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*Poor, or Just Feeling Poor?*

On Using Subjective Data in Measuring  
Poverty

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# Poverty reduction has long been an overarching goal of development

- It is well recognized that survey-based household consumption or income aggregates must be normalized for cost-of-living differences, although differing views on how to do so.
- It is also recognized that neither income nor consumption can be considered a sufficient statistic for economic welfare.
  - There are important non-market goods that are typically excluded, such as access to public services for health care or schooling.
  - And household aggregate income or consumption reveals nothing directly about distribution within the household.
- The real issue: *What do we do about this problem?*

# Attempts to define composite indices that allow for “non-income” factors

- Human Development Index,” “Multidimensional Poverty Index,” ...a growth industry of “mashup indices.”
- All such composite indices confront the problem of setting the trade-offs (relative weights) across their dimensions. This is essentially *ad hoc* in all these measures.
- *Can subjective data on welfare/well-being provide useful clues for devising more comprehensive poverty measures?*

# Outline

1. Problems in the standard objective approach to poverty measurement
2. A solution? Anchoring poverty measures to subjective welfare
3. Problems in using subjective data in measuring poverty

# 1. Problems in the standard objective approach to poverty measurement

# Standard approach to poverty measurement

- Poverty is taken to be absolute in the space of welfare.
- The welfare-consistent poverty lines are then given by:

$$z_i^u = e(p_i, x_i, u_z) = p_i q^c(p_i, x_i, u_z)$$

where  $u_z$  is the minimum utility necessary to escape poverty,  $e(.)$  is the expenditure function at prices  $p$  and HH characteristics  $x$  and  $q^c(p_i, x_i, u_z)$  is the vector of utility-compensated demands.

- Thus the welfare-consistent poverty line is the cost of a bundle of “basic consumption needs,” given by the vector of utility-compensated demands at the reference level of utility.
- The measure of aggregate poverty can then be defined on the vector of welfare ratios,  $\{y_i / z_i^u, i=1, \dots, N\}$ .
- The “poverty rate” or “headcount index of poverty” is the proportion of the population with  $y_i / z_i^u \leq 1$ .

Fine in theory, but two core problems confronted in implementation.

# Two classic problems in applied welfare economics 1: *The referencing problem*

- *What is the reference level of utility that anchors the poverty line?* (This is an instance of a general problem of reference-dependence, including in welfare measurement.)
- It is tempting to say this choice is arbitrary, and to hope that it is innocuous.
- But the choice of the reference in poverty measurement is far from arbitrary, since (in general) it affects the resulting poverty measure.

## Two classic problems in applied welfare economics 2: *The identification problem*

- Even if we agree on the poverty line in the welfare space, we also need to know the expenditure function.
- Standard practice is to calibrate its parameters from data on consumer demands.
- However, individuals vary in characteristics that can influence welfare in ways that may not be evident in demand behavior.
- If demands can be integrated back to a utility function  $u(p, y, x)$  then the same demands also maximize any broader welfare function  $w[u(p, y, x), x]$  (Pollak and Wales (1979); Browning (1992)).
- **Thus there is no unique utility function that can be inferred from market demands alone.**
- We need stronger identifying assumptions, or more data.

## 2. Subjective welfare data to the rescue?

*Can we rely on subjective welfare data to solve the referencing and identification problems?*

# Two approaches to collecting subjective data 1

- The first uses qualitative categories in the welfare space.
- An example is the “economic ladder question” (ELQ):  
*“Imagine six steps, where on the bottom, the first step, stand the poorest people, and on the highest step, the sixth, stand the rich (show a picture of the steps). On which step are you today?”*
- A popular indicator of overall welfare has been the “satisfaction with life” (SWL) question:  
*“Overall, how satisfied (content, happy) are you with your life? Are you (1) very unsatisfied; (2) unsatisfied; (3) neither unsatisfied nor satisfied; (4) satisfied; (5) very satisfied?”*
- The ELQ is arguably better suited to poverty measurement as it is tied to a concept of economic welfare, while ideas such as SWL or “happiness” are more nebulous in scope.

## Two approaches to collecting subjective data 2

- The second approach asks for a money-metric of subjective welfare. An example is the “minimum income question” (MIQ): *“What income level do you personally consider to be absolutely minimal? That is to say that with less you could not make ends meet.”*
- This can be thought of as a special case of Van Praag’s (1968) “income evaluation question,” which asks what income is considered “very bad,” “bad,” “not good,” “not bad,” “good,” “very good.”

# The social subjective poverty line 1

- Let  $y_i^{\min}$  be the answer given by person  $i$  to the MIQ and write:

$$y_i^{\min} = E(y_i^{\min} | p_i, y_i, x_i) + \varepsilon_i \quad y_i \in [y_0, y_1]$$

- It is assumed that  $E(y_i^{\min} | p_i, y_i, x_i)$  is strictly increasing in  $y$ . It can also be assumed that  $E(y_i^{\min} | p_i, y_0, x_i) > y_0$  and  $E(y_i^{\min} | p_i, y_1, x_i) < y_1$ .

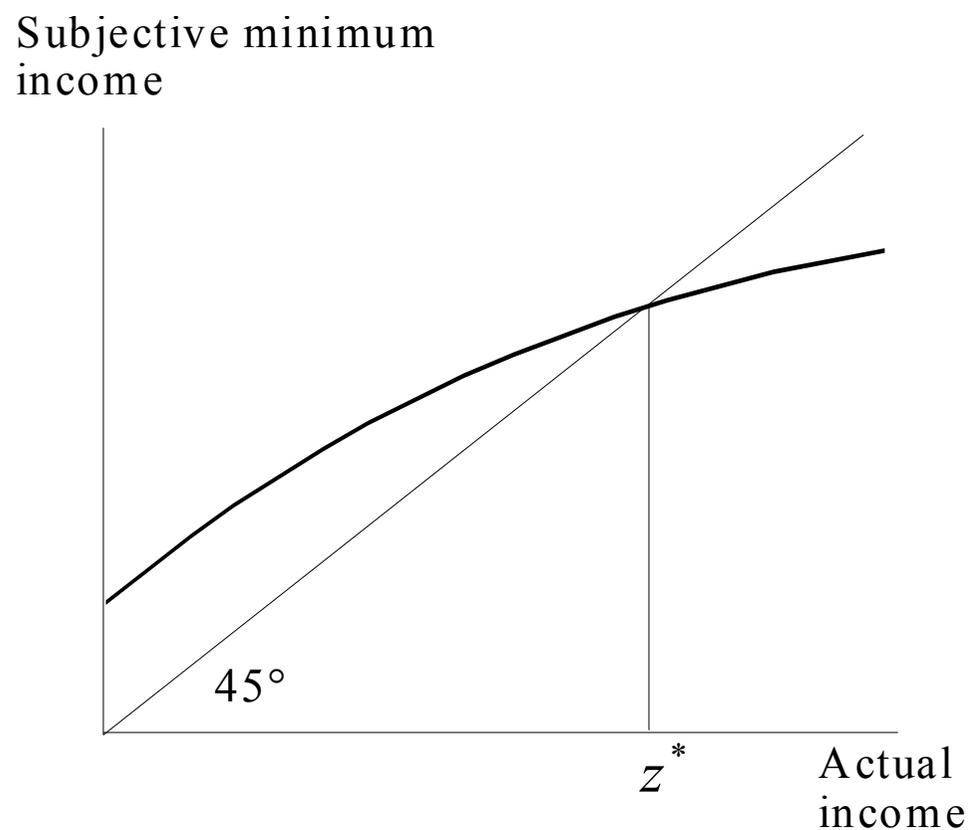
- Then there exists a unique fixed point such that:

$$E[y_i^{\min} | p_i, z(p_i, x_i), x_i] = z(p_i, x_i)$$

- The social subjective poverty line (SSPL) is the (unique) solution for  $z(p_i, x_i)$ . If higher  $p$  or  $x$  is associated with higher  $y^{\min}$  then a higher SSPL will be required.

## The social subjective poverty line 2

*"What income do you consider to be absolutely minimal, in that you could not make ends meet with any less?"*



# Can these approaches be consistent?

- Unclear conceptual links between the objective and subjective approaches; the three approaches have largely existed independently.
- *Under what conditions will they be consistent in terms of whom they identify as “poor”?*
- It is evident that the direct approach will be consistent with the objective utility-based approach as long as the ordinal qualitative questions asked of respondents stem from the same welfare index.
- This is a judgment call, and some observers may not accept that (say) SWL is driven by “utility.”
- The paper outlines theoretical conditions for consistency.

# The subjective welfare regression

- Typically the researcher has data on subjective welfare ( $SW$ ) across  $N$  survey respondents and a set of covariates ( $X$ , including some suitable non-linear function of income) and postulates a regression model of the form:

$$SW_i = \alpha + \beta X_i + \varepsilon_i \quad (i=1, \dots, N)$$

where the error term,  $\varepsilon$ , is uncorrelated with  $X$ .

- If using ordinal data (ladder question) then ordered response estimator is used;  $SW$  is the latent continuous variable generating the responses relative to fixed thresholds.
- If using the MIQ, then  $y_i^{\min}$  is the dependent variable.

*Can we trust the SW regression to inform welfare and poverty measurement?*

## 4. Problems in using subjective data in measuring poverty

# Welfare-irrelevant covariates and missing data on welfare-relevant ones

- Not everything that helps predict self-assessed welfare will be considered normatively relevant to measuring poverty.
- Personality traits: The idea of a poverty line that depends on personality traits, at given levels of other relevant factors, is probably not going to gain much acceptance.
- **Personality is unlikely to be given independent weight in assessing “welfare.”**
- And some more readily observed covariates may well be acting as proxies for personality.
- For example, a common finding in the literature is that unemployment reduces subjective welfare at a given level of income. *This could just be picking up latent personality traits!*

# And there are invariably missing welfare dimensions

- The available data will surely never embrace all that matters to welfare.
- This approach is unlikely to provide a sufficient statistic for multidimensional poverty comparisons.
  - To estimate the regression function we ideally have the  $X$ 's from the same individuals as the indicator of subjective welfare.
  - There is bound to be some relevant dimension of welfare left out, but hopefully available in some separate survey.
- In practice, multidimensional poverty measurement is invariably going to be a matter of devising a defensible set of multiple indices rather than one single composite index

# Survey design and measurement errors

- Attenuation bias in estimates of the income gradient in subjective welfare due to measurement errors in incomes.
- An attenuation bias can also arise from psychological adaptation to adverse circumstances.
  - Poor people may try to cope with deprivation in ways that attenuate the true income gradient in subjective assessments of their well-being.
  - For example, Lokshin and Ravallion (2008) found that the income gradient in the self assessed health status of Russians was greatly attenuated relative to that in their objective health status.
- Spatial autocorrelation in income measurement errors will create spurious social effects. Mean income of “neighbors”—survey respondents in a geographic area that includes the respondent—is a dangerous variable!

# Survey design and implementation effects

- How, and in what circumstances, one asks subjective questions matters to the results.
- Taylor (2006): those interviewed on a Friday report significantly greater job satisfaction and less mental stress than those interviewed mid-week.
- Conti and Pudney (2011): seemingly small changes in how questions on satisfaction with work were asked led to large changes in the answers obtained, particularly for women.
  - “Put a good show for the visitor effect” —an upward bias in reported welfare in open oral interviews relative to when the questionnaire is completed in private
  - “Not in front of the children effect”, whereby there was another upward bias when children were present at the interview. These biases were found to be larger for women.

## Latent heterogeneity in what “income” means

- While the Minimum Income Question offers an elegant solution to the problem of determining the SSPL, it comes with a problem, and it is a problem that is likely to be especially serious in developing–country settings.
- The problem is that the income concept respondents to the MIQ have in mind need not correspond to that used by the analyst in estimating the SSPL. **This will bias the SSPL!**

# Estimating the SSPL using qualitative data on consumption adequacy

- Instead of asking respondents what the precise minimum consumption is that they need, Pradhan and Ravallion asked whether their current consumptions are adequate.
  - *Concerning your family's food consumption over the past one month, which of the following is true?*
    - *Less than adequate*
    - *Just adequate*
    - *More than adequate*
  - *Adequate" means no more nor less than what you consider to be the minimum consumption needs of your family.*
- The question is then repeated for other components of consumption (both market and non-market).

## Estimating the SSPL cont.,

- This provides a multidimensional alternative to the one-dimensional, and difficult, MIQ.
- The method exploits the structure of consumption—essentially providing a subjective welfare function for each component of basic needs.
- The SSPL can be defined as the level of total spending above which respondents say (on average) that their expenditures are adequate for all their needs or some subset.
- Under certain technical conditions, a unique solution for the SSPL can then be obtained from the estimated parameters of a set of regressions for consumption adequacy; Pradhan and Ravallion (2000) provide details.
- **But other problems remain....**

# Non-ignorable latent heterogeneity

(“non-ignorable”: latent heterogeneity correlated with  $X$ )

- Two examples on personality traits in subjective welfare

## Example 1: SSPL

- Personality 1: Suppose that SW depends on income and personality, and we are interested in identifying the income poverty line corresponding to some fixed level of SW.
- Personality is unobserved (and so relegated to the error term), but affects earnings and (hence) income.
- If the combined effect of the latent personality traits that raise SW is to increase (decrease) labor market earnings then we will underestimate (overestimate) the SSPL.

## Example 2: Schooling gradient in SSPL

- Personality 2: we can agree that people with fewer opportunities for schooling are poorer at given current income.
- In data we see that schooling is associated with higher subjective welfare at given current income.
- Thus, welfare consistency appears to demand that we use a higher income poverty line for people with less schooling.
- However, schooling depends on personality as well as opportunities. More conscientious people acquire more schooling.
- And (arguably) more conscientious people delay gratification in other aspects of their life, so they report lower current SW at given current income.
- Then a SW regression will lead us to underestimate the gradient in poverty lines needed to compensate for differences in schooling opportunities.

# Heterogeneity in scales

- People clearly have different ideas about what it means to be “rich” or “poor,” or what it means to be “satisfied” or not with one’s life.
- It has been argued in the literature (in prominent places) that, while inter-personal welfare comparisons are invalidated by heterogeneous scales, the SW regressions are likely to be robust to such heterogeneity.
- This claim is of doubtful veracity.

# Frame of reference bias

- People living in poor rural areas of a developing country tend to have a more limited knowledge of the full range of levels of living found in the society as a whole.
- Someone living in a poor, remote village who has only infrequently left the village and gone no further than the district town is likely to rate her welfare higher than someone with the same real income who lives in a city and sees far greater affluence around her.
- Similarly, it can be conjectured that well-off people are often unaware of how poor some people are, and may thus rate their own welfare lower on the scale.
- This can be called a frame-of-reference bias (FORB).

# FORB in subjective welfare regressions

- The potential for FORB raises concerns about the SW regressions in the literature.
- Consider, for example, the many papers that have used SW regressions to test for reference-group effects, such as whether higher “neighbors” income makes one feel worse off through perceptions of relative deprivation.
- It seems likely that the same reference group also influences the respondents’ interpretation of the scales.
- **The reference group acts as both the comparator in assessing relative position and a key element of the information set used by respondents when interpreting the scales.**
- Reference groups also change in the process of economic development (esp., urbanization) leading to shifting scales.

# To recap

- We have seen that latent heterogeneity can confound the interpretation of subjective welfare regressions.
- *What can be done about the problem?*
- One possibility is to control for these differences directly.
  - Psychologists have developed various tests that can be implemented in surveys.
  - The Pearlin scale is an example (Pearlin and Schooler).
- However, it is not as yet common to have such data collected in the surveys needed to estimate SW regressions.
- *What can we do with standard data sources?*

# Panel data to address latent heterogeneity

- Panel data on SW and covariates have been proposed as one solution to the problem of latent heterogeneity.
- If we have longitudinal data on self-assessed welfare ( $SW$ ) and covariates ( $X$ ) we postulate a model of the form:

$$SW_{it} = \alpha + \beta X_{it} + \eta_i + \varepsilon_{it} \quad (i=1, \dots, N; t=1, \dots, T)$$

where the error term includes a time-invariant effect capturing (say) personality traits,  $\eta_i$ , for which  $Cov(\eta_i, X_{it}) \neq 0$ , and an innovation error term,  $\varepsilon_{it}$  with  $Cov(\varepsilon_{it}, X_{it}) = 0$ .

- Thus the non-ignorable heterogeneity is assumed to be entirely captured by  $\eta_i$ .
- One can question whether this specification adequately captures the way heterogeneity impacts on SW.

# Example for Russia 1

Using panel data, Lokshin and Ravallion confirm some results in past studies using single cross-sections, but not others.

- Household income is a highly significant predictor of self-rated economic welfare.
- Controlling for household income, individual income is a far weaker predictor, suggesting that there is some degree of income pooling.
- Health shocks lowered subjective economic welfare, at given values of other variables in their model, including incomes.
- The demographic effects were not found to be robust.

## Example for Russia 2

- Evidence of an income-compensated welfare cost of unemployment. Large gain in current income to compensate for becoming unemployed.
- But qualifications:
- While becoming unemployed entails a large welfare loss, that loss is not fully restored when an unemployed person gets a job, except via the income gain. **This implies a long-term welfare loss from even transient unemployment at given income.**
- It also suggests that **high unemployment benefits do not attract people out of work, but they may well discourage a return to work.**

# Using vignettes to address scale heterogeneity

- The essential idea of vignettes is to include in the survey reasonably detailed descriptions of the lives of certain stylized individuals and ask the respondent the same subjective question about those vignettes that was posed about the respondent herself.
- Beegle, Himelein and Ravallion (BHR) (2012) used vignettes to provide various tests for bias due to latent heterogeneity in individual scales of subjective welfare.
- The BHR tests entailed adding vignettes to a national household survey for Tajikistan in 2007.

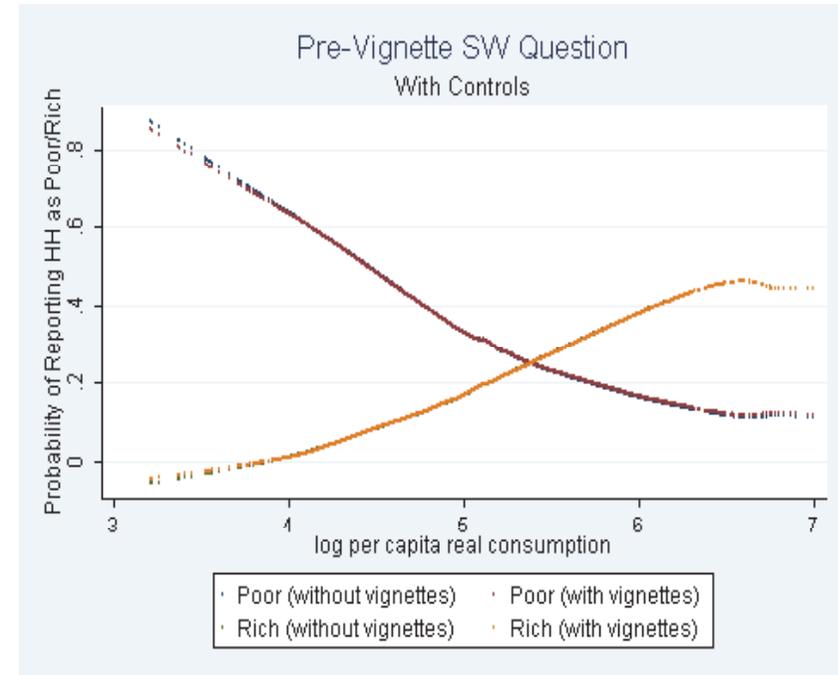
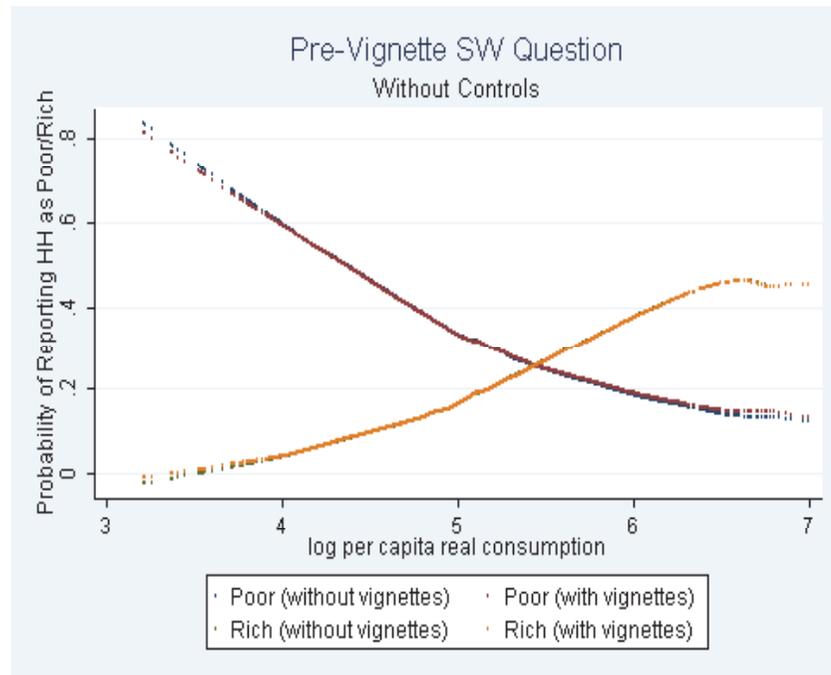
# The BHR vignettes for Tajikistan

- Vignette 1: Family A can only afford to eat meat on very special occasions. During the winter months, they are able to partially heat only one room of their home. They cannot afford for children to complete their secondary education because the children must work to help support the family. When the children are able to attend school, they must go in old clothing and worn shoes. There is not enough warm clothing for the family during cold months. The family does not own any farmland, only their household vegetable plot.
- Vignette 2: Family B can afford to eat meat only once or twice a week. During winter months, they can heat several rooms, but not the entire house. They cannot afford for all their children to complete secondary education. Their clothing is sufficiently warm, but they own only simple garments. In addition to their household vegetable plot, they own a small plot of poor quality farmland that is distant from their home.
- Vignette 3: Family C can afford to eat meat everyday. During the winter months, generally they are able to keep their home warm. They can afford for all their children to complete secondary education. They have sufficient clothing to keep warm in the winter. Their everyday clothing is simple, but they also have some fancy items for special occasions. In addition to their household vegetable plot, they have a larger plot of good quality farmland, not too distant from their home.
- Vignette 4: Family D can afford to eat whichever foods they would like, including sweets and imported food. During the winter months, they have no problems with heating and are able to keep their entire house warm. They can afford for all of their children to complete their education, and then to continue at a local university. They are able to afford a variety of fancy traditional clothes and also imported brand clothing. The family owns property, including a good car. The family also has a large farm and acts as landlord to others in their area.

# The BHR tests

- Test 1: Testing for systematic effects on vignette answers; yes, but neither very strong nor consistent across vignettes
- Test 2: Correcting standard SW regressions using the vignette responses; the bias is negligible with respect to the income effect on subjective welfare as well as other covariates.
- Test 3: Model the heterogeneity in scales, whereby the thresholds are modeled as functions of covariates, assuming that the structure of this heterogeneity is common between “own welfare” and the vignettes (King et al.)
  - This shows similar results on the factors influencing subjective welfare, but throws new light on the heterogeneity in scales.
  - Poorer households tend to have narrower range in the thresholds used in identifying where they lie and where the vignettes lie on the subjective welfare ladder.

# Correcting for scale heterogeneity has negligible impact



# Encouraging results, though only one study

- A frame-of-reference bias in SW regressions is evident in BHR's findings; people with different socioeconomic backgrounds use systematically different scales in responding to questions on their welfare.
- However, BHR's results do not suggest that this is an important source of bias in past efforts to model the objective determinants of SW, and for retrieving the SSPL.
- This is encouraging for future applications., but it is only one study.

# Latent heterogeneity in weights

- So far the discussion has focused on the problem of heterogeneity in self-assessed welfare, interpreted as either an additive effect on the underlying continuous welfare level or in the ordinal scales used in the survey.
- However, there is another concern that has received little or no attention in this context.
- Recall that one objective of the exercise is to use subjective welfare data to help determine the weights on various non-income dimensions of welfare—to inform choices in constructing a multidimensional index of poverty.
- It appears very likely that **different people have different weights** given that non-market goods are included, and so there is no market mechanism to bring marginal rates of substitution into parity across people.

# What then does the standard SW regression give us?

- It appears to be widely thought that the regression coefficients can be interpreted as the average weights.
- This is not true in general.

$$SW_i = \alpha + \beta_i X_i + \varepsilon_i = \alpha + \bar{\beta} X_i + (\varepsilon_i + \gamma_i X_i)$$

- Even if  $Cov(X_i, \varepsilon_i) = 0$ , a linear regression for SW will not in general deliver the mean weights in the population in large samples.
- Clearly that also requires that  $Cov(X_i, \gamma_i X_i) = 0$ .
- We can easily imagine that people with high weights on some welfare dimension tend to be better endowed with that dimension. Then the regression coefficient will tend to over-estimate the mean weight.
- Alternatively, suppose that people with low innate attributes (such as health) tend to put a higher value on those attributes. We will underestimate the mean weight.

# Conclusions 1

- Subjective data offer to expand the information set traditionally used for assessing welfare and measuring poverty.
- But self-assessed welfare should not be equated with “welfare.”
- Rather, the promise of subjective data is to help identify the **weights** on the dimensions of welfare for which prices are missing (or unreliable)
- and in determining the **social subjective poverty line**—below which people tend to think they are poor, but above which they do not.

## Conclusions 2

- Some variables with explanatory power for subjective welfare may not be relevant for measuring poverty.
- Personality traits, for example, are expected to influence self-assessed welfare but are unlikely to carry much weight in deciding if one person is poorer than another.
- And even when personality traits are not data, they are likely to influence the observed covariates of self-assessed welfare.
- In the end, one cannot escape the need for normative judgments about what should be included in a measure of poverty.

## Conclusions 3

- The existence of confounding “non-welfare” factors in survey-based measures of subjective welfare is a continuing concern.
- Practitioners should not presume that these variables are statistically harmless for the purpose at hand.
- **We can expect biases in the SW regressions found in the literature, especially those using cross-sectional data.**
- However, some encouragement in the recent literature. For example, while there are frame-of-reference effects, the biases turned out to be quite small in the one study to date using vignettes to eliminate the heterogeneity in subjective scales for a developing country.

# Conclusions 4

- A potentially important problem that has received no attention (to my knowledge) is latent heterogeneity across individuals in their welfare weights—as must be expected for non-market goods.
- Those weights may well reflect endowments of the welfare covariates, or the covariates may come to reflect differing weights.
- Then we do not know whose trade-offs the subjective-welfare regression is giving us; we would like to use weights favored by poor people, but that cannot be assured.
- Further research might usefully explore the possibilities of deriving a locally valid estimator using innovative survey or experimental methods to identify personal tradeoffs.