

MEASURING POVERTY USING QUALITATIVE PERCEPTIONS OF CONSUMPTION ADEQUACY

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Abstract—We show that subjective poverty lines can be derived using simple qualitative assessments of perceived consumption adequacy based on a household survey. We implement the method using survey data for Jamaica and Nepal. Respondents were asked whether their consumptions of food, housing, and clothing were adequate for their family's needs. The implied poverty lines are robust to alternative methods of dealing with other components of expenditure. The aggregate poverty rates accord quite closely with those based on independent "objective" poverty lines. However, there are notable differences in the geographic and demographic poverty profiles.

I. Introduction

THE most common practice in drawing a poverty line starts with a predetermined set of basic needs for good health and an active life; nutritional requirements normally figure prominently. The poverty line is then defined as the value of a monetary measure of individual economic welfare, such as expenditure on all goods and services, at which these basic needs are met at given prices and reference tastes. People are deemed to be poor if and only if their expenditure is below this line, and a poverty measure is estimated on the censored distribution (such as the head-count index given by the proportion below the line). Methodological differences within this approach are known to yield different poverty measures.²

However (as has been noted before), there is an inherent subjectivity and social specificity to any notion of basic needs, including nutritional requirements. For example, psychologists, sociologists, and others have argued that the circumstances of the individual relative to others in some reference group influence perceptions of well-being at any given level of individual command over commodities.³ By this view, "the dividing line . . . between necessities and luxuries turns out to be not objective and immutable, but socially determined and ever changing" (Scitovsky, 1978, p. 108). Some have taken this view so far as to abandon any attempt to rigorously quantify a definition of poverty. Poverty analysis (particularly, but not only, for developing

countries) has become polarized between the objective-quantitative schools and the subjective-qualitative schools, with rather little effort at cross-fertilization.

An intermediate approach has emerged in a segment of the developed country literature on poverty. Subjective poverty lines have been based on answers to the minimum-income question (MIQ), such as the following (paraphrased from Kapteyn et al., 1988): "What income level do you personally consider to be absolutely minimal? That is to say that with less you could not make ends meet." One might define everyone as poor whose income is less than the amount they give as an answer to this question as poor. However, this would almost certainly lead to inconsistencies in the resulting poverty measures, in that people with the same income, or some other agreed measure of economic welfare, will be treated differently (Ravallion & Lokshin, 1999). Clearly an allowance must be made for heterogeneity, such that people at the same level of living may well give different answers to the MIQ, but must be considered equally "poor" for consistency. Past empirical work has found that the expected value of the answer to the MIQ conditional on income tends to be an increasing function of income.⁴ Past studies have tended to find a relationship such as that depicted in figure 1, which gives a stylized representation of the regression function on income for answers to the MIQ. The point z^* in the figure is an obvious candidate for a poverty line; people with income above z^* tend to feel that their income is adequate, while those below z^* tend to feel that it is not. In keeping with the literature, we term z^* the *subjective poverty line* (SPL).⁵ Common practice is to estimate z^* using a regression equation such as $z_i = \alpha + \beta y_i + \gamma x + \epsilon_i$ (or a nonlinear form) where y is actual income, x is a vector of household characteristics deemed relevant to needs (such as family size and demographic composition), and ϵ is a zero mean error term orthogonal to y and x . We call this the *MIQ regression*. The social subjective poverty line is then evaluated at the mean of ϵ_i and any given x , giving $z^* = (\alpha + \gamma x)/(1 - \beta)$. The answers to the MIQ are sometimes interpreted as points on the consumer's cost function (giving the minimum expenditure needed to assure a given level of utility) at a point of "minimum utility," interpreted as the poverty line in utility space.⁶ The way z^* varies with x then

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² Ravallion (1994) gives examples. See Ravallion (1998) for a critical overview of alternative methods of setting poverty lines found in practice in both developing and developed countries.

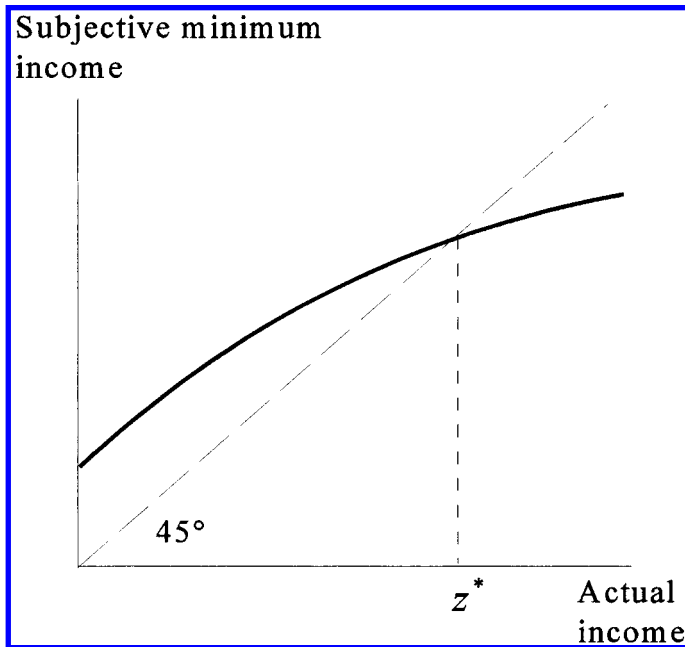
³ Runciman (1966) provided an influential exposition and supportive evidence. Also see van de Stadt, Kapteyn, and van de Geer (1985) and Easterlin (1995).

⁴ Contributions include Groedhart et al. (1977), Colastanto, Kapteyn, and van der Gaag (1984), Danziger et al. (1984), Kapteyn et al. (1985), Kapteyn, Kooreman, and Willemse (1988), Stanovnik (1992), and Kapteyn (1994).

⁵ The term *social subjective poverty line* might be preferable to distinguish it from the individual subjective poverty lines. However, the meaning will be clear from the context.

⁶ On the use of subjective welfare assessments to identify cost and/or utility functions, see van Praag (1991) and Kapteyn (1994).

FIGURE 1—THE SUBJECTIVE POVERTY LINE (z^*)



identifies the equivalence scale (including an allowance for any scale economies of family size).

It seems without exception that the MIQ regression has been estimated assuming that the measure of income obtained from the survey is the concept of “income” that respondents have in mind when they answer the MIQ. The survey-based income estimate is typically based on an economic concept of income as the maximum consumption that is possible without depleting current wealth. The estimate is typically built up from many survey questions; no respectable household survey would ever try to obtain its income estimate from just one or two questions.⁷

Yet the standard practice in the MIQ assumes that the household that responds to that question already knows its income. More plausibly, different households have different concepts of income, which will not often correspond to the concept of income used by the analyst of the MIQ. Some respondents will perceive their own income to be lower than it actually is (as defined by an economist); for example, they might include only cash income, excluding imputed income from own housing or own production activities (such as a family farm). Some will include asset sales or ignore certain production costs, thus overestimating their actual income.

These issues are of particular concern in developing countries. While the MIQ has been applied in a number of OECD countries,⁸ we know of no attempts to apply it in a developing country. Doing so has a number of potential

⁷ For example, in the analysis of the World Bank’s Living Standards Measurement Surveys, it generally requires many pages of programming code to obtain the income and expenditure aggregates from the survey responses.

⁸ See, for example, Hagenaars (1986) for a cross-European comparison and De Vos and Garner (1991) for a U.S.-Dutch comparison.

pitfalls, however. Income is not a well-defined concept in most developing countries, particularly (but not only) in rural areas. It is not at all clear whether one could even get sensible answers to the MIQ.

Our main aim in this paper is to develop and implement a qualitative model of perceived consumption needs that allows us to identify the subjective poverty line without the MIQ. We argue here that the qualitative idea of the adequacy of consumption is, in many settings, a more promising approach than the MIQ. We will demonstrate that one can still estimate the SPL without the MIQ; less-demanding qualitative questions suffice.

The following section outlines our qualitative model of the subjective poverty line. In section III, we present our results for two (quite different) developing countries, Jamaica and Nepal. Section IV concludes.

II. A Qualitative Model of Subjective Poverty Lines

We assume that each individual has his or her own reasonably well-defined consumption norms at the time of being surveyed. At the prevailing incomes and prices, there can be no presumption that these needs will be met at the consumer’s utility-maximizing consumption vector. Let the consumption vector of a given individual be denoted y , and let z denote the matching vector of consumption norms for that individual. The subjective basic need for good k and household i is given by

$$z_{ki} = \varphi_k(y_i, x_i) + \epsilon_{ki} \quad (k = 1, \dots, m; i = 1, \dots, n) \quad (1)$$

where φ_k ($k = 1, \dots, m$) are continuous functions, and x is a vector of indicators of economic welfare at a given consumption vector. We assume that each φ_k has a positive lower bound as actual consumptions approach zero, and that the function is also bounded above as consumptions approach infinity. The error terms, ϵ_{ki} , are assumed to have zero mean and to be independently and identically normally distributed for all i with variance σ_k^2 . The distribution functions of the standard normal error terms (ϵ_{ki}/σ_k) are denoted F_k ($k = 1, \dots, m$).

We define the subjective poverty line as the expenditure level at which the subjective minimums for all k are reached in expectation, for a given x . A household is poor if and only if its total expenditure is less than the appropriate SPL for a household with its characteristics. Thus, the SPL satisfies

$$z^*(x) = \sum_{k=1}^m z_k^*(x) \quad (2)$$

where $z_k^*(x)$ is defined implicitly by the fixed-point relationship:

$$z_k^*(x) = \varphi_k(z_1^*(x), \dots, z_m^*(x), x) \quad (k = 1, \dots, m). \quad (3)$$

A solution of this equation will exist as long as the functions φ_k are continuous for all k .⁹

This provides a multidimensional extension to the one-dimensional case based on the MIQ, as illustrated in figure 1. The SPL is the level of total spending above which respondents say (on average) that their expenditures are adequate for their needs. However, we do not assume that the MIQ is answerable, and so we cannot observe z_{ki} directly. Rather, we know from a purely qualitative survey question whether actual expenditure on good k by the i th sampled household (y_{ki}) is below z_{ki} . The probability that the i th household will respond that actual consumption of the k th good is adequate will then be given by

$$Prob(y_{ki} > z_{ki}) = F_k[y_{ki}/\sigma_k - \varphi_k(y_i, x_i)/\sigma_k]. \quad (4)$$

As long as the specific parameterizations of the function φ_k are linear in parameters (although possibly nonlinear in variables), one can estimate the model as a standard probit. Let us follow the literature on the MIQ and assume a log-linear specification for the individual subjective poverty lines. Equation (1) is then

$$\begin{aligned} \ln z_{ki} &= \alpha_k + \beta'_k y_i + \pi'_k x_i + \epsilon_{ki} \\ (k &= 1, \dots, m; i = 1, \dots, n) \end{aligned} \quad (5)$$

where $y' \equiv (\ln y_1, \dots, \ln y_m)$.

If we observed the values of z_{ki} (analogously to the answers to the MIQ), then a unique solution for the subjective poverty line could be obtained by directly estimating equation (5) and solving, assuming that the following matrix is nonsingular (in obvious notation):

$$B = \begin{bmatrix} 1 - \beta_{11} & \cdots & -\beta_{1m} \\ \vdots & \ddots & \vdots \\ -\beta_{m1} & \cdots & 1 - \beta_{mm} \end{bmatrix}$$

The (unique) solution for $z^* \equiv (\ln z_1^*, \dots, \ln z_m^*)$ is then given by (in obvious notation)

$$z^* = B^{-1}(\alpha + \Pi x) \quad (6)$$

However, the parameters B , α , and π are not identified when we have only qualitative data on consumption adequacy relative to latent norms. Equation (4) becomes

$$Prob(y_{ki} > z_{ki}) = F_k(\ln y_{ki})/\sigma_k - (\alpha_k + \beta'_k y_i + \pi'_k x_i)/\sigma_k. \quad (7)$$

As in any probit, we do not identify the parameters of the underlying model generating the latent continuous variable (equation (5)), but only their values normalized by σ_k . Thus,

armed with only the qualitative welfare assessments (telling us $Prob(y_{ki} > z_{ki})$), we cannot identify the parameters of the model determining the individual basic needs.

That fact does not, however, limit our ability to identify the SPL. To see why, consider first the special case of one good with $\ln z = \alpha + \beta \ln y + \epsilon$. The log SPL is $\alpha/(1 - \beta)$. The probability of reporting that actual consumption is adequate is $F[\ln y(1 - \beta)/\sigma - \alpha/\sigma]$, which allows us to identify only $(1 - \beta)/\sigma$ and α/σ . Nonetheless, $\alpha/(1 - \beta)$ is still identified.

This property carries over to the more general model with more than one good, and other sources of heterogeneity in welfare, as in equation (5). In this case, define the estimable normalized matrix B_σ , obtained by postmultiplying the B matrix by the column vector formed by σ_k^{-1} ($k = 1, \dots, m$). Similarly define the normalized vector α_σ and parameter matrix Π_σ (so, for example, the k th element of α_σ is α_k/σ_k). It is clear that we can always rewrite the solution for the SPLs given by equation (6) in terms of the observed (normalized) parameters:

$$z^* = B_\sigma^{-1}(\alpha_\sigma + \Pi_\sigma x) \quad (8)$$

Thus, we can solve for the subjective poverty line without the MIQ as long as we have the qualitative data to determine $Prob(y_{ki} > z_{ki})$ for all i, k . Instead of asking for the minimum income, we simply ask the simple qualitative question as to whether current consumptions are adequate.

III. Results

For the purpose of this paper, qualitative questions on perceptions of consumption adequacy were added to both the Jamaica Living Conditions survey of 1993 and the Nepal Living Standards Survey of 1995/96. The questions asked are given in table 1. To limit the number of questions, only broad aggregates for the main categories of spending were included. This creates a practical problem of how to deal with the remaining types of spending. We consider alternatives below.

In the survey schedule, these questions came after a detailed consumption module. The expenditure aggregate includes imputed values for consumption in kind as well as cash expenditures.¹⁰ For house owners, a rent is imputed based on the quality of the house, facilities, and location of the residence. Consumption in kind (including from home production) is valued at local market prices. Other information was also collected on a wide range of household characteristics. Aside from the addition of the "consumption adequacy" questions, the surveys followed the reasonably standard practices of the surveys conducted under the

⁹ This follows from the Brouwer fixed-point theorem given our boundedness assumptions. Stronger assumptions are needed to rule out multiple solutions.

¹⁰ Deaton and Zaidi (1998) discuss the construction of the expenditure aggregates in LSMS surveys.

TABLE 1.—QUESTIONS ON CONSUMPTION ADEQUACY

I would like to ask your opinion of your family's standard of living.	It was less than adequate for your family's needs	1
	It was just adequate for your family's needs	2
	It was more than adequate for your family's needs	3
	Not applicable	4
	"Adequate" means no more nor less than what the respondent considers to be the minimum consumption needs of the family	
Concerning your family's food consumption over the past one month, which of the following is true?		
Concerning your family's housing, which of the following is true?		
Concerning your family's clothing, which of the following is true?		
Concerning the health care your family gets, which of the following is true?		
Concerning your children's schooling, which of the following is true?		

auspices of the World Bank's Living Standards Measurement Study.¹¹

Table 2 summarizes the answers to the questions in table 1. In all categories that can be compared, a higher percentage of respondents in Nepal than Jamaica said that their consumption was less than adequate. For Nepal, the percentages range from 42% to 59%, while in Jamaica they range from 20% to 42%, with schooling the lowest and housing the highest in both countries (although other categories are ranked differently).¹² Relatively few respondents in either country deemed their consumptions "more than adequate" in either country. Nonetheless, we considered it preferable to keep the information in this category and use an ordered probit estimator.

In deriving subjective poverty lines, we have to take account of the fact that the subjective adequacy questions did not span the entire consumption space. We consider two methods of dealing with this missing data.

A. Method (1)

Method (1) anchors the subjective poverty lines to the perceived adequacy of food consumption alone. We ignore the answers given to the other questions in table 1 and simply regress the answers to the food adequacy question on total expenditure on consumption and the demographic and regional variables. This method is of interest because it corresponds closely to a widely used practice in constructing objective poverty lines in which the poverty line is a level of total expenditure or income at which food spending is sufficient to assure that food consumption is deemed nutritionally adequate by predetermined "objective" criteria of requirements for good health and normal activity levels. (For a discussion of this method, see Ravallion (1998).) The difference here is that we abandon nutritional requirements

¹¹ For further information on these surveys, see Grosh and Glewwe (1995).

¹² In Nepal, the survey also asked about the adequacy of income; 69% said their income was less than adequate, appreciably higher than for any consumption components. We will not use these answers, however, because it is implausible that respondents will have similar ideas about what *income* means; no doubt, many were answering about their cash income only.

in favor of the information contained in the subjective qualitative assessments of food adequacy.¹³

B. Method (2)

Method (2) uses the answers on perceived adequacy of other non-food consumptions, as described in section II. All consumption which falls under the headings in table 1 is called *core expenditure* and the rest is lumped into a remainder.¹⁴ We include an allowance for the remainder consistent with spending behavior in the data. Specifically, in method (2), we estimate a reduced-form Engel curve for the remainder as a function of core expenditure and the demographic and regional variables. The Engel curve is thus used to make an allowance for the remaining components of spending which is an estimate of the expected value for someone consuming the subjective poverty-line levels for core expenditure.¹⁵

As regressors we use log actual household expenditure (in total for method (1), and by component for method (2)), log household size, demographic composition variables, and regional dummy variables. To allow for relative-income effects, we also include log mean expenditure in the primary sampling unit. Table 3 gives summary statistics on the

¹³ Blaylock and Smallwood (1986) also use a food adequacy question in deriving poverty measures, although their approach is quite different to our method (1). Blaylock and Smallwood use an ordered probit model of survey responses on food adequacy to predict the probabilities of inadequate food consumption at given poverty lines, which are chosen to correspond to predetermined food shares (by inverting an estimated Engel curve for food, at the given food share). So, in their method, the food share defines the underlying reference welfare level to which the poverty line is anchored. Our method (1), by contrast, derives a poverty line in the consumption space which assures food adequacy in expectation. This is the more natural analogue of the idea of the subjective poverty line, as discussed in the introduction.

¹⁴ We did not use health care and schooling in either core expenditure or the remainder because these are, to a large extent, public goods for which the perception of adequacy is not necessarily related to private consumption. We will be analyzing these data in future work.

¹⁵ The working paper version (Pradhan & Ravallion, 1998) gives results for an alternative method in which we do not use the Engel curve allowance for remaining consumption, but simply exclude the remaining consumption from both the poverty lines and the welfare indicator. Because the welfare indicator changes, this method entails a different definition of poverty. However, the poverty measures turned out to be very similar to method (2).

TABLE 2.—PERCEIVED ADEQUACY OF CONSUMPTION IN JAMAICA AND NEPAL

Percentages	Less than Adequate	Just Adequate	More than Adequate	Not Applicable
Food				
Jamaica	39	55	6	0
Nepal	47	51	2	0
Housing				
Jamaica	42	50	8	0
Nepal	59	41	0	0
Clothing				
Jamaica	36	57	7	0
Nepal	53	47	0	0
Transport				
Jamaica	48	47	4	0
Healthcare				
Jamaica	41	55	4	0
Nepal	52	48	0	1
Schooling				
Jamaica	20	35	2	43
Nepal	42	38	0	19

variables we will use in attempting to explain the differences in self-rated consumption adequacy.

A practical problem arose in the case of transport spending in Jamaica and clothing in Nepal, namely that the relatively large number of zero entries in the data created a very weak relation between actual expenditure and perceived adequacy. In the case of clothing in Nepal, the underlying reason may be that clothing is a durable, bought only infrequently because of the distances to markets (especially in the hills and mountains). In Jamaica, the transport question was phrased as perceived adequacy of access to transport, which could be sufficient even for those who do not use it. The result was a considerable instability in the poverty lines, whereby the allowances for these components could fluctuate wildly according to other household variables. We decided not to include these components in the subjective poverty line, although they are included in the expenditure remainder under method (2).

Table 4 gives the ordered probit estimates of the parameters of the model for food adequacy as a function of total consumption spending, log household size, demographic variables, the (log) mean expenditure of the primary sam-

TABLE 3.—DESCRIPTIVE STATISTICS FOR EXPLANATORY VARIABLES USED IN ANALYSIS

	Jamaica		Nepal	
	Mean	Std. Dev.	Mean	Std. Dev.
Log food consumption	10.14	0.70	9.94	0.63
log housing consumption	7.98	1.20	7.87	1.37
log clothing consumption	8.58	1.00		
log household size	1.11	0.72	1.60	0.53
fraction men aged <18	0.151	0.185	0.224	0.174
fraction women aged <18	0.151	0.187	0.205	0.176
fraction men aged [18–60]	0.290	0.316	0.232	0.167
fraction women aged [18–60]	0.244	0.241	0.268	0.157
fraction men aged >60	0.078	0.214	0.033	0.097
fraction women aged >60	0.086	0.212	0.038	0.124
log mean consumption of cluster	10.10	0.42	8.97	0.63
Number of observations	1954		3373	

Note: Natural logarithms are used throughout the paper.

TABLE 4.—ADEQUACY OF FOOD AS A FUNCTION OF TOTAL CONSUMPTION

	Jamaica	Nepal
log total consumption	0.64 (11.69)	0.79 (16.01)
log household size	-0.54 (-8.25)	-0.37 (-5.77)
fraction men age <18	-0.13 (-0.72)	-0.35 (-2.04)
fraction women aged <18	-0.09 (-0.48)	-0.45 (-2.60)
fraction women aged [18–60]	0.33 (2.61)	0.11 (0.61)
fraction men aged >60	0.12 (0.86)	-0.08 (-0.34)
fraction women aged >60	-0.01 (-0.07)	0.11 (0.53)
log mean consumption of cluster	0.07 (0.83)	-0.23 (-3.33)
other urban	0.17 (2.13)	-0.40 (-3.85)
rural Jamaica	-0.004 (-0.070)	
rural Nepal (west hills)		-0.45 (-3.89)
rural Nepal (east hills)		-0.58 (-5.71)
rural Nepal (west Terai)		0.003 (0.03)
rural Nepal (east Terai)		-0.15 (-1.34)
α_1	6.91 (8.91)	5.08 (8.44)
α_2	8.92 (11.37)	7.58 (12.41)
McFadden's pseudo R^2	0.09	0.13

(*t*-ratios in parentheses)

pling unit, and regional dummy variables. For implementing method (2), table 5 gives the results for the perceived adequacy of food, housing, and clothing in Jamaica, and table 6 gives the corresponding results for food and housing in Nepal. Notice that in these regressions we separately identify the corresponding consumption components. For method (2), we also require the Engel curves for remaining consumption, as given in table 7.

The regressions in tables 4 through 7 are self-explanatory, and there are few surprises. Actual measures of consumption tend to be highly significant predictors of perceived consumption adequacy. The perceived adequacy of food and housing tends to respond more elastically to actual spending on the corresponding category of goods than to other types of spending (tables 5 and 6). The perceived adequacy of clothing in Jamaica, however, tends to respond more elastically to actual housing expenditure than to spending on clothing; the lack of imputations for clothing services may be the reason. Holding other variables constant, larger households tend to perceive their consumptions as less adequate. Holding per capita expenditure constant, we find no significant economies of scale in Jamaica but we do for Nepal. From table 4, the estimated elasticity of the SPL based on food adequacy in Nepal with respect to family size

TABLE 5.—PERCEIVED CONSUMPTION ADEQUACY BY COMMODITY GROUP IN JAMAICA

	Food	Housing	Clothing
log food consumption	0.24 (4.04)	0.04 (0.71)	0.13 (2.11)
log housing consumption	0.23 (7.51)	0.47 (14.29)	0.23 (7.60)
log clothing consumption	0.06 (1.64)	-0.02 (-0.59)	0.14 (3.83)
log household size	-0.39 (-5.58)	-0.18 (-2.64)	-0.29 (-4.19)
fraction men age <18	-0.31 (-1.63)	-0.21 (-1.09)	-0.57 (-2.99)
fraction women aged <18	-0.19 (-0.99)	-0.27 (-1.39)	-0.17 (-0.90)
fraction women aged [18-60]	0.15 (1.09)	0.04 (0.27)	0.09 (0.64)
fraction men aged >60	-0.03 (-0.17)	0.61 (3.66)	0.15 (0.92)
fraction women aged >60	-0.26 (-1.54)	0.58 (3.53)	0.35 (2.12)
log mean consumption of cluster	0.16 (1.89)	0.02 (0.28)	0.16 (1.89)
other urban	0.14 (1.75)	0.17 (2.07)	0.10 (1.24)
rural	0.08 (1.10)	0.33 (4.27)	0.08 (1.03)
α_1	5.69 (6.80)	4.05 (4.84)	5.17 (6.24)
α_2	7.73 (9.15)	5.98 (7.09)	7.21 (8.61)
McFadden's pseudo R^2	0.09	0.12	0.08

(*t*-ratios in parenthesis)

equals 0.47 (=0.37/0.79).¹⁶ The demographic compositional effects tend not to be significant. Regional effects are stronger in Nepal, which is unsurprising given the country's much greater geographic diversity. There is also a strong negative effect of neighborhood expenditure on perceived adequacy in Nepal, but not in Jamaica. The implied elasticity of the SPL for Nepal with respect to mean expenditure of the cluster is 0.29 (=0.23/0.79).

The region-specific SPLs are given in table 8 for both countries and each method. We give the poverty lines at mean points of other variables. However, the calculation of poverty measures (to follow) naturally uses household-specific poverty lines rather than the averages in table 8. The last column gives previously established "objective" poverty lines for both countries, which will be discussed later.

Method (2) requires the more prior estimation than either of the other methods; it requires both the ordered probits by category of consumption and the Engel curve for the remainder. It is to be expected that this creates imprecision in the resulting estimates. How much so can be seen from

¹⁶ It is widely assumed that poor households in low-income countries do not face significant economies of scale in consumption because the share of their expenditure going to "private" goods within the household is high. However, this assumption is questionable, and quite a wide range of elasticity values might be defended in such settings (Lanjouw & Ravallion, 1995). Nonetheless, we do find this size elasticity for Nepal to be surprisingly low. Household size might well be picking up some other factor influencing subjective perceptions of welfare, although what that factor might be is unclear. We hope to investigate this finding further in future work.

TABLE 6.—PERCEIVED ADEQUACY OF FOOD AND HOUSING IN NEPAL

	Food	Housing
log food consumption	0.60 (10.60)	0.22 (3.81)
log housing consumption	0.32 (12.57)	0.32 (12.03)
log household size	-0.37 (-5.660)	-0.19 (-2.72)
fraction men age <18	-0.32 (-1.84)	-0.43 (-2.37)
fraction women aged <18	-0.43 (-2.44)	-0.36 (-2.00)
fraction women aged [18-60]	0.06 (0.35)	-0.01 (-0.04)
fraction men aged >60	-0.07 (-0.29)	0.18 (0.70)
fraction women aged >60	0.07 (0.34)	0.14 (0.62)
log mean consumption of cluster	-0.23 (-3.41)	-0.37 (-5.16)
other urban	-0.34 (-3.26)	-0.10 (-0.90)
rural west hills	-0.26 (-2.19)	-0.75 (-5.99)
rural east hills	-0.40 (-3.62)	-0.50 (-4.30)
rural west Terai	0.29 (2.14)	-0.54 (-3.76)
rural east Terai	0.03 (0.25)	-0.25 (-2.06)
α_1	5.40 (8.67)	0.75 (1.16)
α_2	7.92 (12.55)	3.90 (5.87)
McFadden's pseudo R^2	0.14	0.12

(*t*-ratios in parenthesis)

TABLE 7.—ENGEL CURVES FOR REMAINING CONSUMPTION

	Jamaica	Nepal
constant	-1.02 (-3.36)	-1.78 (-5.24)
log core consumption	1.08 (36.31)	1.09 (34.05)
log household size	0.08 (2.11)	0.10 (2.20)
fraction men age <18	-0.48 (-4.41)	-0.11 (-0.87)
fraction women aged <18	-0.34 (-3.02)	-0.18 (-1.40)
fraction women aged [18-60]	-0.15 (-1.95)	-0.25 (-1.82)
fraction men aged >60	-0.43 (-5.13)	-0.20 (-1.05)
fraction women aged >60	-0.53 (-6.32)	-0.38 (-2.37)
other urban	-0.08 (-1.74)	-0.20 (-2.64)
rural Jamaica	-0.32 (-8.35)	
rural Nepal (west hills)		-0.79 (-11.07)
rural Nepal (east hills)		-0.56 (-8.48)
rural Nepal (west Terai)		-0.53 (-6.48)
rural Nepal (east Terai)		-0.53 (-7.62)
R^2	0.57	0.50

Note: Core consumption is food and housing, plus clothing for Jamaica. The dependent variable is total consumption minus core consumption.
(*t*-ratios in parenthesis).

TABLE 8.—SUBJECTIVE POVERTY LINES FOR FAMILIES WITH AVERAGE CHARACTERISTICS: JAMAICA AND NEPAL (IN JAMAICAN DOLLAR AND NEPALESE RUPIAH)

	<i>Method (1)</i> Based on Perceived Adequacy of Food Alone	<i>Method (2)</i> Based on Perceived Adequacy of Food, Housing and (for Jamaica) Clothing, and Using an Engel Curve for Remaining Consumption	<i>Independent, Previous Estimates of Objective Poverty Lines:</i> Cost of Basic Needs Poverty Lines, Anchored to Pre-determined Nutritional Requirements
Jamaica			
Kingston	13110	10524	14472
Other urban	10082	7624	14319
Rural	13203	10980	13203
Nepal			
Kathmandu	4129	5164	6122
Other urban	6790	8851	5197
Rural western hills	7256	12821	5065
Rural eastern hills	8620	5834	5241
Rural western Terai	4112	11896	3964
Rural eastern Terai	4973	3655	4404

Note: All poverty lines are per capita per month. Poverty lines for method (1) and (2) were calculated on the basis of country-specific average household characteristics (see table 3), and normalized by household size. Independent poverty lines pertain to same year.

TABLE 9.—STANDARD ERRORS OF THE SUBJECTIVE POVERTY LINES

	<i>Method (1)</i> Based on Perceived Adequacy of Food Alone	<i>Method (2)</i> Based on Perceived Adequacy of Food, Housing and (for Jamaica) Clothing, and Using an Engel Curve for Remaining Consumption
Jamaica		
Kingston	1174	4906
Other urban	1141	3579
rural	1011	4546
Nepal		
Kathmandu	498	1494
other urban	643	2544
rural western hills	447	8174
rural eastern hills	528	460
rural western Terai	387	11549
rural eastern Terai	311	317

Note: Standard errors for the SPLs in table 8, calculated using the Delta method.

table 9, which gives standard errors for the SPLs in table 8, calculated by the Delta method. Standard errors increase substantially as one moves from method (1) to method (2). The standard errors for method (1) are of similar magnitude to those obtained using the MIQ.¹⁷

The aggregate poverty measures are given in table 10; we give the popular headcount index as well as the poverty gap index and the squared poverty gap index (introduced by Foster, Greer, and Thorbecke, (1984)) which penalizes inequality among the poor. The two methods are in reasonably close agreement.

As an aside, it may be noted that the headcount index for method (1) in table 10 is not the same as the percentage of people who say that their food is inadequate, as given in table 2. This is in keeping with the SPL approach, which (as noted in the introduction) identifies the poor as those for whom total income or spending is less than the level which, on average, is deemed to be adequate “to make ends meet.”

¹⁷ In applying the minimum income question to the United States and the Netherlands, de Vos and Garner (1991) report standard errors in the range of 7% to 12% of the subjective poverty line. Our estimates from method (1) yield standard errors of similar magnitudes (from 6% to 12% of the SPL).

TABLE 10.—AGGREGATE POVERTY MEASURES

	Percentages	Headcount Index	Poverty Gap Index	Squared Poverty Gap Index
Jamaica				
Method (1)	34.4	34.4	11.2	5.3
Method (2)	31.5	31.5	13.2	7.7
Previous estimate	31.5	31.5	n.a.	n.a.
Nepal				
Method (1)	43.6	43.6	14.5	6.5
Method (2)	43.0	43.0	16.7	8.6
Previous estimate	42	42	12.1	5.0

Note: See table 7 for description of alternative methods; see text for full details.

Given latent heterogeneity and measurement error, there will be people above this point who still feel that their level of living is inadequate, and people below this point who feel that it is adequate. One cannot predict on a priori grounds whether the proportion of people with expenditure below the SPL will be above or below the proportion who say that their consumption is inadequate.

It is striking how close these aggregate poverty rates are to the results obtained by two independent studies of poverty in these countries which have been based on objective poverty lines. The Planning Institute of Jamaica (the statistics office of the government of Jamaica) estimated the incidence of poverty at 31.5% (Social Policy Development Unit, 1994). As part of the World Bank's Poverty Assessment for Nepal, researchers estimated the headcount index in Nepal to be 42% (Lanjouw, Prennushi, & Zaidi, 1996). Both estimates are based on the same survey but use per capita poverty lines based on a food basket yielding minimum nutritional requirements (2,245 calories per person per day for Jamaica and 2,124 for Nepal).¹⁸ The resulting poverty lines are given in the last column of table 8.

¹⁸ The Nepal Study employed the same measure of expenditure as this study. The Jamaican Planning Institute constructed its own expenditure measure based on the same survey which was not available to the authors. The results quoted in table 8, 10, and 11 are directly taken from Social Policy Development Unit (1994). Figure 2 is based on the authors' calculations.

TABLE 11.—POVERTY PROFILE BY REGION FOR JAMAICA

Percentages	Method	Headcount Index	Poverty Gap Index	Squared Poverty Gap Index
Kingston	1	21.4	6.1	2.8
	2	18.1	5.8	3.1
	Previous estimate	21.8	n.a.	n.a.
Other urban	1	19.6	5.1	1.9
	2	13.2	4.3	2.2
	Previous estimate	28.9	n.a.	n.a.
Rural	1	47.8	16.7	8.2
	2	46.5	21.1	12.5
	Previous estimate	38.9	n.a.	n.a.

The regional poverty profiles vary more depending on the method used. Regional poverty profiles can be found in table 11 for Jamaica and table 12 for Nepal. Recall that method (1) controls only for differences in food adequacy. In Nepal, for instance, housing conditions—holding everything else constant—are perceived to be less adequate in the western hills than in the eastern hills, while the opposite holds for food adequacy. As a result, method (2) yields a higher headcount index than method (1) for the western hills, while the opposite holds for the eastern hills.

The urban-versus-rural poverty comparisons are of special interest in a developing-country setting. Poverty comparisons between the two sectors have often been controversial, with different measurement methods giving very different results, including rank reversals (Ravallion & Bidani, 1994). It has been argued that, by ignoring relative welfare considerations, conventional approaches based on (objective) absolute poverty lines (which attempt to fix the real value of the poverty line between the two sectors) will tend to underestimate poverty in urban areas versus rural areas. The previous estimates we have quoted for both countries follow the conventional approach, and so they could also be criticized from this point of view. Yet, our subjective poverty lines tend to show even larger differences between rural and urban poverty measures than do the more conventional

methods. Our results do not suggest that the conventional approach has underestimated urban versus rural poverty when compared to subjective poverty lines incorporating relative welfare effects, consistently with welfare perceptions.

Next, we examine differences in the demographic poverty profile. Standard methods of setting poverty lines typically find that larger households are poorer in developing countries (Lipton & Ravallion, 1995). The relationship between poverty and household size is known, however, to be sensitive to measurement assumptions even within the class of standard “objective” methods (Lanjouw & Ravallion, 1995). The previous objective poverty lines for both Jamaica and Nepal followed the common practice in developing countries of having a constant per capita value (that is, without any allowance for economies of scale in household consumption). In table 13, we give our subjective poverty lines for various demographic groups and both methods described above. The SPL is found to increase less than proportionately with household size, with somewhat stronger economies of scale indicated for Nepal than for Jamaica. For example, the poverty line for a family of four is (depending on the method) 2.3 to 2.4 times that for a single adult in Nepal, versus 3.1 to 3.9 in Jamaica. The high returns to scale found in Nepal could result either from a high valuation of children or from relatively cheap child-specific consumption.

Given the sizable scale economy in the Nepal SPL, it should not be surprising that this greatly changes the demographic poverty profile when compared to poverty lines that do not incorporate scale economies. This is confirmed in figure 2, which compares the poverty rates by household size implied by the previous objective poverty lines (table 8) with those based on our SPL.¹⁹ The per capita “objective” poverty line suggests that larger households tend to be poorer in both countries. This is also the case for the Jamaican poverty measures based on subjective poverty lines. However, for Nepal, the poverty measures based on our SPL tend to fall as household size increases, although not monotonically. The objective poverty lines indicate that single-person families are the least poor, while the subjective poverty lines for Nepal indicate that they are the poorest.

As an aside on methodology, we also estimated our models using a probit estimator combining the “more than adequate” responses with the “just adequate” ones. The results were similar, which was to be expected given that very few households reported their consumption to be more

TABLE 12.—POVERTY PROFILE BY REGION FOR NEPAL

Percentages	Method	Headcount Index	Poverty Gap Index	Squared Poverty Gap Index
Kathmandu	1	0.7	0.2	0.0
	2	1.1	0.3	0.1
	Previous estimate	4	0.4	0.1
Other urban	1	30.5	9.1	3.8
	2	39.4	16.2	8.5
	Previous estimate	34	10.9	4.4
Rural western hills	1	71.1	27.9	13.6
	2	84.7	39.7	22.4
	Previous estimate	57	21.0	9.9
Rural eastern hills	1	66.7	23.5	10.8
	2	38.7	10.7	4.1
	Previous estimate	33	9.1	3.6
Rural western Terai	1	22.6	4.5	1.4
	2	62.7	23.0	10.7
	Previous estimate	46	11.2	3.9
Rural eastern Terai	1	31.5	7.0	2.3
	2	12.2	2.1	0.6
	Previous estimate	39	8.7	2.9

¹⁹ Using method (2), this choice made little difference. The relationship with household size was also similar for the poverty gap and squared poverty gap. The Social Policy Development Unit (1994) does not quote poverty measures by household size for Jamaica. We have calculated our own measures for figure 2. However, because the precise definition of their expenditure aggregate is not given in Social Policy Development Unit, our expenditure aggregate gives a slightly different (higher) aggregate poverty measure. Full details are available from the authors.

TABLE 13.—HOUSEHOLD POVERTY LINES BY FAMILY COMPOSITION (IN JAMAICAN DOLLAR AND NEPALESE RUPIAH)

	Family Size	Method (1)		Method (2)	
		Poverty Line	Index	Poverty Line	Index
Jamaica					
one prime age man	1	16187	1.00	8096	1.00
one prime age woman	1	9626	0.59	5334	0.66
one prime age man plus one prime age woman	2	22428	1.39	12680	1.57
one prime age man plus one prime age woman plus one male child	3	36954	2.28	22063	2.73
one prime age man plus one prime age woman plus one female child	3	36138	2.23	22216	2.74
one prime age man, one prime age woman, one male child, one female child	4	50121	3.10	31599	3.90
Nepal					
one prime age man	1	11985	1.00	10129	1.00
one prime age woman	1	10425	0.87	9772	0.96
one prime age man plus one prime age woman	2	15397	1.28	12878	1.27
one prime age man plus one prime age woman plus one male child	3	22018	1.84	19449	1.92
one prime age man plus one prime age woman plus one female child	3	22971	1.92	18574	1.83
one prime age man, one prime age woman, one male child, one female child	4	28268	2.36	23886	2.36

Note: All poverty lines are at the household level and should be compared with total household consumption. Poverty lines for method (1) and (2) were calculated on the basis of country-specific average household characteristics (table 3).

than adequate and the fact that the derivation of the poverty line is based on the first threshold only.

IV. Conclusions

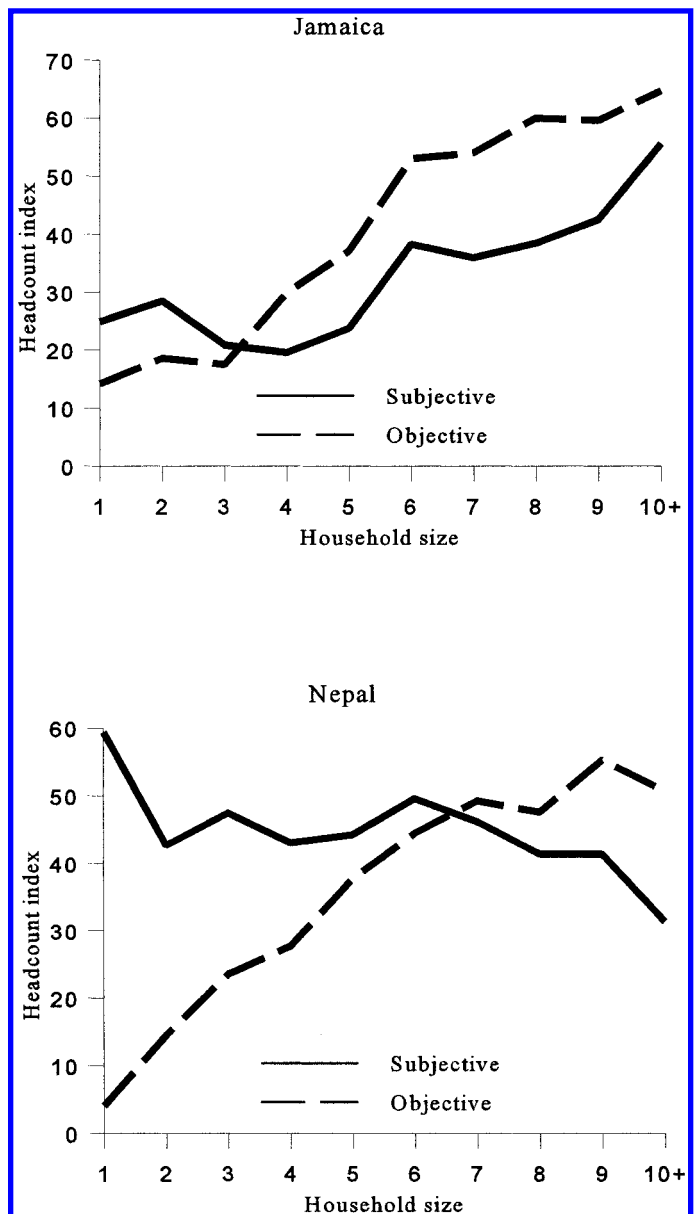
Methods of poverty analysis have differed radically between the objective-quantitative and the subjective-qualitative schools, with little effort to learn from both. We have suggested a hybrid approach, building on past methods of subjective-welfare measurement, but adapted to a developing-country setting.

It is difficult to believe one could get sensible answers to the usual MIQ in most developing countries. The method we have proposed here avoids the need for this question, but still allows one to retrieve the subjective poverty line from simple qualitative questions on perceived consumption adequacy added to an integrated household survey.

We have implemented the approach using surveys for Jamaica and Nepal. The aggregate poverty measures implied by our subjective poverty lines accord quite closely with existing “objective” methods for both countries. The aggregate measures are also reasonably robust to whether one uses a single question on the perceived adequacy of food consumption versus a fuller set of consumption components.

However, more-notable differences emerge in the geographic and demographic poverty profiles. The poverty measures by region are more sensitive than are the aggregates to the choice of method, although there is still considerable agreement on rankings. Interestingly, our subjective-qualitative approach does not tend to narrow the differentials in poverty measures between “poor” and “rich” areas. For example, our results suggest a larger difference in poverty measures between urban and rural areas than found by more-conventional objective approaches that are based on a concept of basic and absolute consumption needs. People in poor areas perceive themselves to be even poorer than objective comparisons suggest.

FIGURE 2—POVERTY AND HOUSEHOLD SIZE



Other differences emerge in the demographic poverty profile. Our subjective poverty lines indicate sizable scale economies in consumption, particularly for Nepal.

Indeed, unlike commonly used "objective" methods, large households do not tend to be any poorer than small households in Nepal, when this is assessed by our objective poverty lines.

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