16

Who Pays for Health Care? Progressivity of Health Finance

Who pays for health care? To what extent are payments toward health care related to ability to pay? Is the relationship proportional? Or is it progressive—do health care payments account for an increasing proportion of ability to pay (ATP) as the latter rises? Or, is there a regressive relationship, in the sense that payments comprise a decreasing share of ATP? The preferred relationship between health care payments and ATP will vary across individuals with their conceptions of fairness. But identification of the nature of the empirical relationship and quantification of the degree of any progressivity or regressivity is of interest, not only from a wide range of equity perspectives, but also for macroeconomic and political analyses of the health care system.

This chapter provides practical advice on methods for assessing and measuring progressivity in health care finance. Throughout, we measure progressivity through departures from proportionality in the relationship between payments toward the provision of health care and ATP. There are other approaches to the measurement of progressivity (Lambert 1993). The relationship between progressivity and the redistributive impact of health care payments is considered in the next chapter.

Definition and measurement of variables

There are two distinct stages to an analysis of progressivity. First, establish the progressivity of each source of finance. Second, establish the overall progressivity of the system by weighting the progressivity of the separate sources. Two types of data are required: survey data to establish the distribution of payments across households and aggregate data to determine the macroweights to be assigned to each finance source. The most suitable source of survey data is a household income and expenditure survey, which should contain good data on the two central variables: payments toward health care and ability to pay.

Ability to pay

In a developing country context, given the lack of organized labor markets and the high variability of incomes over time, household consumption, or even expenditure, is generally considered to be a better measure of welfare and ATP, than is income (see chapter 6). In principle, ATP should indicate welfare before payments

for health care, and so measurement of ATP by consumption requires an assumption, most probably a strong one, that the means of financing health care does not affect saving decisions. Household consumption net of expenditures assumed nondiscretionary, such as those on food, is often used as a measure of welfare (World Health Organization 2000). For the purpose of assessing progressivity, such a measure of ATP can be problematic, depending on the objective, if the nondiscretionary expenditures are, in fact, sensitive to the system of health finance. For example, the relative tax rate imposed on food would be expected to differentially influence household decisions with respect to food spending. Then the distribution of household consumption net of food expenditure is itself a product of the health finance system and does not provide a benchmark against which to assess the distributional impact of that system. But if the objective is simply to assess the degree of proportionality between health payments and some measure of living standards, then household expenditures gross or net of those on food can be used, as preferred.

If one wishes to make an inference about the distributional impact of health finance (World Health Organization 2000), then the measure of ATP should be gross of all health care, tax, and social insurance payments. Out-of-pocket payments for health care should already be included in measures of household consumption/expenditure, but it will be necessary to add direct tax payments, social insurance contributions that contribute to health financing and, possibly, private health insurance premiums. If household income is used to proxy ATP, then it must be gross of tax and social insurance contributions, and one examines the impact of health financing on this benchmark distribution of income.

Adjustment should be made for the size and age structure of the household through application of an equivalence scale (see chapter 6).

Health care payments

Evaluation of progressivity in health care finance requires examination of all sources of health sector funding and not simply those payments that are made exclusively for health care. So, in addition to out-of-pocket (OOP) payments, health insurance contributions, and earmarked health taxes, the distributional burden of all direct and indirect taxes is relevant in cases in which, as is commonly true, some health care is financed from general government revenues. Social insurance contributions should also be considered. One source of revenue, foreign aid, is not relevant because the purpose is to evaluate the distributional impact on the domestic population. Assuming tax parameters have been set for foreign loan repayment, the distributional burden on the current generation of foreign debt financing will be captured through evaluation of the tax distribution.

In summary, there are five main sources of health care finance to be considered: direct taxes, indirect taxes, social insurance, private insurance, and OOP payments.

Progressivity analyses usually seek to determine the distribution of the real economic burden of health finance and not simply the distribution of nominal payments. So, the incidence of payments—who incurs their real cost—must be established, or assumed (Atkinson and Stiglitz 1980). For example, the result of employer contributions to health insurance is most likely lower wages received by employees. The extent to which this is true will depend on labor market conditions, in particu-

lar, the elasticities of labor demand and supply. Given that incidence depends on market conditions, it cannot be determined through application of universal rules. However, a fairly conventional set of assumptions follows (Wagstaff et al. 1999):

Payment toward health care	*Incidence*
Personal income and property taxes	legal taxpayer
Corporate taxes	shareholder (or labor)
Sales and excise taxes	consumer
Employer social and private insurance contributions	employee
Employee social insurance contributions	employee
Individual private insurance premiums	consumer

Survey data are unlikely to provide complete information on household tax and insurance payments. For example, income tax payments or social insurance contributions may not be explicitly identified, and payments through sales taxes almost certainly will not be reported. Various approximation strategies are necessary. For example, tax and social insurance schedules can be applied to gross incomes/earnings. The distribution of the sales tax burden can be estimated by applying product-specific tax rates to disaggregated data on the pattern of household expenditure.

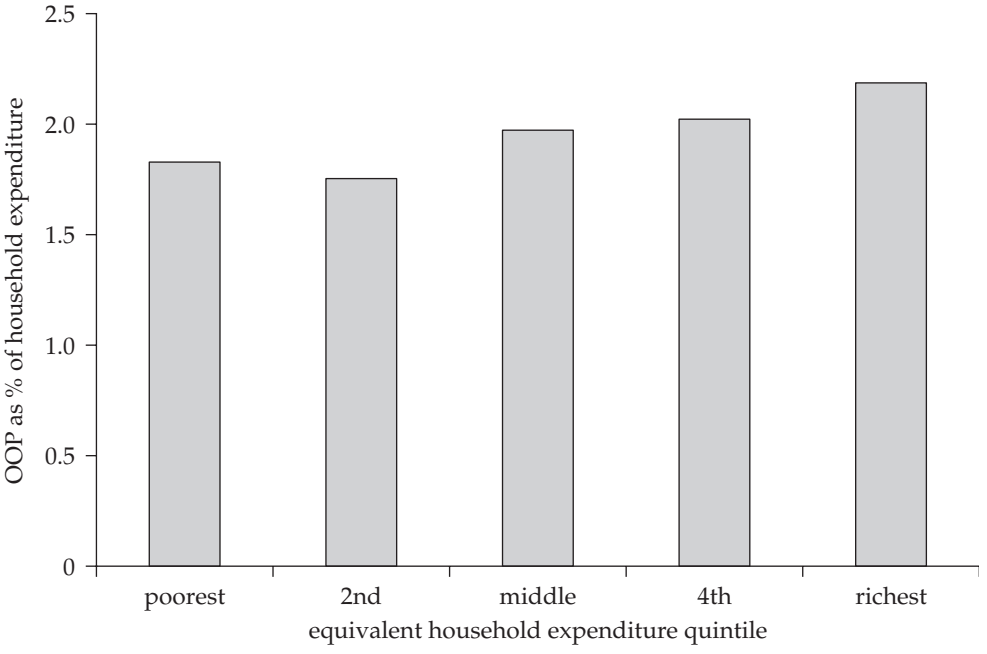
Estimates of OOP payments from survey data are potentially subject to both recall bias and small sample bias owing to the infrequency with which some health care payments are made. Survey estimates of aggregate payments tend to show substantial discrepancies from production-side estimates, in cases in which the latter are available. Whether estimates of the distribution, as opposed to the level, of OOP payments are biased depends on whether reporting of OOP payments is related systematically to ATP. Under the possibly strong assumption of no systematic misreporting, survey data can be used to retrieve the distribution of payments, and mismeasurement of the aggregate level can be dealt with through application of a macroweight that gives the best indication of the relative contribution of OOP to total revenues.

Assessing progressivity

The most direct means of assessing progressivity of health payments is to examine their share of ATP as the latter varies. In figure 16.1, for Egypt we show OOP payments for health care as a percentage of total household expenditure by quintile groups of equivalent household expenditure. On average, OOP payments claim about 2 percent of household expenditures, and there is a tendency for this share to rise with total expenditure, indicating some progressivity.

A less direct means of assessing progressivity, defined in relation to departure from proportionality, is to compare shares of health payments contributed by proportions of the population ranked by ATP with their share of ATP. That is, to compare the concentration curve for health payments, $L_H(p)$, with the Lorenz curve for ATP, $L(p)$ (see chapter 7). If payments toward health care always account for the same proportion of ATP, then the share of health payments contributed by any group must correspond to its share of ATP. The concentration curve lies on top of the Lorenz curve. Under a progressive system, the share of health payments contrib-

Figure 16.1 *Out-of-Pocket Payments as a Percentage of Total Household Expenditure—Average by Expenditure Quintile, Egypt, 1997*



Source: Authors.

Box 16.1 *Progressivity of Health Care Finance in Egypt, 1997*

Health care in Egypt is financed from a number of sources. As is common for developing countries, OOP payments contribute the greatest share of revenue, 52 percent in this case. The next biggest contribution—one-third—is from general government revenues. Social and private health insurance contribute 7 percent and 5.5 percent, respectively, and an earmarked health tax on cigarette sales makes up the remaining 3 percent of revenues going toward the provision of health care.

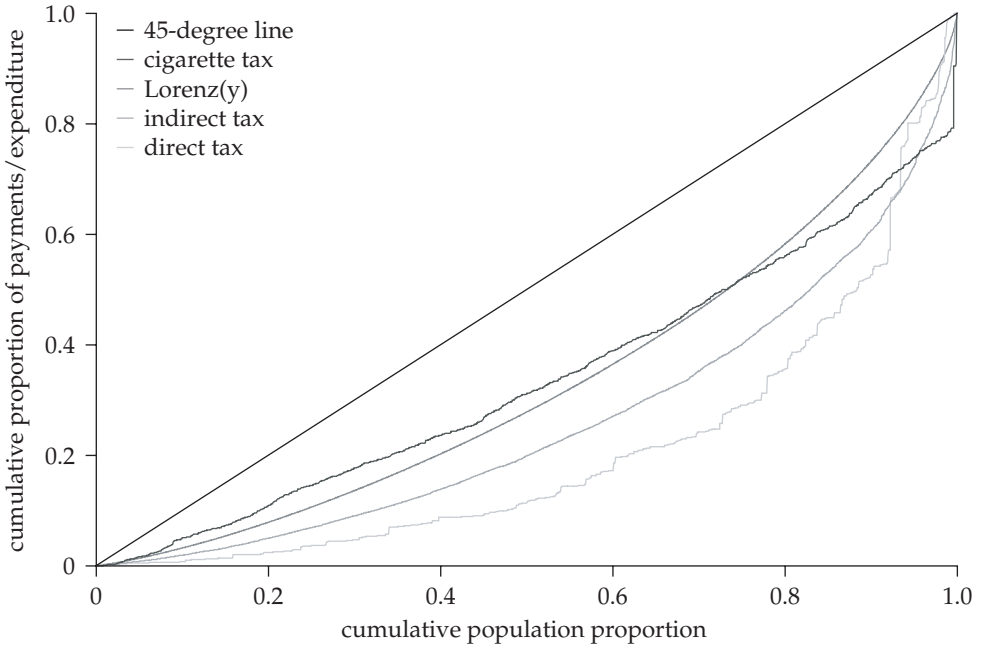
We assess the progressivity of this system of health finance using data from the 1997 Egypt Integrated Household Survey. In instances in which it is feasible, the incidence assumptions stated above are applied. Payment variables recorded in the survey are as follows: (i) direct personal taxes (income, land, housing, and property taxes), (ii) OOP medical expenses, and (iii) private health insurance premiums. Payment variables estimated from other survey information were (i) sales and cigarette taxes approximated by applying rates to the corresponding expenditures and (ii) social health insurance contributions estimated by applying contribution rates to earnings/incomes of covered workers/pensioners. ATP is approximated by equivalent household expenditure; calculated as total household expenditure, plus direct tax and social insurance contributions, divided by the square root of household size.

In the figures we present the concentration curves for each source of finance, as well as the Lorenz curve for household expenditure. In the first figure (a) the concentration curves for direct and indirect taxes appear to lie outside the Lorenz curve, suggesting that these are progressive sources of finance. The formal tests reported in the table confirm that the Lorenz curve dominates both of these concentration curves. The table also reveals that the cumulative shares of direct and indirect taxes paid at each of the first four quintiles are always significantly less the respective shares of ATP. Again, confirming progressivity. The curve for the earmarked cigarette tax appears to lie inside the Lorenz curve at lower ATP but outside it at higher ATP. The test does not reject the null of nondominance, and therefore proportionality, in this case. Apparently, the difference between the two curves never reaches statistical significance at any point.

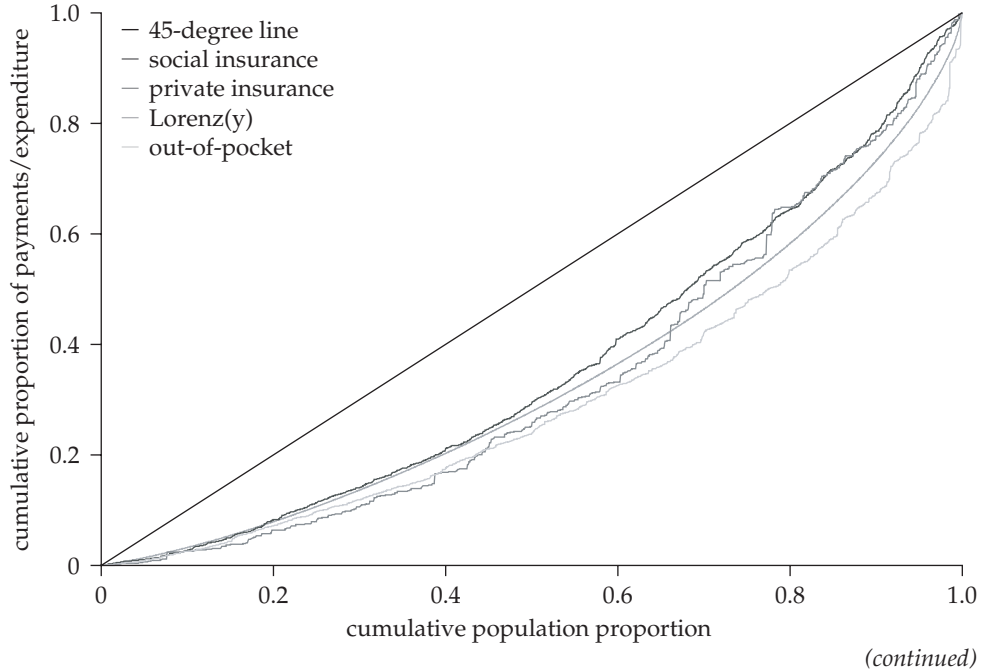
Box 16.1 *(continued)*

Concentration Curves for Health Payments and Lorenz Curve for Household Expenditure, Egypt 1997

a. Direct, Indirect, and Cigarette Taxes



b. Social Insurance Contributions, Private Insurance Premiums, and Out-of-Pocket Payments



(continued)

Box 16.1 *(continued)*

In the second figure (b), we present the concentration curves for social insurance contributions, private insurance premiums, and OOP payments. The latter concentration curve appears to lie outside the Lorenz curve, and the test reported in the table confirms that there is dominance. However, unlike for direct and indirect taxes, the cumulative share of OOP payments is not significantly different from the share of ATP at any of the quintiles.[1] Although the concentration curve for private insurance premiums appears to lie below the Lorenz curve at lower ATP, the opposite is true at higher ATP. In fact, the test does not reject nondominance (/proportionality). The concentration curve for social insurance contributions is almost exactly on top of the Lorenz curve (indicating proportionality) up to the middle of the ATP distribution but lies inside the Lorenz curve for the top half of the distribution. This pattern in the top of the distribution leads to the test finding dominance of the concentration curve over the Lorenz curve and so regressivity. The quintile shares confirm that the significant differences are at the higher quintiles.

In summary, there is evidence that direct and indirect taxes plus OOP payments are progressive means of financing health care in Egypt. There is no evidence that the earmarked cigarette tax and private insurance premiums depart significantly from proportionality. Social insurance premiums are regressive but only at the top of the distribution.

[1]Despite this, the test finds dominance because we use the multiple comparison approach decision rule, which requires only one significant difference from, in this case, 19 quantile comparison points (see chapter 7).

Distributional Incidence of Sources of Health Finance in Egypt, 1997

		Nonearmarked taxes		*Earmarked taxes*			
Equivalent household expenditure quintile	*Equivalent household expenditure*	*Direct personal taxes*	*Indirect taxes*	*Cigarette tax*	*Social insurance contrbns.*	*Private insurance premiums*	*OOP payments*
Poorest 20%	**7.85%**	**2.35%***	**4.96%***	**10.90%***	**8.17%**	**6.36%**	**7.11%**
(standard error)	(0.1481)	(0.7609)	(0.2276)	(1.5543)	(0.6241)	(1.4012)	(0.8350)
Poorest 40%	**20.23%**	**8.70%***	**13.86%***	**23.54%**	**21.13%**	**16.78%**	**17.56%**
	(0.3051)	(1.9313)	(0.5304)	(3.1339)	(1.0234)	(2.4107)	(1.6167)
Poorest 60%	**36.46%**	**17.12%***	**27.00%***	**38.92%**	**40.91%***	**33.18%**	**32.45%**
	(0.4761)	(3.0182)	(0.9359)	(5.0465)	(1.5111)	(3.2497)	(2.7124)
Poorest 80%	**58.24%**	**35.60%***	**46.15%***	**56.14%**	**64.36%***	**64.83%**	**53.44%**
	(0.6415)	(5.4012)	(1.4279)	(7.1683)	(1.5481)	(3.6676)	(4.1572)
Test of dominance							
– Against 45° line	–	–	–	–	–	–	–
– Against Lorenz curve		–	–		+		–
Concentration index[a]	0.3345	0.5846	0.4780	0.3283	0.2812	0.3334	0.3988
(robust standard error)	(0.0098)	(0.0395)	(0.0279)	(0.0977)	(0.0202)	(0.0448)	(0.0528)
(*p*-value)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)
Kakwani index		0.2501	0.1435	–0.0061	–0.0532	–0.0011	0.0644
(robust standard error)		(0.1311)	(0.0460)	(0.1407)	(0.0270)	(0.0748)	(0.0848)
(*p*-value)		(0.059)	(0.002)	(0.965)	(0.051)	(0.988)	(0.449)

Note: For shares: **bold** indicates significant difference from population share (5%)
* indicates significant difference from expenditure share (5%).
Standard errors for concentration and Kakwani indexes are robust to heteroskedasticity and within cluster correlation.
Dominance tests: – indicates the 45-degree line/Lorenz curve dominates the concentration curve
+ indicates concentration curve dominates 45-degree line/Lorenz curve
Blank indicates nondominance.
Dominance is rejected if there is at least one significant difference in one direction and no significant difference in the other, with comparisons at 19 quantiles and 5% significance level.
a. Gini index for equivalent household expenditure.
Source: Authors.

uted by the poor will be less than their share of ATP. The Lorenz curve dominates (lies above) the concentration curve. The opposite is true for a regressive system.

Measuring progressivity

Lorenz dominance analysis is the most general way of detecting departures from proportionality and identifying their location in the ATP distribution. But it does not provide a measure of the magnitude of progressivity, which may be useful when making comparisons across time or countries. Summary indices of progressivity meet this deficiency but require the imposition of value judgments about the weight given to departures from proportionality at different points in the distribution (Lambert 1989). The Kakwani index (Kakwani 1977) is the most widely used summary measure of progressivity in both the tax and the health finance literatures (O'Donnell et al. forthcoming; Wagstaff et al. 1992; Wagstaff et al. 1999).

We gave the definition of the Kakwani index in chapter 14. It is twice the area between a payment concentration curve and the Lorenz curve and is calculated as $\pi_K = C - G$, where C is the concentration index for health payments and G is the Gini coefficient of the ATP variable. The value of π_K ranges from –2 to 1. A negative number indicates regressivity; $L_H(p)$ lies inside $L(p)$. A positive number indicates progressivity; $L_H(p)$ lies outside $L(p)$. In the case of proportionality, the concentration lies on top of the Lorenz curve and the index is zero. But note that the index could also be zero if the curves were to cross and positive and negative differences between them cancel. Given this, it is important to use the Kakwani index, or any summary measure of progressivity, as a supplement to, and not a replacement of, the more general graphical analysis.

In a generalized Kakwani index, the judgment about the weight given to departures from proportionality along the ATP distribution is made explicit through the choice of a parameter (Lambert 1989). An alternative to the simple Kakwani is the Suits index, which gives greater weight to departures from proportionality that occur among households higher up the ATP distribution (Suits 1977).

Progressivity of overall health financing

The progressivity of health financing in total can be measured by a weighted average of the Kakwani indices for the sources of finance, where weights are equal to the proportion of total payments accounted for by each source. Thus, overall progressivity depends both on the progressivity of the different sources of finance and on the proportion of revenue collected from each of these sources.

Ideally, the macroweights should come from National Health Accounts (NHA). It is unlikely, however, that all sources of finance that are identified at the aggregate level can be allocated down to the household level from the survey data. Assumptions must be made about the distribution of sources of finance that cannot be estimated. Their distributional burden may be assumed to resemble that of some other payment source. For example, corporate taxes may be assumed to be distributed as income taxes. In this case, we say that the missing payment distribution has been allocated. Alternatively, we may simply assume that the missing payment is distributed as the weighted average of all the revenues that have been identified. We refer to this as ventilation. Best practice is to make such assumptions explicit and to conduct extensive sensitivity analysis.

Box 16.2 *Measurement of Progressivity of Health Financing in Egypt*

Concentration and Kakwani indices by source of health financing in Egypt are given in the bottom part of the table in box 16.1. All concentration indices are significantly positive confirming, as was clear from the concentration curves and dominance tests, that the better-off contribute absolutely more to the financing of health care than do the poor. The index is largest for direct payments and smallest for social insurance contributions, suggesting that direct taxes are most progressive and social insurance contributions the least so. The Kakwani indices for both direct and indirect tax are statistically significantly positive, marginally so in the case of direct taxes (10 percent), indicating progressivity. For the cigarette tax, private insurance, and OOP payments, the Kakwani indices are not significantly different from zero. In the latter case, this seems inconsistent with the result of the dominance test, which indicates that the OOP concentration curve is dominated by the Lorenz curve. The explanation would appear to be that the curves differ in the top half of the ATP distribution but are near coincident in the bottom half, where the Kakwani index places more weight. The Kakwani index for social insurance contributions is significantly negative at just above the 5 percent significance level. Again, the magnitude of the index is reduced by the near proportionality in the bottom half of the ATP distribution.

We can formally test for the relative progressivity of different sources of finance using dominance methods. The results, which are reported in the table, indicate that the concentration curve for direct taxes is dominated by all the others, and so we can conclude that direct taxes are the most progressive source of finance. Next come indirect taxes, the concentration curve for which is dominated by all the others but for OOP payments. There are no significant differences between the concentration curves for social insurance, private insurance, cigarette taxes, and OOP payments. These sources cannot be ranked in relation to progressivity.

Tests of Dominance between Concentration Curves for Different Sources of Health Finance, Egypt 1997

	Cigarette tax	*Private insurance*	*Out-of-pocket*	*Indirect taxes*	*Direct taxes*
Social insurance	non-D	non-D	non-D	D	D
Cigarette tax		non-D	non-D	D	D
Private insurance			non-D	D	D
Out-of-pocket				non-D	D
Indirect taxes					D

Note: D indicates that concentration curve of row source dominates (is more progressive than) that of column source. Dominance is rejected if there is at least one significant difference in one direction and no significant difference in the other, with comparisons at 19 quantiles and 5% significance level. Non-D indicates that nondominance between the concentration curves cannot be rejected.

Source: Authors.

Box 16.3 *Derivation of Macroweights and Kakwani Index for Total Health Finance, Egypt, 1997*

The NHA shares of total health revenues in Egypt (1994–5) from various finance sources are given in the table. The table also shows which of the various finance sources can be allocated, either directly or through estimation, from the survey data. In this example, as in most others, the main difficulty concerns the allocation of the 33 percent of all health care finance that flows from general government revenues. Only direct personal and sales taxes, which account for only one-sixth of government revenues, can be allocated down to households. Nonetheless, it is possible to allocate to households, revenues that account for 72 percent of all health care finance.

Box 16.3 *(continued)*

We consider three sets of assumptions about the distribution of unallocated revenues. In case 1, it is assumed that unallocated general government revenues are distributed as the weighted average of those taxes that can be allocated. Essentially, this involves inflating the weight given to the taxes that can be allocated. For example, the weight on domestic sales taxes is inflated from its actual value of 0.0472 of all health finance to a value of 0.2829 (= [4.72/5.5]*0.3298) to reflect the distribution of unallocated revenues. In case 2, we assume that "other income, profits, and capital gains taxes" are distributed as direct personal taxes and that import duties are distributed as sales taxes. It is assumed that the rest of the unallocated revenues are distributed as the weighted average of the allocated taxes. Finally, in case 3, we assume that unallocated revenues are distributed as the weighted average of all allocated payments (and not just allocated taxes). Another interpretation of this case is that the Kakwani index is informative of the overall progressivity of only those health payments that can be allocated to households.

The relative emphasis given to such alternative scenarios should depend on evidence as to the relative validity of the underlying assumptions. In the example, the various assumptions about the distributions of the unallocated revenues makes little difference to the conclusion about the overall progressivity of the health finance system. In every case, the Kakwani index for total payments is only very slightly positive, indicating near proportionality.

Source: Authors.

Health Finance by Source of Progressivity of Overall Health Financing, Egypt 1997

Finance source	*Share of total finance*	*Method of allocation*	*Kakwani by source*	*Macroweights*		
				Case 1	*Case 2*	*Case 3*
General government revenues	32.98%					
Taxes						
a. Income, capital gains, and property	0.78	reported	0.2501	0.0469	0.0552	0.0108
b. Corporate	4.83	ventilated allocated /				
c. Other income, profit, and capital gains	0.62	ventilated				
d. Domestic sales of goods and services	4.72	estimated allocated /	0.1435	0.2829	0.2825	0.0649
e. Import duties	3.64	ventilated				
f. Other	3.22	ventilated				
Nontax revenue	15.16	ventilated				
Earmarked cigarette tax	3.00	estimated	–0.0061	0.0300	0.0300	0.0425
Social insurance	6.67	estimated	–0.0532	0.0667	0.0667	0.0919
Private insurance	5.57	reported	–0.0011	0.0557	0.0557	0.0768
Out-of-pocket payments	51.77	reported	0.0644	0.5177	0.5177	0.7132
Total	100%			1.0000	1.0000	1.0000
% revenues allocated	72.51%					
	Kakwani for total health finance			0.0819	0.0839	0.0527

Derivation of macroweights:

Case 1—Unallocated revenues distributed as the weighted average of allocated taxes.

Case 2—Taxes c. distributed as taxes a. Taxes e. distributed as d. Remainder of unallocated revenues distributed as weighted average of allocated taxes.

Case 3—Unallocated revenues distributed as weighted average of all allocated payments.

Sources: Government of Egypt 1995; Rannan–Eliya 1998.

Computation

Quintile shares, dominance tests, and concentration indices can be computed as described in chapters 7 and 8. Computation for the Kakwani index is provided in chapter 14.

References

Atkinson, A. B., and J. E. Stiglitz. 1980. *Lectures on Public Economics.* New York: McGraw Hill.

Government of Egypt. 1995. *Egypt Government Finance Statistics Yearbook.* Cairo.

Kakwani, N. C. 1977. "Measurement of Tax Progressivity: An International Comparison." *Economic Journal* 87(345): 71–80.

Lambert, P. J. 1989. *The Distribution and Redistribution of Income: A Mathematical Analysis.* Cambridge, MA: Blackwell.

Lambert, P. J. 1993. *The Distribution and Redistribution of Income: A Mathematical Analysis.* Manchester, UK, and New York: Manchester University Press.

O'Donnell, O., E. van Doorslaer, R. Rannan-Eliya, A. Somanathan, S. R. Adhikari, B. Akkazieva, D. Harbianto, C. G. Garg, P. Hanvoravongchai, A. N. Herrin, M. N. Huq, S. Ibragimova, A. Karan, S.-M. Kwon, G. M. Leung, J.-F. R. Lu, Y. Ohkusa, B. R. Pande, R. Racelis, K. Tin, L. Trisnantoro, C. Vasavid, Q. Wan, B.-M. Yang, and Y. Zhao. Forthcoming. "Who Pays for Health Care in Asia?" *Journal of Health Economics.*

Rannan-Eliya, R. 1998. *Egypt National Health Accounts 1994–95,* Special Report No. 3, Partnerships for Health Reform Project. Baltimore, MD: Abt Associates Inc.

Suits, D. 1977. "Measurement of Tax Progressivity." *American Economic Review* 67: 747–52.

Wagstaff, A., E. van Doorslaer, S. Calonge, T. Christiansen, M. Gerfin, P. Gottschalk, R. Janssen, C. Lachaud, R. Leu, and B. Nolan. 1992. "Equity in the Finance of Health Care: Some International Comparisons." *Journal of Health Economics* 11(4): 361–88.

Wagstaff, A., E. van Doorslaer, H. van der Burg, S. Calonge, T. Christiansen, G. Citoni, U. G. Gerdtham, M. Gerfin, L. Gross, U. Hakinnen, P. Johnson, J. John, J. Klavus, C. Lachaud, J. Lauritsen, R. Leu, B. Nolan, E. Peran, J. Pereira, C. Propper, F. Puffer, L. Rochaix, M. Rodriguez, M. Schellhorn, G. Sundberg, and O. Winkelhake. 1999. "Equity in the Finance of Health Care: Some Further International Comparisons." *Journal of Health Economics* 18(3): 263–90.

World Health Organization. 2000. *World Health Report 2000.* Geneva, Switzerland: World Health Organization.