

## Comparing Poverty Over Time: Problems and Treatments

Quantitatively comparing poverty over time is a critical aspect of measuring the impacts of policies and other sources of change. However, *directly* comparing poverty indicators from separate time periods can be misleading since data collection and interpretation methods often change over time. Applying the treatments to make such data comparable can be analytically difficult and, lacking adequate funding, time and/or knowledge, analysts often default to direct comparison. Nonetheless, the consideration of these issues is critical; their neglect can potentially lead to large errors in the magnitude and sign of poverty changes.

This site provides a guide for some of the basic issues in comparing poverty levels over time. While the discussion focuses on income and consumption measures, some of the issues apply more broadly to all types of quantitative survey data. In addition to a guide on how to identify the problems, this site provides a basic discussion and some options for dealing with the five most common issues when comparing poverty over time:

- (1) constructing the consumption aggregate,
- (2) accounting for price changes,
- (3) selecting the poverty line,
- (4) adjusting for changes in sampling and,
- (5) dealing with changes in survey administration.

All five discussion sections provide links to a glossary of terms and to theoretical and regional documents, which give more details and example applications. In each section, we provide some guidance on thinking about robustness of poverty comparisons over time. However, all of the measures discussed below require some assumptions and/or alterations to the data. Hence, it is worthwhile checking how the measured change in poverty changes if these assumptions change or a different method is used to make the data comparable.

While this site is meant to be primarily used by those seeking to deal with existing data, it is also of use to those seeking to update and improve household surveys. As Deaton and Kozel (2004) observe “there is always a conflict between updating and improving a survey instrument on the one hand, and consistency of estimation on the other.” Hopefully, the discussion that follows can provide some considerations on how to maintain consistency while improving survey instruments.

---

### Identifying the problems

When comparing poverty over time, there are four central questions to ask:

#### **1. Has the structure of the data changed?**

There are 3 important ways in which this could matter:

- a) *Is the sample the same?* At one end of the spectrum, you have a panel dataset of the same individuals followed over time. At the other end you have different cross-sectional datasets using different sampling techniques. The less the sample is identical over the periods under consideration, the more issues of making the

samples comparable will be important. Note also that a panel does not guarantee comparability, as often only the first round of a panel is representative of the wider population.

b) *Is the questionnaire the same?* If the questionnaire design has changed significantly over time, the construction of the consumption aggregate will require attention. Questionnaire design change may arise because of changes in reality, such as the large increase in the prevalence of mobile telephones in developing countries. This change in what aspects of consumption are captured may also lead to reconsideration of the selection of the poverty line. These issues extend beyond consumption measures to include any quantitative definition and measure of poverty.

c) *Was the survey administered in the same way?* When the way in which the survey is implemented changes, the analyst needs to pay careful attention to ways in which this may change the comparability of the data across time. While the questions above highlight two of the more common problems, other small changes to methodology can have significant impacts. For example, there may be a change in the seasons during which the survey is administered, regions may be excluded because of political instability, or the like. Such changes may not even occur by design and will only be revealed through an exploration of summary statistics and careful comparison work. For example, enumerators in the second round of a survey may avoid larger households because this entails more work and hence introduce a problem of sample comparability. The analyst needs to be alert to these potentially subtle problems. A general approach to dealing with these problems is discussed below in changes in survey administration.

## **2. Have the data been interpreted differently at different points in time?**

Generally, an over time estimate will follow a set of cross-sectional poverty analyses done separately for each point in time. In constructing these cross-sectional estimates, it is possible that different poverty lines were used and/or the consumption aggregates were constructed differently. If the methodology for interpreting any of the surveys' data was dissimilar or unclear, then new consumption aggregates and poverty lines may need to be chosen.

## **3. Have there been any significant macroeconomic changes?**

Long term shifts in the structure of the economy and short term shocks are likely to affect prices and hence an analysis of poverty over time will have to take into account price and relative price changes. Significant changes to the structure of the economy are likely to lead to changes in the patterns of consumption, which will have implications for the construction of the consumption aggregate and possible reconsideration of the selected poverty line.

## **4. Do these changes really matter for the question at hand?**

The solutions here will help the analyst cope with some of the problems that are particularly important in over-time comparisons. Before undertaking any of them,

however, it is important to ask how significant the problem is. When deciding whether to implement policy, for instance, there may be a wide range of results over which a conclusion is unaffected.<sup>1</sup> In such a case, fine tuning the treatment of data may be unnecessary. Another case in which adjustments to the data may be unnecessary is when they are likely to only have small effects. One useful strategy is to identify the set of problems in data comparability using the questions above and then set priorities based on informed guesses as to the relative magnitude of the different issues. See the appendices to Grimm and Gunther for one such exercise.

---

---

<sup>1</sup> Ravallion, Martin. 1992. "Poverty Comparisons: A Guide to Concepts and Methods." Living Standards Measurement Study Working Paper No. 88. Pgs 1-2.

## Issues and Options

### (1) Consumption aggregate construction

The consumption aggregate, in the context of assessing poverty, is some combination of the total value of goods and services (or sometimes just food) consumed by the household for a given period. The goods and services may be purchased from outside of the household or provided from within, such as food grown at home (see note in section on [price changes](#) on comparing market-bought and home-grown items). If available, data on the use-value of durables and imputed rent may also be included in the total.

The consumption aggregate is used to determine the [poverty line](#), as well as estimate the number of people below it, so the consumption aggregate construction needs to be consistent across periods in order to draw conclusions about changes in poverty levels. There are different methods for constructing the consumption aggregate; [Deaton and Zaidi](#) discuss guidelines for its construction and [Ravallion 1994](#) gives an overview of the popular cost-of-basic-needs method for establishing poverty lines, which is used, for example, in the 2003 [Serbia & Montenegro Poverty Assessment](#) (pages 156-157).

The set of items that are consumed by households may change over time as new items become available or others cease to be relevant. This will result in incomparability in the total consumption of households across time as items are added or dropped from the survey instruments. Other changes to the survey may also render total consumption less comparable over time. For example, the [recall period](#) used for expenditures could change, the units of measurement may vary, and levels of disaggregation for certain goods or groups of goods may change. To further complicate matters, the food basket of the poor can change (particularly in the face of price changes or a long interval between surveys), necessitating a revisiting of the aggregate construction (see Lanjouw and Lanjouw 2001; Deaton 1997; .

### Treatments

- When different elements, measurements, and levels of disaggregation are used in the surveys to be compared, construct a new consumption aggregate using only the elements and measurements common to all surveys<sup>2</sup>. (see the [Ecuador PA](#) for 2004, page 151, for a detailed example)—decomposing aggregated elements to comparable levels where possible. Bear in mind that narrowing the consumption definition to just the elements common in all surveys compromises the sharpness of the poverty profile,<sup>3</sup> so missing data may be imputed if they are considered an important indicator of welfare<sup>4</sup> (see [Ravallion 1996](#) for a discussion of methods for imputing data). As a test for robustness, compare the results from a consumption aggregate made up of only the items that the surveys have in common vs. one with imputed values for the missing items.’ See the

---

<sup>2</sup> Paternostro, Stefano, Jean Razafindravonona and David Stifel (2001), “Changes in Poverty in Madagascar: 1993-1999”, Africa region working paper series number 19. World Bank.

<sup>3</sup> Lanjouw, Jean Olson and Lanjouw, Peter (1997), “Poverty Comparisons with Noncompatible Data, Theory and Illustrations.” Pg 7.

<sup>4</sup> Paternostro, Stefano, Jean Razafindravonona and David Stifel (2001), “Changes in Poverty in Madagascar: 1993-1999”, Africa region working paper series number 19. World Bank. Pg 85.

discussion on the case of India below, for further examples (and some issues) with using this method.

- Another option is to dispense with consumption data altogether and use other measures of well being. One example comes from Ravallion (1996) where he provides an example of using data on real agricultural wages and agricultural output per acre in India. Using two different forecasting models (he also has consumption data), he finds that there is decent predictions one year ahead, but that significant drifts can develop in longer time periods. We discuss options for using other indicators more fully in the discussion on poverty lines, below.
- To compare surveys which either have different recall periods or for which the surveys allowed for unspecified recall periods, judge whether the variations are within reasonable margins and/or if it is possible to adjust for the differences.<sup>5</sup> Three examples follow, while the next point provides a more in-depth discussion of the debate over this issue in India:
  - a) Ghana's statistical service (2000) used rates found by Scott and Amenuvegbe (1990) to adjust for inconsistent recall periods between the 1998/1999 and 1991/1992 Ghana Living Standards Survey. Scott and Amenuvegbe's study of the effect of surveys' recall periods in Ghana showed that, when increasing the recall period by an additional day within a one-week time span, reported daily expenditures decreased on average by 2.9% for every day added. There was little or no fall when increasing the recall period from one week to two, and results were erratic for a one-year recall period.
  - b) In Madagascar, respondents were allowed to choose their own recall period. This led to some variation in the recall period chosen by households over time. In order ascertain the comparability of these figures over time, the authors of the Paternostro, et. al.(2001) examined the frequency of various recall periods for each point and time. They show that, for most items, there are not large changes in the choice of recall periods across years and hence make no adjustments (page 76).
  - c) Grimm and Günther (2004) made numbers comparable on an annual basis by multiplying expenditures bought over a month by twelve, expenditures bought over a 15-day period by 24, etc. (page 53). While they take on board the results of research that show a decline in reported expenditure with a lengthening of the recall period, they have at least partially offsetting other sources of bias and hence do not correct for this.
- During the late 1990s, India experimented with the recall period used in the National Sample Surveys (NSS). The resulting data led to a wide ranging set of estimates that fed into a significant political debate and may have affected electoral outcomes. As Deaton and Kozel (2004) speculate: "It is not impossible to that the breakdown of the poverty monitoring system, its biases, and the room for 'mindless' optimism that they created, helped instill a false sense of security in reformist governments in India" (39).

---

<sup>5</sup> Paternostro, Stefano, Jean Razafindravonona and David Stifel (2001), "Changes in Poverty in Madagascar: 1993-1999", Africa region working paper series number 19. World Bank.

From 1994-1998, the NSS experimented with different recall periods for different types of expenditure (this discussion draws on the excellent review of the changes, debate and estimates described in Deaton and Kozel, 2004). Moving from a 30 day recall for all items to a 7 day recall for high frequency items such as food, pan and tobacco, a 365 day recall for low frequency items and a 30 day recall for remaining items produced significantly lower measures of poverty incidence. Deaton and Kozel attribute this to two factors. First, the shorter recall period for high frequency items led to higher average monthly expenditure. Second, the longer recall period for low frequency items led to a lower mean (as the recall period was moved from 30 to 365 days), it also led to a lower number of people reporting *no* expenditure in this category, and hence pulled up the lower end of the distribution. In order to resolve the issue as to which recall period was best, in 2000 the National Sample Survey Organization (NSSO) ran a pilot survey to compare recall using 30 days, 7 days and a daily record, combined with direct measurement. As with the earlier survey work, the 7 day recall showed higher (but not by as much) daily expenditure than the 30 day recall. Nonetheless, as Deaton and Kozel note, this higher number wasn't necessarily better: "comparison with the daily estimates shows that, for many important commodities, including cereals and cereal products, the 30-day estimates are *more* accurate than the 7 day estimates" (15, emphasis in the original).

Official national poverty figures for India are constructed using larger sample rounds conducted every five years (the NSS fields surveys continuously). In the 55<sup>th</sup> round, for 1999-2000, the NSS opted to use a mix of recall periods: for food, tobacco and pan both the 7 and 30 day recall periods were used while for low frequency expenditures a 365 day recall was used (in comparison to 30 or both 30 and 365 in previous years). As Deaton and Kozel note, the use of both recall periods for high frequency items for the same respondent is likely to lead to a forced reconciliation between the two (and it is unclear as to which recall period will be closer to the truth).

These changes rendered the data not directly comparable with the earlier (50<sup>th</sup>) large round of 1993-4. The interval between these rounds was a period of significant economic policy change in India, and hence the question of whether poverty had changed, and by how much, was politically salient. The official estimates (based on a comparison of the 30 day recall figures) showed a 10 percentage point fall in the All India poverty index. These figures were challenged by a host of researchers, and the variance in their methods (and results) is instructive when thinking about how to deal with this problem<sup>6</sup>.

The approaches varied, but some of the techniques included:

1. *Use a subset of items which have common recall periods.* Deaton (2003) and Tarozzi (2004) correct the data using the sub-set of items for which only a 30 day recall was used in both rounds. This is a non-trivial

---

<sup>6</sup> For samples of some of these challenges, see the *Economic and Political Weekly* January 25, 2003 issue and Deaton and Kozel (2005).

component of expenditures, as well as highly correlated with total expenditure. Hence, Deaton uses these goods to estimate the probability of being poor in the 50<sup>th</sup> round, and then applies these predictions to the 55<sup>th</sup> round data. As Deaton and Kozel point out, this method hinges on 2 assumptions: 1) changes elsewhere in the survey do not affect how 30 day goods are reported and 2) the probability of being poor is a stable function (over time) of the 30 day items. There is some evidence (particularly given the structural change in the economy) that the second assumption is not valid. Kijima and Lanjouw (2003), while focusing on a different method (see below), also provide a similar technique. Instead of estimating the probability of being poor directly, they estimate per capita total expenditure as a function of the (consistent across round) 30 day goods.

2. *Use replacement data from elsewhere in the questionnaire.* While some households were asked the lengthy complete expenditure modules, others received employment modules with an abbreviated expenditure module (items were aggregated and a 30 day recall was used for many items). Sundaram and Tendulkar (2003) find the data from this abbreviated expenditure module to be a decent match in the mean with data from the complete consumption module. For the low frequency items where the 55<sup>th</sup> round collected a 365 day recall, they argue that the 50<sup>th</sup> round used both a 30 and 365 day recall for those items and hence use the 365 day recall for both. Deaton and Kozel identify 2 main issues for this approach. First, as noted above, aggregation can lead to lower reports. In fact, Deaton and Kozel find that reports for food items are lower in the abbreviated questionnaire relative to the comprehensive. Second, the use of one period reports when both are asked (for the low frequency items) opens this approach to the critique that affects the high frequency items in the 55<sup>th</sup> round.
3. *Use different methods and choose amongst them.* Himanshu and Sen (2004) use the data from both the complete and abbreviated consumption modules and complement this with an extrapolation based on the (smaller sample but annual) surveys before and after the 55<sup>th</sup> round to calculate 3 possible levels of expenditure for a given household. They then implement an algorithm that chooses amongst these. Unfortunately, this method does not resolve the issues of either of the other methods.
4. *Predict poverty using plausible determinants.* Datt, Kozel and Ravallion (2001) predict poverty for the time of the 55<sup>th</sup> round using variables such as agricultural yields, non-farm growth, development spending, and inflation.
5. *Predict poverty using a combination of measured expenditure and forecasting.* Kijima and Lanjouw (2003) model expenditure as a function of household demographic, occupation and educational variables. After estimating this using the 50<sup>th</sup> round data, they use this model to predict expenditure in the 55<sup>th</sup> round. The critical assumption that Kijima and Lanjouw highlight is that the relationship between the explanatory

variables and expenditure is stable over time: “that the ‘returns’ to consumption from these regressors has not changed over time, even though the levels of the regressors clearly have” (30).

These methods can yield significantly different results. Table 1 (drawn from Kijima and Lanjouw, 2004) provides an overview of the range of estimates for some of these methods (applying a common poverty line and price deflators, which was not always the case in the original works).

Rural Poverty in India	
Method	Headcount Measure
43 <sup>rd</sup> round (1987-8)	39.25
50 <sup>th</sup> round (1993-4)	33.07
Deaton method – method 1 above	26.4
Kijima and Lanjouw (2003), 30 day method 1 above	25.61
Kijima and Lanjouw (2003), correlates – method 5 above	30.07
Combined method, based on Sundaram & Tendulkar and Sen & Himanshu.	30.91

Keep in mind while these disagreements over national levels are non-trivial, these methods also produce different results with respect to the relative performance of the different states.

### Regional Applications and Theoretical Papers

---

## (2) Price changes

Macroeconomic changes including inflation affect the nominal costs of acquiring goods and services at different points in time. Significant movement of prices can affect the exercise of measuring poverty in two ways: a) a change in the overall price level (either nationally or at a disaggregated level) and b) a change in relative prices among goods. In what follows, we discuss ways to adjust expenditure to changes in prices.

### Treatments

*Note: For all treatments, ensure that:*

- (i) Either unit values or price survey data are used consistently across time period. While the availability of both these price data sources at one point in time can provide an informative cross-sectional comparison, they often yield different numbers and hence when comparing poverty over time, it is usually best to use one only<sup>7</sup>. In addition, if the price data has been disaggregated to take into account the fact that the poor face different prices, then ensure that this adjustment is consistently applied across time (this is likely to be particularly important in the case of unit values). See Pradhan, et. al. (2000) for a discussion of predicting unit prices faced by the poor.*
  - (ii) A common price is determined for home-grown items and those purchased on the market, and that the method used to determine this price (e.g. use of unit values or a separate price survey) is consistent over time. See Paternostro, et. al. (2001), pages 78-79, and Serbia & Montenegro PA (2003), page 154, for discussion and suggestions; and*
  - (iii) Differences in regional costs of living are consistently accounted for across time, possibly by constructing separate poverty lines or by making prices comparable across regions. An illustration of and adjustment for the variation in regional costs of living appears in a report by the Ghana Statistical Office (2000), pages 3-4 and 59, and by Grimm and Günther (2004), page 57.*
- Deflate prices according to food and non-food price indices, such as the national consumer price index (CPI), to temporally and regionally match a reference group.<sup>8</sup> It may be the case that the type of data available to do this changes over time. For example, Paternostro, et. al. (2001) temporally and regionally deflated prices to correspond to those in urban Antananarivo in November 1993 (see pages 85-87<sup>9</sup>). In terms of regional price deflation, a community price survey was only available for one year (1999) and unit prices were available for all 3 years (1993, 1997, 1999). On inspection, the unit prices for 1997 and 1999 showed a high amount of variation even within regions. However, these unit prices showed similar variation for product, quantity and region across time. Hence, in both 1997 and 1999, the authors use the regional deflators based on the 1999 community price survey. The 1993 unit price data show less variation and hence for 1993, the authors use the unit prices for

---

<sup>7</sup> Of course, it is possible to have only unit values at one point in time and price survey data at another point. In this case, a review of cases where both types of data were collected contemporaneously may provide a starting point in devising a correction method. For example, Deaton and Tarozzi (2004) discuss the use of unit values vs. price data in the case of India.

<sup>8</sup> Deaton, Angus and Salman Zaidi (2002), "Guidelines for Constructing Consumption Aggregates for Welfare Analysis", LSMS working paper number 135. World Bank.

<sup>9</sup> Note that with respect to the 1993./97 comparison there appears to be a typo and 1993 should read 1999.

regional price adjustments. In this instance, one possible robustness check would be to see how much poverty figures change when the assumptions are altered (e.g. what is the poverty level when the 1999 regional deflator is also applied to 1993?) For temporal price deflation, the authors use monthly Antananarivo price indices. Overall, this approach illustrates the need to improvise in the face of a lack of a consistent set of data sources. The analysts' method was to (i) choose one community and survey year as a base, (ii) assess the variability of unit prices within each year to determine whether or not to use the unit prices for regional deflation, and (iii) compare only those items listed in each survey with comparable units of measurement and recall periods (as discussed in the section on the consumption aggregate).

- It may not be appropriate to use the CPI to deflate the poverty over time as the CPI's underlying consumption basket is not always representative of the poor (see, pages 10 and 57). For example, Grimm and Gunther, 2004 (pgs 10 and 57) find that for Burkina Faso there is a much higher rate of growth in the *official* poverty line than in the CPI. They construct a poverty line for the last year of data and then deflate it for other years using rural/urban expenditure decile specific deflators. See also Ravallion and Huppi (1991) for a discussion of reweighting the CPI to account for the consumption pattern of the poor.
- The choice of price index may matter. If there are no big changes in relative prices or expenditure patterns, then most price indices will deliver similar numbers. If, however, these types of changes do occur, then the choice of index is important. Deaton and Tarozzi (2000) provide an overview of a range of price indices including the Paasche, Laspeyres, Fisher and Törnqvist indices. What distinguishes the latter two is their ability to deal with substitution effects. Deaton and Tarozzi apply the Törnqvist index to Indian data and show that relative to the official price indices that the use of the Törnqvist index shows almost no difference in urban areas, while the rate of rural poverty decline increases from 1.8 to 6.2 during the period from 1987-8 to 1993-4.
- In poverty analyses it is often the poverty lines themselves that are used as a price index to deflate consumption over time. Blackorby and Donaldson (1987) argue for basing interpersonal welfare comparisons on the "welfare ratio," which is defined as  $y^*_{hit} = y_{hit}/z_{it}$ , where  $y_{hit}$  is consumption of household  $h$  in location  $i$  in period  $t$ , and  $z_{it}$  is the corresponding poverty line for that location and time period. One advantage of using the poverty line as the price index is that, unlike typical CPIs, it reflects the consumption patterns of poor households. Another advantage is that the spatial and temporal coverage of the poverty lines typically matches the coverage of the consumption aggregate, because they are usually computed from the same survey. In contrast, CPIs are often calculated solely from prices in a few urban areas, and may not accurately capture prevailing prices in other areas.
- If the reference commodity basket is held fixed over time and the prices are updated in subsequent surveys, poverty lines behave as low-income Laspeyres price indices. If there are significant substitution effects from changes in relative prices over time, then the initial reference basket loses some of its relevance and can yield misleading poverty estimates. In particular, failure to account for substitution effects will tend to overstate poverty levels. On the other hand, updating the poverty basket to reflect new consumption patterns raises other issues, most notably how to ensure that the

new basket yields the same level of utility as the original basket, which is critical for consistent poverty estimates over time. This topic is taken up in section 3, which discusses the selection of poverty lines.

- While spatial price data may be obtainable for food expenditure either through unit prices or a price survey, price data on non-food items may be missing when only expenditures and not quantities are reported. This leads to a normative decision as to how much weight to allocate to non-food expenditure in the poverty line, fixed for a reference year and across sectors/regions. When analyzing data across time, data on relative price changes will allow this to vary, if applicable. See Ravallion and Sen (1994), pages 10-11 for an example of this in Bangladesh.
- To test for robustness of the price deflation method, Grimm and Günther, 2004 (page 57) use the poverty lines and consumption baskets for different years (other than the terminal year) to see if the trend in poverty is the same. Using various plausible intertemporal price deflators is another method for testing for robustness (indeed, as the work by Deaton and Tarozzi (2000) shows, the choice of these can matter quite a bit.)
- In another approach, Ravallion and Huppi (1991) find first order dominance in consumption per capita distributions between 1984 and 1987 for Indonesia. They are concerned that inflation may be underestimated so they estimate by how much the rate of inflation would have to be underestimated to reverse their result. It turns out to be an implausibly high 50%. This is an example of a useful general approach when dealing with errors/biases of unknown magnitude when estimating poverty over time: estimate the magnitude needed to reverse the trend and gauge its plausibility.

#### Regional Applications and Theoretical Papers

---

### (3) Poverty line selection

The poverty line is the threshold below which individuals and households are considered poor and above which they are considered non-poor. Due to the subjectivity of selecting such a line, it is not meant to act as an exact measure of poverty, but rather as a means for comparing shifts in poverty incidence over time and space. More generally, poverty lines are often used as low income cost of living deflators that map consumption from nominal to real terms to facilitate welfare comparisons across time or space (Blackorby and Donaldson 1987). One method for selecting a poverty line is termed “cost-of-basic-needs.” This method bases the poverty line on culturally appropriate items as included in the consumption aggregate and the price structures of the items as measured over time and location.<sup>10</sup> For a discussion of this method, see Ravallion 1994. Other methods for setting poverty lines are discussed in Ravallion 1992.

Cross-sectional estimates of poverty in a country may use different poverty lines at different points in time. This may be due to changes in prices, changes in the method used to determine the poverty line or even different assumptions within a given methodology (see for example, the discussion on the change to India’s poverty line in Deaton and Kozel (2004) section 5.4). Before determining a poverty line to use *over time*, it is worth revisiting the purpose of this line. The most common goal is to use this line to measure the change in command over basic consumption needs over time, relative to some base period. This may be different from what is the best poverty line for a cross-sectional estimate<sup>11</sup>. Since the main goal of this measure is consistency over time, the typical approach is to set a poverty line at an initial point and then use prices (as disaggregated as possible) to create equivalent values of that line for other points in time. However, in some circumstances it is preferable to update the reference poverty basket over time, such as when consumption patterns of the poor change in response to changes in relative prices or the introduction of new commodities. Changing the poverty basket adds the complication of ensuring that the new basket provides the same standard of living as the old basket. In what follows we discuss options to deal with these types of cases.

#### Treatments

- Lanjouw and Lanjouw (2001) provide a theoretical approach to dealing with non-identical consumption aggregates. They show that given a set of assumptions and a certain method of calculating the poverty line, the poverty headcount measure can provide consistent measurement across different consumption aggregates. However, they derive this result with respect to different aggregates in terms of the *non-food* consumption items they contain and hence a broader application of their result requires careful attention to how it is derived. First, they assume four things: 1) food consumption is increasing in total expenditure, 2) non-food consumption is increasing in total expenditure, 3) Engel’s law holds (total expenditures increase at an increasing

---

<sup>10</sup> Ravallion, Martin (1994), “A Better Way to Set Poverty Lines”, Outreach #15, Policy Views from the World Bank Research Complex.

<sup>11</sup> This needs to be strongly emphasized in any analysis, as point estimates in an over-time analysis may be used by the unwary as the valid cross-sectional number.

rate with food expenditure), and 4) there is not a large change in relative prices across points in time (or across populations if this is applied to a cross-section). They then define two ways to derive the total poverty line. In the “austere” they follow Ravallion: the poverty line is set to the food expenditure plus the non-food expenditure of households whose *total* expenditure just equals the food poverty line. In the “traditional” poverty line, the total poverty line is the non-food plus food expenditure of households whose *food* expenditure just equals the food poverty line. They show that as the non-food component of the consumption aggregate increases in breadth (i.e. covers more items), only the traditional measure used for the headcount index (and not higher order FGT measures) will provide consistent estimates of poverty. Lanjouw and Lanjouw provide empirical evidence of this result using data from Ecuador and Pakistan. Does this result extend to cases where it is the food component of the consumption aggregate that is increasing (or decreasing) in breadth? Here the assumption on Engel’s law is critical, they write that this analysis holds if “as long as there is a behavioral regularity analogous to Engel’s law regarding the share of the more broadly defined expenditure going to items which are part of the less comprehensive definition.” (7) That is, the budget share of what is comparable in the two different consumption aggregates declines as total expenditure increases.

- As an alternative to restricting the choice of poverty line and poverty measure when faced with incomparable consumption aggregates, one can predict the consumption in periods where total expenditure is not available. Lanjouw and Lanjouw (1997) provide one example of this. Take a case where one period has food only, while the other period has both food and non-food expenditure. The analyst estimates the relationship between food and total expenditure in the period with both types of expenditure. Assuming a stable set of demand relations, this predicted relationship can be used to estimate total expenditure in the period lacking non-food expenditure. Keep in mind the assumption here, a large shift in relative prices would make this approach inadvisable. Lanjouw and Lanjouw also caution against using FGT measures other than the headcount as the higher-order measures are more sensitive to measurement error, more of which is introduced by the use of predicted total expenditure<sup>12</sup>.
- The Ecuador PA provides an example where consumption aggregates are not comparable over time (63% in 1994 and 55% in 1999 are comparable) and poverty lines are determined for the 2 periods using the set of comparable expenditures. They start by finding the value of the 1994 comparable expenditures that would produce the 0.35 headcount ratio that was found in the 1996 World Bank Ecuador Report., call this poverty line  $Z_{CE}$ . They then average total expenditure<sup>13</sup> in the neighborhood of the household where comparable expenditure equals  $Z_{CE}$  and derive the 1994 total expenditure poverty line. They use the CPI to deflate  $Z_{CE}$  to its value in 1999. They then average the value of total expenditure in the neighborhood of the household where comparable expenditure in 1999 equals the deflated  $Z_{CE}$  to determine the total expenditure poverty line in 1999 (p. 153). This method yields two different poverty

---

<sup>12</sup> Note that this relationship can and should be tested with the data.

<sup>13</sup> Note total expenditure includes comparable and non-comparable elements.

lines, informed by the total expenditure patterns in each different period, but based on a core of expenditures that are comparable across the two periods.

- Another option when faced with different sets of items in the consumption aggregates is to base the over time comparison on items that are comparable only. Paternostro et. al. (1997) do this, providing figures on what percentage of base year expenditure the excluded items represent for reference. They then choose the (comparable) expenditure amount that reproduces the poverty rate found in the cross-sectional analysis of the base period (i.e. the 1996 Madagascar Poverty Assessment) to set the poverty line to use for the over time analysis. They then use temporal and regional deflation to derive this poverty line for the other time periods. However, Lanjouw and Lanjouw (1997) caution against discarding data because this 1) worsens the measure of household welfare (depending on the relationship between the excluded items and total expenditure), 2) their analysis (discussed further above) show that higher order FGT measures, for example, will have lower values when a subset of expenditure is used, and 3) this can be hard if there is not a sufficiently large set of comparable categories (which is not an issue in Paternostro, et. al).
- Arndt and Simler (2005) provide an approach for consistent poverty estimation when there are large changes in relative prices. The approach has three distinct steps.
  - First, a new poverty consumption basket is constructed, using the same calorie requirements as the previous reference basket. The composition of the basket is determined by the consumption patterns of poor consumers. The exact sub-sample used varies from study to study (e.g., all those below the expected poverty line, those with total consumption  $\pm 10\%$  of the poverty line, etc.). The choice is usually guided by the method used to establish the earlier poverty line(s). After determining which foods are consumed in what quantities, the quantities in the basket are scaled up or down so that it yields the preset calorie requirement.
  - Second, after creating the new consumption basket, it must be determined whether or not it provides the same standard of living, or utility, as the earlier basket. Two baskets containing the same number of calories can be vastly different in quality and cost. If income (consumption) has risen dramatically but the calorie-expenditure elasticity is low, the new basket could be of higher quality. This would effectively raise the poverty threshold, which must remain constant over time and space for consistent poverty comparisons.

Revealed preference tests are used to compare the baskets. That is, each of the baskets is costed using the prices observed in each of the two periods. If  $\mathbf{p}_1\mathbf{q}_1 > \mathbf{p}_1\mathbf{q}_0$ , this is evidence that the new basket ( $\mathbf{q}_1$ ) is superior (revealed preferred) to the old basket ( $\mathbf{q}_0$ ), because in  $t=1$  poor consumers consumed  $\mathbf{q}_1$  even though it costs more than the old basket ( $\mathbf{q}_0$ ) at current prices. Similarly, the basket  $\mathbf{q}_0$  would be revealed preferred if  $\mathbf{p}_0\mathbf{q}_0 > \mathbf{p}_0\mathbf{q}_1$ . In the few studies that have compared temporally- or spatially-differentiated poverty baskets using revealed preference tests, such violations of poverty basket comparability are common (Gibson and Rozelle 2003; Arndt and Simler 2005; Ravallion and Lokshin 2006).

- Third, if the revealed preferences tests show that the new baskets are inferior or superior to the previous standard, the composition of the baskets is adjusted to ensure that they are comparable. An information theoretic approach is employed, using mathematical optimization methods. The objective function minimizes the difference (specifically, the entropy distance) between the observed quantities in the poverty line basket ( $\mathbf{q}_1$ ) and the final, adjusted quantities ( $\mathbf{q}_1^*$ ), subject to a set of constraints. These constraints are the revealed preference conditions ( $\mathbf{p}_i\mathbf{q}_j \geq \mathbf{p}_j\mathbf{q}_i$  for all  $i \neq j$ ), the calorie levels used for the poverty threshold, and non-negativity constraints on  $\mathbf{q}$ . The resulting adjusted quantities ( $\mathbf{q}_1^*$ ) satisfy the revealed preference tests for utility consistency, while remaining as close as possible to the observed quantities consumed ( $\mathbf{q}_1$ ). Using data from Mozambique, Arndt and Simler (2005) show that imposing utility-consistency on poverty lines over time can have a large effect on the estimated changes in poverty. Applying the same methods to cross-sectional regional comparisons in Egypt showed much smaller impact.
- Whatever approach is used for dealing with different consumption aggregates and any possible resulting changes in poverty lines over time, some robustness analysis is worthwhile to test the impact of the assumption. :
  - As with setting all poverty lines, the analyst can examine the sensitivity of poverty measures to different poverty lines (or the decision not to alter it over time) using stochastic dominance analysis (see Deaton and Zaidi, pgs 54-64).<sup>14</sup> For example, Paternostro, et. al. (1997) do this and show over which ranges the choice of poverty line matters. While they show this with the adjusted (comparable expenditure) it might be useful to see this also with the unadjusted expenditure.
  - The methods discussed above provide alternate ways to deal with the issue of non-comparability (for example, predicting missing expenditure or restricting the choice of poverty line and indicator) so in some cases, one check of robustness would be to see if the results differ by method.
  - Compare trends demonstrated by the common poverty line to measures of income, wealth, or social indicators (as noted in Burkina Faso paper by Grimm and Günther, 2004, page 58). However, there may be valid reasons for these not to move together (see for example the discussion on food-energy intake vs. expenditure data in Ravallion (1996)). However, sometimes they do. Ravallion and Huppi (1991) check their trend results from consumption poverty using data on income, non-food expenditure and caloric intake.

### Regional Applications and Theoretical Papers

---

<sup>14</sup> Deaton, Angus and Salman Zaidi (2002), "Guidelines for Constructing Consumption Aggregates for Welfare Analysis", LSMS working paper number 135. World Bank.

#### **(4) Survey sampling**

An ideal setting in which to measure poverty over time is when the data follows the same individuals over time (panel data), and this set of individuals remains representative of the population (as is possible, for example, in a rotating panel). However, this is expensive and not always the best option (and panel data can have attrition problems, which would require careful attention to cause of the attrition to ascertain the possibility of bias<sup>15</sup>). Most surveys used to analyze changes in poverty over time will take the form of repeated cross-sections. Furthermore, most nationally representative surveys will not use a straight random sample, but rather some sort of stratified cluster random sample. This exercise, repeated over time by different survey teams, raises the possibility that a change in sample design has weakened the direct comparability.

In what follows we discuss a few examples of how studies have dealt with some sampling issues. One of the things they highlight is the need for careful attention not only to the survey documentation but some diagnostics using the different data as well to reveal sampling problems that may not be obvious (we discuss other non-sampling issues of this type below). One example of careful diagnostic work is Demery and Grootaert (1993). They show how the summary statistics of the Cote d'Ivoire Living Standards Survey (CILSS) show a marked decline in household size, from 8.31 in 1985 to 6.33 in 1988. Indeed, theirs is a rotating panel and within the panel, no decline in household size is observed. They rule out an underlying demographic change and the possibility of measurement error. In the end, they determine the cause of the decline is errors in sampling implementation, where the procedures used to list households to be surveyed was biased towards larger households in the early rounds. One of the underlying practices that led to this was a practice of using doors (not households themselves) as the identifying factor in choosing households. As larger households in the Cote d'Ivoire have more doors, they had a larger chance of being selected<sup>16</sup>. We now turn to their solution, and those of others, for dealing with these kind of problems.

#### Treatment

- Reweight the data. Demery and Grootaert (1993) reweight the CILSS sample to correct for a bias towards larger households in the sampling procedure. It is important to note that they rule out non-sampling error (which we discuss below). They identify two important features of the reweighting procedure: 1) it has to take into account the stratified nature of the sample and 2) it has to allow for the real underlying decline in household size that did occur in Cote d'Ivoire in this period. Their solution is designed for the particulars of the CILSS. In this case, the sampling error occurred in the early years, but was absent in the later years. Hence, they can use the distribution of the later years to correct the earlier years. They discuss two methods to reweight the sample by household size, one of which uses just the data at the point that the sampling method changed to correct the data and the second which uses the full range of years after the change (see pages 270-4 for a discussion). Each method has its drawbacks: one point in time may not be robust enough, while using a

---

<sup>15</sup> See for example, Alderman, et. al. 2000

<sup>16</sup> There are other factors that probably contributed to this, but this example illustrates the need to be familiar with how the survey was administered.

range of years may over-correct and erase some of the real change in household size. In the end, this correction (they use the range of years for correction) turns out to have a large impact on measured poverty, for example mean per capita expenditure in 1986 was 10% too low in unweighted estimates. This translates to lower poverty estimates for 1986, lowering the headcount ratio from 0.35 to 0.30. As this sampling problem only affects the early years of the data, the trend is also different once the weights are applied, as is the attendant policy conclusion. Demery and Grootaert argue that the revised poverty figures show that instead of increased poverty during the period of structural adjustment, poverty remains fairly level and the increase comes when the government abandons adjustment.

- Howes and Lanjouw (1997) suggest software and discuss specific methods for correcting for sampling designs such as clustering and stratification, this is useful as a general resource even though they do not directly address measurement over time issues.

### Regional Applications and Theoretical Papers

---

#### **(5) Changes in survey administration**

As indicated above, these are likely to be less obvious than the other sorts of problems covered here. In particular, survey documentation is not likely to explicitly reveal these types of issues. Hence, in order to discover these types of problems, and the possible magnitude of the distortion they introduce, careful work with summary statistics are required. A complete list of these issues would be impossible, but the examples that follow are designed to spark thinking about issues such as survey timing, the incentives facing respondents, the incentives facing survey staff and the processing of data.

- Why it is important to use raw data. Grimm and Gunther (2004) give this account of data they use from the National Institute of Statistics and Demography (INSD) in Burkina Faso: “Comparing the raw data (adjusted for regional deflation) with the official INSD processed data, we found that to all aggregated expenditure categories an additional 12.4% ‘expenditure margin’ was added across all households in 1998, which might be justified by the extremely ‘bad’ year in 1998 or the fact that the survey was conducted in the pre-harvest season. However this 12.4% margin was not applied in 2003 when the household survey was also conducted in the pre-harvest season and therefore introduced a major bias into poverty comparisons over time.” (54)
- Adjusting for seasonal differences. One approach would be to use seasonal price differences to deflate the poverty line across seasons within a year (and this may vary by region). While this would work when dealing with data within a year, another problem that may surface is analogous to the Burkina Faso data analyzed in Grimm and Gunther (2004). They face data where the first year’s data comes from the post-harvest period, while the second and third years’ data is from the pre-harvest season. They use secondary data on seasonal consumption variation from Burkina Faso (and elsewhere in Sub-Saharan Africa) as well as seasonal price fluctuations to derive a

rough estimate for the magnitude of seasonal consumption fluctuations. While they do adjust for the seasonal difference in prices, they do not adjust real consumption levels for the seasonality differences in the surveys. They argue against this adjustment for 2 reasons. First, they show other sources of error (recall bias and a change in the aggregation of expenditure items) that would seem to at least partially offset this source of error and second, that this correction would involve arbitrary assumptions.

- Incentives for survey respondents. Ravallion (1994) notes that in Bangladesh free blankets were discontinued as an incentive for participation in expenditure surveys, with likely larger impacts among the poor. In order to examine the robustness of expenditure data poverty estimates to this and other changes in methodology, he compares poverty estimates from household surveys with estimates based on the national accounts. He finds a sharp divergence in the trends shown by the two approaches.
- Working to identify the source of differences. As mentioned above, Demery and Grootaert (1993) find larger households are over-represented in data from Cote d'Ivoire. While they determine that this is due to sampling error, such a pattern could be caused by non-sampling error. In order to rule out non-sampling error, they need to test a likely manifestation of non-sampling error that would cause this. One likely source is the amount of work for field staff -- enumerators did not want to list more household members in later rounds of the survey since every individual listed on the household roster multiplies the number of questions that need to be asked. The most likely to be discarded then are those who are not part of the nuclear family, since these members would require some additional effort on the part of the enumerator. However, they find the decline to be equal with respect to the relationship to the head of the household. This fact, combined with an examination of the panel element of their sample, which shows almost no decline within panel groups, leads them to rule out non-sample sources of error.

## Regional Applications and Theoretical Documents

“PA” and “WP” respectively stand for Poverty Assessment and Working Paper.

### (1) Construction of the consumption aggregate: Regional Applications and Theoretical Documents

Regional Applications	Demonstrates Problem	Demonstrates Treatment
Bangladesh WP 1359 (2004)	X	X
Burkina Faso mimeo (2004)	X	X
<a href="#">Ecuador PA (2004)</a>	X	X
Ghana Statistical Service Report	X	X
Paternostro, et. al. , Africa Region Series No. 19 (2001)	X	X
Nicaragua PA (2003)	X	X
<b>Serbia &amp; Montenegro PA (2003)</b>	X	
Theoretical Documents		
<b>Deaton, Angus and Zaidi, Salman.</b> “Guidelines for Constructing Consumption Aggregates for Welfare Analysis.” <a href="http://poverty.worldbank.org/library/view/4336">http://poverty.worldbank.org/library/view/4336</a>		
Deaton, Angus, “Counting the World’s Poor: Problems and Possible Solutions.” The World Bank Research Observer, Vol. 16, No. 2 (Fall 2001), pp. 125-147.		
Lanjouw, Jean Olson and Peter Lanjouw (1997), “Poverty Comparisons with Noncompatible Data: Theory and Illustrations”, Policy Research Working Paper Number 1709. World Bank.		
Lanjouw, Peter and Martin Ravallion (1996) “How Should we Assess Poverty Using Data from Different Surveys,” <i>Poverty Lines Newsletter</i> , September 1996, World Bank: Washington D.C. <a href="http://www.worldbank.org/html/prdph/lms/research/povline/pl_n03.pdf">http://www.worldbank.org/html/prdph/lms/research/povline/pl_n03.pdf</a>		
Ravallion, Martin (1996), “How well can method substitute for data? Five experiments in poverty analysis”, The World Bank Research Observer, vol. 11, no. 2, pp 199-221. <a href="http://www.worldbank.org/research/journals/wbro/obsaug96/method.htm">http://www.worldbank.org/research/journals/wbro/obsaug96/method.htm</a>		
Ravallion, Martin and Binayak Sen (1994). “When method matters: toward a resolution of the debate about Bangladesh's poverty measures” Policy research working paper 1359, World Bank: Washington, D.C.		
Ravallion, Martin. “A better way to set poverty lines,” Outreach #15, March 1994.		
<b>Scott, Christopher and Ben Amenuvegbe</b> (1990), “Effect of recall duration on reporting of household expenditures: an experimental study in Ghana”, SDA Working Paper 8905. World Bank. <a href="http://www4.worldbank.org/afr/poverty/databank/docnav/show_doc.cfm?ID=2958">http://www4.worldbank.org/afr/poverty/databank/docnav/show_doc.cfm?ID=2958</a>		
<b>Ghana Statistical Service</b> (2000), “Poverty Trends in Ghana in the 1990s,” Accra, Ghana. <a href="http://www4.worldbank.org/afr/poverty/databank/docnav/show_doc.cfm?ID=1797">http://www4.worldbank.org/afr/poverty/databank/docnav/show_doc.cfm?ID=1797</a>		

(2) **Price and relative price structure changes:** Regional Applications and Theoretical Documents

Regional Applications	Demonstrates Problem	Demonstrates Treatment
Bangladesh WP 1359 (2004)	X	X
Burkina Faso mimeo (2004 same as theoretical document below)	X	X
<a href="#">Ecuador PA (2004)</a>	X	X
<b>Pradhan, et. al. (2000) Indonesia</b>	X	X
<b>Paternostro, et. al.</b> , Africa Region Series No. 19 (2001)	X	X
Mexico PA (2004)	X	X
Nicaragua PA (2003)	X	X
<b>Serbia &amp; Montenegro PA (2003)</b>	X	X
<b>Theoretical Documents</b>		
Module 2: Measuring Poverty Lines (Issues of inflation). World Bank.		
<b>Deaton, Angus and Ann Case (1987)</b> , " <a href="#">Analysis of Household Expenditures</a> ." Living Standards Measurement Study, Working Paper No. 28, World Bank, Washington, D.C.		
Deaton, Angus and Zaidi, Salman. "Guidelines for Constructing Consumption Aggregates for Welfare Analysis." <a href="http://poverty.worldbank.org/library/view/4336">http://poverty.worldbank.org/library/view/4336</a>		
Ravallion, Martin and Binayak Sen (1994), "When Method Matters – Towards a Resolution of the Debate about Bangladesh’s Poverty Measures", Policy Research Working Paper 1359. World Bank.		
<b>Grimm, Michael and Isabel Günther (2004)</b> , "How to achieve pro-poor growth in a poor economy. The case of Burkina Faso". University of Göttingen, mimeo.		
Ravallion, Martin and Monika Huppi (1991). "Measuring Changes in Poverty: A Methodological Case Study of Indonesia During an Adjustment Period." World Bank Economic Review 5: 57-84.		
<b>Papers on Poverty in India</b>		
Datt, Gurav, Valerie Kozel and Martin Ravallion (2003). "A Model-Based Assessment of India’s Progress in Reducing Poverty in the 1990s" <i>Economic and Political Weekly</i> (January 25): 355-361.		
Deaton, Angus and Valerie Kozel, (2004). "Data and Dogma: The Great Indian Poverty Debate." <a href="http://ssrn.com/abstract=593864">http://ssrn.com/abstract=593864</a>		
Deaton, Angus (2003). "Adjusted Indian Poverty Estimates for 1999-2000" <i>Economic and Political Weekly</i> (January 25): 322-326.		
Kijima, Yoko and Peter Lanjouw (2004). "Agricultural Wages, Non-Farm Employment and Poverty in Rural India" Unpublished manuscript, the World Bank.		
Kijima, Yoko and Peter Lanjouw (2003). "Poverty in India during the 1990s: A Regional Perspective" World Bank Policy Research Working Paper 3141.		
Sen, Abhijit and Himanshu (2004). "Poverty and Inequality in India" (Parts I & II) <i>Economic and Political Weekly</i> (September 18): 4247-4375.		

Sudaram, K and Suresh Tendulkar (2003). “Poverty <i>Has Declined</i> in the 1990s: A Resolution of Comparability Problems in NSS Consumer Expenditure Data” <i>Economic and Political Weekly</i> (January 25): 327-337.
Tarozzi, Alessandro (2004). “Calculating Comparable Statistics from Incomparable Surveys, with an Application to Poverty in India.” Unpublished manuscript, Duke University.

(3) **Selection of poverty lines:** Regional Applications and Theoretical Documents

Regional Applications	Demonstrates Problem	Demonstrates Treatment
<b>Burkina Faso</b> mimeo (2004)	X	X
<b>Ecuador PA</b> (2004)	X	X
Paternostro, et. al. , Africa Region Series No. 19 (2001)	X	X
Mexico PA (2004)	X	X
Nicaragua PA (2003)	X	X
Serbia & Montenegro PA (2003)	X	
Theoretical Documents		
Deaton, Angus and Zaidi, Salman. “Guidelines for Constructing Consumption Aggregates for Welfare Analysis.” <a href="http://poverty.worldbank.org/library/view/4336">http://poverty.worldbank.org/library/view/4336</a>		
Lanjouw, Jean Olson and Peter Lanjouw (1997), “Poverty Comparisons with Noncompatible Data: Theory and Illustrations”, Policy Research Working Paper Number 1709. World Bank.		
Lanjouw, Peter and Martin Ravallion (1996) " <a href="#">How Should we Assess Poverty Using Data from Different Surveys,</a> " <i>Poverty Lines Newsletter</i> , September 1996, World Bank: Washington D.C.		
Module 2: Measuring Poverty Lines (Choosing a basket of goods with which to compare two surveys). World Bank.		
Module 3: Measuring Poverty Lines (Cost-of-basic-needs method for setting poverty lines; Absolute poverty lines with which to compare two surveys). World Bank.		
Module 6: Measuring (Issues in measurement and comparison of poverty). World Bank.		
<b>Ravallion, Martin (1994)</b> . “A better way to set poverty lines,” Outreach #15, March 1994.		
Ravallion, Martin and Binayak Sen (1994). “When method matters : toward a resolution of the debate about Bangladesh's poverty measures” Policy research working paper 1359, The World Bank: Washington, D.C.		
<b>Ravallion, Martin (1992)</b> , “Poverty comparisons: A guide to concepts and methods”, LSMS working paper number 88. World Bank.		
Ravallion, Martin (2004), “Monitoring Progress Against Global Poverty”, <i>In Focus</i> , United Nations Development Programme, International Poverty Centre. September 2004, pgs. 12-15. <a href="http://www.undp.org/povertycentre/newsletters/infocus4sep04eng.pdf">http://www.undp.org/povertycentre/newsletters/infocus4sep04eng.pdf</a>		
Ravallion, Martin (1996). “How well can method substitute for data? Five experiments in poverty analysis” World Ban Research Observer 11, No. 2: 199-221.		

(4) **Survey sampling:** Regional Applications and Theoretical Documents

Regional Applications	Demonstrates Problem	Demonstrates Treatment
Burkina Faso mimeo (2004)	X	X
<a href="#">Ecuador PA (2004)</a>	X	
<b>Paternostor, et. al.</b> , Africa Region Series No. 19 (2001)	X	X
Serbia & Montenegro PA (2003)	X	
Theoretical Documents		
Deaton, Angus, “ <a href="#">Counting the World’s Poor: Problems and Possible Solutions.</a> ” The World Bank Research Observer, Vol. 16, No. 2 (Fall 2001), pp. 125-147.		
<b>Demery, Lionel and Christiaan Grootaert</b> (1993), “Correcting for Sampling Bias in the Measurement of Welfare and Poverty in the Côte d’Ivoire Living Standards Survey.” The World Bank Economic Review, Vol. 7, No. 3 (September 1993), pp. 263-292. <a href="http://www.worldbank.org/research/journals/wber/revsep93/correct.htm">http://www.worldbank.org/research/journals/wber/revsep93/correct.htm</a>		
Howes, Steven and Jean Olson Lanjouw (1997), “Poverty Comparisons and Household Survey Design”, LSMS working paper number 129. World Bank.		
Module 2: Measuring Poverty Lines (Seasonality). World Bank.		
United Nations(1982), “Non-sampling Errors in Household Surveys: Sources, Assessment and Control,” Department of Technical Co-operation for Development and Statistical Office, National Household Survey Capability Programme. <a href="http://unstats.un.org/unsd/pubs/gesgrid.asp?ID=313">http://unstats.un.org/unsd/pubs/gesgrid.asp?ID=313</a>		
Alderman, Harold, Jere R. Behrman, Hans-Peter Kohler, John A. Maluccio, Susan Cotts Watkins (2000), “ <a href="#">Attrition in longitudinal household survey data - some tests for three developing-country samples.</a> ” Policy Research Working Paper Number 2447. World Bank.		
Ravallion, Martin (1994) Poverty Comparisons: Fundamentals of Pure and Applied Economics. Vol. 56. Chur, Switzerland: Harwood Academic Publishers.		

## Glossary

### Clustering

A method of sample design wherein the population is first divided into units such as villages or street blocks. Households to be surveyed are then selected from within a cluster. Clustering reduces survey costs, but it leads to higher variances.

### Consumer price index

The weighted averages of individual commodity prices regularly observed in the market. The weights come from the budget shares in the reference period, typically as reported in a household expenditure survey.

### Engel's Law<sup>17</sup>

The share of budget devoted to food tends to decrease as total real consumption expenditure increases. Problems with this assumption:

- The relationship between the food budget share and consumption will generally differ across households due to differences in relative prices, demographic differences, or differences in preferences.
- The income elasticity of demand for food can be very close to unity for poor households.

### Headcount

The proportion of people deemed to be poor.<sup>18</sup>

### Panel datasets

Datasets compiled from a number of observations over time on a number of cross-sectional units like individuals, households, firms, or governments. Each "panel" consists of cross-sectional data from a specific observation period.

### Poverty

A level of material well-being below that deemed to constitute a reasonable minimum by the standards of a given society.<sup>19</sup> Due to the subjective nature of this concept, analysts will often construct an artificial level of material well-being called the consumption aggregate.

### Recall period

The period of time to be taken into account. For example, in the following question, the previous thirty days is the recall period. "On average, how often have you eaten lentils *in the past thirty days*? One time or less per week, two to four times per week,...."

---

<sup>17</sup> Ravallion, Martin. 1992. "Poverty Comparisons: A Guide to Concepts and Methods." Living Standards Measurement Study Working Paper No. 88. Pgs 21-22.

<sup>18</sup> Ravallion, Martin. 1992. "Poverty Comparisons: A Guide to Concepts and Methods." Living Standards Measurement Study Working Paper No. 88. Pgs 31.

<sup>19</sup> Ravallion, Martin. 1992. "Poverty Comparisons: A Guide to Concepts and Methods." Living Standards Measurement Study Working Paper No. 88. Pg 4.

**Stochastic Dominance**

The random variable X first-order stochastically dominates the random variable Y if  $\Pr[X > a] \geq \Pr[Y > a]$  for all a. If the distribution of X is F and the distribution of Y is G, then X first-order stochastically dominates Y if  $F(a) \geq G(a)$  for all a.<sup>20</sup>

**Stratification**

A method of sample design wherein the population is first divided into different groups (such as urban vs. rural or rich vs. poor) and households to be surveyed are selected from within each strata. This method can provide a more representative sample, and so reduces variance. Stratification may also reduce costs by allowing lower sampling rates for more homogenous sub-groups or more populous areas.

---

<sup>20</sup> <http://www.econ.hku.hk/~hrneswc/uncertainty/fsd.pdf>