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ON THE APPLICATION OF EFFICIENCY ANALYSIS TO THE STUDY OF THE DIMENSIONS OF HUMAN DEVELOPMENT

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This paper is an attempt to translate empirically some of the categorizations of human development reviewed by Alkire (2002). It compares the estimates of human development obtained on the basis of Sen's (1985) capability approach, Narayan *et al.*'s (2000) dimensions of well-being, Cummins (1996) domains of life satisfaction and Allardt's (1993) comparative Scandinavian welfare study. To obtain these estimates of human development use is made of techniques developed in efficiency analysis, an approach rarely applied to the study of consumption and standards of living (see, however, Lovell *et al.*, 1994). Our database is the British Household Panel Survey. Our findings vindicate the multi-dimensional approach to human development but show a great empirical resemblance between the four conceptual approaches to well-being.

1. Introduction

Economists attempting to measure the standard of living and/or quality of life of individuals (or households) have often limited their empirical analysis to a study of the income sources or/and the consumption patterns of individuals (or households). It is however well known that these measures are seriously deficient. As stressed by Sen (1985, 1998a, 1998b) it is a handicap to be concerned with goods as such to the exclusion of what goods "do to human beings." This is why he introduced the concepts of capabilities and functionings. For Sen, "resources" are the material goods and services which confer capability on individuals, that is, provide them with the capacity to do things, while the concept of "functionings" captures the notion of how well individuals are functioning as human beings.

Sen was however not the only one to advocate a broader definition of human development. In a recent study Alkire (2002) presents a list of fifteen works looking in different ways at the dimensions of Human Development (see Alkire, 2002,

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Appendix A). The purpose of the present study is to attempt to translate empirically some of the categorizations of human development reviewed by Alkire (2002). In order to implement such a goal, we suggest to apply efficiency analysis to the study of human development.

Efficiency analysis is a technique that is widely used in the analysis of production. It has been more rarely applied to the study of consumption and standards of living. Lovell *et al*. (1994) were probably the first to do so. In their study they use distance functions to estimate the standard of living, the quality of life and the efficiency in transforming resources into functionings. The standard of living is measured as a mixture of resources by means of an index analogous to the input quantity index of production economics, whereas quality of life is measured by an index of individual functionings analogous to the output quantity index of production economics. Deutsch *et al*. (2003) employ this methodology and the same data we use in this paper to analyze the standard of living and quality of life in Great Britain focusing on Sen's capability approach only.

In this paper we also apply the approach advocated by Lovell *et al*. (1994). More precisely, we compare the estimates of human development that are obtained on the basis of Sen's (1985) capability approach, Narayan *et al*.'s (2000) dimensions of well-being, Cummins' (1996) domains of life satisfaction and Allardt's (1993) comparative Scandinavian welfare study. Our database is the British Household Panel Survey that provides us with an incomparable wealth of information on individual well-being.

The paper is organized as follows. Section 2 looks at the way Human Development is viewed in four of the approaches reviewed by Alkire (2002). Section 3 explains how it is possible to apply efficiency analysis to the study of human development. Section 4 presents the data and variables that are used. Section 5 analyzes the results of the empirical investigation, while concluding comments are given in Section 6.

2. On Various Ways of Defining Human Development

Sen (1985) described as follows the complexity of the concepts of standard of living and quality of life:

> One could be *well-off*, without being *well* (due to health problems). One could be *well*, without being able to lead the life he or she *wanted* (due to cultural restrictions and bounds). One could have got the life he or she *wanted*, without being *happy* (due to psychological problems). One could be *happy*, without having much *freedom* (due to society's norms). One could have a good deal of *freedom*, without *achieving* much (due to lack of self-confidence or self-esteem). We can go on. (Sen, 1985, p. 3)

There are thus many dimensions of these two notions of standard of living and quality of life and they are not easy to capture by any economic measure of income or wealth.

In her study of the dimensions of human development Alkire (2002) took a look at fifteen works which have attempted in a way or another to apprehend the

components of human well-being. The present paper does not have the ambition to translate empirically all these approaches. It will rather focus on three of them, those of Allardt (1993), Cummins (1996) and Narayan *et al*. (2000). Before presenting these three approaches we briefly summarize Sen's (1985) famous capability approach.

Sen's (1985) Capability Approach

Sen (1985) stressed the fact that economists have traditionally identified well-being with market command over goods, thus, confounding the "state" of a person—well-being—with the extent of his or her possessions—being well-off. To some extent, such an "opulence-focused approach" (Sen, 1985) could be empirically justified by the scarcity of (individual) data. From a theoretical point of view, however, "economics has not been very interested in the plurality of focus in judging a person's states. In fact, often enough the very richness of the subject matter has been seen as an embarrassment. There is a powerful tradition in economic analysis that tries to eschew the distinctions and make do with one simple measure of a person's interest and its fulfilment" (Sen, 1985).

In order not to overlook the plurality embedded in the standard of living and the quality of life notions, Sen (1985) advocated the "capability approach," which views individual well-being as a combination of various functionings. A functioning is an achievement of a person: what she manages to do or to be, and reflects a part of the "state" of that person. These functionings are then the constituents of an individual's quality of life, and the evaluation of the latter must take the form of valuing the functioning vectors.[1] In other words, according to Sen, the mere command over commodities cannot determine the valuation of the goodness of the life that one can lead for "the need of commodities for any specified achievement of living conditions may vary greatly with various physiological, social, cultural and other contingent features" (Sen, 1985, p. 25). Commodity command is a means to the end of well-being. Ideally well-being should be measured by the set of capabilities with which an individual is endowed. Sen however did not propose a list of the relevant capabilities, not even one of functionings.

Allardt (1993) on Having, Loving and Being

In a paper where he proposed an alternative to the Swedish model of welfare research, Allardt (1993) made a distinction between three components of human well-being, which refer respectively to Having, Loving and Being. "Having" covers such domains as economic resources, housing, employment, working conditions, health and education. "Loving" refers to contacts with the local community, with

[1]More precisely, in his "capability approach," Sen proposes to evaluate quality of life in terms of capabilities, defined as "the alternative combinations of functionings individuals can achieve, and from which they can choose one collection" (Sen, 1985, p. 31). The notion of capability is thus conceptually superior to that of functioning in that it reflects the freedom individuals have in terms of the choice of functionings. Due to the difficulty in measuring such freedom to pursue different functionings, we will not use capabilities but will focus on achieved functionings. According to Sen (1985, pp. 38–40), our exercise constitutes then an "elementary evaluation" of the capability set.

family and kin, with friends, associations and work-mates. Finally in the category "Being" Allardt (1993) puts such aspects as self-determination, political activities, leisure-time activities, opportunities to enjoy nature and meaningful work.

Cummins' (1996) Domains of Life Satisfaction

Reviewing over 1500 articles relating to quality of life, Cummins (1996) arrived at a classification of life satisfaction into seven domains referring respectively to material well-being, health, productivity, intimacy/friendship, safety, the community in which the individual lives and his/her emotional well-being.

Narayan et al.*'s (2000) Dimensions of Well-Being*

In their pioneering study of the values of poor persons, Narayan *et al*. (2000) gathered data on over 60,000 individuals, many of them, across many countries and, among other questions, asked them to define wellbeing or a good/bad quality of life. A careful analysis of the answers provided by these individuals led Narayan *et al*. (2000) to identify the following domains of well being: material well-being, bodily well-being, social well-being, security, freedom of choice and action, psychological well-being.

3. The Estimation Procedure: Efficiency Analysis

The evaluation of the different dimensions of well-being that have been defined by the various authors previously mentioned raises several questions. First, one has to specify a complete list of the elements to be taken into account in attempting to evaluate each one of these dimensions. Second, a procedure has to be devised to give a relative valuation first to each of these elements within a given dimension, second to the various dimensions distinguished to arrive at an overall assessment of the well-being or level of human development of a given individual.

Concerning the first issue, we will simply try to stick as closely as possible to the ideas formulated by the various authors. This will lead us to determine for each dimension and author, on the basis of the information available in the British Household Panel Survey, a list of the components that seem relevant to us.

As far as the second issue is concerned, several options may be thought of. One possibility is to treat all attributes equally. This strategy, which may be associated to an "agnostic" attitude or to a wish to minimize interference, is as arbitrary as any other one. A second possibility is to use frequency-based weights. This weighting strategy has been mainly used in the construction of multidimensional deprivation indicators,[2] the basic idea being to give a larger weight to those vector constituents for which there is a lower proportion of people in deprivation. In our context, however, this weighting scheme does not seem that reasonable since well-

[2]See Cerioli and Zani (1990) and Desai and Shah (1988).

being need not be measured in relation to what the rest of the population (or reference group) achieves. Finally, those using multivariate techniques let the method and the data determine the weights.

As will be seen later on, this will also be our case. We will use a technique originally proposed by Lovell *et al*. (1994) and based on the concept of distance functions in order to estimate first indices measuring the level of achievement reached by the individual in each of the dimensions distinguished, and second an index aggregating these various achievement levels into an overall index of well-being or human development.

A priori it is difficult to determine how the results we obtain using Lovell *et al*.'s technique could differ from those using other techniques, which have been employed mostly to implement Sen's capability approach. All techniques pursue a common goal, namely obtaining a scalar valuation of individual well-being. They usually do so in two aggregation stages: first, the (often-abundant) information available for each dimension is aggregated; and second, the information given by each of these dimensions is summarized into an overall indicator of well-being. According to our understanding, there are no formal links between different techniques, which hinders direct comparisons.[3] Thus, we have to rely on existing empirical applications. An *ex post* comparison of existing work using different techniques (basically to operationalize Sen's concepts) suggests that overall results are not contingent on the choice of the specific technique.[4] Moreover, to the best of our knowledge, the only comparative work assessing the impact of two different techniques (factor analysis and fuzzy sets theory) on Sen's functionings also concludes that the two methodological approaches depict very similar results—in terms of individual's well-being profiles (see Lelli, 2001).

Distance Functions and the Analysis of Human Development

A major issue when trying to provide a relative valuation of well-being (or of achievement levels in a given domain) is that of aggregation in a multidimensional framework. To measure to what extent individuals do better or worse in a given dimension of well-being, all the information provided by the distinct constituent elements of the dimension needs to be summarized into a scalar, which will allow us to assess the degree of achievement.

Formally, this is a problem very similar to those efficiency and productivity analysis are concerned with, where the interest may lie, say, in measuring differences in the amount of a set of inputs employed to produce a given amount of output. The distance between an inefficient and an efficient amount of inputs—the latter lying onto the isoquant for the corresponding output level—is measured by an (input) distance function.

[3]At this point, we cannot but endorse Lelli's (2001) point when calling for a normative comparison of the different approaches. Such comparison goes beyond the purpose of this paper.

[4]As far as we are aware of, in terms of inequality—one of our concerns in the empirical investigation below, see Section 5—all studies yield surprisingly low levels of functioning inequality, i.e. Gini coefficients lower than 0.1 (see Deutsch *et al*. (2000) for Israel, Lovell *et al*. (1994) for Australia, and Delhausse (1996) for France), while income inequality Gini coefficients are usually higher than 0.3.

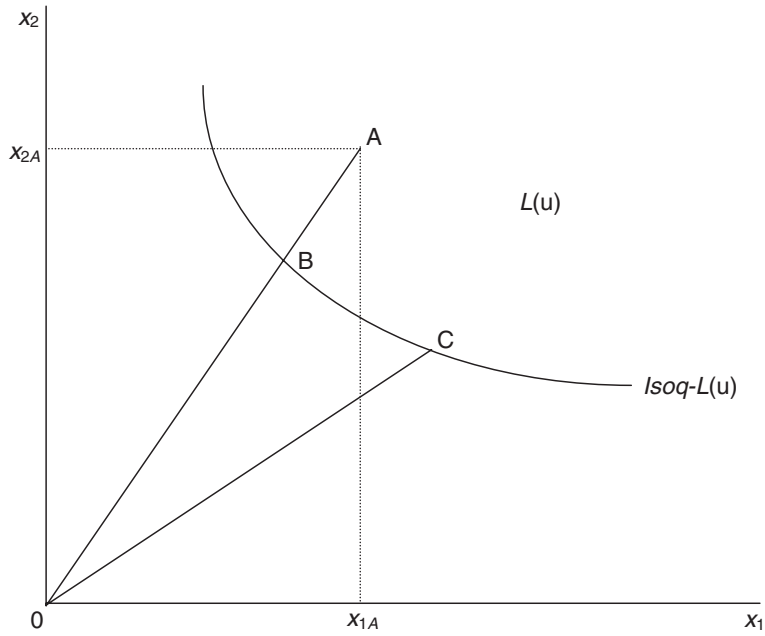

Figure 1. The Concept of Distance Function

An input distance function is the minimal proportional contraction of the input vector, given an output vector.[5] For the analysis of human development, the input vector contains all constituent elements of the different dimensions or domains of human development mentioned in Section 2 and listed in Appendix Table A2. Let us illustrate the concept of (input) distance function with a simple example where two constituent elements (inputs), x_1 and x_2 are used in the production of an achievement level (output) vector, u. In Figure 1, the input set, L(u), is the area bounded from below by the isoquant, Isoq-L(u).[6] The value of the distance function for point A (using input quantities x_{1A} and x_{2A} to produce u) is equal to the ratio 0A/0B. That is, it is the amount by which the input vector x must be divided in order to bring it on to the isoquant curve Isoq-L(u). Hence, when the input vector lies exactly on the isoquant curve (as in point B or C) the distance function shows a minimum value of 1.

The (input) distance function is nondecreasing, positively linearly homogeneous and concave in x, and decreasing in u; properties which are especially attractive in the present context and thus strengthen the argument for using distance functions. Next we briefly show how the distance function can be used to

[5]The output distance function is defined in a similar manner and also has similar properties to the input distance function. For a more detailed and technical discussion of distance functions and related topics see Coelli *et al*. (1998). Deutsch *et al*. (2003) and Lovell *et al*. (1994) establish the link between distance functions and the analysis of well-being focusing on Sen's capability approach.

[6]Recall that an input set represents the set of all input vectors, x, which can produce a given output vector, u. Therefore, in terms of well-being, it is the set of all constituent elements of the different domains of human development that can generate a given achievement level in a particular dimension.

estimate achievement levels in the various domains as well as levels of human development.

Estimating the Level of Achievement in a Given Dimension of Well-Being

Let $x = (x_1, \ldots, x_N) \in \mathbb{R}^N_{++}$ denote the vector of the n elements that are considered as inputs in the production of achievement levels in the various domains and $u = (u_1, \ldots, u_M) \in \mathbb{R}^M_{++}$ denote the vector of achievement levels. Then an individual's endowment of inputs and levels of achievement are denoted by the pair (x^i, u^i), $i = 1, \ldots l$, l being the number of individuals.

The standard of achievement SA may then be estimated using a Malmquist input quantity index so that:

$$\mathrm{SA}(u, x^s, x^t) = D_{in}(u, x^s) \big/ D_{in}(u, x^t)$$

where x^s and x^t are two different input vectors and D_{in} is an input distance function. The idea behind the Malmquist index is to provide a reference set against which to judge the relative magnitudes of the two input vectors. That reference set is the isoquant $L(u)$ and the radially farther x^i is from $L(u)$, the higher its standard of achievement, for x^i must be shrunk more to move back onto the reference set $L(u)$.

There is, however, a difficulty because the Malmquist index depends generally on u. One could use an approximation of this index such as the Tornquist index, but such an index requires price vectors as well as behavioral assumptions.[7] Since we do not have prices for inputs we have to adopt an alternative strategy. The idea is to get rid of u by treating all individuals equally and assume that each individual has the same level of achievement: one unit for each of the M dimensions distinguished. Let e represent such a vector of achievements—an M-dimensional vector of ones. Thus, the reference set becomes $L(e)$ and bounds the input vectors from below. Individuals with input vectors onto $L(e)$ share the lowest level of achievement, with an index value of unity, whereas individuals with large input vectors will then have higher levels of achievement, with index values above unity.

To estimate the distance function, define an $(N - 1)$ dimensional vector z as $z = \{z_j\} = \{x_j/x_N\}$ with $j = 1, \ldots, N - 1$. Then $D_{in}(e, z) = (1/x_N) \cdot D_{in}(e, x)$ and, since $D_{in}(e, x) \geq 1$,[8] we have

$$(1/x_N) \leq D_{in}(e, z).$$

This implies that we may also write

$$(1/x_N) = D_{in}(e, z) \cdot \exp(\varepsilon), \quad \varepsilon \leq 0.$$

By assuming that $D_{in}(e, z)$ has a translog functional form, we have[9]

$$\ln(x_N^{-1}) = \alpha_0 + \sum_{j=1}^{N-1} \alpha_j \ln z_j + \frac{1}{2} \sum_{j=1}^{N-1} \sum_{k=1}^{N-1} \alpha_{jk} \ln z_j \ln z_k + \varepsilon$$

[7]This is also the case of other indices that are usually used to approximate the Malmquist index such as the Paasche index, the Laspeyres index or the Fisher index.

[8]See above for the properties of the distance functions.

[9]To avoid multicollinearity problems with the translog specification covariates that show a correlation higher than 70 percent were dropped.

Estimates of the coefficients α_j and α_{jk} may be obtained using COLS (corrected ordinary least squares)[10] while the input distance function $D_{in}(e, x^i)$ for each individual i is provided by the transformation

$$D_{in}(e, x^j) = \exp\{\max(\varepsilon_i) - \varepsilon_i\}.$$

This distance will, by definition, be greater than or equal to one (since its logarithm will be non-negative) and will hence indicate by how much an individual's resources must be scaled back in order to reach the resource frontier. This procedure guarantees that all input vectors lie on or above the resource frontier $L(e)$. The level of achievement for individual i will then be obtained by dividing $D_{in}(e, z^i)$ by the minimum observed distance value—which by definition equals 1.[11]

Estimating the Overall Level of Individual Well-Being or Human Development

The overall Level of Well-Being, WB, may be derived and estimated in a similar manner. Now, though, instead of an input distance function we use an output[12] distance function $D_{out}(x, u)$ defined as

$$D_{out}(x, u) = \min\{\theta : (u/\theta) \in P(x)\}$$

where $P(x)$ is the set of all achievement vectors that can be realized with the input vector x. A theoretical index of Well-Being, WB, may be estimated using a Bergson–Moorsteen output quantity index

$$\mathrm{WB}(x, u^s, u^t) = D_{out}(x, u^s) / D_{out}(x, u^t)$$

where u^s and u^t are two achievement vectors and x is an input vector. Clearly, the further inside the isoquant $P(x)$ an achievement vector is, the more it must be radially expanded in order to meet the standard and the lower the corresponding well-being.

Here also the problem is to choose a reference vector, in this case an input vector x. We will, this time, define a N-dimensional vector e of ones. That is, we will assume that each individual is endowed with one unit of each input. This implies that we define a reference set $P(e)$ which bounds from above the observed achievements of the various individuals. If an individual has a vector of achievements that places him on the frontier $P(e)$, this implies that she has the maximum

[10]For further information on COLS and other possible estimation methods, see Appendix A3 in Deutsch *et al*. (2003). Arguably, the translog specification may suffer from endogeneity problems. These problems arise because of the cross-product terms, $\Sigma_{j=1}^{N-1}\Sigma_{k=1}^{N-1}\alpha_{jk}\ln z_j \ln z_k$. If the latter did not contribute much to the explanatory power of the model, one could drop them and get rid of the endogeneity problem. However, this is not our case. Alternatively, nonlinear instrumental variable estimation could be performed (to instrument the normalizing variable, x_N). The problem we face here is the lack of good instruments for every one of the 37 translog models. Therefore, endogeneity problems constitute an econometric weakness of the procedure that could not be confronted satisfactorily.

[11]Note that the estimate of $D_{in}(e, x^i)$—and thus, of $\mathrm{SA}(u, x^s, x^t)$—depends on the normalizing variable (x_N) used in the empirical specification. Changes in the normalizing variable yield statistically insignificant differences in mean values of achievement levels of dimensions, and some statistically significant changes in their variances. That is, our data reject the "input" homotheticity restriction.

[12]This was also the procedure followed in Lovell *et al*.'s (1994) pathbreaking paper.

level of well-being and, hence, an output index of unity. Individuals with smaller achievement levels will have a lower level of well-being and, hence, index values below unity. As before, note that this index is independent of the units in which the achievement levels are measured.

To estimate the output distance functions we proceed as in the input distance case. We assume a translog functional form

$$\ln(u_M^{-1}) = \beta_0 + \sum_{f=1}^{M-1} \beta_f \ln v_f + \frac{1}{2} \sum_{f=1}^{M-1} \sum_{h=1}^{M-1} \beta_{fh} \ln v_f \ln v_h + \varepsilon$$

where $v_f = (u_f/u_M)$, $f = 1, \ldots, M-1$. The (modified) residuals, which are then derived from COLS, provide output distance functions for each individual by means of the transformation

$$D_{out}(e, u^i) = \exp\{\min(\varepsilon_i) - \varepsilon_i\}$$

This distance will by definition be smaller than or equal to one (since its logarithm will be non-positive or at most equal to zero) so that all individual achievement vectors will lie on or beneath the achievement frontier corresponding to $P(e)$. Hence, the output distance function $D_{out}(e, u^i)$ gives the maximum amount by which individual achievement levels vectors must be radially scaled up in order to reach the achievement frontier. Finally, a well-being/human development index $\mathrm{WB}(x, u^s, u^t)$ is obtained by dividing all the output distance functions by the maximum observed distance—by definition equal to 1.[13]

4. The Data

Data used in this study come from the 7th wave of the British Household Panel Study (BHPS), conducted in 1997. The sample used in this study consists of 7,545 individuals who provided valid answers to the questions relevant to our investigation.[14]

The BHPS questionnaire provides information on the possession and quality of several durable goods as well as objective and subjective information on several aspects of the respondent's life such as health, physical mobility, ability to undertake mental tasks, self-worth, etc—which we use to estimate the various dimensions of well-being. The relevant dimensions of human development taken into account by each of the four approaches mentioned previously are given in Appendix A, in Table A1. Table A2 gives, for each dimension, the list of variables ("inputs") that were assigned to it. This has been done separately for the four approaches analyzed in this paper: Narayan *et al.*'s (2000) Dimensions of Well-Being, Cummins' (1996) Domains of Life Satisfaction, Allardt's (1993) Having, Loving and Being and Sen's (1985) Capability Approach.

[13]As with the input distance function, the "output" homotheticity restriction is rejected. Changes in the normalizing variable (u_M) yield statistically insignificant differences in mean values of well-being and only few statistically significant changes in their variances.

[14]For a detailed discussion of the BHPS methodology, see Taylor (1994, 1995).

5. Results of the Empirical Investigation

As mentioned in the Introduction, Alkire (2002) reviews and compares the four approaches to human development we are concerned with, and draws their conceptual differences, strengths and weaknesses. Despite these conceptual differences, our empirical findings clearly suggest that such differences do not have much bearing on the empirical counterparts, and that human development or well-being indicators derived from the various approaches bear a great resemblance. This is our most important finding.

Next, we discuss the most relevant features of our results in more detail. To start with, Table 1 provides summary statistics for the various approaches. Please note that the empirical application of the efficiency analysis to the four approaches is not uniform, but differs slightly depending on the approach. As shown in Table 1, the implementation of Narayan's and Cummins' approach follows identical lines with input-distance functions (based on indicators found in Table A2) being used to generate the components of the well-being measure, and output distance functions being used to generate the overall well-being measure. Implementing Allardt's approach involved using the input distance functions twice, once to generate each sub-component of each component, and once to apply it to generate an index of the component from the three sub-components (having, loving, being); then the output distance function is used to generate the overall well-being measure. With Sen's approach, we chose to generate two different measures, one focusing on resources and one focusing on functionings. Clearly, the latter one is the one closer to the spirit of Sen, but we felt it useful to generate the resources measure for comparison. For the resources measure, we use the input distance function twice, once to aggregate the components, and once to aggregate to the overall measure. For the functioning measure, we use input distance functions to generate the components and then an output distance function to generate the overall well-being measure. Bearing in mind that the distribution of the overall indices of well-being takes on values in the interval [0, 1] where zero denotes minimum level of well-being and one complete attainment, all approaches show a relatively high degree of overall accomplishment in well-being.

A look at the constituent elements of these indices of well-being reveals that the dimensions related to material well-being, health and social well-being score highest while the dimensions that capture psychological or emotional aspects of well-being show the lowest mean values.[15,16]

Starting with Narayan *et al.*'s (2000) approach we observe that the index takes high values for Social, Bodily and Material Well-Being, while Psychological Well-Being fares poorly. Allardt's (1993) approach gives quite similar results in so far as the index is higher for Loving, and Having, and lowest for Being. Cummins' (1996) approach goes in the same direction: Health, Material Well-Being and

[15]In one of the few studies that show summary statistics for the dimensions (functionings), Lelli (2001) finds similar results for a sample of Belgium individuals, with the notable exception of psychological status.

[16]Recall that dimensions have values in the support $[1,\infty)$.

TABLE 1

Summary Statistics and Gini Index for the Various Dimensions of Human Development and the Overall Index Obtained for Each Approach

	Mean	St. Dev.	Gini[1]
Narayan	0.62	0.06	4.96
Material Well-Being	6.56	1.40	11.49
Bodily Well-Being	7.44	1.78	13.02
Social Well-Being	10.10	1.97	10.58
Security	3.91	1.28	18.07
Freedom and Choice of Action	1.70	0.88	26.02
Psychological Well-Being	3.29	0.34	5.25
Cummins	0.57	0.05	5.10
Material Well-Being	6.56	1.40	11.49
Health	7.44	1.78	13.02
Intimacy and Friendship	5.74	1.28	12.53
Safety	3.91	1.28	18.07
Community	2.70	0.70	10.97
Emotional Well-Being	3.19	0.34	5.47
Allardt	0.40	0.04	5.00
Having	4.74	1.88	22.21
Economic Resources	4.46	1.67	21.11
Housing	10.42	2.40	11.59
Employment	2.32	0.45	10.40
Working Conditions	6.48	1.00	8.13
Health	9.05	1.77	9.71
Loving	10.10	1.97	10.58
Being	3.16	0.33	5.45
Self Determination	3.20	0.42	6.49
Political Activities	1.70	0.88	26.02
Sen			
Resources	2.34	0.24	3.866
Functionings	0.62	0.07	6.018
Resources			
Durables Leisure	2.52	0.10	0.746
Durables Home Work	2.42	0.28	3.807
Other Property	3.21	0.65	11.01
Quality of Dwelling	2.29	0.24	3.355
Functionings			
Right Environment	5.18	1.30	13.014
Able to Undertake Physical Tasks	4.41	0.53	3.692
Able to Undertake Mental Tasks	3.08	0.41	6.516
Self-worth	3.31	0.49	7.347
Socialize	4.57	0.59	6.409
Health Related	6.11	1.43	12.869

Note: [1]Reports the Gini coefficient multiplied by 100.

Intimacy and Friendship show the highest mean values, whereas, once again Emotional Well-Being shows one of the lowest mean values. Note that this is also what one observes with Sen's Capability approach (1985) because, as far as functionings are concerned, the highest value of the index is observed for health and the lowest for the ability to undertake mental tasks and for self-worth.

Besides the average level, a second important feature of all these indices is the dispersion or inequality of their distribution. The last column of Table 1 presents estimates of the Gini coefficient.[17] As a whole, the overall indices seem to be equally distributed since the Gini ranges from 0.05 to 0.06. The differences are however much more important once one looks at the distribution of the various dimensions of a given approach. These larger differences seem to compensate each other so that as a whole the overall indices are equally distributed. Such low degrees of inequality are surely a consequence of the qualitative nature of most of our variables, and of the two aggregating stages required to arrive at the overall indices of well-being, as explained in Section 3. In other words, it should not be surprising to find a lower level of inequality for the overall indicators than for the various components since each output indicator and *a fortiori* the overall development indicators are weighted averages. Therefore, all these inequality figures should not be taken at face value. Clearly, the inequality values of the overall indices of well-being cannot be directly compared to standard figures of income inequality, which according to our BHPS sample amounts to 0.47 for Great Britain in 1997. Policy as well as methodological implications, however, can be drawn from comparing well-being inequality indices or inequality of different dimensions within a given approach.

Given the similarity in the levels and inequality of well-being indicators, a first and important methodological conclusion can be drawn. As pointed out at the beginning of this section, when implemented empirically, the different conceptual approaches to human development tell similar stories. In other words, it does not make much difference which approach we choose to implement when assessing well-being inequality of a community. Of course this result is contingent on the information we use to measure the dimensions and on the methodology to approximate well-being. Thus, more comparative work is required. Further contributions should test the dependency of our results to our particular dataset, our choice of variables, and our choice of methodology.

Table 2 shows correlation coefficient estimates between the various dimensions. The overall indicators derived from the approaches of Narayan *et al.*, Cummins and Allardt are quite highly positively correlated. This strong relationship reinforces our conclusion above about the three approaches revealing a very similar picture. Sen's functioning index is much more correlated than Sen's resources index[18] with the overall indices corresponding to the three approaches. It might therefore not matter too much which of these approaches we select provided we make sure that aspects of well-being that have not much to do with resources, such as emotional well-being, friendship, etc, are taken into account.

The weak correlation between Sen's resources and functionings confirms that they measure different aspects of one's life. As we have argued elsewhere (Deutsch

[17]Estimates for other inequality indices, such as the Generalized Entropy Family or Atkinson indices provide a very similar message and are available from the authors upon request.

[18]Let us stress again that Sen's resources should not be considered as a dimension of well-being but only as means to achieve functionings. They are not valuable at all in their own right, as was already stressed in the Introduction and in Section 2. This very important point is also emphasized in Klasen (2000) who uses factor analysis and an equal weights approach.

TABLE 2

CORRELATIONS (STANDARD ERROR BELOW CORRELATION ESTIMATE)

	MW	BW	SW	SE	FCA	PW	Eq. Inc.	NAR
Material Well-Being	1							
Bodily Well-Being	0.1875	1						
	0							
Social Well-Being	0.1848	0.2064	1					
	0	0						
Security	0.0928	0.072	0.0181	1				
	0	0	0.15					
Freedom and Choice of Action	0.0921	0.0204	0.0871	0.0729	1			
	0	0.0391	0	0				
Psychological Well-Being	0.1286	0.1606	0.1681	0.0725	0.0155	1		
	0	0	0	0	0.1216			
Equivalent Income	0.2058	0.0287	–0.0245	0.1556	0.1331	0.0046	1	
	0	0.0056	0.0195	0	0	0.6572		
Narayan	0.3224	0.2992	0.4696	0.2785	0.2346	0.8637	0.0684	1
	0	0	0	0	0	0	0	

	MW	HE	IFR	SA	CO	EW	Eq. Inc	CUM
Material Well-Being	1							
Health	0.1875	1						
	0							
Intimacy and Friendship	0.2313	0.2601	1					
	0	0						
Safety	0.0928	0.072	0.0288	1				
	0	0	0.0221					
Community	0.148	0.0342	0.0914	0.0822	1			
	0	0.0006	0	0				
Emotional Well-Being	0.0716	0.1573	0.183	0.069	0.0011	1		
	0	0	0	0	0.9097			
Equivalent Income	0.2058	0.0287	–0.0074	0.1556	0.0992	0.004	1	
	0	0.0056	0.4803	0	0	0.7035		
Cummins	0.1794	0.4015	0.3795	0.2258	0.2466	0.8441	0.0394	1
	0	0	0	0	0	0	0.0039	

	Having	Loving	Being	Eq. Inc.	Allardt
Having	1				
Loving	–0.056	1			
	0				
Being	0.0272	0.1982	1		
	0.0331	0			
Equivalent Income	0.2874	–0.0245	0.0187	1	
	0	0.0195	0.1778		
Allardt	0.2194	0.515	0.88	0.0923	1
	0	0	0	0	

	Narayan	Cummins	Allardt	Sen (R)	Sen (F)	Eq. Inc.
Narayan	1					
Cummins	0.9031	1				
	0.000					
Allardt	0.7116	0.6647	1			
	0.000	0.000				
Sen (Resources)	0.0642	0.0307	0.0401	1		
	0.000	0.0329	0.0054			
Sen (Functionings)	0.3960	0.3259	0.3550	0.0737	1	
	0.000	0.000	0.000	0.000		
Equivalent Income	0.0684	0.0394	0.0923	0.1748	0.0244	1
	0.000	0.0039	0.000	0.000	0.0452	

TABLE 2 (*continued*)

	DL	DHW	OP	QDW	REN	AUPT	AUMT	SR	SAL	HTH	EI	R	F
Durables Leisure (DL)	1												
Durables Home Work (DHW)	0.253	1											
	(0.00)												
Other Property (OP)	0.1066	0.2604	1										
	(0.00)	(0.00)											
Quality of Dwelling (QDW)	0.0166	0.0532	0.0606	1									
	(0.15)	(0.00)	(0.00)										
Right Environment (REN)	0.0407	0.0371	0.1513	0.1099	1								
	(0.00)	(0.00)	(0.00)	(0.00)									
Able to Undertake Physical Tasks (AUPT)	0.013	0.0244	0.0564	0.0186	0.0347	1							
	(0.26)	(0.03)	(0.00)	(0.11)	(0.00)								
Able to Undertake Mental Tasks (AUMT)	0.01	–0.008	0.0048	0.0152	0.0875	0.1351	1						
	(0.39)	(0.49)	(0.68)	(0.19)	(0.00)	(0.00)							
Self-worth (SR)	0.033	0.0119	0.0299	0.0393	0.1125	0.1307	0.5276	1					
	(0.00)	(0.30)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)						
Socialize (SAL)	0.0226	0.0353	–0.0057	0.0251	0.0912	0.0313	0.1079	0.1286	1				
	(0.05)	(0.00)	(0.62)	(0.03)	(0.00)	(0.01)	(0.00)	(0.00)					
Health Related (HTH)	0.0019	0.0082	0.0308	0.0382	0.1941	0.1487	0.1702	0.1819	0.071	1			
	(0.87)	(0.48)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)				
Equivalent Income (EI)	0.0183	–0.0364	0.0091	0.0342	0.0306	0.0372	0.0002	0.0322	–0.0007	0.0301	1		
	(0.11)	(0.00)	(0.43)	(0.00)	(0.01)	(0.00)	(0.99)	(0.01)	(0.95)	(0.01)			
Resources (R)	0.0189	0.0469	0.0604	0.9859	0.1133	0.0257	0.017	0.0461	0.0263	0.0428	0.1815	1	
	(0.10)	(0.00)	(0.00)	(0.00)	(0.00)	(0.03)	(0.14)	(0.00)	(0.02)	(0.00)	(0.00)		
Functionings (F)	0.033	0.0437	0.0473	0.0706	0.3948	0.0769	0.1658	0.1935	0.8433	0.4978	0.0173	0.0737	1
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.13)	(0.00)	

Note: Significance levels in parentheses.

et al., 2003), such a degree of independence is to be favored since it implies that one's standing in one distribution does not determine one's standing in the other distribution. In other words, one can have low levels of resources yet be functioning well, and viceversa.

In spite of the rather high correlation between the indices corresponding to the approaches of Narayan *et al*., Cummins and Allardt, these indices are very weakly correlated with equivalent income,[19] which confirms the observation that was just made about Sen's resources and functionings. This finding of a weak relationship between income and indicators of well-being or human development is recurrent in the literature (see, *inter alia*, Lovell *et al*., 1994; Delhausse, 1996; Lelli, 2001; Deutsch *et al*., 2003). Hence, our results provide additional support to the claim that the analysis of well-being ought to be multidimensional. The novelty of our evidence lies in that, for first time, it goes beyond Sen's functionings and explores other conceptions of well-being.

Furthermore, for a given approach (Narayan, Cummins, Allardt or Sen) equivalent income has usually a low correlation with the components (dimensions) that do not measure something which is related with resources.[20] This implies therefore that studies of economic and social development that focus only on income related indicators clearly miss important aspects of the quality of life. This should certainly vindicate the efforts made by the UNDP to develop human development indicators, no matter how unsatisfactory these indicators may still be at this stage.

Finally it is also interesting to note that the indices corresponding to Narayan *et al*.'s, Cummins' and Allardt's approaches are all very highly correlated (coefficient higher than 0.8) with psychological dimensions (Psychological Well-Being for the Narayan *et al*. approach, Emotional Well-Being for Cummins' approach and Being for Allardt's approach). Going back to Table 1 one sees that these dimensions are those for which the ratio of the standard deviation over the mean is the lowest. Since we also observed that the overall indices are, in relative terms, much less dispersed than most of their components (see, "Narayan," "Cummins" and "Allardt" in Table 1), this could explain the high correlation between them and the component which is the least dispersed.[21]

Beyond the particular results of our empirical exercise for Great Britain, one of our main concerns has been to show that a meaningful implementation of several of the philosophical approaches to human development is feasible. Yet, as advocated in our concluding remarks, much still remains to be done.

[19]To equivalize income we use the McClements scale before housing costs, which is provided by the BHPS.

[20]For Narayan, see the correlation between equivalent income and social well-being or psychological well-being; for Cummins, see the correlation between equivalent income and health or emotional well-being; for Allardt see the correlation between equivalent income and loving or being; for Sen see the correlation between equivalent income and self-worth or socialize.

[21]We have already commented on the mean values in the second and third paragraph of this section. For a comparison of our results with those of other studies, see footnote 15. One should however be very careful in discussing these mean values because the mean value of a particular dimension may depend on the normalizing variable used in the distance function and on the coding of the qualitative variables.

6. Conclusions

This study has tried to translate empirically Alkire's (2000) interesting attempt to compare various philosophical approaches to Human Development. Four of these approaches were tested, those of Narayan *et al*. (2000), Cummins (1996), Allardt (1993) and Sen (1985). This empirical investigation was based on the application of efficiency analysis to the study of well-being and human development. Several important messages emerged from our empirical exercise. First, our findings suggest that in practice the four conceptual approaches provide a very similar picture for Great Britain: relatively high levels of achievement in most dimensions and of well-being, and low levels of inequality of well-being.

Second, material well-being—including income—is only weakly correlated with other dimensions of human development. Thus, limiting our analysis to income alone is clearly incomplete and unsatisfactory, but above all may provide misleading recommendations for policy-makers. Our results vindicate the commitment of UNDP in promoting the use of multidimensional indicators for the assessment of human development.

Third, it was also observed that the overall level of human development is much more equally distributed than its components. Our empirical methodology might help to explain this finding as the human development indices can be thought of as weighted averages of different dimensions.

Our focus has been on the empirical consequences of implementing several philosophical conceptions of human development using a particular dataset (BHPS) and methodology (efficiency analysis). Additional work, applied to data of both developed and developing countries, is required before firmer conclusions may be drawn. Also, comparative analyses implementing several existing methodologies are urgently needed if multidimensional approaches are to become the standard approach to well-being and human development.

The present attempt has however shown that on a conceptual as well as on an empirical basis human development may be measured in different ways. And, despite all the acknowledged caveats, this is already a step forward.

Appendix A

TABLE A1

Dimensions of Human Development for Each of the Four Approaches

Abbreviations for Table A2

(1) Narayan *et al.* (N)
N1 Material Well-Being
N2 Bodily Well-being
N3 Social Well-Being
N4 Security
N5 Freedom of Choice and Action
N6 Psychological Well-Being

(2) Cummins (C)
C1 Material Well-Being
C2 Health
C3 Productivity
C4 Intimacy and Friendship
C5 Safety
C6 Community
C7 Emotional Well-Being

(3) Allardt (A)
A1 *Having*
- A1a Economic Resources
- A1b Housing
- A1c Employment
- A1d Working Conditions
- A1e Health
- A1e Education

A2 *Loving*

A3 *Being*
- A3a Self Determination
- A3b Political Activities
- A3c Leisure Time Activities
- A3d Opportunities to enjoy Nature
- A3e Meaningful Work

(4) Sen (S)
S1 *Resources*
- S1a Durables Leisure
- S1b Durables Home Work
- S1c Other Property
- S1d Quality of Dwelling
- S1e Equivalent Income

S2 *Functionings*
- S2a Right Environment
- S2b Mobility and Ability to Undertake Usual Physical Tasks
- S2c Ability to Undertake Usual Mental Tasks
- S2d Self-Respect, Self-Worth
- S2e Ability to Socialize and Network
- S2f Health

TABLE A2

LIST OF INPUTS IN EACH DOMAIN, FOR EACH APPROACH

(1) NARAYAN *ET AL.* (N)

BHPS Variable Name	Description			
Material Well-Being (N1)				
wCD1USE	Color TV in accommodation	N1	C1	A1b
wCD2USE	VCR in accommodation	N1	C1	A1b
wCD8USE	Home computer in accommodation	N1	C1	A1b
wCD9USE	CD player in accommodation	N1	C1	A1b
wCD10USE	Satellite dish at accommodation	N1	C1	A1b
wCD11USE	Cable TV in accommodation	N1	C1	A1b
wCD12USE	Telephone in accommodation	N1	C1	A1b
wCD3USE	Freezer in accommodation	N1	C1	A1b
wCD4USE	Washing machine in accommodation	N1	C1	A1b
wCD5USE	Tumble dryer in accommodation	N1	C1	A1b
wCD6USE	Dishwasher in accommodation	N1	C1	A1b
wCD7USE	Microwave oven in accommodation	N1	C1	A1b
wNCARS	Household member owns vehicle	N1	C1	A1a
wHSOWND	House owned or rented	N1	C1	A1b
wHSROOM	Number of rooms in accommodation	N1	C1	A1b
wHSTYPE4	Type of accommodation (wHSTYPE)	N1	C1	A1b
wHEATCH	Household has central heating	N1	C1	A1b
wHSPRBG	Accom: shortage of space	N1	C1	A1b
wHSPRBH	Accom: noise from neighbors	N1	C1	A1b
wHSPRBI	Accom: street noise	N1	C1	A1b
wHSPRBJ	Accom: not enough light	N1	C1	A1b
wHSPRBK	Accom: lack of adequate heating	N1	C1	A1b
wHSPRBL	Accom: condensation	N1	C1	A1b
wHSPRBM	Accom: leaky roof	N1	C1	A1b
wHSPRBN	Accom: damp walls, floors etc	N1	C1	A1b
wHSPRBO	Accom: rot in windows, floors	N1	C1	A1b
wFIYR	Annual equivalent income (1.9.96–1.9.97)	N1	C1	A1a
wHSPRBP	Accom: pollution/environmental problems	N1	C1	A1b
wLFSAT3	Satisfaction with: house/flat	N1	C1	A1b
Bodily Well-Being (N2)				
wHLLTB	Health hinders climbing the stairs	N2	C2	A1e
wHLLTC	Health hinders getting dressed	N2	C2	A1e
wHLLTD	Health hinders walking more than 10 mins	N2	C2	A1e
wHLENDW	Health prohibits some types of work	N2	C2	A1e
wHLLT	Health limits daily activities	N2	C2	A1e
wHLLTA	Health hinders doing the housework	N2	C2	A1e
wHLLTWA	How far health limits amount of work	N2	C2	A1e
wHLPRBA	Health problems: Arms, legs, hands, etc	N2	C2	A1e
wHLPRBC	Health problems: Hearing	N2	C2	A1e
wHLPRBD	Health problems: Skin conditions/allergy	N2	C2	A1e
wHLPRBE	Health problems: Chest/breathing	N2	C2	A1e
wHLPRBF	Health problems: Heart/blood pressure	N2	C2	A1e
wHLPRBG	Health problems: Stomach or digestion	N2	C2	A1e
wHLPRBL	Health problems: Migraine	N2	C2	A1e
wHLPRBM	Health problems: Other	N2	C2	A1e
wHLSTAT	Health over last 12 months	N2	C2	A1e
wHOSP	Hospital in-patient since 1.9.96	N2	C2	A1e
wHL2GP	Number of visits to GP since 1.9.96	N2	C2	A1e
wHLSVI	Health service: used physiotherapist	N2	C2	A1e
wLFSAT1	Satisfaction with: health	N2	C2	A1e
Social Well-Being (N3)				
wLKNBRD	Likes present neighborhood	N3	C6	A1b
wFRNA	Frequency of talking to neighbors	N3	C6	A2
wFRNB	Frequency of meeting people	N3	C6	A2

TABLE A2 (*continued*)

(1) NARAYAN *ET AL.* (N)

BHPS Variable Name	Description			
wSSUPA	Is there someone who will list	N3	C4	A2
wSSUPB	Is there someone to help in a crisis	N3	C4	A2
wSSUPC	Is there someone you can relax with	N3	C4	A2
wSSUPD	Anyone who really appreciates you	N3	C4	A2
wSSUPE	Anyone you can count on to offer comfort	N3	C4	A2
wXSUPA	Someone outside HH can help if depressed	N3	C4	A2
wXSUPC	Someone outside HH can borrow money from	N3	C4	A2
wLFSAT6	Satisfaction with: social life	N3	C4	A2
Security (N4)				
wCRDARK	Feel safe walking alone at night	N4	C5	A1b
wHSPRBQ	Accom: vandalism or crime	N4	C5	A1b
wCRBURG	Extent of homes broken into	N4	C5	
wCRCAR	Extent of cars stolen/broken into	N4	C5	
wCRMUGG	Extent of people attacked on street	N4	C5	
wCRVAND	Extent of vandalism	N4	C5	
wCRWORA	Worry about being affected by crime	N4	C5	
wCRWORB	Extent of concern about crime	N4	C5	
Freedom of Choice and Action (N5)				
wNORGA	Number of organizations active in	N5	C6	A3b
wNORGM	Number of organizations member of	N5	C6	A3b
wORGMB	Member of trade union	N5	C6	A3b
wTUIN1	Member of workplace union (wTUIN2)	N5	C6	A3b
Psychological Well-Being (N6)				
wLKMOVE	Prefers to move house	N6	C6	A1b
wGHQA	GHQ: concentration	N6	C7	A1e
wGHQB	GHQ: loss of sleep	N6	C7	A1e
wGHQD	GHQ: capable of making decisions	N6	C7	A3a
wGHQE	GHQ: constantly under strain	N6	C7	A1e
wGHQF	GHQ: problem overcoming difficulties	N6	C7	A3a
wGHQG	GHQ: enjoy day-to-day activities	N6	C7	A1e
wGHQH	GHQ: ability to face problems	N6	C7	A3a
wGHQI	GHQ: unhappy or depressed	N6	C7	A1e
wGHQL	GHQ: general happiness	N6	C7	A1e
wGHQC	GHQ: playing a useful role	N6	C7	A3a
wGHQJ	GHQ: losing confidence	N6	C7	A3a
wGHQK	GHQ: believe in self-worth	N6	C7	A3a
wHLPRBI	Health problems: Anxiety, depression, etc	N6	C7	A1e

(2) CUMMINS (C)

BHPS Variable Name	Description			
Material Well-Being (C1)				
wCD1USE	Color TV in accommodation	N1	C1	A1b
wCD2USE	VCR in accommodation	N1	C1	A1b
wCD8USE	Home computer in accommodation	N1	C1	A1b
wCD9USE	CD player in accommodation	N1	C1	A1b
wCD10USE	Satellite dish at accommodation	N1	C1	A1b
wCD11USE	Cable TV in accommodation	N1	C1	A1b
wCD12USE	Telephone in accommodation	N1	C1	A1b
wCD3USE	Freezer in accommodation	N1	C1	A1b
wCD4USE	Washing machine in accommodation	N1	C1	A1b
wCD5USE	Tumble dryer in accommodation	N1	C1	A1b
wCD6USE	Dishwasher in accommodation	N1	C1	A1b
wCD7USE	Microwave oven in accommodation	N1	C1	A1b
wNCARS	Household member owns vehicle	N1	C1	A1a
wHSOWND	House owned or rented	N1	C1	A1b

TABLE A2 (*continued*)

(2) CUMMINS (C)

BHPS Variable Name	Description			
wHSROOM	Number of rooms in accommodation	N1	C1	A1b
wHSTYPE4	Type of accommodation (wHSTYPE)	N1	C1	A1b
wHEATCH	Household has central heating	N1	C1	A1b
wHSPRBG	Accom: shortage of space	N1	C1	A1b
wHSPRBH	Accom: noise from neighbors	N1	C1	A1b
wHSPRBI	Accom: street noise	N1	C1	A1b
wHSPRBJ	Accom: not enough light	N1	C1	A1b
wHSPRBK	Accom: lack of adequate heating	N1	C1	A1b
wHSPRBL	Accom: condensation	N1	C1	A1b
wHSPRBM	Accom: leaky roof	N1	C1	A1b
wHSPRBN	Accom: damp walls, floors etc	N1	C1	A1b
wHSPRBO	Accom: rot in windows, floors	N1	C1	A1b
wFIYR	Annual equivalent income (1.9.96—1.9.97)	N1	C1	A1a
wHSPRBP	Accom: pollution/environmental problems	N1	C1	A1b
wLFSAT3	Satisfaction with: house/flat	N1	C1	A1b
Health (C2)				
wHLLTB	Health hinders climbing the stairs	N2	C2	A1e
wHLLTC	Health hinders getting dressed	N2	C2	A1e
wHLLTD	Health hinders walking more than 10 mins	N2	C2	A1e
wHLENDW	Health prohibits some types of work	N2	C2	A1e
wHLLT	Health limits daily activities	N2	C2	A1e
wHLLTA	Health hinders doing the housework	N2	C2	A1e
wHLLTWA	How far health limits amount of work	N2	C2	A1e
wHLPRBA	Health problems: Arms, legs, hands, etc	N2	C2	A1e
wHLPRBC	Health problems: Hearing	N2	C2	A1e
wHLPRBD	Health problems: Skin conditions/allergy	N2	C2	A1e
wHLPRBE	Health problems: Chest/breathing	N2	C2	A1e
wHLPRBF	Health problems: Heart/blood pressure	N2	C2	A1e
wHLPRBG	Health problems: Stomach or digestion	N2	C2	A1e
wHLPRBL	Health problems: Migraine	N2	C2	A1e
wHLPRBM	Health problems: Other	N2	C2	A1e
wHLSTAT	Health over last 12 months	N2	C2	A1e
wHOSP	Hospital in-patient since 1.9.96	N2	C2	A1e
wHL2GP	Number of visits to GP since 1.9.96	N2	C2	A1e
wHLSVI	Health service: used physiotherapist	N2	C2	A1e
wLFSAT1	Satisfaction with: health	N2	C2	A1e
Productivity (C3)				
No variable available				
Intimacy and Friendship (C4)				
wSSUPA	Is there someone who will list	N3	C4	A2
wSSUPB	Is there someone to help in a crisis	N3	C4	A2
wSSUPC	Is there someone you can relax with	N3	C4	A2
wSSUPD	Anyone who really appreciates you	N3	C4	A2
wSSUPE	Anyone you can count on to offer comfort	N3	C4	A2
wXSUPA	Someone outside HH can help if depressed	N3	C4	A2
wXSUPC	Someone outside HH can borrow money from	N3	C4	A2
wLFSAT6	Satisfaction with: social life	N3	C4	A2
Safety (C5)				
wCRDARK	Feel safe walking alone at night	N4	C5	A1b
wHSPRBQ	Accom: vandalism or crime	N4	C5	A1b
wCRBURG	Extent of homes broken into	N4	C5	
wCRCAR	Extent of cars stolen/broken into	N4	C5	
wCRMUGG	Extent of people attacked on street	N4	C5	
wCRVAND	Extent of vandalism	N4	C5	
wCRWORA	Worry about being affected by crime	N4	C5	
wCRWORB	Extent of concern about crime	N4	C5	

TABLE A2 (*continued*)

(2) Cummins (C)

BHPS Variable Name	Description			
Community (C6)				
wLKMOVE	Prefers to move house	N6	C6	A1b
wLKNBRD	Likes present neighborhood	N3	C6	A1b
wFRNA	Frequency of talking to neighbors	N3	C6	A2
wFRNB	Frequency of meeting people	N3	C6	A2
wNORGA	Number of organizations active in	N5	C6	A3b
wNORGM	Number of organizations member of	N5	C6	A3b
wORGMB	Member of trade union	N5	C6	A3b
wTUIN1	Member of workplace union (wTUIN2)	N5	C6	A3b
Emotional Well-Being (C7)				
wGHQA	GHQ: concentration	N6	C7	A1e
wGHQB	GHQ: loss of sleep	N6	C7	A1e
wGHQD	GHQ: capable of making decisions	N6	C7	A3a
wGHQE	GHQ: constantly under strain	N6	C7	A1e
wGHQF	GHQ: problem overcoming difficulties	N6	C7	A3a
wGHQG	GHQ: enjoy day-to-day activities	N6	C7	A1e
wGHQH	GHQ: ability to face problems	N6	C7	A3a
wGHQI	GHQ: unhappy or depressed	N6	C7	A1e
wGHQL	GHQ: general happiness	N6	C7	A1e
wGHQC	GHQ: playing a useful role	N6	C7	A3a
wGHQJ	GHQ: losing confidence	N6	C7	A3a
wGHQK	GHQ: believe in self-worth	N6	C7	A3a
wHLPRBI	Health problems: Anxiety, depression, etc	N6	C7	A1e

(3) Allardt (A)

BHPS Variable Name	Description			
Having (A1)				
Economic Resources (A1a)				
wNCARS	Household member owns vehicle	N1	C1	A1a
wFIYR	Annual equivalent income (1.9.96–1.9.97)	N1	C1	A1a
Housing (A1b)				
wCD3USE	Freezer in accommodation	N1	C1	A1b
wCD4USE	Washing machine in accommodation	N1	C1	A1b
wCD5USE	Tumble dryer in accommodation	N1	C1	A1b
wCD6USE	Dishwasher in accommodation	N1	C1	A1b
wCD7USE	Microwave oven in accommodation	N1	C1	A1b
wCD1USE	Color TV in accommodation	N1	C1	A1b
wCD2USE	VCR in accommodation	N1	C1	A1b
wCD8USE	Home computer in accommodation	N1	C1	A1b
wCD9USE	CD player in accommodation	N1	C1	A1b
wCD10USE	Satellite dish at accommodation	N1	C1	A1b
wCD11USE	Cable TV in accommodation	N1	C1	A1b
wCD12USE	Telephone in accommodation	N1	C1	A1b
wHSOWND	House owned or rented	N1	C1	A1b
wHSROOM	Number of rooms in accommodation	N1	C1	A1b
wHSTYPE4	Type of accommodation (wHSTYPE)	N1	C1	A1b
wHEATCH	Household has central heating	N1	C1	A1b
wHSPRBG	Accom: shortage of space	N1	C1	A1b
wHSPRBH	Accom: noise from neighbors	N1	C1	A1b
wHSPRBI	Accom: street noise	N1	C1	A1b
wHSPRBJ	Accom: not enough light	N1	C1	A1b
wHSPRBK	Accom: lack of adequate heating	N1	C1	A1b
wHSPRBL	Accom: condensation	N1	C1	A1b
wHSPRBM	Accom: leaky roof	N1	C1	A1b
wHSPRBN	Accom: damp walls, floors etc	N1	C1	A1b

TABLE A2 (*continued*)

(3) Allardt (A)

BHPS Variable Name	Description			
wHSPRBO	Accom: rot in windows, floors	N1	C1	A1b
wCRDARK	Feel safe walking alone at night	N4	C5	A1b
wHSPRBP	Accom: pollution/environmental problems	N1	C1	A1b
wHSPRBQ	Accom: vandalism or crime	N4	C5	A1b
wLKMOVE	Prefers to move house	N6	C6	A1b
wLKNBRD	Likes present neighborhood	N3	C6	A1b
wLFSAT3	Satisfaction with: house/flat	N1	C1	A1b
Employment (A1c)				
wLMS	Labour market status (full/part time, type of contract)			A1c
wWBCOL	Blue/White collar			A1c
Working Conditions (A1d)				
wJBSTA1	Job satisfaction: promotion prospects			A1d
wJBSTA2	Job satisfaction: total pay			A1d
wJBSTA3	Job satisfaction: relations with boss			A1d
wJBSTA4	Job satisfaction: security			A1d
wJBSTA5	Job satisfaction: use of initiative			A1d
wJBSTA7	Job satisfaction: hours worked			A1d
Health (A1e)				
wHLLTB	Health hinders climbing the stairs	N2	C2	A1e
wHLLTC	Health hinders getting dressed	N2	C2	A1e
wHLLTD	Health hinders walking more than 10 mins	N2	C2	A1e
wHLENDW	Health prohibits some types of work	N2	C2	A1e
wHLLT	Health limits daily activities	N2	C2	A1e
wHLLTA	Health hinders doing the housework	N2	C2	A1e
wHLLTWA	How far health limits amount of work	N2	C2	A1e
wGHQA	GHQ: concentration	N6	C7	A1e
wGHQB	GHQ: loss of sleep	N6	C7	A1e
wGHQE	GHQ: constantly under strain	N6	C7	A1e
wGHQG	GHQ: enjoy day-to-day activities	N6	C7	A1e
wGHQI	GHQ: unhappy or depressed	N6	C7	A1e
wGHQL	GHQ: general happiness	N6	C7	A1e
wHLPRBA	Health problems: Arms, legs, hands, etc	N2	C2	A1e
wHLPRBC	Health problems: Hearing	N2	C2	A1e
wHLPRBD	Health problems: Skin conditions/allergy	N2	C2	A1e
wHLPRBE	Health problems: Chest/breathing	N2	C2	A1e
wHLPRBF	Health problems: Heart/blood pressure	N2	C2	A1e
wHLPRBG	Health problems: Stomach or digestion	N2	C2	A1e
wHLPRBI	Health problems: Anxiety, depression, etc	N6	C7	A1e
wHLPRBL	Health problems: Migraine	N2	C2	A1e
wHLPRBM	Health problems: Other	N2	C2	A1e
wHLSTAT	Health over last 12 months	N2	C2	A1e
wHOSP	Hospital in-patient since 1.9.96	N2	C2	A1e
wHL2GP	Number of visits to GP since 1.9.96	N2	C2	A1e
wHLSVI	Health service: used physiotherapist	N2	C2	A1e
wLFSAT1	Satisfaction with: health	N2	C2	A1e
Education (A1f)				
WQFE6	Highest educational attainment			A1f
Loving (A2)				
wFRNA	Frequency of talking to neighbors	N3	C6	A2
wFRNB	Frequency of meeting people	N3	C6	A2
wSSUPA	Is there someone who will list	N3	C4	A2
wSSUPB	Is there someone to help in a crisis	N3	C4	A2
wSSUPC	Is there someone you can relax with	N3	C4	A2
wSSUPD	Anyone who really appreciates you	N3	C4	A2
wSSUPE	Anyone you can count on to offer comfort	N3	C4	A2

TABLE A2 (*continued*)

(3) Allardt (A)

BHPS Variable Name	Description			
wXSUPA	Someone outside HH can help if depressed	N3	C4	A2
wXSUPC	Someone outside HH can borrow money from	N3	C4	A2
wLFSAT6	Satisfaction with: social life	N3	C4	A2
Being (A3)				
Self Determination (A3a)				
wGHQD	GHQ: capable of making decisions	N6	C7	A3a
wGHQF	GHQ: problem overcoming difficulties	N6	C7	A3a
wGHQH	GHQ: ability to face problems	N6	C7	A3a
wGHQC	GHQ: playing a useful role	N6	C7	A3a
wGHQJ	GHQ: losing confidence	N6	C7	A3a
wGHQK	GHQ: believe in self-worth	N6	C7	A3a
Political Activities (A3b)				
wNORGA	Number of organizations active in	N5	C6	A3b
wNORGM	Number of organizations member of	N5	C6	A3b
wORGMB	Member of trade union	N5	C6	A3b
wTUIN1	Member of workplace union (wTUIN2)	N5	C6	A3b
Leisure Time Activities (A3c)				
Opportunities to Enjoy Nature (A3d)				
Meaningful Work (A3e)				
wJBSTA6	Job satisfaction: work itself			A3e

(4) Sen's Resources and Functionings

BHPS Variable Name	Description			
Resources (S1)				
Durables Leisure (S1A)				
wCD1USE	Color TV in accommodation	N1	C1	A1b
wCD2USE	VCR in accommodation	N1	C1	A1b
wCD8USE	Home computer in accommodation	N1	C1	A1b
wCD9USE	CD player in accommodation	N1	C1	A1b
wCD10USE	Satellite dish at accommodation	N1	C1	A1b
wCD11USE	Cable TV in accommodation	N1	C1	A1b
wCD12USE	Telephone in accommodation	N1	C1	A1b
Durables Home Work (S1B)				
wCD3USE	Freezer in accommodation	N1	C1	A1b
wCD4USE	Washing machine in accommodation	N1	C1	A1b
wCD5USE	Tumble dryer in accommodation	N1	C1	A1b
wCD6USE	Dishwasher in accommodation	N1	C1	A1b
wCD7USE	Microwave oven in accommodation	N1	C1	A1b
Other Property (S1C)				
wNCARS	Household member owns vehicle	N1	C1	A1a
wHSOWND	House owned or rented	N1	C1	A1b
wHSROOM	Number of rooms in accommodation	N1	C1	A1b
wHSTYPE4	Type of accommodation (wHSTYPE)	N1	C1	A1b
Quality of Dwelling (S1D)				
wHEATCH	Household has central heating	N1	C1	A1b
wHSPRBG	Accom: shortage of space	N1	C1	A1b
wHSPRBH	Accom: noise from neighbors	N1	C1	A1b
wHSPRBI	Accom: street noise	N1	C1	A1b
wHSPRBJ	Accom: not enough light	N1	C1	A1b
wHSPRBK	Accom: lack of adequate heating	N1	C1	A1b
wHSPRBL	Accom: condensation	N1	C1	A1b
wHSPRBM	Accom: leaky roof	N1	C1	A1b

TABLE A2 (*continued*)

(4) Sen's Resources and Functionings

BHPS Variable Name	Description			
wHSPRBN	Accom: damp walls, floors etc	N1	C1	A1b
wHSPRBO	Accom: rot in windows, floors	N1	C1	A1b
Income (S1E)				
wFIYR	Annual equivalent income (1.9.96-1.9.97)	N1	C1	A1a
Functionings (S2)				
Right Environment (S2A)				
wCRDARK	Feel safe walking alone at night	N4	C5	A1b
wHSPRBP	Accom: pollution/environmental problems	N1	C1	A1b
wHSPRBQ	Accom: vandalism or crime	N4	C5	A1b
wLKMOVE	Prefers to move house	N6	C6	A1b
wLKNBRD	Likes present neighborhood	N3	C6	A1b
wLFSAT3	Satisfaction with: house/flat	N1	C1	A1b
Mobility and Able to Undertake Usual Physical Tasks (S2B)				
wHLLTB	Health hinders climbing the stairs	N2	C2	A1e
wHLLTC	Health hinders getting dressed	N2	C2	A1e
wHLLTD	Health hinders walking more than 10 mins	N2	C2	A1e
wHLENDW	Health prohibits some types of work	N2	C2	A1e
wHLLT	Health limits daily activities	N2	C2	A1e
wHLLTA	Health hinders doing the housework	N2	C2	A1e
wHLLTWA	How far health limits amount of work	N2	C2	A1e
Able to Undertake Usual Mental Tasks (S2C)				
wGHQA	GHQ: concentration	N6	C7	A1e
wGHQB	GHQ: loss of sleep	N6	C7	A1e
wGHQD	GHQ: capable of making decisions	N6	C7	A3a
wGHQE	GHQ: constantly under strain	N6	C7	A1e
wGHQF	GHQ: problem overcoming difficulties	N6	C7	A3a
wGHQG	GHQ: enjoy day-to-day activities	N6	C7	A1e
wGHQH	GHQ: ability to face problems	N6	C7	A3a
wGHQI	GHQ: unhappy or depressed	N6	C7	A1e
wGHQL	GHQ: general happiness	N6	C7	A1e
Self-Respect, Self-Worth (S2D)				
wGHQC	GHQ: playing a useful role	N6	C7	A3a
wGHQJ	GHQ: losing confidence	N6	C7	A3a
wGHQK	GHQ: believe in self-worth	N6	C7	A3a
Able to Socialize and Network (S2E)				
wFRNA	Frequency of talking to neighbors	N3	C6	A2
wFRNB	Frequency of meeting people	N3	C6	A2
wSSUPA	Is there someone who will list	N3	C4	A2
wSSUPB	Is there someone to help in a crisis	N3	C4	A2
wSSUPC	Is there someone you can relax with	N3	C4	A2
wSSUPD	Anyone who really appreciates you	N3	C4	A2
wSSUPE	Anyone you can count on to offer comfort	N3	C4	A2
wXSUPA	Someone outside HH can help if depressed	N3	C4	A2
wXSUPC	Someone outside HH can borrow money from	N3	C4	A2
wNORGA	Number of organizations active in	N5	C6	A3b
wNORGM	Number of organizations member of	N5	C6	A3b
wORGMB	Member of trade union	N5	C6	A3b
wTUIN1	Member of workplace union (wTUIN2)	N5	C6	A3b
wLFSAT6	Satisfaction with: social life	N3	C4	A2
Health Related (S2F)				
wHLPRBA	Health problems: Arms, legs, hands, etc	N2	C2	A1e
wHLPRBC	Health problems: Hearing	N2	C2	A1e
wHLPRBD	Health problems: Skin conditions/allergy	N2	C2	A1e
wHLPRBE	Health problems: Chest/breathing	N2	C2	A1e

TABLE A2 (*continued*)

(4) SEN'S RESOURCES AND FUNCTIONINGS

BHPS Variable Name	Description			
wHLPRBF	Health problems: Heart/blood pressure	N2	C2	A1e
wHLPRBG	Health problems: Stomach or digestion	N2	C2	A1e
wHLPRBI	Health problems: Anxiety, depression, etc	N6	C7	A1e
wHLPRBL	Health problems: Migraine	N2	C2	A1e
wHLPRBM	Health problems: Other	N2	C2	A1e
wHLSTAT	Health over last 12 months	N2	C2	A1e
wHOSP	Hospital in-patient since 1.9.96	N2	C2	A1e
wHL2GP	Number of visits to GP since 1.9.96	N2	C2	A1e
wHLSVI	Health service: used physiotherapist	N2	C2	A1e
wLFSAT1	Satisfaction with: health	N2	C2	A1e

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