies above $L_x(p)$, the index is negative. The value of K_t ranges from -2 to 1 . It approaches the lower limit when the income distribution is extremely unequal ($G_x \rightarrow 1$) and the tax burden falls on the poorest population groups ($C_t \rightarrow -1$). It approaches the upper limit with the converse: there is almost no income inequality and the tax burden falls on the richest groups.

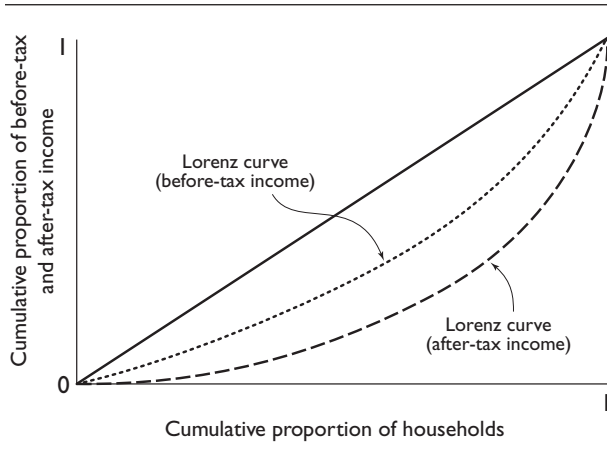
Unlike the Kakwani index which measures departures from proportionality, the Reynolds-Smolensky index (29), often called the redistributive effect (RE), measures the extent to which the tax system redistributes income. Denoting the after-tax Gini coefficient by G_{x-t} , the redistributive effect is:

$$RE = G_x - G_{x-t} = 2 \int_0^1 [L_{x-t}(p) - L_x(p)] dp \quad [3]$$

The index is defined in the range $[-1,1]$, a negative value indicating regressivity and redistribution towards the better-off, and positive values pointing to the opposite. This is depicted in Figure 38.2.

Aronson et al. (34) have suggested a decomposition where the redistributive effect is partitioned into three components: indicating vertical equity, horizontal equity, and a reranking component in turn. It can be formalized as follows:

Figure 38.2 The redistributive effect (RE)



$$RE = \left(\frac{g}{1-g} \right) K_t - \sum \alpha_x G_{F(x)} - [G_{x-t} - C_{x-t}] \quad [4]$$

$$= V - H - R$$

K_t is the Kakwani progressivity index and g is the average tax rate. The first component reflects vertical equity (V) of tax payments. The second term, corresponding to horizontal inequity, H , is obtained as a weighted sum of after-tax Gini coefficients, $G_{F(x)}$, computed within each group of before-tax equals. Non-zero values of H are associated with situations where households with the same before-tax income end up with different after-tax income due to differential tax treatment. Reranking, R , measures the extent to which households move up or down the order of households ranked by income in the process of moving from the before-tax income distribution to the after-tax income distribution. The value of V indicates the extent of redistribution that could have been attained in the absence of differential treatment of equals and rank reversals (i.e. when $H = R = 0$). The H and R terms are by definition non-negative and they reduce the redistributive effect below its potential maximum.

EXTENDING INCOME REDISTRIBUTION ANALYSIS TO HEALTH SYSTEM PAYMENTS

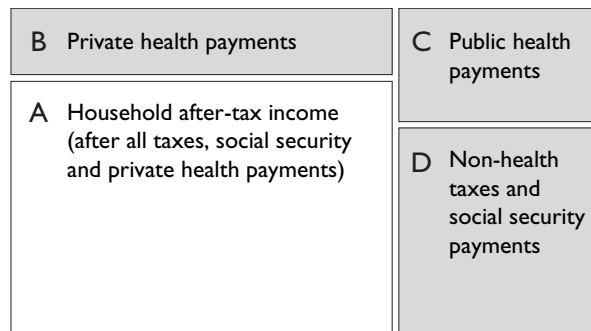
The policy interest in the impact of health payments on income has focused on the marginal impact of health system payments. It starts with the question: given the redistributive effect of non-health public financing, what further redistributive effect is produced by health financing (6)? Health payments influence income distribution through general taxation, social security contributions used on health, and direct private pay-

ments for health services. To see the distinct effect of health payments on the amount of money that is left for the household after all health payments, the redistributive effect should be addressed with respect to the distribution of after-tax income before any health payments (public and private) and after-tax income after all health payments.

Figure 38.3 shows total gross income (before any taxes) as the area $A + B + C + D$. Area A is after-tax income after all health payments, social security contributions and taxes, B represents private health payments, C is health payments through general taxation and social security contributions, and D shows tax payments used for purposes other than health. Total health payments are area $B + C$, and total tax and social security contributions are area $C + D$. Without health payments total after-tax income would equal the area $A + B + C$; with health payments after-tax income becomes area A .

In their analysis of OECD countries Wagstaff, van Doorslaer et al. (18) defined RE as the difference between the Gini coefficient of gross income ($A + B + C + D$) and the Gini coefficient of gross income after health payments ($A + D$). It can be argued that this does not measure what is intended, namely income distribution changes resulting from health payments taking as the starting point society's efforts to redistribute income through non-health public finance. To measure the true marginal redistributive effect of health payments alone, the income distribution changes created by health payments are better captured by measuring the difference between the Gini of after-tax income before health payments ($A + B + C$) and the Gini of after-tax income after health payments (A). The two methods will give different results. In the following

Figure 38.3 Conceptual framework for the calculation of redistributive effect (RE)



empirical work, we have adopted the approach of examining (A + B + C) compared with (A).

As was shown above, RE can be decomposed as:

$$\begin{aligned}
 RE &= V - H - R = \frac{g}{1-g} K_t - (H + R) \\
 &= \frac{g}{1-g} (C_t - G_x) - (H + R)
 \end{aligned}
 \tag{5}$$

In this context, g is the average share of household after-tax or before-tax income spent on health depending on the method used. Decomposition of RE helps to understand the difference between the methods. In the Wagstaff and van Doorslaer approach, the health payment share of income, g , is smaller because health payments (B + C) are divided by total income (A + B + C + D), while in the latter approach the same health payments are divided by the area (A + B + C). Where general non-health taxation is progressive overall, the before-payment Gini, G_x , becomes smaller in the method proposed here because it is based on after-tax income and tax payments used exclusively on health, while in the former method the Gini coefficient is based on total gross income. Although the directions of changes in the average contribution rate (g) and the before-payment income Gini can be identified, other terms in the formula, such as the concentration index (C_t) horizontal inequity (H) and reranking (R) could become either bigger or smaller because they depend on both the distribution of health payments and the income rank order.

EXTENDING THE ANALYSIS TO THE IMPACT ON POVERTY

Wagstaff and van Doorslaer (10) extended recently the analysis of health system contributions on overall

income distributions to include changes in the number of households falling below the poverty line. The poverty impact is illustrated in Figure 38.4 by a hypothetical distribution of income, where the horizontal axis measures cumulative income and the vertical axis shows the cumulative percentage of the population.

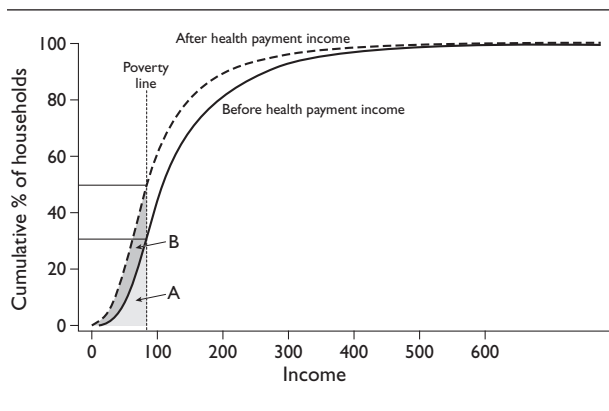
The vertical line is the poverty line. Before health payments, about 30% of the population is under the poverty line. The poverty gap can be defined as area A, which equals total income required to push these households above the poverty line. After health payments, about 50% of the population is under the poverty line and the poverty gap has increased to A + B. Besides their impact on the number of households falling below the poverty line, health payments can also influence the extent of poverty for households already below the poverty line, sometimes called the depth of poverty.

A simple measure quantifying the impact of health system contributions on poverty is given by the difference in the percentage of households under the poverty line before and after health payments. Denoting the percentage of households under the poverty line after health payments as H_a and before health payments as H_b , the headcount difference DH is given as:

$$DH = H_a - H_b
 \tag{6}$$

Wagstaff and van Doorslaer (10) also propose measures that reflect changes in the depth of poverty in addition to the simple headcount measures. In this paper, for simplicity we focus on changes in the fraction of households falling beneath the poverty line.

Figure 38.4 Distribution of income and the poverty line



HEALTH PAYMENTS IN THE SPACE OF BURDEN

EQUAL BURDEN OF HEALTH PAYMENTS

Murray et al. (2) and WHO (12) proposed that the impact of health system payments should be examined in the space of burden on households. Although the extension of public finance analysis to health payments has yielded interesting information on progressivity and income redistribution, it can be argued that a society does not seek to finance the health system for the purpose of redistributing income. Instead, societies expect health payments to be arranged in a fair way. Consistent with public financing studies that follow the capacity to pay principle, health payments should be viewed as a distinct entity, independent of income determination (27). We argue that the appropriate

principle for this purpose is one where the burden created by health payments is equalized across all households.

The equal burden principle is different from the progressivity principle developed and used in the public finance context. Analysis of tax progressivity defines a tax function without reference to the total amount of revenue to be raised. Under the principle of equal burden, a given amount of total revenue is needed and each individual is requested to contribute according to his/her capacity to pay (35). The equal sacrifice principle advanced by Mills (36) proposed that everyone should suffer the same absolute loss of utility. Under a particular form of utility function, this proposition is equivalent to each individual paying the same proportion of income in taxes (37). The equal burden principle could also imply progressive payments when capacity to pay is defined as income net of basic needs spending instead of total income. Other definitions of the capacity to pay follow from alternative forms of the household's utility function.

WHO has argued that health system payments should be organized in such a way that the burden of payments is equalized across households. The concern about equal burden or sacrifice among households is explicitly not a matter in the space of income or the marginal contribution of the health system to an overall social goal of redistributing income. Rather, this concern is expressed in terms of raising revenue for the health system in such a way that the burden of payments on households is distributed fairly. As the term "equity" is associated with the distribution of income, WHO introduced the term "fairness" in financial contribution to describe the distribution of the burden of health payments. Equalizing burden is a proposition about what is fair for health system contributions not about what is the overall social policy regarding the distribution of income.

How can equal burden be defined? We argue that equal burden is equivalent to an equal fraction of households' capacities to pay. The debate on what is a fair contribution in this construct is in fact a debate on what is capacity to pay.

Adopting a utility function commonly used in the poverty literature (38), the utility of household i before (U_i) and after health payments (U'_i) can be expressed as:

$$U_i = \ln(C_i - S_i) \quad [7]$$

$$U'_i = \ln(C_i - S_i - HE_i) \quad [8]$$

where C_i is household consumption, S_i is the minimum

consumption required for subsistence and HE_i is the total household contribution to the health system. The reduction in utility for household i (ΔU_i) due to a household's contribution of the health system is given by:

$$\Delta U_i = U_i - U'_i = \ln(C_i - S_i) - \ln(C_i - S_i - HE_i) \quad [9]$$

If we define a household's consumption net of subsistence requirements as household capacity to pay (CTP_i), total household health contribution (HE_i) can be written as household capacity to pay multiplied by household financial contribution (HFC_i). So equation [9] becomes:

$$\begin{aligned} \Delta U_i &= \ln(CTP_i) - \ln(CTP_i - CTP_i HFC_i) \quad [10] \\ &= \ln\left[\frac{CTP_i}{CTP_i(1 - HFC_i)}\right] = \ln\left[\frac{1}{1 - HFC_i}\right] \end{aligned}$$

Then according to the equal burden principle we have:

$$\ln\left[\frac{1}{1 - HFC_i}\right] = \ln\left[\frac{1}{1 - HFC_j}\right] = \dots = \ln\left[\frac{1}{1 - HFC_n}\right] \quad [11]$$

From equation [11], we get:

$$HFC_i = HFC_j = \dots = HFC_n = HFC_o \quad [12]$$

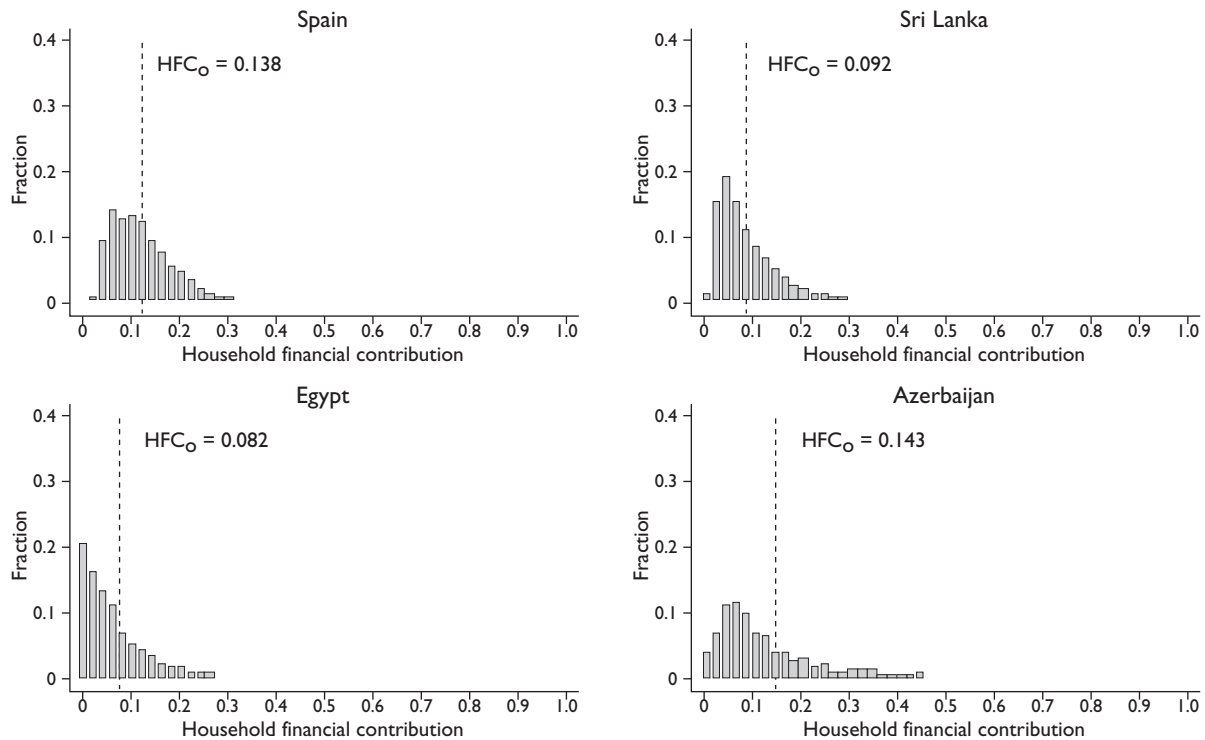
where HFC_o is the total health expenditure share of total capacity to pay. It can be written as:

$$HFC_o = \frac{\sum HE_i}{\sum CTP_i} \quad [13]$$

In other words, equalizing HFC across households can be justified as the basis for assessing the fairness in financial contribution from the premise that the disutility due to financing the health system should be equalized across households. Capacity to pay for a household follows from the form of the utility function. In the case of the utility function in equation [7], capacity to pay is household consumption minus subsistence expenditure.

The above formulation for determining the distribution of the health financial contribution may also have implications for determining a measure to summarize the distribution of HFC. Figure 38.5 shows the distribution of HFC in four countries. The x -axis shows the household financial contribution, HFC, while the y -axis shows fractions of households. The HFC-norm (HFC_o) is represented by the vertical line. The more

Figure 38.5 Distribution of household financial contribution (HFC)



tightly the distribution is concentrated around HFC_o , the fairer the system.

The HFC distributions of Spain and Sri Lanka are narrower than those of Egypt and Azerbaijan. On these grounds, Spain is the fairest, followed by Sri Lanka, Egypt, and Azerbaijan.

A summary index of the distribution should permit a comparison of fairness across countries. A discussion of various summary measures and their properties is found in Xu et al. (11) and based on a variety of considerations, they propose the fairness in financial contribution index (FFC) as the most appropriate summary measure, defined as:

$$FFC = 1 - \sqrt[3]{\frac{\sum_{i=1}^n |HFC_i - HFC_o|^3}{n}} \quad [14]$$

More details on the derivation of this summary index are provided elsewhere including a discussion of the difference between it and the index used in *The World Health Report 2000* (11). The FFC index can vary between 0 and 1, with 1 representing perfect fairness and 0 representing maximal unfairness.²

CATASTROPHIC FINANCIAL BURDEN ON HOUSEHOLDS

In the income space analysis, the effect of health system contributions was examined with respect to changes in the overall distribution and changes in the share of households below the poverty line. The same logic applies when considering the impact of health payments in the burden space, where interest lies not only with the distribution of payments, but also with the households at the right-hand tail of the distribution facing particularly high financing burdens.

Accessing the services that can improve people's health can lead to households having to pay catastrophic shares of their available income, and may subsequently push them into poverty. The desire to protect people from such payments has influenced the design of health systems and insurance mechanisms in many different settings including the USA, Australia, India, and Indonesia and is now widely accepted as a desirable objective of health policy (12;21;22;39-50).

In designing health systems, policy-makers need to know what system characteristics are associated with the incidence of catastrophically high health payments.

Catastrophic payments need not be synonymous with high health care costs (51). A large bill for surgery, for example, may not be catastrophic if households do not bear the full costs because the service is provided at a subsidized price or covered by a third party insurance. On the other hand, even relatively small expenditures for common illnesses can be financially disastrous for poorer households lacking insurance coverage.

Capacity to pay was defined earlier as total household consumption net of subsistence requirements, adjusted for equivalent household size. Health expenditures consist of out-of-pocket payments in addition to direct and indirect tax payments and social security contributions. As with the poverty line, defining what level of HFC is catastrophic calls for an arbitrary choice of threshold. The incidence of catastrophic payments in a country is calculated here as the percentage of households with health payments equaling or exceeding a 40% threshold of capacity to pay. For a full rationale behind these choices, see Xu et al. (24).

EMPIRICAL ILLUSTRATION

DATA SOURCES AND DEFINITION OF VARIABLES

The empirical results reported in this chapter are based on nationally representative household surveys from 59 countries conducted between 1991 and 2000. The sample size ranges from 1 103 households in Sweden to 62 946 households in the Republic of Korea (see the Table 42.1 for more details).

Household consumption expenditure was used to estimate household capacity to pay. The choice of consumption expenditure instead of current income was based on two considerations. First, the variance of current expenditure is smaller than the variance of current income over time. Income data reflect random shocks while expenditure data conform better to the notion of effective income and consumption smoothing. Second, in most of the household surveys available for this study, expenditure data are more reliable than income data. This is particularly true in developing countries, where the informal sector is typically quite large and survey respondents may not wish to reveal their true income for various reasons (52–53).

All out-of-pocket payments and private health insurance premium information were taken directly from the surveys. The general tax and social security contributions used for health were estimated from salary income (for income tax and social security contributions) and expenditure data (for expenditure taxes such as value added taxes or VAT) when the infor-

mation was not directly available from the survey. In order to distinguish the part of government spending that is used on health, each household's tax payments were multiplied by the proportion of total government spending that goes to finance the health system. These ratios were available from National Health Accounts estimates.

For determining poverty, as well as for measuring household subsistence expenditure, a food share based poverty line was used. Subsistence needs and the poverty line were defined for each country separately to allow for different consumption patterns and prices. This is based on the observation that the share of food expenditure to income falls as household income rises, and that the poor have higher shares of food in total income or consumption than the rich (54). The food expenditure of the household with the median share of food expenditure in total expenditure, adjusted for household size, was taken to reflect subsistence requirements and the poverty line, although because of variation across households, the average food expenditures of households with food shares from the 45th to 55th percentile was used. An equivalence scale of $eqsize = hsize^\beta$ was used to adjust for household size. The value of β was estimated from the data from the 59 countries using the following fixed-effects regression:

$$\ln food = \ln k + \beta \ln hsize + \sum_{i=1}^{N-1} \gamma_i country_i \quad [15]$$

The value of the coefficient β was estimated as 0.564 with a confidence interval of 0.556–0.572 (see (55) for more details).

RESULTS

The Income Approach

The augmented methodology proposed in the present chapter was used to calculate the redistributive effect (RE) and its constituent parts—the vertical, horizontal, and reranking components. The RE and headcount difference (DH) for each country is presented in Table 38.2. The largest positive value of the overall RE, indicating the largest decrease in income inequality after health payments, is 0.019 for Nicaragua. The other extreme is Switzerland where health system payments increased income inequality as measured by the Gini coefficient by 0.021. While there is considerable variation within this set of 59 countries in the RE, overall health system payments appear to have only a small impact on the distribution

Table 38.2 Redistributive effect (RE) and poverty headcount difference (DH)

| Country | Distribution | | | Threshold | | |
|--------------------|--------------|--------|-------|---|--|---|
| | RE | V | H+R | Before health pay- ments (H_a^a) (%) | After health pay- ments (H_b^a) (%) | Difference ^a $DH=H_a-H_b$ (%) |
| Argentina | 0.008 | 0.020 | 0.012 | 19.54 | 26.28 | 6.74 |
| Azerbaijan | 0.006 | 0.010 | 0.004 | 39.35 | 43.67 | 4.32 |
| Bangladesh | 0.006 | 0.008 | 0.001 | 31.69 | 35.12 | 3.43 |
| Belgium | 0.011 | 0.016 | 0.005 | 0.00 | 0.00 | 0.00 |
| Brazil | 0.007 | 0.014 | 0.006 | 25.13 | 30.23 | 5.10 |
| Bulgaria | 0.007 | 0.009 | 0.003 | 7.16 | 10.44 | 3.28 |
| Cambodia | 0.005 | 0.016 | 0.011 | 22.10 | 24.97 | 2.87 |
| Canada | 0.004 | 0.010 | 0.005 | 0.02 | 0.04 | 0.02 |
| Colombia | 0.010 | 0.014 | 0.004 | 18.45 | 21.77 | 3.32 |
| Costa Rica | 0.008 | 0.010 | 0.003 | 13.90 | 16.92 | 3.02 |
| Croatia | 0.012 | 0.019 | 0.008 | 3.30 | 4.48 | 1.18 |
| Czech Republic | 0.011 | 0.023 | 0.011 | 0.05 | 0.05 | 0.00 |
| Denmark | -0.003 | 0.001 | 0.004 | 0.03 | 0.07 | 0.03 |
| Djibouti | -0.002 | 0.000 | 0.001 | 18.90 | 20.69 | 1.79 |
| Egypt | 0.003 | 0.004 | 0.001 | 19.45 | 22.23 | 2.78 |
| Estonia | 0.009 | 0.012 | 0.004 | 17.42 | 21.09 | 3.67 |
| Finland | -0.001 | 0.005 | 0.006 | 0.08 | 0.15 | 0.08 |
| France | 0.002 | 0.008 | 0.006 | 0.34 | 0.47 | 0.13 |
| Germany | -0.007 | -0.002 | 0.004 | 0.00 | 0.01 | 0.01 |
| Ghana | 0.003 | 0.004 | 0.002 | 30.54 | 34.13 | 3.58 |
| Greece | 0.003 | 0.010 | 0.007 | 0.72 | 1.28 | 0.56 |
| Guyana | 0.009 | 0.010 | 0.001 | 23.48 | 28.55 | 5.07 |
| Hungary | 0.012 | 0.017 | 0.005 | 0.86 | 1.31 | 0.45 |
| Iceland | -0.008 | -0.003 | 0.006 | 0.00 | 0.00 | 0.00 |
| Indonesia | 0.007 | 0.008 | 0.002 | 20.47 | 22.14 | 1.68 |
| Israel | 0.009 | 0.013 | 0.004 | 0.31 | 0.74 | 0.43 |
| Jamaica | -0.006 | -0.005 | 0.001 | 28.73 | 33.72 | 4.99 |
| Korea, Republic of | -0.008 | -0.002 | 0.006 | 0.36 | 0.75 | 0.38 |
| Kyrgyzstan | 0.000 | 0.002 | 0.002 | 30.96 | 34.34 | 3.38 |
| Latvia | 0.002 | 0.005 | 0.002 | 9.34 | 12.45 | 3.12 |
| Lebanon | -0.011 | -0.005 | 0.006 | 1.94 | 4.07 | 2.13 |
| Lithuania | 0.009 | 0.011 | 0.001 | 6.21 | 7.66 | 1.45 |
| Mauritius | 0.006 | 0.008 | 0.002 | 8.84 | 10.19 | 1.35 |
| Mexico | 0.007 | 0.008 | 0.002 | 15.33 | 17.08 | 1.75 |
| Morocco | 0.010 | 0.011 | 0.001 | 20.41 | 21.59 | 1.19 |
| Namibia | 0.001 | 0.003 | 0.002 | 31.13 | 34.71 | 3.58 |
| Nicaragua | 0.019 | 0.023 | 0.004 | 28.02 | 30.91 | 2.90 |
| Norway | -0.013 | -0.006 | 0.008 | 0.09 | 0.09 | 0.00 |
| Panama | 0.013 | 0.018 | 0.004 | 17.51 | 19.97 | 2.47 |
| Paraguay | 0.001 | 0.005 | 0.003 | 16.71 | 20.39 | 3.68 |
| Peru | 0.007 | 0.011 | 0.004 | 22.49 | 25.17 | 2.68 |
| Philippines | 0.005 | 0.005 | 0.001 | 27.35 | 29.17 | 1.82 |
| Portugal | 0.002 | 0.004 | 0.002 | 5.40 | 7.20 | 1.79 |
| Romania | 0.002 | 0.002 | 0.000 | 29.94 | 32.26 | 2.31 |
| Senegal | 0.007 | 0.009 | 0.001 | 20.28 | 22.33 | 2.05 |
| Slovakia | 0.010 | 0.011 | 0.001 | 0.33 | 0.42 | 0.09 |
| Slovenia | -0.006 | 0.001 | 0.008 | 2.03 | 3.66 | 1.63 |
| South Africa | 0.006 | 0.008 | 0.002 | 29.50 | 30.82 | 1.32 |
| Spain | 0.005 | 0.009 | 0.004 | 0.89 | 1.33 | 0.44 |

continued

Table 38.2 Redistributive effect (RE) and poverty headcount difference (DH) (continued)

| Country | Distribution | | | Threshold | | |
|-------------|--------------|--------|-------|---|--|---|
| | RE | V | H+R | Before health payments (H_b) ^a (%) | After health payments (H_a) ^a (%) | Difference ^a $DH=H_a-H_b$ (%) |
| Sri Lanka | 0.005 | 0.007 | 0.002 | 21.74 | 25.19 | 3.45 |
| Sweden | -0.001 | 0.002 | 0.003 | 0.00 | 0.31 | 0.31 |
| Switzerland | -0.021 | -0.016 | 0.005 | 0.00 | 0.08 | 0.08 |
| Thailand | 0.005 | 0.008 | 0.002 | 6.79 | 8.28 | 1.50 |
| UK | 0.006 | 0.007 | 0.002 | 0.53 | 0.71 | 0.18 |
| Ukraine | 0.006 | 0.010 | 0.004 | 21.79 | 25.79 | 4.01 |
| USA | -0.003 | 0.002 | 0.005 | 1.19 | 1.62 | 0.42 |
| Viet Nam | 0.000 | 0.006 | 0.007 | 28.35 | 36.09 | 7.75 |
| Yemen | 0.006 | 0.009 | 0.002 | 27.16 | 29.82 | 2.66 |
| Zambia | 0.004 | 0.006 | 0.002 | 52.95 | 54.86 | 1.91 |

^a Households under the poverty line

V=Vertical effect; H+R=Horizontal and reranking effects-

of income. In percentage terms, the largest impact of health system payments was to increase the Gini coefficient by 7% in Switzerland and to decrease it by 5% in Slovakia. Given that health system contributions range from 1.3% to 13% of GDP in the world, their relatively minor impact on the distribution of income is not surprising.

While the overall impact on the distribution of income as measured by the Gini coefficient is relatively small, the pattern across countries is interesting. A group of Scandinavian countries, Denmark, Finland, Iceland, Norway, and Sweden all have negative REs, indicating that health contributions in those countries make the after-payment distribution of income less equal than the before-payment distribution, i.e. health payments are regressive despite the existence of public prepayment mechanisms.

The values of the horizontal inequity and reranking components are relatively low but for some countries the H and R components outweigh the pro-poor redistributive impact deriving from vertical redistribution, with the consequence that the total effect becomes negative. This is the explanation for the results in Denmark, Finland, and Sweden but not in Norway where the vertical effect is also regressive. Other countries where health system payments worsen the distribution of income include Germany, Djibouti, the Republic of Korea, Jamaica, Lebanon, Slovenia, Switzerland, and the USA. In nine countries, the RE is greater than 0.01: Belgium, Colombia, Croatia, Czech Republic, Hungary, Morocco, Nicaragua, Panama, and Slovakia. The cluster of Eastern European countries with health systems that contribute to greater income equality is notable.

In fact, in most of the countries where RE is negative the principal reason seems to be vertical redistribution. This illustrates that it is important to identify the reasons behind a negative RE—whether it is due to vertical or horizontal inequalities—because the appropriate policy response could well differ depending on the source of the negative RE. The RE is, however, relatively insensitive to the horizontal and reranking effects. In Figure 38.6 the *x*-axis depicts the redistributive effect, while the *y*-axis shows the vertical (V), horizontal and reranking effects (H + R). The horizontal and reranking components are relatively constant regardless of the level of RE, whereas the vertical effect explains much of the variation in RE.

Results from a variance decomposition analysis of RE strengthen the above argument that RE is not sensitive to horizontal inequity and reranking. The RE index can be written as:

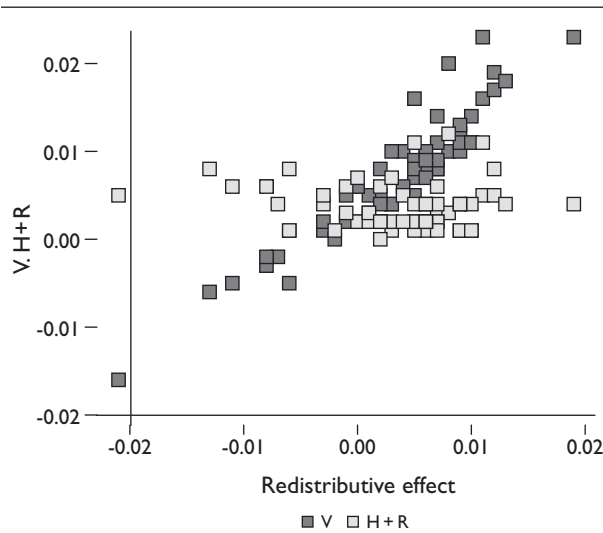
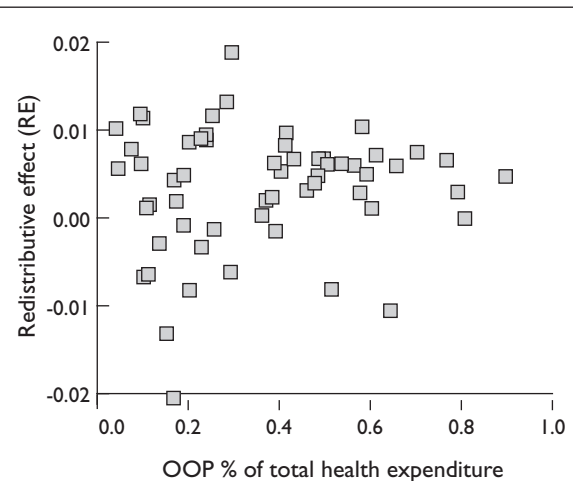
$$RE = V - (H + R) \quad [16]$$

and the variance of RE can be expressed as:

$$\text{var}(RE) = \text{var}(V) + \text{var}(H + R) - 2 \text{cov}(V, H + R) \quad [17]$$

Since the horizontal and reranking effects reduce the impact of the vertical effect on RE, the covariance of the vertical effect and the horizontal and reranking effects must be subtracted from the variance of RE. If both sides of the equation are divided by the variance of RE, we obtain the percentage effect of each component on the total variance of RE as:

$$\frac{\text{var}(RE)}{\text{var}(RE)} = \frac{\text{var}(V)}{\text{var}(RE)} + \frac{\text{var}(H + R)}{\text{var}(RE)} - \frac{2 \text{cov}(V, H + R)}{\text{var}(RE)} \quad [18]$$

Figure 38.6 Redistributive effect (RE) and its components (V, H and R)**Figure 38.7** Redistributive effect (RE) and out-of-pocket (OOP) share

The results show that the variances of the horizontal and reranking effects contributed for only 16% of the total variance. This suggests that the variance of RE is determined predominantly by the variance of the vertical effect.

In an effort to identify health system characteristics associated with different types of redistributive effects, some studies have suggested a negative relationship between RE (or progressivity) and the proportion of total health expenditures met by out-of-pocket payments (OOP) (7;18). Figure 38.7 does not support this hypothesis for the 59 countries. In countries with a low proportion of health expenditure met by OOP in particular, there is very substantial variation in the RE, and no obvious trend in RE as OOP increases in importance.³

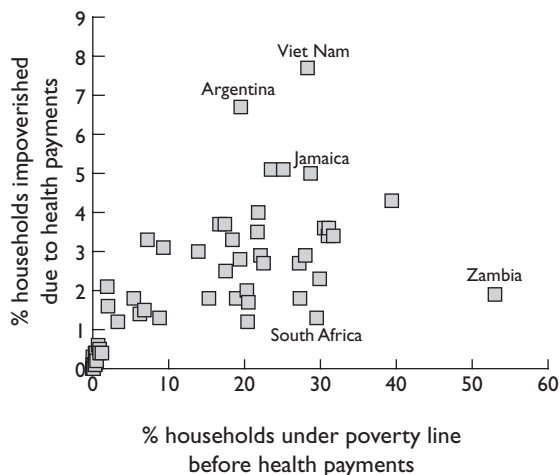
Turning next to the poverty impact of health payments, the way the health system is financed can have a significant effect. Table 38.2, in the last three columns, shows the proportion of people living in poverty before and after health contributions, and the difference between the two. Across this sample of countries, the percentage of households driven below the absolute poverty line by health system contributions ranged from near 0 in Belgium, Canada, Czech Republic, Denmark, Germany, Iceland, and Norway to 7.7% in Viet Nam. Argentina, Brazil, Guyana, and Jamaica also have more than 5% of households impoverished through health system contributions. Substantial effects can be noted as well in some of the former socialist countries, such as Azerbaijan, Esto-

nia, Kyrgyzstan, and Ukraine. It is important to note that the marginal impact of health system payments on the levels of poverty appears to be substantially larger than the impact of health system payments on the overall distribution of income.

The weak relationship between the impact of health system payments on the distribution of income and their impact on the levels of poverty is exemplified by Brazil. Overall in that country, the RE was 0.007 indicating progressive health system payments, yet these same payments increased the poverty rate by 5.1 percentage points. In contrast, Norway with a RE of -0.013 had no change in the poverty rate due to health payments. Clearly, the RE does not capture the impact of health system contributions on poor households very well. Health payments can still force people living close to the poverty line into poverty even if these payments are progressive in the system, which indicates the importance of focusing not only on the distribution as a whole through the RE, but also on the tail of the distribution using the DH.

As a general rule, health payments have a greater impact on poverty in countries with a higher proportion of the population already living in poverty. However, Figure 38.8 shows that there is substantial variation in the levels of impoverishment at any given level of overall poverty, suggesting that some countries have been more effective in protecting the poor from impoverishing health payments than others. Notable examples include South Africa and Zambia where health payments caused little additional poverty despite high levels of the population living in poverty. On the other hand, substantial impoverishment took

Figure 38.8 Level of poverty and impoverishment due to health payments



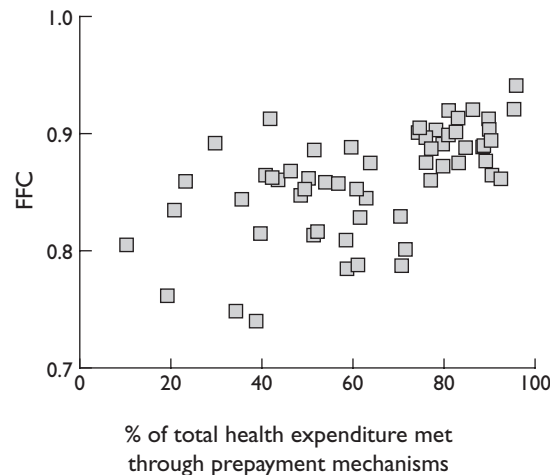
place in Jamaica and Viet Nam, although these countries were at the same level of poverty as South Africa before health payments. Argentina stands out as a country with lower than average poverty before health payments, but with a large fraction of the population pushed into poverty due to health system payments.

The Burden Approach

The summary measure of the distribution of household financial contributions in the burden space, the FFC, is reported in Table 38.3. It ranges between 0.740 in Brazil to 0.941 in Slovakia. In this sample of countries, the high levels of fairness are also seen in a number of high-income OECD countries including the United Kingdom, Sweden, Denmark, Germany, and Canada. Nevertheless, there is considerable variation within the OECD, with the United States of America, Switzerland, and Norway having substantially lower levels of fairness. In the case of the USA and Switzerland, the role of private insurance with regressive premiums is important, while in Norway general taxation is regressive. The lowest scores (less than 0.800) were found in a group of countries in transition from socialist economies (Azerbaijan, Ukraine, and Viet Nam) and a group in Latin America and the Caribbean (Argentina, Brazil, and Jamaica).

The crudest measure of the extent of financial risk protection mechanisms in a society is the share of health expenditure channelled through prepayment mechanisms including taxes, social insurance, and private insurance. Not surprisingly, Figure 38.9 shows that there is a moderately strong relationship between

Figure 38.9 The fairness in financial contribution index (FFC) and the prepayment share of total health expenditure (%)



the FFC and the share of expenditure through prepayment. At any given level of prepaid health financing, however, there is considerable variation in the FFC suggesting that the progressivity of taxes, social insurance, and private insurance matter as well as the types of out-of-pocket expenditures that households incur.

Table 38.3 also reports the threshold measure in the burden space, the proportion of households with catastrophic health contributions. The overall proportion is reported in addition to the proportion facing catastrophic expenditures solely because of out-of-pocket payments. The impact of health system contributions is notably high in many Latin American countries—in Argentina and Brazil more than 10% of households had payments that exceeded 40% of their capacities to pay, while in Colombia, Nicaragua, Panama, and Paraguay the share was more than 5%. Similarly, more than 5% of households faced catastrophic expenditure in the same group of countries in transition from socialist economies listed above, and in Cambodia. The fact that the countries with the lowest scores on the FFC also had a high proportion of households with catastrophic spending reflects the general finding that there is a strong negative correlation between these two measures (-0.903)—the fairer the distribution of financial burden across households, the lower the proportion of households facing catastrophic payments.

Although the proportion of households with catastrophic payments was high in some countries in transition, others have been better at protecting households against catastrophic payments, including

Table 38.3 Fairness in financial contribution and catastrophic payments

| <i>Country</i> | <i>Distribution</i> | <i>Threshold</i> | |
|--------------------|---|---|--|
| | <i>Fairness in financial contribution (FFC)</i> | <i>Households with catastrophic payments (Total health expenditure) (%)</i> | <i>Households with catastrophic payments (Out-of-pocket expenditure) (%)</i> |
| Argentina | 0.785 | 11.84 | 5.77 |
| Azerbaijan | 0.748 | 11.27 | 7.15 |
| Bangladesh | 0.868 | 1.73 | 1.21 |
| Belgium | 0.903 | 0.23 | 0.09 |
| Brazil | 0.740 | 13.27 | 10.27 |
| Bulgaria | 0.862 | 2.79 | 2.00 |
| Cambodia | 0.805 | 5.54 | 5.02 |
| Canada | 0.913 | 0.48 | 0.09 |
| Colombia | 0.809 | 7.82 | 6.26 |
| Costa Rica | 0.861 | 3.06 | 0.12 |
| Croatia | 0.865 | 2.45 | 0.20 |
| Czech Republic | 0.904 | 0.01 | 0.00 |
| Denmark | 0.920 | 0.38 | 0.07 |
| Djibouti | 0.853 | 0.82 | 0.32 |
| Egypt | 0.835 | 3.24 | 2.80 |
| Estonia | 0.872 | 2.47 | 0.31 |
| Finland | 0.901 | 1.36 | 0.44 |
| France | 0.889 | 0.68 | 0.01 |
| Germany | 0.913 | 0.54 | 0.03 |
| Ghana | 0.862 | 2.47 | 1.30 |
| Greece | 0.858 | 3.29 | 2.17 |
| Guyana | 0.887 | 1.73 | 0.60 |
| Hungary | 0.905 | 0.96 | 0.20 |
| Iceland | 0.891 | 1.30 | 0.30 |
| Indonesia | 0.859 | 1.34 | 1.26 |
| Israel | 0.897 | 1.09 | 0.35 |
| Jamaica | 0.787 | 5.39 | 1.86 |
| Korea, Republic of | 0.847 | 2.57 | 1.73 |
| Kyrgyzstan | 0.875 | 1.32 | 0.62 |
| Latvia | 0.828 | 4.05 | 2.75 |
| Lebanon | 0.844 | 8.50 | 5.17 |
| Lithuania | 0.875 | 1.68 | 1.34 |
| Mauritius | 0.861 | 1.59 | 1.28 |
| Mexico | 0.857 | 1.93 | 1.54 |
| Morocco | 0.913 | 0.27 | 0.17 |
| Namibia | 0.877 | 1.65 | 0.11 |
| Nicaragua | 0.829 | 5.02 | 2.05 |
| Norway | 0.888 | 1.22 | 0.28 |
| Panama | 0.801 | 5.53 | 2.35 |
| Paraguay | 0.815 | 5.07 | 3.51 |
| Peru | 0.813 | 4.01 | 3.21 |
| Philippines | 0.886 | 0.99 | 0.78 |
| Portugal | 0.845 | 4.01 | 2.71 |
| Romania | 0.901 | 0.31 | 0.09 |
| Senegal | 0.892 | 0.86 | 0.55 |
| Slovakia | 0.941 | 0.00 | 0.00 |
| Slovenia | 0.890 | 1.88 | 0.06 |
| South Africa | 0.894 | 1.12 | 0.03 |

continued

Table 38.3 Fairness in financial contribution and catastrophic payments (*continued*)

| Country | Distribution | Threshold | |
|-------------|--|--|---|
| | Fairness in financial contribution (FFC) | Households with catastrophic payments (Total health expenditure) (%) | Households with catastrophic payments (Out-of-pocket expenditure) (%) |
| Spain | 0.899 | 0.89 | 0.48 |
| Sri Lanka | 0.865 | 1.75 | 1.25 |
| Sweden | 0.920 | 0.39 | 0.18 |
| Switzerland | 0.875 | 3.03 | 0.57 |
| Thailand | 0.888 | 0.99 | 0.80 |
| UK | 0.921 | 0.33 | 0.04 |
| Ukraine | 0.788 | 6.82 | 3.87 |
| USA | 0.860 | 3.23 | 0.55 |
| Viet Nam | 0.762 | 11.46 | 10.45 |
| Yemen | 0.853 | 2.29 | 1.66 |
| Zambia | 0.816 | 4.02 | 2.29 |

the Czech Republic, Romania, Slovakia, and Slovenia. While catastrophic payments were relatively low in most OECD countries, they were relatively high, effecting more than 3% of households, in the USA, Switzerland, Portugal, and Greece, and more than 1% in Korea, Mexico, Finland, and Norway.

In most cases, the principal source of catastrophic payments was direct payments made by the users of services. This can be seen by comparing the proportion of households facing catastrophic financial burdens due to out-of-pocket payments with the proportion facing catastrophic expenditure from all causes in Table 38.3. In some countries, however, public prepayment mechanisms played a significant role, causing over 2% of households to face catastrophic health spending in Argentina, Brazil, Costa Rica, Jamaica, and Panama in the Americas; Azerbaijan, Croatia, and Estonia among the transition economies; Switzerland and the USA among the OECD countries; and Lebanon. In the Latin American countries it is likely to be due to social insurance payments that can constitute a relatively high share of salaries, and people with low incomes are not usually exempt as they are in the case of income taxes. In the USA and Switzerland, it is more related to the nature of the health insurance system where payments are not levied in proportion to incomes.

The chapter by Xu et al. (24) in this volume explores further the factors related to the variation in the proportion of households facing catastrophic expenditures due to out-of-pocket payments. The triad of poverty or low capacity to pay, the ready availability of health services, and the absence of risk pooling

mechanisms, are closely associated with increases in catastrophic payments on a cross-country basis.

WHAT IS THE EMPIRICAL RELATIONSHIP BETWEEN THE INCOME AND BURDEN APPROACHES?

Comparison of the results of Table 38.2 with those in Table 38.3 shows that health payments in the income space improve the after-payment distribution of income over the prepayment distribution (i.e. the RE was positive) in all of the countries shown to perform at the low end of the FFC scale in the burden space (e.g. Argentina, Azerbaijan, Brazil, Jamaica, Ukraine, and Viet Nam). At the other extreme, health payments in Denmark and Sweden resulted in an increase in income inequality (RE was negative) but the distribution of household financial contributions in the burden space was relatively fair with FFC scores in excess of 0.9. There appears to be little correlation between the RE and the FFC across countries.

On the other hand, a comparison of the threshold measures shows more consistency—countries where health payments resulted in a relatively high proportion of households falling below the poverty line were also those where a relatively high percentage of households faced catastrophic payments. These correlations are explored formally in Table 38.4.

The two measures used in the burden space (FFC and %CAT) are highly correlated, negatively. This means that the fairer the distribution of household financial payments, the lower is the proportion of households facing catastrophic expenditure. The FFC also has a strong negative correlation with DH, the

Table 38.4 Correlation coefficients between measures in the income and burden space

| | | Burden space | | Income space | |
|--------------|------|--------------|-------|--------------|-------|
| | | FFC | %CAT | RE | DH |
| Burden space | FFC | 1.000 | | | |
| | %CAT | -0.903 | 1.000 | | |
| Income space | RE | -0.071 | 0.028 | 1.000 | |
| | DH | -0.740 | 0.708 | 0.251 | 1.000 |

threshold measure in the income space. Not surprisingly, the two threshold measures, DH and %CAT, show a high, positive correlation. By contrast, the income space summary measure of the distribution of payments, RE, shows only a weak relationship with the threshold measure in the income space (DH), and almost no relationship with the threshold (%CAT) and the distribution (FFC) measures in the burden space. In fact, the correlation between RE and the FFC is negative, suggesting that the fairer the distribution of household financial contributions in the burden space, the worse is the measured impact of health payments on the distribution of incomes.

Why is the FFC closely correlated with %CAT and with DH while the RE is not? Part of the answer lies in the fact that contributions by household in the middle and upper parts of the income distribution can have an important influence on the Gini coefficient and thus the RE. All three measures, the FFC, %CAT, and DH are highly sensitive to payments of poor households. In the burden space, health system contributions are analysed as a fraction of household capacity to pay so that contributions by middle and upper income house-

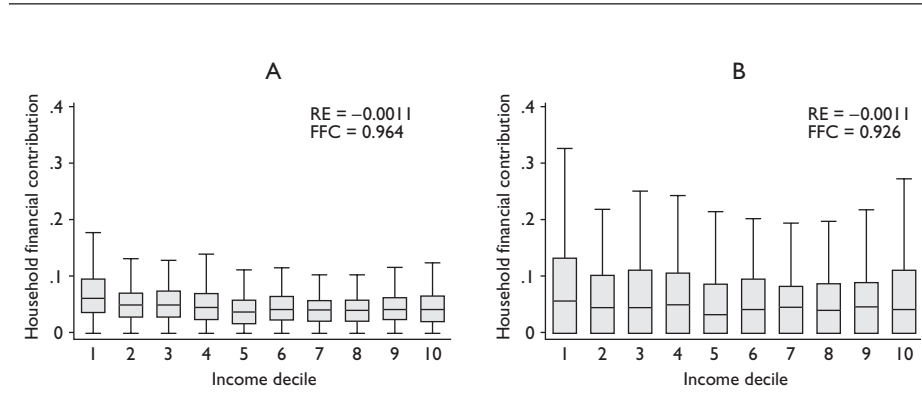
holds have relatively little effect. While the three are empirically correlated, they do capture distinct aspects of the experience of poorer households.

Wagstaff and van Doorslaer (10) have argued that the main concern of the FFC, a concern with equalizing the burden of payments across households, can be captured by the income space measure (RE). Their logic was that subsistence expenditure which is deducted from total expenditures to estimate capacity to pay for the FFC, is highly regressive. A fairly financed system with equal financial burdens implies, therefore, a particular level of progressivity (or redistributive effect) and deviations from financial fairness can be mapped into the RE.

This is not necessarily the case as two populations with the same RE can have different levels of the FFC index and vice versa. Comparison of Tables 38.2 and 38.3 shows that in Azerbaijan and Bangladesh, for example, the RE was 0.006 but the FFC was 0.748 in the former and 0.868 in the latter. The fact that the two approaches capture different features of the health payment distribution and that the same level of progressivity or redistributive effect of health payments can lead to different levels of fairness as measured by the FFC index can be illustrated using simulated data. Let us assume two populations, A and B, with the same redistributive effect (RE = -0.0011). In order to demonstrate the sensitivity to horizontal inequity of the two approaches, we make the variance of the health financing contributions (HFC) within income deciles in population A smaller than in population B.

Figure 38.10 shows the distribution of HFC across income deciles for both populations. The y-axis shows HFC and the x-axis income deciles ranked from the lowest to the highest. The horizontal line in the middle of the box represents the median of the HFC. The

Figure 38.10 The distribution of household financial contribution by income deciles



box extends from the lower 25th percentile to the upper 25th percentile. The upper value is equal to $HFC_{[75]} + 1.5(HFC_{[75]} - HFC_{[25]})$, and the lower one is $HFC_{[25]} - 1.5(HFC_{[75]} - HFC_{[25]})$. The mean HFC in each decile is the same, but there are larger variances within each decile in population B than in population A.

The redistributive effect of health payments is the same in both populations. However, the FFC is lower in population B than in population A. This is because the income space measure is not sensitive to horizontal inequity (as shown earlier) and it does not give great weight to households in the tails of the distribution, e.g. those with catastrophic health expenditures. FFC and RE, therefore, capture different concerns. Fairness in financial contribution is measured in the burden space, a concern with the equal burden of health system payments. It is not a concern with progressivity of health payments with respect to income, the focus of the income space approach.

One implication is that countries with a high degree of out-of-pocket financing of their health systems can be shown to be progressive in the income space (a relatively high RE), yet they also have high catastrophic payments in the burden space. A health financing system with a relatively large share of expenditure provided by out-of-pocket payments can be progressive because the rich spend more on health than the poor, both in absolute terms and as a share of their total capacity to pay. At the same time, the smaller payments of the poor can be catastrophic, putting them into poverty. If health policy focuses exclusively on the progressivity of payments, this consequence of out-of-pocket payments—and the converse, the benefits of the prepayment mechanism—will be ignored.

In conclusion, an in-depth analysis in the burden space provides additional insights into the impact of different insurance coverage arrangements than those indicated by the RE index alone.

CONCLUSIONS

This paper described two approaches for measuring the distributional consequences of financial contributions to the health system. The first is derived in the income space while the second is derived in the burden space. The income space distributional measure is based on the progressivity principle, while the burden space approach is based on capacity to pay or the equal burden principle. Each approach has its own distribution and threshold measures.

The income space approach focuses on the changes in income distribution due to health payments. The most common distribution measure used in this context is the redistributive effect, which compares income Gini coefficients before and after health payments. Progressive health payments will reduce the income Gini and make the resulting distribution of income more equal while regressive health payments will have an opposite impact. The threshold measure explores how many households fall into poverty because of health payments.

The burden space approach focuses on the proportion of capacity to pay contributed to health. The summary measure, FFC, captures three common concerns: protecting households against extreme financial loss due to ill health (preventing catastrophic health expenditure); equal payments by households with equal capacity to pay (horizontal equity); and an element of progressivity (richer households should contribute more of their total income than poorer households). The threshold measure indicates the proportion of households with catastrophic health expenditures.

While the two approaches explore different aspects of the impact of health payments, they both provide useful information for policy-makers. The income space approach is sensitive to progressivity and gives feedback on this aspect of the health financing system, but it gives little information on risk protection and catastrophic outcomes leading to impoverishment. The burden space approach is sensitive to horizontal inequity, and particularly to catastrophic health payments. It allows policy-makers to identify shortcomings associated with risk pooling and other financial protection mechanisms in the health financing system.

We believe that the purpose of health policy is not to redistribute income, although its impact on the distribution of income is of obvious interest. Accordingly, it was shown in the present paper that an analysis based on the examination of financing burdens offers an important new insight to the development of health financing policies. Analyses using both approaches will provide more comprehensive information for policy-makers who wish to improve the performance of their health financing systems and who may be operating under rather different circumstances.

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NOTES

- 1 Anand (56) showed that it is a measure of the covariance between the income ranks and the tax payments of households.
- 2 The FFC index approaches zero when households with lower financial contributions to health have substantially larger capacities to pay than households that contribute a higher proportion of their capacities to pay. Consider a hypothetical example of 10 households where 1 household contributes 0% and the remaining 9 households contribute 100% of their capacities to pay. The larger the share of the summed capacity to pay belonging to the household with zero contributions, the smaller the FFC index becomes, approaching its lowest value of zero when virtually all capacity to pay belongs to the one household that pays nothing to health, and all contributions are made by the rest. Of course, in practice such an outcome is not feasible, as health system contributions can only be made from positive capacity to pay, but at the limit the condition applies. This result of the FFC being bounded by 0 and 1 is specific to the formulation in which the sum-mean formulation of HFC_o is used. If the arithmetic mean of household financial contributes was used instead, the FFC would be bounded by 0.5 and 1.
- 3 This is confirmed in regression analysis where the coefficient of OOP/THE was never significant in explaining RE regardless of the functional form used.

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