

***Dinamiche e persistenze nel mercato del lavoro italiano ed effetti di politiche  
(basi di dati, misura, analisi)***

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**Longitudinal Measures of Income Poverty  
and Life-style deprivation**

V. Verma, G. Betti

*Dipartimento di Metodi Quantitativi, Univ. di Siena*

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Unità locali del progetto:

Dip. di Economia “S. Cagnetti De Martiis”, Univ. di Torino	(coord. Bruno Contini)
Dip. di Scienze Economiche, Univ. “Ca’ Foscari” di Venezia	(coord. Giuseppe Tattara)
Dip. di Metodi Quantitativi, Univ. di Siena	(coord. Achille Lemmi)
Dip. di Scienze Statistiche, Univ. di Padova	(coord. Ugo Trivellato)
Dip. di Politiche Pubbliche e Scelte Collettive, Univ. del Piemonte Orientale	(coord. Alberto Martini)

Dip. di Scienze Statistiche  
via C. Battisti 241-243, 35121 Padova

## 1. Introduction

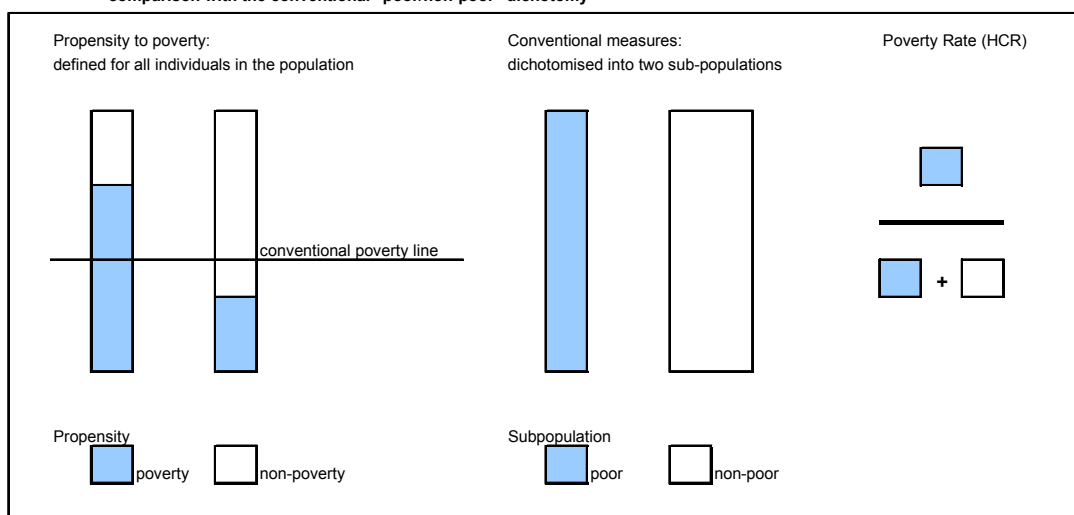
In place of the conventional classification of the population into a simple "poor/non-poor" or "deprived/non-deprived" dichotomy, in this study we develop and explore measures treating poverty and deprivation as a matter of degree (as originally proposed by Cerioli and Zani, 1990): in principle all individuals are subject poverty or deprivation, but to varying degrees (some much more than others). That degree, say 1 for the poorest or the most deprived to 0 for the richest or the least deprived, is determined by the individual's rank in the income distribution (and/or access to non-monetary resources and facilities determining the living conditions), and the individual's share in the total resources of the society.

### 1.1 Poverty and deprivation as a matter of degree

Figure 1 illustrates the basic idea. Each individual in the population has a certain propensity (in the range 0 to 1) to poverty or deprivation, some more than others. We take these quantified differences into account in the analysis. The conventional approach is a special case of this: those with income below a certain threshold are deemed to be poor (i.e. are assigned propensity=1); others with income at or above that threshold are deemed to be non-poor (i.e. are assigned propensity=0).

There are several advantages of treating poverty and deprivation as a matter of degree, applicable to all members of the population, rather than as simply a "yes-no" state dichotomising the population.

**Figure 1. The basic idea of poverty or deprivation as a matter of degree: comparison with the conventional "poor/non-poor" dichotomy**



1. In the conventional analysis in terms of poverty threshold, further insight into the relative income situations of individuals and groups can be obtained by incorporating into the statistics a measure of the actual levels of incomes received, particularly by groups at the lower end of the income distribution. Supplementary measures such as the Poverty Gap, the Gini Coefficient or the Sen Index serve this purpose. Using the alternative approach, some of these aspects can be incorporated into a *single measure* of the degree and extent of poverty of individuals and subgroups in the population.

2. By taking into account the degree of poverty rather than simply assuming a discrete state, further insights on the relative position of socio-economic subgroups within each national population can be gained.
3. Life-style or non-monetary deprivation depends on forced non-access to various facilities or possessions determining the basic conditions of life. An individual may have access to some but not to others. Hence life-style deprivation is inherently a matter of degree, and simply dichotomising the population into deprived/non-deprived categories is inappropriate or at best arbitrary (Cheli and Lemmi, 1995).
4. The real potential of this approach is in the study of poverty in the longitudinal context (see also Betti and Cheli, 2000). To what extent do individuals and households move in and out of poverty from one period to another? The conventional measure traces this as a count of movements across some chosen poverty line. This measures mobility simply in terms of movements across some designated poverty line, rather than reflect the actual magnitude of the changes affecting individuals at all points of the distribution. Consequently, the degree of mobility of persons near to the chosen poverty line tends to be over-estimated, while that of persons far from that line grossly under-estimated.
5. The combined analysis, considering income poverty and life-style deprivation simultaneously, especially in the longitudinal context, is greatly facilitated by treating each dimension as a matter of degree. The need to divide the population into numerous discrete groups, as would normally be required in the conventional analysis, is avoided.
6. We can expect the resulting measures to be more precise. The sampling error of a distribution is lower than that of dichotomy with values concentrated at the two end points. We can also expect the measures to be less sensitive to local irregularities in the income distribution curve, and to the particular choice of the poverty threshold.

### *1.2 Scope of this paper*

The concern of this paper is primarily with the development and presentation of elements of a new methodology, rather than the presentation of specific findings of a substantive nature. Many substantive aspects have been discussed in the *Second European Social Report* being published by Eurostat, to which the present authors contributed as members of a team of researchers<sup>1</sup>. Nevertheless, the rich body of comparative data from the European Community Household Panel analysed in the course of the development and testing of this methodology provides a number of interesting insights into the social situation of EU Member States as concerns poverty, deprivation and social exclusion to which sections of their populations are subject.

In order to illustrate the richness of this approach, we analyse *five types of measures of poverty and deprivation* in relation to each other: income poverty as conventionally viewed in the form of a poor/non-poor dichotomy; poverty viewed as a propensity or a matter of degree to which all individuals are subject to a greater or lesser extent; life-style deprivation in its various dimensions determined by the lack of access to non-monetary facilities and opportunities; and two measures of income poverty and

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<sup>1</sup> Eurostat (forthcoming). *Income, Poverty Risks and Social Exclusion in the European Union: Second European Social Report*. The contributors to this report include Gianni Betti, Kimberly Fisher, Michael Förster, Liana Giorgi, Richard Layte, Géza Tarcali, Matthias Till, Vijay Verma and Chris Whelan.

life-style deprivation in combination - 'latent deprivation' representing the presence of either dimension, and 'manifest deprivation' representing the situation of individuals subject to both simultaneously. Then we analyse each of these measures in *five aspects in the time dimensions*: cross-sectional measures (including their averaging over a time interval of 5 years); the incidence of poverty/deprivation at any time during the interval; the persistence of the state of poverty/deprivation over time; continuous experience of such a state; and the dynamic aspects of movements into and out of poverty/deprivation and the duration of the time spent in that state by individuals in the population.

### 1.3 Source data

As noted, the analyses presented here are based on the European Community Household Panel data for waves 1-5 (annual household panel surveys during 1994-1998). Table A.1 in the annex gives the national surveys and sample bases used. Most of the data analysed are confined to a 'balanced panel' of individuals present in the survey during all the 5 years, with essential information on income and living conditions of their households obtained each year. For various reasons, such data are available for only 11 of the 15 EU countries as concerns household income, and for 9 among those as concerns life-style or non-monetary indicators of deprivation. A major part of these analyses were done in the preparation of the above mentioned European Social Report, though we have additional methodological progress to report.

## 2. Income poverty

### 2.1 Conventional income poverty measures

The population is dichotomised into the "poor" and the "non-poor" as follows. Each person  $j$  is assigned the equivalised income  $y_j$  of the person's household<sup>2</sup>. Persons with equivalised income below say 60% of the median are considered to be poor (assigned a poverty index  $I_j^{(0)}=1$ ), and the other as non-poor (assigned a poverty index  $I_j^{(0)}=0$ ). The conventional income poverty rate (the so-called Head Count Ratio) is the average over individuals of this poverty index:

$$\bar{I}^{(0)} = \frac{\sum_j w_j \cdot I_j^{(0)}}{\sum_j w_j}.$$

### 2.2 The propensity to income poverty

The propensity to income poverty ( $I_j$ ) associated with each individual  $j$  is related to the person's rank and share in the equivalised income distribution. The model used is as follow<sup>3</sup>. First we construct an income index

$$V_j = \sum_{i=j+1}^n v_i, j = 1 \text{ to } n-1; V_n = 0,$$

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<sup>2</sup> The equivalised income of a household is obtained by dividing its total disposable income by the household's equivalised size. The equivalised size is obtained by using an equivalent scale which takes into account the actual size and composition of the household. In our empirical analysis here, we have used the Eurostat or so-called 'modified OECD' scale, which assigns a weight of 1 to the first adult in the household, 0.5 to each subsequent person aged 14 and over and 0.3 to each child aged under 14 in the household.

<sup>3</sup> For a fuller description of the methodology and some empirical results, see Betti and Verma (1998).

where  $v_i = y_i / \sum_{i=2}^n y_i$  is the share of total equivalised income ( $y_i$ ) received by individual of rank  $i$  in the ascending income distribution.  $V_j$  varies from  $V_1 = 1$  for the poorest, to  $V_n = 0$  for the richest individual. It is the share of the total equivalised income received by all individuals less poor than the person concerned. Corresponding to the income index, the propensity to income poverty is defined as:

$$I_j = V_j \cdot \exp(\alpha \cdot k / \bar{I}^{(0)}).$$

As in Cheli (1995), we have determined parameter  $\alpha$  such that for the *national population as a whole* the mean of the index  $I_j$ , i.e.  $\bar{I}$ , is equal to the proportion poor  $\bar{I}^{(0)}$  according to the conventional approach as defined above. Empirically, large values of  $I_j$  tend to be concentrated at the lower end of the income distribution, making the propensity to income poverty sensitive to the share of the income received by poorer sections of the population.<sup>4</sup>

### 2.3 The level of income poverty

[ Table 1.1 about here ]

Table 1.1 shows the evolution of poverty rates over time by country. In each country the poverty rate is computed on the basis of national income distribution, as the average of the poverty propensities of individuals as defined above. As seen from column (1), there is a large (three-folds) range of variation in the poverty rates across EU countries, from 8% of the national population in Denmark and 10% in The Netherlands, to 22% in Greece and 23% in Portugal. The countries have been ranked according to the poverty rate averaged over 5 years. This ranking will be used throughout so as to keep the large differences among the countries in this respect in view.

By definition, these rates have adjusted at the level of each country so as to equal the conventional poverty rate (taken here as the proportion with incomes below 60% of the median equivalised income).<sup>5</sup> Hence *as such*, the new measure contains no new information at the national level. However, additional insight is provided by an examination of the *proportion of the population with above-average propensity to poverty*. In the conventional analysis, this *proportion* is, by definition, identical to the

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<sup>4</sup>Note that with the exponent  $\alpha \cdot (k / \bar{I}^{(0)}) = 1$ ,  $\bar{I} = (1+G)/2$ , where  $G$  is the Gini coefficient of the income distribution, which is typically 3-5 times larger than the conventional poverty rate or the head count ratio  $\bar{I}^{(0)}$ . Values of  $\alpha$  considerably larger than  $\alpha = (\bar{I}^{(0)} / k)$  are needed to concentrate the distribution of  $I_j$  at the lower end. In our empirical results, values of  $\alpha$  encountered are practically all in the narrow range 0.9-1.1, with average over EU countries very close to 1.0. Hence the range of variation in the values encountered in the empirical parameter  $\alpha$  is small (with cv across countries of only 8%), compared with the much larger variations in poverty rates among the EU countries, as discussed later in this section. Generally, greater inequality (higher poverty rate) goes with slightly higher values of  $\alpha$ , i.e. with greater concentration of that poverty - thus further exaggerating its impact. We have introduced  $k$  as a purely arbitrary scaling factor, taking it as  $k = \ln(10)$ , which gives  $\alpha \approx 1$  when averaged over EU countries, making the variation across countries easier to see.

<sup>5</sup> Actually, the measures presented in Table 1.1 are slightly different from what would be obtained from the same data with the conventional approach. This is because the former were calibrated to agree with the latter at the national level for the cross-sectional sample in each wave. The results presented are, however, for a smaller sample base, namely the balanced panel enumerated over all the five years (see Annex 1). The differences are negligible except in the case of Germany, France and Belgium (see Table 4.2).

poverty rate (i.e. to the *average propensity* to poverty). This is not generally the case with the new measure. Column (3) of the table shows the ratio of this proportion to the average. In all countries the ratio exceeds 1.0, the simple average across countries being 1.6. A noteworthy feature is that the ratio is larger for the countries with lower levels of poverty (such as 2.2 for Denmark and 2.0 for the Netherlands), and much lower for countries with higher levels of poverty (such as 1.5 for Greece and 1.4 for Portugal). The implication is that in countries with already higher levels of poverty, that quantum of poverty tends to be more concentrated at the lower end of the income distribution, compared with countries with lower levels of poverty. *The impact of the observed differences in the poverty rates among the countries thus tends to be further accentuated.* This effect is missed in the conventional approach.

Column (4) shows the values of the parameter  $\alpha$ , averaged over the 5 waves, determined so as to make the new measures of the level of poverty identical to the level obtained with the conventional approach at the country level. The small range of variation across EU countries despite large differences in poverty rates makes this a robust and easily-estimated parameter, which is an important advantage in empirical work. There is some variation in this parameter, the value being positively correlated with the level of poverty. This is consistent with the variation in the figures in column (3).

Finally, column (5) shows the variation in the level of income (median income, averaged over 5 waves). The negative correlation between the level of income and the poverty rate is clear. In the EU, the less well-off countries also tend to be more unequal. *This further accentuates the impact of the differences among the countries in the poverty rates.*

Patterns of poverty and deprivation can also be affected by trends in the level of income. For instance, rapid changes in the average level of income may be accompanied by alleviation of poverty and deprivation, or at least in the short run, by sharpening of disparities. Table 1.2 provides some basic information as a background. With the average over the 5 years taken as the base (100), it shows variations in the level of mean equivalised household income (adjustments for price inflation have not been made, but the interest here is mainly in differences in the patterns among the countries. All values were converted to PPS for each year.) Ireland, and to a lesser extent The Netherlands and Greece show well above-average increase, while Belgium and Spain are at the other end.

[Table 1.2 about here]

### **3. Life-style deprivation**

#### *3.1 Variables and dimensions of life-style deprivation*

In addition to the level of monetary income, the standard of living of households and persons can be described by a host of indicators, such as housing conditions, possession of durable goods, the general financial situation, perception of hardship, expectations, norms and values. Quantification and putting together of a large set of non-monetary indicators of living conditions involves a number of steps, models and assumptions.

Firstly, from the large set which may be available, a selection has to be made of indicators which are most meaningful and useful. For our analysis using European Community Household Panel data, a large subset of the available indicators were selected. The most important determining factor in the choice of the set of items for

analysis was an assessment – based on a detailed examination of variations in frequency distributions across countries and background knowledge of national situations – of the extent to which an item could be meaningfully included in *comparative analysis*. Generally, the preference has been to include a majority of so-called ‘objective’ indicators on life-style deprivation, such as the possession of material goods and facilities and physical conditions of life, at the expense of what may be called ‘subjective’ indicators such as self-assessment of the general health condition, economic hardship and social isolation, and the expressed degree of satisfaction with various aspects of work and life.

Secondly, it is useful to identify underlying dimensions and group the indicators accordingly. Taking into account the manner in which different indicators cluster together (possibly differently in different national situations) adds to the richness of the analysis; ignoring such dimensionality can in fact result in misleading conclusions. Using confirmatory factor analysis various dimensions of non-monetary or life-style deprivation were identified. The indicators used and their grouping is summarised in the inset "Dimensions and Items of Deprivation".

#### **Dimensions and items of deprivation**

1 Basic life-style deprivation – these concern the lack of ability to afford most basic requirements:

- Keeping the home (household’s principal accommodation) adequately warm.
- Paying for a week’s annual holiday away from home.
- Replacing any worn-out furniture.
- Buying new, rather than second hand clothes.
- Eating meat chicken or fish every second day, if the household wanted to.
- Having friends or family for a drink or meal at least once a month.
- Inability to meet payment of scheduled mortgage payments, utility bills or hire purchase installments.

2 Secondary life-style deprivation – these concern enforced lack of widely desired possessions ("enforced" means that the lack of possession is because of lack of resources)

- A car or van.
- A colour TV.
- A video recorder.
- A micro wave.
- A dishwasher.
- A telephone.

3 Housing facilities – these concern the absence of basic housing facilities (so basic that one can presume all households would wish to have them):

- A bath or shower.
- An indoor flushing toilet.
- Hot running water.

4 Housing deterioration – these concern serious problems with accommodation:

- Leaky roof.
- Damp walls, floors, foundation etc.
- Rot in window frames or floors.

5 Environmental problems – these concern problems with the neighbourhood and the environment:

- Shortage of space.
- Noise from neighbours or outside.
- Too dark/not enough light.
- Pollution, grime or other environmental problems caused by traffic or industry.
- Vandalism or crime in the area.

### 3.2 Constructing indicators of life-style deprivation

Putting together of categorical indicators of deprivation for individual items to construct composite indices requires decisions about assigning numerical values to the ordered categories and the weighting and scaling of the measures.

#### 3.2.1. Assigning numerical values to deprivation scores

Most of the items under consideration are in fact simple ‘yes/no’ dichotomies. The obvious choice is to assign a value of (say) 1 to the presence and 0 to the absence of a particular item of deprivation. In principle, some such items may involve more than two ordered categories. In the same as for dichotomies, equally spaced values in the range 1-0 can be assigned to an ordered polytomy:

$$D_{j(m)} = \frac{M - m}{M - 1},$$

where individual  $j$  is scored  $m$  on  $M$  ordered categories, with  $m=1$  the most deprived to  $m=M$  the least deprived.

#### 3.2.2. Composite indicators for underlying dimensions

Next, individual indicators within each major dimension (such as housing, environment, etc.) are combined to form an index describing the degree of deprivation specific to the dimension concerned. Denoting by  $D_{di,j}$  the score of individual  $j$  on item  $i$  in dimension  $d$ , the individual's score averaged over items ( $i$ ) in the dimension ( $d$ ) is written as the weighted mean:

$$D_{d,j} = \sum_i (w_{d,i} \cdot D_{di,j})$$

where the weights  $w_{di}$  are defined for items ( $i$ ) within a given dimension or group of items ( $d$ ). The set of weights are taken to be common to all individuals ( $j$ ) in the population, and have been computed, separately for each country, on the basis of the following statistical considerations taking into account how the items are distributed in the population. Alternative models are possible; furthermore, account may also be taken of substantive considerations in particular situations.

Firstly, the weight is determined by the variable's power to ‘discriminate’ among individuals in the population, that is, by its dispersion. We take this as proportional to the coefficient of variation. This means that for small proportions, the weight varies inversely to the square-root of the proportion ( $p$ ). Thus deprivations which affect only a small proportion of the population, and hence are likely to be considered more critical, get larger weights; while those affecting large proportions, hence likely to be regarded less critical, get smaller weights. Note, however, that the contribution of these  $p$  individual values to the average level of deprivation in the population resulting from the item concerned turns out to be directly proportional to the square-root of the  $p$ . In other words, deprivations affecting a smaller proportion of the population are treated as more intense at the individual person's level but, of course, their contribution to the average level of deprivation in the population as a whole is correspondingly smaller.



From a non-redundant point of view, it is necessary to limit the influence of those characteristics that are highly correlated with the others included in the analysis. The weight of variable  $i$  in dimension  $k$  is taken as the inverse of an average measure of its correlation with all the other variables in the dimension. Thus the results are not affected by arbitrary inclusion or exclusion of items highly correlated with other items in the set.

To surmise, the weight given to an item is directly proportional to the variability of the item in the population and inversely proportional to its correlation with other items in the dimension, and the weights are scaled to sum to 1.0 over items in the dimension:

$$\sum_i w_{di} = 1.$$

### 3.2.3. Composite indicator of overall non-monetary or life-style deprivation

The next logical step is to seek a way to combine all the individual indicators (and hence the various underlying dimensions) into a single summary index of the degree of non-monetary or life-style deprivation. Such a single overall index can provide a powerful tool for cross-sectional and longitudinal analysis of life-style deprivation within and across countries, and greatly enrich the picture emerging from the study of income poverty alone. However, it should be kept in view that putting together all the information into a single index and simply ignoring the different underlying dimensions of deprivation can sometimes be misleading regarding the determinants of deprivation.

An overall indicator of life-style deprivation to which an individual ( $j$ ) is subject is provided by a weighted average of the person's deprivation indices on the different dimensions ( $d$ ):

$$D_j = \sum_d (w'_d \cdot D_{d,j}),$$

where the dimension weights  $w'_d$  are taken as proportional to a weighted (with item weights  $w_{di}$  defined above) average of coefficients of variation of items in the dimension. Again, the weights are scaled to sum to 1.0 over the dimensions:

$$\sum_d w'_d = 1.$$

### 3.2.4. Scaling of the life-style deprivation indices

For individuals in the population, the deprivation index for individual items and, by virtue of the constraints, the index aggregated to each of the dimensions of deprivation, and the overall deprivation index, all vary in the range (0-1). Note that with this procedure, an index of 1.0 is obtained only if the individual lacks *all* the items comprising the dimension; and similarly, an overall index of 1.0 is obtained only if the individual lacks *all* the items included in the analysis. These conditions are too restrictive in defining what should be considered as the 'most deprived' situation (it would be even more restrictive if the number of items included in the analysis is increased). It is more reasonable to define as 'the most deprived' persons who lack at least a certain proportion  $C < 1$  of the items considered. In our view, something like

$C=0.6$  is a reasonable choice, meaning that individuals lacking 60 percent (i.e. 15 of the 24 items in our analysis) or more items are considered to be ‘most deprived’<sup>6</sup>.

It should be emphasized that the particular choice of the value of parameter  $C$  is of absolutely no consequence for the resulting patterns of variation across items, dimensions, countries or population subgroups discussed in the following sections. It does, however, affect the numerical results when we contrast and combine monetary and non-monetary indices for analyzing overall deprivation in all its aspects, as discussed in the next section.

[Table 1.3 about here]

Table 1.3 shows the variation and trends in the overall indicator of life-style deprivation. (Results by different dimension of deprivation are not discussed here for lack of space.). The measures are scaled to equal the income poverty rate when a simple average is taken over EU countries<sup>7</sup>. Firstly, in almost all countries, we see a strong downward trend in the levels of life-style deprivation. This is expected in view of generally increasing levels of income. However, the figures are likely to be over-estimating his trend because of the life-cycle effect.

The main point brought out in column (4) is that differentials among countries are generally larger in life-style deprivation than in income poverty, though the pattern is not uniform. (The Netherlands, and in particular Ireland and Italy differ from the overall pattern.) This is related to the negative correlation between levels and disparities in income among the EU countries, noted earlier. Across countries, the average lifestyle deprivation increases with increasing levels of income poverty and declines with the increasing level of income in the country. *In so far as less well-off countries in the EU also tend to be subject to greater inequality of income, the non-monetary deprivation index shows a greater range of variation among the Member States*, with particularly large values for Portugal and Greece.

In fact, the deprivation index reflects both the relative and absolute dimensions of the levels of living. It is an ‘absolute’ measure in the sense that it reflects the actual lack of various possessions and facilities to which individuals and households are subject. However, the significance (in statistical terms, the weight) given to the lack of a particular item is determined in the ‘relative’ context of the level and distribution of the lack in the national population of which the individual forms a part. This is in contrast to the income poverty rate which reflects only the relative distributional aspects, and the mean or median income which reflect only the absolute levels. In fact, the life-style deprivation index varies closely as the ratio of the poverty rate to the national median income. Column (5) of the table shows this ratio (for convenience, scaled to average 1.0 for countries at the bottom half of the table). Such a high degree of consistency between two different types of measures, constructed independently from different survey

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<sup>6</sup> The exact value of  $C$  used in our analysis has been determined on the following basis: it is chosen to scale the overall life-style deprivation index such that its simple average over EU-15 countries exactly equals the same average for the income poverty rate. This in fact gives a value of  $C$  very close to 0.6. This single scaling factor (determined on the basis of ECHP Wave 4 data) is then used throughout our analysis, for all countries and waves. Note that for any particular country, the average life-style deprivation and income poverty rates are not identical.

<sup>7</sup> As noted, this scaling was done for the full cross-sectional sample of wave 4. The results presented here are for the balanced panel, and are also confined to the countries which could be included for panel analysis. Hence some (generally slight) differences may appear between the two measures averaged over countries.

questions and using different statistical methodologies, is clearly very reassuring regarding the underlying quality and consistency of ECHP data.

As in the case of income measures (Table 1.1), additional insight is provided by an examination of the *proportion of the population with above-average propensity to deprivation*. Column (3) of the table shows the ratio of this proportion to the average. In all countries the ratio exceeds 1.0, the simple average across countries being 2.4, substantially higher than the corresponding figures for the income measures discussed above. Again, that the ratio is larger for the countries with lower levels of deprivation (such as 3.9 for Denmark and the Netherlands), and much lower for countries with higher levels of poverty (such as 1.6 for Greece and 1.3 for Portugal), and *the differences are much larger than those in the income measures*. Countries with already higher levels of life-style deprivation, deprivation tends to be more concentrated at the lower end. *The impact of the observed differences in the deprivation rates among the countries thus tends to be further accentuated.*

#### 4. Income poverty and life-style deprivation in combination

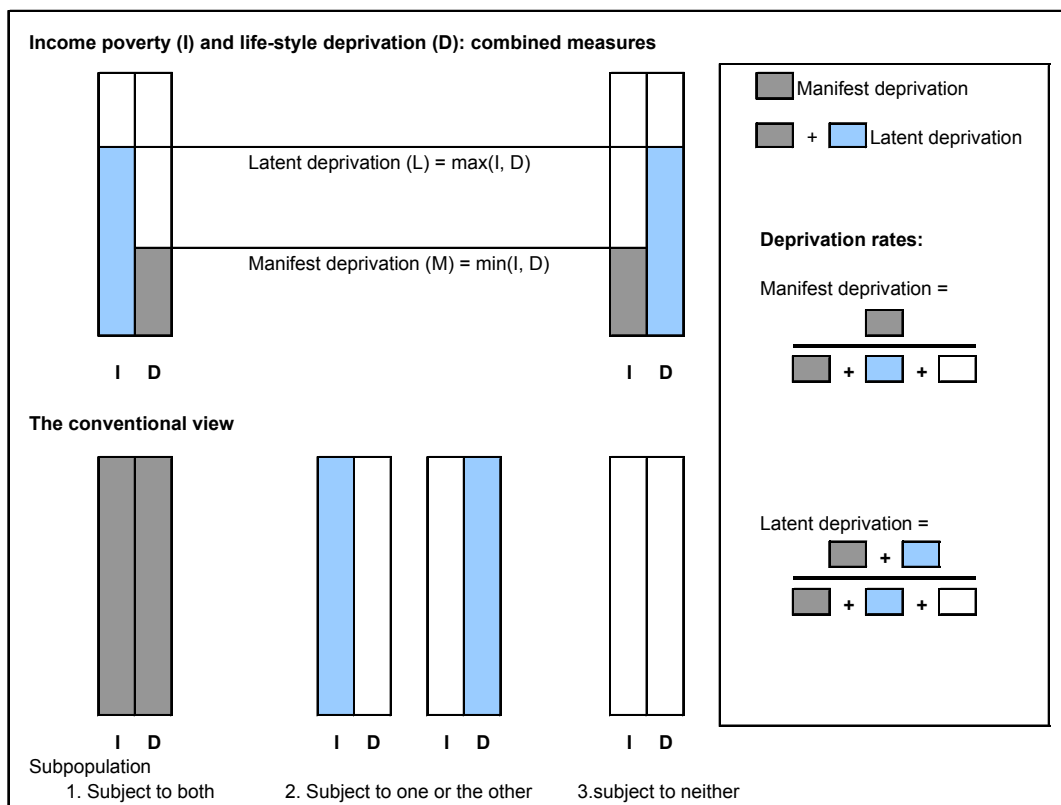
The two measures:

$I_j$  propensity to income poverty, and

$D_j$  the overall life-style deprivation propensity

may be combined to construct composite measures which indicate the extent to which the two aspects of income poverty and life-style deprivation overlap for the individual concerned. These measures are as follows.

**Figure 2. Latent and manifest deprivation:  
the present conceptualisation compared with the traditional view.**



$M_j$  manifest deprivation, representing the propensity to both income poverty and life-style deprivation simultaneously. It represents the individual being subject to both income poverty and life-style deprivation; one may think of this as the ‘manifest’ or the ‘more intense’ degree of deprivation.

$L_j$  latent deprivation, representing the individual being subject to at least one of the two, income poverty and/or life-style deprivation; one may think of this as the ‘latent’ or the ‘less intense’ degree of deprivation.

Once the propensities to income poverty ( $I_j$ ) and life-style deprivation ( $D_j$ ) have been defined at the individual level ( $j$ ), the corresponding combined measures are obtained in a straightforward way, which can then be aggregated to produce the relevant averages and rates for the population. The ‘manifest’ deprivation propensity of individual  $j$  is the intersection (the smaller) of the two measures  $I_j$  and  $D_j$ :

$$M_j = \min\left(I_j, D_j\right).$$

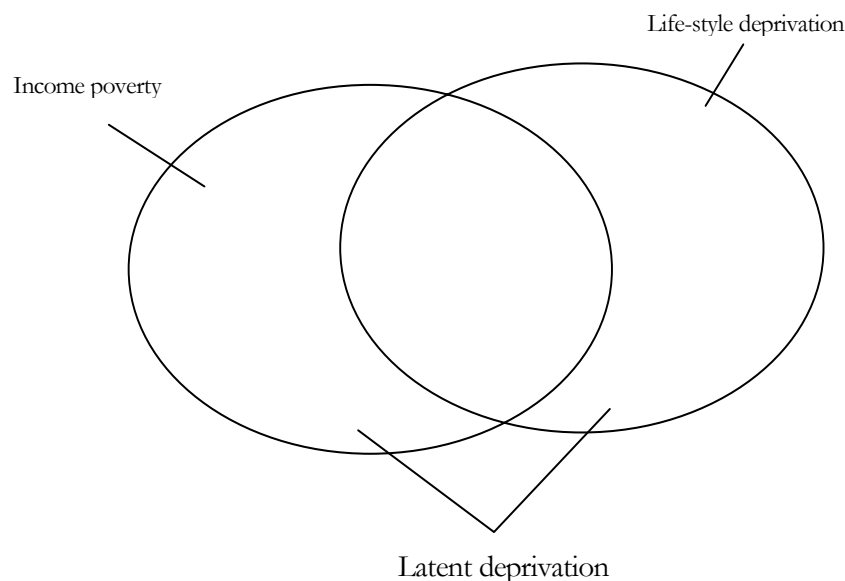
Similarly, the ‘latent’ deprivation propensity of individual  $j$  is the union (the larger) of the two measures  $I_j$  and  $D_j$ :

$$L_j = \max\left(I_j, D_j\right).$$

These measures are shown in Tables 1.4 and 1.5 in the same form as those for income poverty and life-style deprivation separately in the previous tables.

Averaged over countries the picture is as displayed below. Around two-thirds of those in latent deprivation are income poor, and the same proportion are subject to life-style deprivation. The overlap between these two groups (the manifest deprivation) is 45% of either group, ie 30% of those subject to latent deprivation.

National differentials in the latent deprivation are smaller than those in income poverty or in life-style deprivation taken alone. This is because in countries with lower levels of disparities overall, different dimension of deprivation tend to be less overlapping over the same individuals, than in countries with higher levels of disparities among their populations. This comes out very clearly in Table 1.5 for manifest deprivation. *The high level of overlap between different dimension of deprivation over the same individuals in the already more unequal situation in countries makes the impact of these disparities even more extreme.*



[Table 1.4 about here]

[Table 1.5 about here]

## 5. Longitudinal aspects: persistence of poverty and deprivation

### 5.1 Diverse measures

Above we have described five main measures which have been developed and analysed in this paper. These are:

- $I_j^{(0)}$  the conventional income poverty index (0,1)
- $I_j$  the propensity to income poverty (continuous in the range 0-1)
- $D_j$  the propensity to life-style deprivation
- $M_j$  manifest deprivation, representing the propensity to both income poverty and life-style deprivation simultaneously.
- $L_j$  latent deprivation, representing the individual's propensity to being subject to at least one of the two, income poverty and/or life-style deprivation.

In addition, the propensity to life-style deprivation needs to be analysed separately in its various dimensions, such as the five dimensions (D1-D5) identified as above. Then in principle there are also measures corresponding to D, M and L in the conventional (0,1 dichotomous) form.

Any of these measures can be studied in the time dimension: both in the cross-sectional and the longitudinal contexts. The cross-sectional may refer to single years or to the average over a number (T) of years. In the longitudinal dimension, indicators may be designed to capture the experience of poverty and deprivation at any time during a period, or persistently or continuously over the period. We can also construct individual propensities and average rates of exit and of re-entry into the state of poverty and deprivation, and the distribution of the time spent in such state. And so on.

In the following we develop and study the diverse measures in the time dimension. The following concepts apply to all of the above measures (I, D, M, L, etc., and their conventional counterparts), and the symbol P is used to represent any of these. Thus:

$P_{t,j}$  = the propensity to poverty (and/or deprivation) at time t of individual j, over some interval t=1 to T

It is also useful to introduce the notation

$P_{(t),j}$  = the ordered set corresponding to the above, such that

$$P_{(1),j} \geq P_{(2),j} \geq \dots \geq P_{(T),j}.$$

Cross-sectional rates

$$\bar{P}_t = \frac{\sum_j w_j \cdot P_{t,j}}{\sum_j w_j}, \quad t = 1 \text{ to } T$$

where  $w_j$  = the sample weight of individual j.

### 5.2 Longitudinal rates over period t = 1 to T

Consider a panel of individuals (j) over a period (t=1 to T) years, with  $P_{t,j}$  the propensity to poverty or deprivation at time t of individual j. In the conventional analysis,  $P_{t,j}$  takes the dichotomous values 1 (=poor) and 0 (=non-poor). Here the measure varies in the range (1-0) determined by the level and position of the individual in the income distribution, as defined above.

#### 5.2.1 Any-time poverty

The individual's propensity to 'any-time poverty' (i.e., poverty during at least one year over the interval) is given by the largest of the cross-sectional indices:

$$P_{(1),j} = \max(P_{t,j}), \quad t = 1 \text{ to } T,$$

the corresponding rate for the population being

$$\bar{P}^{(A)} = \frac{\sum_j w_j \cdot P_{(1),j}}{\sum_j w_j}.$$

#### 5.2.2 Persistent poverty

This refers to poverty during at least a majority of the T years, i.e. for at least T' years, where

$T' = \text{int}(T/2) + 1$  (i.e. the smallest integer strictly larger than T/2).

For instance, for a 2 or 3 year interval, persistent refers to poverty for at least 2 years; for T=4 or 5 years, it refers to poverty for at least 3 years; for T=6 or 7, to poverty for at least 4 years, etc.<sup>8</sup>

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<sup>8</sup> For a period of T=4 years, Eurostat recommends that persistent poverty be defined as poverty for at least 3 of the 4 years, *including the last year*. Except for the additional condition in italics (which is not consistent with the idea of an index covering a whole interval), the above definition is in line with the Eurostat recommendation.

At the individual level, this is the T'th largest value of the annual propensities to poverty, i.e.  $P_{(T),j}$ . The corresponding persistent poverty rate is

$$\bar{P}^{(P)} = \frac{\sum_j w_j \cdot P_{(T),j}}{\sum_j w_j}$$

### 5.2.3 Continuous poverty

The individual's propensity to continuous poverty (i.e., for all the years over the interval) is the smallest of the cross-sectional indices:

$$P_{(T),j} = \min(P_{t,j}), \quad t = 1 \text{ to } T,$$

the corresponding rate for the population being

$$\bar{P}^{(C)} = \frac{\sum_j w_j \cdot P_{(T),j}}{\sum_j w_j}$$

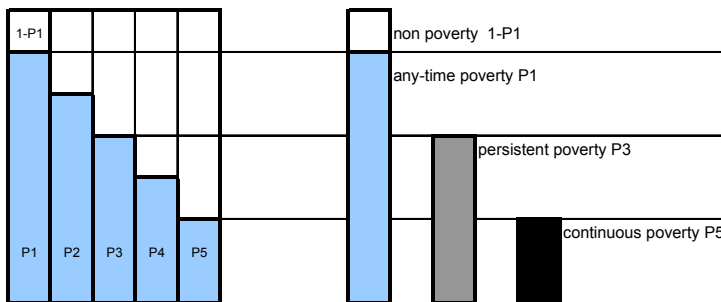
Tables 2.1 to 2.5 report longitudinal rates corresponding to the five main measures described above.

[Tables 2.1 to 2.5 about here]

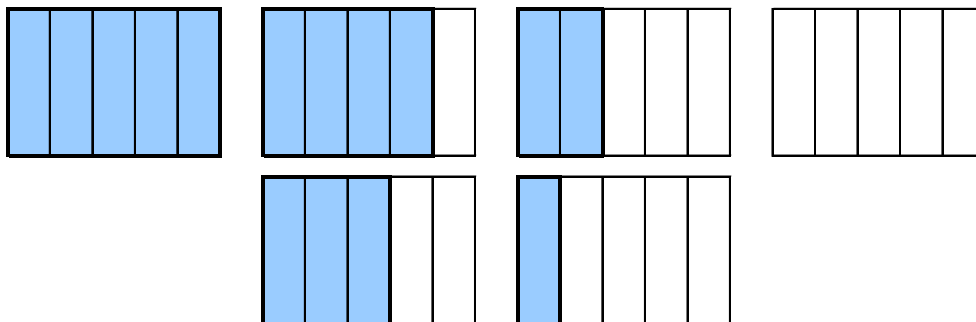
**Figure 3. Any-time, persistent and continuous poverty (or deprivation): the present conceptualisation compared with the traditional view.**

#### Persistence of poverty

Propensity to poverty  
(years ordered in decreasing order of propensity)



#### The conventional view:



#### Subpopulation

1. Poor during all 5 years
2. Poor for 3 or 4 of the 5 years
3. Poor for 1 or 2 of the 5 years
4. Never poor during the 5 years

Continuously poor = 1  
 Persistently poor = 1+2  
 Any-time poor = 1+2+3  
 Never poor = 4  
 Total population = 1+2+3+4

## 6. Dynamic aspects: movements across poverty and deprivation

This section describes how the various dynamic measures of individuals' movements into and out of poverty, of spells and durations in the state of poverty, etc., can be constructed, even though poverty is treated as a propensity rather than simply a "yes-no" state. The more familiar conventional measures are seen only as a special case of the more general formulation below.

### 6.1 Exits from and re-entries to the state of poverty

Given the state of poverty at time  $t=1$ , the objective is to estimate the rates of exit from and re-entry into that state in the following years  $t=2, 3, 4, \dots$ . With

$P_{t,j}$  = propensity to poverty at time  $t$  of individual  $j$

$p_{t,j} = \min(P_{t,j}, P_{1,j})$ , being the propensity to poverty at both times 1 and  $t$ .

Given poverty at time 1, the individual's propensity at time  $t$  to exit from poverty at time  $(t-1)$  is

$$E_{t,j} = \max\left(0, (p_{t-1,j} - p_{t,j})\right).$$

The corresponding "population at risk" is  $p_{t-1,j}$ , giving the exits rate at time  $t$  as:

$$e_{t,j} = \frac{\sum_j w_j \cdot E_{t,j}}{\sum_j w_j \cdot p_{t-1,j}},$$

where  $w_j$  is the sample weight of individual  $j$ .

Similarly, given poverty at time 1 but having exited from it by time  $(t-1)$ , the individual's propensity to re-enter poverty at time  $t$  is

$$R_{t,j} = \max\left(0, (p_{t,j} - p_{t-1,j})\right).$$

The corresponding "population at risk" is that which has escaped by time  $(t-1)$  from poverty at time 1, i.e.,  $p_{1,j} - p_{t-1,j}$ , giving the re-entry rate at time  $t$  as:

$$r_{t,j} = \frac{\sum_j w_j \cdot R_{t,j}}{\sum_j w_j \cdot (p_{1,j} - p_{t-1,j})}.$$

From propensity to poverty at time 1, the gross exit rate over the time  $t=2$  to  $T$  is

$$e_T^{(G)} = \frac{\sum_j w_j \cdot (\sum_t E_{t,j})}{\sum_j w_j \cdot p_{1,j}}.$$

This measures the gross volume of exits experienced, even if some are followed by subsequent re-entry into poverty. Similarly, the gross re-entry rate over the time  $t=3$  to  $T$  is

$$r_T^{(G)} = \frac{\sum_j w_j \cdot (\sum_t R_{t,j})}{\sum_j w_j \cdot p_{1,j}}.$$

The difference between the above two is the net exit rate over the interval:

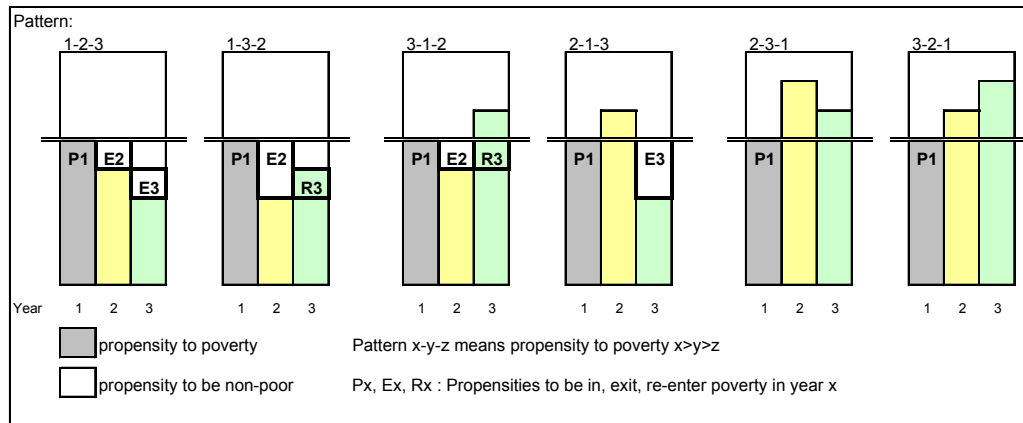


$$e_T^{(N)} = (e_T^{(G)} - r_T^{(G)}) = 1 - \frac{\sum_j w_j \cdot p_{T,j}}{\sum_j w_j \cdot p_{1,j}}$$

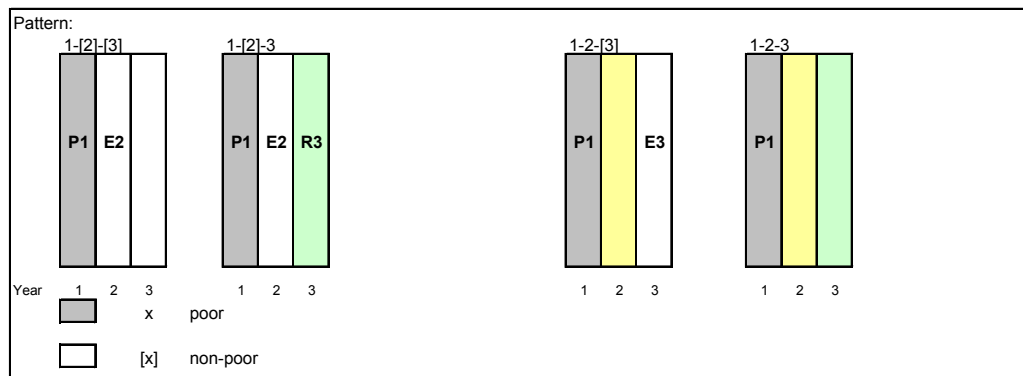
Tables 3.1 to 3.5 report exit and re-entry rates corresponding to the five main measures described above.

[Tables 3.1 to 3.5 about here]

Figure 4. Individuals' propensities to be in poverty and to exit and re-enter poverty: possible patterns over 3 years the present conceptualisation compared with the traditional view.



Patterns for those who are "poor" (conventional measure) in year 1



## 6.2 Time spent in the state of poverty

With the conventional "poor/non-poor" dichotomy, any individual spends specific number of year between 0 and T in the state of poverty during an interval T. However, with poverty treated as a matter of degree, a single individual is seen as contributing to the *whole distribution*, from 0 to T, of the number of years spent in poverty. The individual's contribution to exactly t out of T years spent in poverty is

$$\Pi_{t,j} = P_{(t),j} - P_{(t+1),j} \text{ for } t = 1 \text{ to } T,$$

where, as defined earlier, the propensities to poverty (P) refer to the ordered sequence

$$P_{(1),j} \geq P_{(2),j} \geq \dots \geq P_{(T),j}, \text{ with } P_{(T+1),j} = 0 \text{ defined for convenience.}$$

The individual's contribution to zero years (never) in poverty is the remainder:

$\Pi_{0,j} = 1 - \sum_t \Pi_{t,j} = 1 - P_{(1),j}$ , the sum being over  $t = 1$  to  $T$ .

Obviously, the total time spent by the individual in poverty during the  $T$  years is

$$T_j = \sum_t t \cdot \Pi_{t,j} = \sum_t P_{t,j}.$$

From the above, various measures averaged over the population can be computed, such as the following.

Distribution of the *population* according to the number of years in poverty

$$\bar{\Pi}_t = \frac{\sum_j w_j \cdot \Pi_{t,j}}{\sum_j w_j}, \quad \bar{\Pi}_0 = 1 - \sum_t \bar{\Pi}_t = 1 - \bar{P}^{(A)}, \quad t = 1 \text{ to } T.$$

Mean proportion of the time during  $T$  spent in poverty by the population:

$$\bar{T} = \frac{1}{T} \cdot \frac{\sum_j w_j \cdot T_j}{\sum_j w_j}.$$

Distribution of that *time* according to the number of years in poverty:

$$\bar{T}_t = \frac{\sum_j w_j \cdot (t \cdot \Pi_{t,j})}{\sum_j w_j \cdot T_j} = t \left( \frac{\sum_j w_j \cdot \Pi_{t,j}}{\sum_j w_j \cdot T_j} \right).$$

It is instructive to note how the conventional "poor/non-poor" dichotomous approach is a special case of the above. In that approach, a person is poor during a specific number of years, say  $T_j$  in the range 0 to  $T$ . Only one of the  $\Pi_{t,j}$  values equals 1, the rest being 0.

$$\Pi_{t,j} = 1 \mid T_j = t; \quad \Pi_{t,j} = 0 \mid T_j \neq t; \quad \text{for } t = 0 \text{ to } T.$$

The weighted proportion of the population who spend exactly  $t$  years in poverty is

$$\bar{\Pi}_t = \frac{\sum_j w_j \mid T_j = t}{\sum_j w_j}.$$

The mean proportion of the time spent in poverty is as before:

$$\bar{T} = \frac{1}{T} \cdot \frac{\sum_j w_j \cdot T_j}{\sum_j w_j},$$

the distribution of that time according to the number of years in poverty being:

$$\bar{T}_t = \frac{\sum_j w_j \cdot T_j \mid T_j = t}{\sum_j w_j \cdot T_j}.$$

Tables 4.1 to 4.5 report time spent in poverty corresponding to the five main measures described above.

[Tables 4.1 to 4.5 about here]

Table 1.1

**Cross-sectional income poverty rate**

ECHIP waves 1-5 (balanced panel)

Country	order by (1)	ECHIP wave		Average over waves 1-5							(5) median income (equivalised,PPS)
		w1	w2	(1) poverty	(2) proportion	(3) ratio	(4) parameter	$\alpha$			
		w3	w4	w5	rate	above-average	(2) / (1)				
DK	<b>1</b>	0.08	0.12	0.07	0.07	0.08	0.084	0.188	2.24	0.86	13,247
NL	<b>2</b>	0.10	0.10	0.11	0.09	0.11	0.102	0.204	2.01	1.08	11,665
D	<b>3</b>	0.14	0.13	0.12	0.12	0.13	0.128	0.234	1.83	1.02	13,093
FR	<b>4</b>	0.17	0.17	0.17	0.17	0.17	0.169	0.286	1.69	0.93	11,975
BE	<b>5</b>	0.21	0.18	0.17	0.15	0.16	0.175	0.276	1.58	1.06	13,258
IRL	<b>6</b>	0.17	0.21	0.21	0.21	0.17	0.192	0.312	1.63	0.92	9,007
UK	<b>7</b>	0.18	0.20	0.19	0.20	0.20	0.195	0.304	1.56	0.96	12,411
IT	<b>8</b>	0.22	0.19	0.20	0.19	0.18	0.196	0.298	1.52	1.05	8,937
ES	<b>9</b>	0.22	0.20	0.19	0.19	0.18	0.195	0.297	1.52	1.10	7,644
EL	<b>10</b>	0.22	0.21	0.20	0.23	0.21	0.215	0.315	1.47	1.05	6,867
PT	<b>11</b>	0.24	0.25	0.23	0.25	0.20	0.234	0.329	1.41	1.08	6,169
simple average		0.18	0.18	0.17	0.17	0.16	0.171	0.277	1.62	1.01	10,388

Table 1.2

**Relative trend in median equivalised household income**

ECHP waves 1-5 (balanced panel); data not adjusted for price inflation.

Country		w1	w2	w3	w4	w5	mean	difference w5 - w1
DK	<b>1</b>	94	98	98	104	106	100	12
NL	<b>2</b>	93	93	97	104	114	100	21
D	<b>3</b>	95	97	100	103	105	100	11
FR	<b>4</b>	95	99	99	102	106	100	11
BE	<b>5</b>	99	96	95	105	105	100	5
IRL	<b>6</b>	84	96	102	104	114	100	30
UK	<b>7</b>	91	96	96	107	110	100	19
IT	<b>8</b>	95	98	100	103	105	100	11
ES	<b>9</b>	99	96	96	103	106	100	7
EL	<b>10</b>	89	96	99	106	110	100	21
PT	<b>11</b>	91	97	99	104	108	100	17
simple average		93	97	98	104	108	100	15

Table 1.3

**Cross-sectional life-style deprivation rate**

ECHP waves 1-5 (balanced panel)

Country	order	ECHP wave					(1) average	(2) av proportior	(3) ratio	(4) ratio of (1)	(5) ratio of (1) to
	by (1)	w1	w2	w3	w4	w5	wave1-5	above-average	(2) / (1)	to av. income	( I/ med income )
								propensity	poverty rate (I)	(re-scaled)	
DK	<b>1</b>	0.12	0.09	0.11	0.07	0.05	0.089	0.346	3.89	1.06	<u>1.81</u>
NL	<b>2</b>	0.11	0.10	0.10	0.09	0.05	0.092	0.360	3.93	0.90	<u>1.36</u>
D	<b>3</b>										
FR	<b>4</b>	0.19	0.16	0.15	0.15	0.10	0.150	0.381	2.53	0.89	1.38
BE	<b>5</b>	0.15	0.16	0.13	0.13	0.08	0.129	0.366	2.84	0.74	<u>1.26</u>
IRL	<b>6</b>	0.20	0.17	0.18	0.16	0.09	0.160	0.366	2.28	0.83	0.97
UK	<b>7</b>										
IT	<b>8</b>	0.18	0.16	0.16	0.16	0.10	0.152	0.380	2.51	0.77	0.89
ES	<b>9</b>	0.24	0.21	0.21	0.20	0.12	0.197	0.415	2.11	1.01	0.99
EL	<b>10</b>	0.30	0.28	0.27	0.27	0.17	0.256	0.419	1.63	1.19	1.06
PT	<b>11</b>	0.36	0.35	0.34	0.33	0.20	0.316	0.415	1.31	1.35	1.08
simple average		0.21	0.19	0.18	0.17	0.11	0.171	0.383	2.24	<b>1.00</b>	1.0*

\* average IRL to PT

Table 1.4

**Cross-sectional latent deprivation rate**

ECHP waves 1-5 (balanced panel)

Country	order by (1)	ECHP wave					(1) average wave1-5	(2) proportion above-average propensity	(3) ratio (2) / (1)	(4) ratio of (1) to av. income poverty rate (I)	(5) inverse of (4) income poverty rate (I) to (1)	(6) ratio of life-style dep. rate (D) to (1)
		w1	w2	w3	w4	w5						
DK	<b>1</b>	0.17	0.18	0.16	0.12	0.12	0.150	0.317	2.11	1.79	0.56	0.59
NL	<b>2</b>	0.17	0.17	0.17	0.15	0.14	0.159	0.293	1.84	1.56	0.64	0.58
D	<b>3</b>											
FR	<b>4</b>	0.27	0.25	0.24	0.24	0.21	0.244	0.348	1.43	1.44	0.69	0.62
BE	<b>5</b>	0.28	0.26	0.24	0.22	0.20	0.241	0.333	1.38	1.38	0.73	0.54
IRL	<b>6</b>	0.28	0.28	0.28	0.27	0.20	0.262	0.366	1.40	1.37	0.73	0.61
UK	<b>7</b>											
IT	<b>8</b>	0.30	0.27	0.27	0.27	0.23	0.269	0.343	1.28	1.37	0.73	0.56
ES	<b>9</b>	0.35	0.31	0.31	0.30	0.24	0.300	0.377	1.26	1.54	0.65	0.65
EL	<b>10</b>	0.39	0.37	0.36	0.38	0.29	0.357	0.390	1.09	1.66	0.60	0.72
PT	<b>11</b>	0.45	0.44	0.42	0.42	0.30	0.407	0.427	1.05	1.74	0.58	0.78
simple average		0.29	0.28	0.27	0.26	0.22	0.265	0.355	1.34	1.55	<b>0.65</b>	<b>0.65</b>

Table 1.5

**Cross-sectional manifest deprivation rate**

ECHP waves 1-5 (balanced panel)

Country	order by (1)	ECHP wave					(1) average wave1-5	(2) proportion above-average propensity	(3) ratio (2) / (1)	(4) ratio of (1) to av. income poverty rate (I)	(5) ratio of (1) to av. life-style dep. rate (D)	(6) ratio of (1) to av. latent dep. rate (L)
		w1	w2	w3	w4	w5						
DK	<b>1</b>	0.03	0.03	0.02	0.02	0.02	0.023	0.193	8.47	0.27	0.26	0.15
NL	<b>2</b>	0.04	0.04	0.04	0.03	0.02	0.035	0.207	5.98	0.34	0.38	0.22
D	<b>3</b>											
FR	<b>4</b>	0.08	0.08	0.08	0.08	0.06	0.076	0.276	3.65	0.45	0.50	0.31
BE	<b>5</b>	0.08	0.08	0.06	0.06	0.04	0.063	0.250	3.97	0.36	0.49	0.26
IRL	<b>6</b>	0.10	0.10	0.10	0.09	0.05	0.090	0.292	3.25	0.47	0.56	0.34
UK	<b>7</b>											
IT	<b>8</b>	0.10	0.09	0.08	0.08	0.05	0.079	0.282	3.56	0.40	0.52	0.29
ES	<b>9</b>	0.12	0.10	0.09	0.09	0.06	0.092	0.312	3.40	0.47	0.47	0.31
EL	<b>10</b>	0.13	0.12	0.11	0.12	0.08	0.114	0.338	2.95	0.53	0.45	0.32
PT	<b>11</b>	0.15	0.16	0.15	0.16	0.10	0.144	0.341	2.37	0.61	0.45	0.35
simple average		0.09	0.09	0.08	0.08	0.05	0.079	0.277	3.48	<b>0.46</b>	<b>0.46</b>	0.30

Table 2.1

**Longitudinal income poverty rates (fuzzy measures)**

ECHP waves 1-5 (balanced panel)

Country		(1) average	(2)	(3)	(4)	Ratio:			
		cross-sectional rate, wave1-5	any-time rate	persistent rate	continuous rate	(5)= (2)/(1)	(6)= (3)/(1)	(7)= (4)/(1)	(8)= (4)/(2)
DK	<b>1</b>	0,08	0,21	0,06	0,02	2,51	0,69	0,21	0,08
NL	<b>2</b>	0,10	0,22	0,08	0,03	2,11	0,82	0,29	0,14
D	<b>3</b>	0,13	0,26	0,11	0,04	2,00	0,84	0,34	0,17
FR	<b>4</b>	0,17	0,30	0,15	0,08	1,75	0,90	0,46	0,27
BE	<b>5</b>	0,18	0,33	0,16	0,05	1,88	0,94	0,30	0,16
IRL	<b>6</b>	0,19	0,34	0,18	0,07	1,75	0,92	0,39	0,22
UK	<b>7</b>	0,19	0,36	0,18	0,07	1,85	0,91	0,36	0,19
IT	<b>8</b>	0,20	0,36	0,18	0,07	1,85	0,90	0,37	0,20
ES	<b>9</b>	0,20	0,37	0,17	0,06	1,90	0,89	0,32	0,17
EL	<b>10</b>	0,21	0,39	0,20	0,08	1,82	0,91	0,38	0,21
PT	<b>11</b>	0,23	0,39	0,22	0,11	1,66	0,94	0,46	0,28
simple average		0,17	0,32	0,15	0,06	1,86	0,89	0,37	0,20
excluding D and UK		0,17	0,32	0,16	0,06	1,85	0,90	0,37	0,20

Note. In cols. (5) onwards, combined ratio of simple averages over countries has been taken (rather than average of separate country ratios)



Table 2.2

**Longitudinal income poverty rates (conventional measures)**

ECHP waves 1-5 (balanced panel)

		(1) average cross-sectional rate, wave1-5	(2) any-time rate	(3) persistent rate	(4) continuous rate	Ratio: (5)= (2)/(1)	(6)= (3)/(1)	(7)= (4)/(1)	(8)= (4)/(2)	Ratio of conventional to fuzzy income measures measure= (2)/(1)	(3)/(1)	(4)/(1)	(4)/(2)
DK	<b>1</b>	0,08	0,23	0,05	0,01	2,74	0,62	0,15	0,05	1,09	0,89	0,71	0,65
NL	<b>2</b>	0,10	0,22	0,08	0,02	2,22	0,82	0,23	0,10	1,05	0,99	0,78	0,75
D	<b>3</b>	0,12	0,26	0,10	0,03	2,18	0,83	0,24	0,11	1,09	0,99	0,70	0,64
FR	<b>4</b>	0,18	0,32	0,16	0,08	1,79	0,89	0,45	0,25	1,03	0,98	0,98	0,95
BE	<b>5</b>	0,18	0,36	0,17	0,04	2,00	0,93	0,22	0,11	1,06	0,99	0,74	0,69
IRL	<b>6</b>	0,19	0,36	0,18	0,05	1,89	0,92	0,28	0,15	1,08	0,99	0,73	0,68
UK	<b>7</b>	0,19	0,38	0,17	0,06	1,97	0,90	0,29	0,15	1,07	0,98	0,82	0,77
IT	<b>8</b>	0,19	0,38	0,16	0,06	1,95	0,85	0,29	0,15	1,06	0,95	0,78	0,73
ES	<b>9</b>	0,20	0,40	0,17	0,05	2,04	0,87	0,25	0,12	1,07	0,98	0,77	0,72
EL	<b>10</b>	0,22	0,41	0,20	0,07	1,91	0,91	0,30	0,16	1,05	1,00	0,80	0,76
PT	<b>11</b>	0,23	0,41	0,22	0,10	1,76	0,93	0,43	0,24	1,06	0,99	0,94	0,88
simple average		0,17	0,34	0,15	0,05	1,98	0,88	0,30	0,15	1,06	0,98	0,82	0,77

Note. In cols. (5) onwards, combined ratio of simple averages over countries has been taken (rather than average of separate country ratios)

Table 2.3

**Longitudinal life-style deprivation rates**

ECHP waves 1-5 (balanced panel)

Country		(1) average	(2)	(3)	(4)	Ratio:				Ratio of life-style deprivation to (fuzzy) income measures			
		cross-sectional rate, wave1-5	any-time rate	persistent rate	continuous rate	(5)= (2)/(1)	(6)= (3)/(1)	(7)= (4)/(1)	(8)= (4)/(2)	measure= (2)/(1)	(3)/(1)	(4)/(1)	(4)/(2)
DK	<b>1</b>	0,09	0,18	0,08	0,03	2,01	0,86	0,30	0,15	0,80	1,24	1,45	1,81
NL	<b>2</b>	0,09	0,17	0,08	0,03	1,85	0,91	0,35	0,19	0,87	1,10	1,21	1,39
D	<b>3</b>												
FR	<b>4</b>	0,15	0,26	0,14	0,07	1,70	0,95	0,43	0,25	0,98	1,05	0,94	0,96
BE	<b>5</b>	0,13	0,23	0,12	0,05	1,82	0,91	0,38	0,21	0,97	0,97	1,27	1,32
IRL	<b>6</b>	0,16	0,28	0,15	0,06	1,75	0,94	0,40	0,23	1,00	1,02	1,03	1,04
UK	<b>7</b>												
IT	<b>8</b>	0,15	0,26	0,14	0,06	1,74	0,93	0,40	0,23	0,94	1,04	1,09	1,16
ES	<b>9</b>	0,20	0,33	0,19	0,08	1,68	0,96	0,42	0,25	0,88	1,08	1,30	1,47
EL	<b>10</b>	0,26	0,41	0,25	0,12	1,60	0,97	0,47	0,30	0,88	1,07	1,25	1,42
PT	<b>11</b>	0,32	0,46	0,32	0,17	1,47	1,00	0,53	0,36	0,89	1,06	1,14	1,29
simple average		0,17	0,29	0,16	0,07	1,68	0,95	0,43	0,26	0,91	1,06	1,18	1,30

Note. In cols. (5) onwards, combined ratio of simple averages over countries has been taken (rather than average of separate country ratios). D & UK excluded.

Table 2.4

**Longitudinal latent deprivation rates**

ECHP waves 1-5 (balanced panel)

Country		(1) average	(2)	(3)	(4)	Ratio:				Ratio of latent deprivation to (fuzzy) income measures			
		cross-sectional rate, wave1-5	any-time rate	persistent rate	continuous rate	(5)= (2)/(1)	(6)= (3)/(1)	(7)= (4)/(1)	(8)= (4)/(2)	measure= (2)/(1)	(3)/(1)	(4)/(1)	(4)/(2)
DK	<b>1</b>	0,15	<b>0,31</b>	0,13	0,05	2,08	0,84	0,31	0,15	0,83	1,20	1,49	1,80
NL	<b>2</b>	0,16	<b>0,30</b>	0,14	0,06	1,88	0,88	0,38	0,20	0,89	1,07	1,32	1,48
D	<b>3</b>												
FR	<b>4</b>	0,24	<b>0,40</b>	0,23	0,12	1,62	0,94	0,51	0,31	0,93	1,04	1,09	1,18
BE	<b>5</b>	0,24	<b>0,41</b>	0,23	0,10	1,71	0,94	0,43	0,25	0,91	1,00	1,43	1,56
IRL	<b>6</b>	0,26	<b>0,43</b>	0,25	0,12	1,65	0,95	0,47	0,29	0,94	1,02	1,21	1,29
UK	<b>7</b>												
IT	<b>8</b>	0,27	<b>0,45</b>	0,25	0,13	1,67	0,93	0,47	0,28	0,90	1,04	1,29	1,42
ES	<b>9</b>	0,30	<b>0,49</b>	0,28	0,14	1,64	0,94	0,46	0,28	0,86	1,06	1,44	1,66
EL	<b>10</b>	0,36	<b>0,55</b>	0,35	0,18	1,55	0,97	0,52	0,33	0,85	1,07	1,36	1,60
PT	<b>11</b>	0,41	<b>0,58</b>	0,41	0,23	1,43	1,00	0,57	0,40	0,86	1,06	1,24	1,43
simple average		0,27	<b>0,44</b>	0,25	0,13	1,64	0,94	0,48	0,29	0,89	1,05	1,29	1,46

Note. In cols. (5) onwards, combined ratio of simple averages over countries has been taken (rather than average of separate country ratios). D & UK excluded.

Table 2.5

**Longitudinal manifest deprivation rates**

ECHIP waves 1-5 (balanced panel)

Country		(1) average	(2)	(3)	(4)	Ratio:				Ratio of manifest deprivation to (fuzzy) income measures			
		cross-sectional rate, wave1-5	any-time rate	persistent rate	continuous rate	(5)= (2)/(1)	(6)= (3)/(1)	(7)= (4)/(1)	(8)= (4)/(2)	measure= (2)/(1)	(3)/(1)	(4)/(1)	(4)/(2)
DK	<b>1</b>	0,02	0,06	0,01	<b>0,00</b>	2,66	0,57	0,12	0,04	1,06	0,82	0,57	0,53
NL	<b>2</b>	0,03	0,07	0,03	<b>0,01</b>	2,05	0,86	0,28	0,14	0,97	1,04	0,98	1,01
D	<b>3</b>												
FR	<b>4</b>	0,08	0,13	0,07	<b>0,03</b>	1,75	0,93	0,43	0,24	1,00	1,02	0,92	0,92
BE	<b>5</b>	0,06	0,13	0,05	<b>0,02</b>	2,06	0,85	0,25	0,12	1,10	0,91	0,85	0,77
IRL	<b>6</b>	0,09	0,16	0,08	<b>0,03</b>	1,79	0,94	0,35	0,19	1,02	1,02	0,89	0,88
UK	<b>7</b>												
IT	<b>8</b>	0,08	0,15	0,07	<b>0,03</b>	1,91	0,89	0,33	0,18	1,04	1,00	0,91	0,87
ES	<b>9</b>	0,09	0,18	0,08	<b>0,03</b>	1,91	0,89	0,30	0,15	1,01	1,01	0,93	0,92
EL	<b>10</b>	0,11	0,22	0,10	<b>0,04</b>	1,89	0,91	0,33	0,17	1,04	1,00	0,86	0,83
PT	<b>11</b>	0,14	0,25	0,13	<b>0,06</b>	1,73	0,94	0,40	0,23	1,04	0,99	0,87	0,84
simple average		0,08	0,15	0,07	<b>0,03</b>	1,88	0,90	0,34	0,18	1,02	1,00	0,91	0,90

Note. In cols. (5) onwards, combined ratio of simple averages over countries has been taken (rather than average of separate country ratios). D & UK excluded.

Table 3.1

**Of poor in year 1, exits and re-entries into poverty over 5 years (fuzzy measure)**

ECHP waves 1-5 (balanced panel)

(1) country	Of poor in year 1:					Gross rate over 5 year		Exit		Re-entry	net exit rate
	(2) Exit in yr 2	Of (2) re-enter in yr 3	(3) Exit in yr 3	Of (3) re-enter in yr 4	(4) Exit in yr 4	Of (4) re-enter in yr 5	(5) Exit in yr 5				
DK	<b>1</b>	0,38	0,24	0,40	0,24	0,37	0,27	0,34	0,94	0,38	0,56
NL	<b>2</b>	0,39	0,34	0,21	0,19	0,27	0,23	0,23	0,81	0,32	0,49
D	<b>3</b>	0,38	0,19	0,25	0,15	0,25	0,19	0,20	0,76	0,24	0,52
FR	<b>4</b>	0,28	0,21	0,16	0,24	0,16	0,22	0,14	0,59	0,22	0,37
BE	<b>5</b>	0,37	0,35	0,25	0,19	0,28	0,35	0,35	0,88	0,38	0,50
IRL	<b>6</b>	0,21	0,30	0,19	0,26	0,18	0,17	0,27	0,66	0,20	0,46
UK	<b>7</b>	0,31	0,27	0,23	0,28	0,17	0,23	0,21	0,71	0,28	0,43
IT	<b>8</b>	0,40	0,33	0,21	0,23	0,22	0,27	0,21	0,78	0,34	0,44
ES	<b>9</b>	0,37	0,37	0,31	0,29	0,26	0,25	0,27	0,86	0,37	0,49
EL	<b>10</b>	0,35	0,28	0,22	0,34	0,16	0,24	0,23	0,74	0,32	0,42
PT	<b>11</b>	0,22	0,23	0,19	0,30	0,15	0,17	0,25	0,64	0,20	0,44
simple average		0,33	0,28	0,24	0,25	0,22	0,23	0,25	0,76	0,30	0,47
excluding D & UK		0,33	0,29	0,24	0,25	0,23	0,24	0,25	0,77	0,30	0,46

Table 3.2(a)

**Of poor in year 1, exits and re-entries into poverty over 5 years (conventional measure)**

ECHP waves 1-5 (balanced panel)

(1) country	Of poor in year 1:							Gross rate over 5 year		net exit rate	
	(2) Exit in yr 2	Of (2) re-enter in yr 3	(3) Exit in yr 3	Of (3) re-enter in yr 4	(4) Exit in yr 4	Of (4) re-enter in yr 5	(5) Exit in yr 5	Exit	Re-entry		
DK	<b>1</b>	0,42	0,27	0,45	0,25	0,40	0,24	0,29	0,97	0,40	0,57
NL	<b>2</b>	0,41	0,36	0,25	0,19	0,33	0,23	0,35	0,92	0,35	0,57
D	<b>3</b>	0,44	0,20	0,32	0,14	0,34	0,15	0,29	0,89	0,25	0,64
FR	<b>4</b>	0,29	0,18	0,17	0,25	0,22	0,22	0,12	0,62	0,23	0,39
BE	<b>5</b>	0,41	0,39	0,33	0,18	0,35	0,29	0,39	0,97	0,40	0,57
IRL	<b>6</b>	0,24	0,28	0,25	0,34	0,28	0,26	0,39	0,84	0,30	0,54
UK	<b>7</b>	0,35	0,25	0,27	0,25	0,20	0,21	0,26	0,78	0,29	0,49
IT	<b>8</b>	0,45	0,30	0,26	0,21	0,27	0,29	0,26	0,87	0,38	0,49
ES	<b>9</b>	0,41	0,40	0,37	0,26	0,34	0,27	0,30	0,95	0,42	0,53
EL	<b>10</b>	0,40	0,25	0,28	0,34	0,18	0,21	0,26	0,82	0,34	0,48
PT	<b>11</b>	0,24	0,28	0,23	0,28	0,14	0,20	0,28	0,69	0,23	0,46
simple average		0,37	0,29	0,29	0,25	0,28	0,23	0,29	0,85	0,33	0,52

Table 3.2(b)

**Of poor in year 1, exits and re-entries into poverty over 5 years:  
ratio of statistics for conventional to fuzzy income measures**

ECHP waves 1-5 (balanced panel)

(1) country	Of poor in year 1:							Gross rate over 5 year		net exit rate	
	(2) Exit in yr 2	Of (2) re-enter in yr 3	(3) Exit in yr 3	Of (3) re-enter in yr 4	(4) Exit in yr 4	Of (4) re-enter in yr 5	(5) Exit in yr 5	Exit	Re-entry		
DK	<b>1</b>	1,10	1,13	1,13	1,03	1,08	0,89	0,86	1,03	1,06	1,01
NL	<b>2</b>	1,06	1,06	1,14	1,00	1,21	1,00	1,52	1,14	1,10	1,17
D	<b>3</b>	1,14	1,05	1,27	0,96	1,36	0,79	1,47	1,16	1,05	1,21
FR	<b>4</b>	1,04	0,86	1,06	1,03	1,34	1,02	0,89	1,05	1,06	1,05
BE	<b>5</b>	1,08	1,10	1,32	0,93	1,23	0,84	1,12	1,10	1,06	1,14
IRL	<b>6</b>	1,14	0,93	1,34	1,35	1,61	1,53	1,45	1,27	1,53	1,16
UK	<b>7</b>	1,10	0,95	1,16	0,89	1,16	0,92	1,25	1,11	1,03	1,16
IT	<b>8</b>	1,14	0,92	1,23	0,91	1,19	1,09	1,22	1,11	1,12	1,11
ES	<b>9</b>	1,11	1,07	1,21	0,90	1,30	1,08	1,10	1,10	1,14	1,08
EL	<b>10</b>	1,13	0,90	1,23	1,00	1,13	0,87	1,15	1,11	1,07	1,13
PT	<b>11</b>	1,09	1,21	1,17	0,94	0,95	1,18	1,13	1,08	1,15	1,04
Ratio of simple averages over countries											
		1,10	1,02	1,21	0,99	1,23	1,00	1,19	1,11	1,11	1,12

Table 3.3

**Of poor in year 1, exits and re-entries into poverty over 5 years:  
ratio of statistics for life-style deprivation to (fuzzy) income measures**

ECHP waves 1-5 (balanced panel)

(1) country	Of poor in year 1:							Gross rate over 5 year			net exit rate
	(2) Exit in yr 2	Of (2) re-enter in yr 3	(3) Exit in yr 3	Of (3) re-enter in yr 4	(4) Exit in yr 4	Of (4) re-enter in yr 5	(5) Exit in yr 5	Exit	Re-entry		
DK	<b>1</b>	1,04	1,46	0,59	0,72	1,11	0,43	1,17	1,01	0,73	1,20
NL	<b>2</b>	0,89	0,90	0,98	1,49	0,83	0,46	1,77	1,07	0,81	1,24
D	<b>3</b>										
FR	<b>4</b>	1,20	1,25	1,24	1,36	1,17	0,57	2,30	1,33	1,18	1,42
BE	<b>5</b>	0,76	0,86	0,94	1,63	0,80	0,41	0,98	0,91	0,68	1,10
IRL	<b>6</b>	1,60	1,22	0,89	0,91	1,16	0,42	1,59	1,28	1,15	1,34
UK	<b>7</b>										
IT	<b>8</b>	0,77	0,92	1,04	1,28	0,77	0,42	1,70	1,02	0,72	1,26
ES	<b>9</b>	0,80	1,04	0,62	1,12	0,78	0,46	1,46	0,96	0,69	1,16
EL	<b>10</b>	0,77	1,01	0,68	0,79	0,79	0,45	1,49	0,95	0,60	1,22
PT	<b>11</b>	0,87	1,49	0,64	0,95	0,68	0,44	1,40	0,99	0,73	1,11
Ratio of simple averages over countries (excluding D & UK)		0,93	1,10	0,81	1,10	0,90	0,45	1,46	1,05	0,78	1,22



Table 3.4

**Of poor in year 1, exits and re-entries into poverty over 5 years:  
ratio of statistics for latent deprivation to (fuzzy) income measures**

ECHP waves 1-5 (balanced panel)

(1) country	Of poor in year 1:								Gross rate over 5 year		net exit rate
	(2) Exit in yr 2	Of (2) re-enter in yr 3	(3) Exit in yr 3	Of (3) re-enter in yr 4	(4) Exit in yr 4	Of (4) re-enter in yr 5	(5) Exit in yr 5	Exit	Re-entry		
DK	<b>1</b>	0,88	1,43	0,62	0,74	0,97	0,73	0,92	0,92	0,77	1,02
NL	<b>2</b>	0,85	0,94	0,91	1,36	0,77	0,87	1,19	0,94	0,87	0,99
D	<b>3</b>										
FR	<b>4</b>	0,92	1,25	1,13	1,14	0,94	0,82	1,44	1,06	0,99	1,11
BE	<b>5</b>	0,80	0,95	0,82	1,17	0,78	0,83	0,76	0,85	0,78	0,90
IRL	<b>6</b>	1,15	1,13	0,71	0,99	0,88	0,82	1,08	1,00	0,97	1,01
UK	<b>7</b>										
IT	<b>8</b>	0,79	0,95	0,81	1,28	0,74	0,89	1,07	0,89	0,82	0,93
ES	<b>9</b>	0,77	1,15	0,59	1,09	0,74	0,83	1,04	0,86	0,76	0,93
EL	<b>10</b>	0,70	1,04	0,63	1,04	0,71	0,87	1,10	0,84	0,71	0,94
PT	<b>11</b>	0,76	1,36	0,62	1,08	0,67	0,82	1,13	0,88	0,76	0,94
Ratio of simple averages over countries (excluding D & UK)											
		0,83	1,11	0,73	1,09	0,81	0,83	1,04	0,91	0,81	0,97

Table 3.5

**Of poor in year 1, exits and re-entries into poverty over 5 years:  
ratio of statistics for manifest deprivation to (fuzzy) income measures**

ECHP waves 1-5 (balanced panel)

(1) country	Of poor in year 1:								Gross rate over 5 year		net exit rate
	(2) Exit in yr 2	Of (2) re-enter in yr 3	(3) Exit in yr 3	Of (3) re-enter in yr 4	(4) Exit in yr 4	Of (4) re-enter in yr 5	(5) Exit in yr 5	Exit	Re-entry		
DK	<b>1</b>	1,37	0,75	1,50	1,05	1,31	0,53	1,86	1,23	0,99	1,39
NL	<b>2</b>	1,05	0,99	0,85	0,96	1,09	0,53	1,62	1,10	0,84	1,27
D	<b>3</b>										
FR	<b>4</b>	1,20	1,26	1,17	1,48	1,11	0,68	2,01	1,28	1,25	1,29
BE	<b>5</b>	1,04	0,80	1,16	1,48	1,13	0,62	1,37	1,11	0,91	1,27
IRL	<b>6</b>	1,37	1,07	1,04	1,05	1,22	0,50	1,58	1,26	1,09	1,33
UK	<b>7</b>										
IT	<b>8</b>	0,99	0,94	1,07	0,94	1,01	0,50	1,75	1,11	0,80	1,35
ES	<b>9</b>	0,99	0,91	1,09	0,98	0,97	0,53	1,57	1,10	0,84	1,29
EL	<b>10</b>	1,08	1,04	1,10	0,78	1,19	0,52	1,49	1,14	0,86	1,35
PT	<b>11</b>	1,20	1,16	1,10	0,90	0,99	0,54	1,38	1,16	0,98	1,24
Ratio of simple averages over countries (excluding D & UK)											
		1,13	0,98	1,15	1,04	1,12	0,55	1,60	1,16	0,93	1,31

Table 4.1

**Time spent in income poverty during a 5 year period (fuzzy measure)**

ECHP waves 1-5 (balanced panel)

		Distribution of the population according to the number of years in poverty					Distribution of the time spent in poverty according to the number of years					mean proportion of the 5 yrs	
		zero	1 yr	2 yrs	3 yrs	4 yrs	5 yrs	1 yr	2 yrs	3 yrs	4 yrs		5 yrs
DK	<b>1</b>	0,79	0,11	0,04	0,02	0,02	0,02	0,27	0,19	0,17	0,17	0,21	0,42
NL	<b>2</b>	0,78	0,09	0,04	0,03	0,03	0,03	0,18	0,16	0,17	0,20	0,29	0,51
D	<b>3</b>	0,74	0,10	0,05	0,03	0,03	0,04	0,16	0,15	0,16	0,19	0,34	0,64
FR	<b>4</b>	0,70	0,09	0,05	0,04	0,04	0,08	0,11	0,11	0,12	0,19	0,46	0,84
BE	<b>5</b>	0,67	0,11	0,05	0,05	0,06	0,05	0,13	0,12	0,17	0,28	0,30	0,88
IRL	<b>6</b>	0,66	0,10	0,06	0,05	0,06	0,07	0,10	0,13	0,15	0,23	0,39	0,96
UK	<b>7</b>	0,64	0,11	0,07	0,06	0,05	0,07	0,12	0,14	0,18	0,20	0,36	0,97
IT	<b>8</b>	0,64	0,12	0,07	0,05	0,05	0,07	0,12	0,14	0,15	0,22	0,37	0,98
ES	<b>9</b>	0,63	0,11	0,08	0,06	0,05	0,06	0,12	0,17	0,18	0,21	0,32	0,98
EL	<b>10</b>	0,61	0,12	0,07	0,06	0,06	0,08	0,11	0,14	0,16	0,22	0,38	1,07
PT	<b>11</b>	0,61	0,10	0,07	0,05	0,06	0,11	0,09	0,11	0,14	0,21	0,46	1,17
simple average		0,68	0,11	0,06	0,05	0,05	0,06	0,14	0,14	0,16	0,21	0,35	0,86
excluding D & UK		0,68	0,11	0,06	0,04	0,05	0,06	0,14	0,14	0,16	0,21	0,35	0,87

Table 4.2

**Time spent in income poverty during a 5 year period**  
**ratio of statistics for conventional to fuzzy income measures**

ECHP waves 1-5 (balanced panel)

		Distribution of the population according to the number of years in poverty						Distribution of the time spent in poverty according to the number of years					mean proportion of the 5 yrs
		zero	1 yr	2 yrs	3 yrs	4 yrs	5 yrs	1 yr	2 yrs	3 yrs	4 yrs	5 yrs	
DK	<b>1</b>	0,98	1,17	1,08	0,95	0,92	0,70	1,20	1,10	0,97	0,94	0,71	0,98
NL	<b>2</b>	0,99	1,07	1,05	1,19	0,96	0,77	1,10	1,07	1,22	0,98	0,78	0,98
D	<b>3</b>	0,99	1,12	1,03	1,20	1,00	0,65	1,20	1,10	1,29	1,07	0,70	0,93
FR	<b>4</b>	0,97	1,10	1,15	1,16	0,92	1,02	1,05	1,11	1,11	0,88	0,98	1,04
BE	<b>5</b>	0,95	1,19	1,16	1,20	1,11	0,77	1,14	1,11	1,15	1,07	0,74	1,04
IRL	<b>6</b>	0,96	1,15	1,19	1,31	1,07	0,73	1,15	1,19	1,32	1,07	0,73	1,00
UK	<b>7</b>	0,97	1,13	1,14	1,17	0,96	0,81	1,15	1,15	1,18	0,97	0,82	0,99
IT	<b>8</b>	0,97	1,07	1,30	0,93	1,17	0,77	1,08	1,31	0,94	1,18	0,78	0,99
ES	<b>9</b>	0,95	1,18	1,15	1,21	0,96	0,77	1,17	1,15	1,21	0,96	0,77	1,00
EL	<b>10</b>	0,96	1,14	1,08	1,14	1,17	0,81	1,13	1,07	1,13	1,16	0,80	1,01
PT	<b>11</b>	0,96	1,35	0,87	1,05	1,03	0,94	1,35	0,87	1,05	1,03	0,94	1,00
simple average		0,97	1,15	1,11	1,14	1,04	0,82	1,16	1,12	1,14	1,03	0,81	1,00

Table 4.3

**Time spent in life-style deprivation during a 5 year period**  
**ratio of statistics for life-style deprivation to (fuzzy) income measures**

ECHP waves 1-5 (balanced panel)

		Distribution of the population according to the number of years in poverty						Distribution of the time spent in poverty according to the number of years					mean proportion of the 5 yrs
		zero	1 yr	2 yrs	3 yrs	4 yrs	5 yrs	1 yr	2 yrs	3 yrs	4 yrs	5 yrs	
DK	<b>1</b>	1,04	0,58	0,92	1,19	1,25	1,53	0,54	0,87	1,12	1,19	1,45	1,06
NL	<b>2</b>	1,06	0,59	0,80	0,88	0,99	1,09	0,66	0,89	0,98	1,10	1,21	0,90
D	<b>3</b>												
FR	<b>4</b>	1,06	0,76	0,85	1,13	0,97	0,83	0,86	0,96	1,27	1,09	0,94	0,89
BE	<b>5</b>	1,14	0,66	0,82	0,68	0,56	0,94	0,89	1,12	0,92	0,76	1,27	0,74
IRL	<b>6</b>	1,08	0,86	0,75	0,91	0,78	0,86	1,03	0,90	1,09	0,93	1,03	0,83
UK	<b>7</b>												
IT	<b>8</b>	1,16	0,63	0,70	0,76	0,79	0,84	0,81	0,91	0,99	1,02	1,09	0,77
ES	<b>9</b>	1,07	0,74	0,68	0,84	1,10	1,31	0,74	0,68	0,83	1,09	1,30	1,01
EL	<b>10</b>	0,97	0,82	0,84	1,06	1,18	1,49	0,69	0,70	0,89	0,99	1,25	1,19
PT	<b>11</b>	0,88	0,84	0,95	1,15	1,48	1,54	0,62	0,71	0,85	1,10	1,14	1,35
simple average excluding D & UK		1,05	0,72	0,80	0,94	0,99	1,16	0,73	0,85	0,99	1,01	1,16	0,99

Table 4.4

**Time spent in latent deprivation during a 5 year period**  
**ratio of statistics for latent deprivation to (fuzzy) income measures**

ECHP waves 1-5 (balanced panel)

		Distribution of the population according to the number of years in poverty						Distribution of the time spent in poverty according to the number of years					mean proportion of the 5 yrs
		zero	1 yr	2 yrs	3 yrs	4 yrs	5 yrs	1 yr	2 yrs	3 yrs	4 yrs	5 yrs	
		DK	<b>1</b>	0,87	1,16	1,41	1,84	2,06	2,67	0,65	0,79	1,03	
NL	<b>2</b>	0,89	1,16	1,34	1,40	1,51	2,06	0,74	0,86	0,90	0,97	1,32	1,56
D	<b>3</b>												
FR	<b>4</b>	0,86	1,09	1,31	1,42	1,42	1,57	0,76	0,91	0,99	0,98	1,09	1,44
BE	<b>5</b>	0,87	1,08	1,26	1,09	1,11	1,96	0,78	0,92	0,79	0,81	1,43	1,38
IRL	<b>6</b>	0,86	1,20	1,08	1,20	1,21	1,66	0,88	0,79	0,88	0,89	1,21	1,37
UK	<b>7</b>												
IT	<b>8</b>	0,86	1,03	1,13	1,19	1,17	1,76	0,76	0,82	0,87	0,86	1,29	1,37
ES	<b>9</b>	0,81	1,02	1,10	1,15	1,49	2,21	0,67	0,72	0,75	0,97	1,44	1,54
EL	<b>10</b>	0,73	1,03	1,12	1,33	1,50	2,27	0,62	0,67	0,80	0,90	1,36	1,66
PT	<b>11</b>	0,68	1,01	1,12	1,35	1,72	2,15	0,58	0,64	0,78	0,99	1,24	1,74
simple average excluding D & UK		0,83	1,08	1,18	1,29	1,41	1,98	0,71	0,79	0,86	0,94	1,30	1,53

Table 4.5

**Time spent in manifest deprivation during a 5 year period**  
**ratio of statistics for manifest deprivation to (fuzzy) income measures**




ECHP waves 1-5 (balanced panel)

		Distribution of the population according to the number of years in poverty					Distribution of the time spent in poverty according to the number of years					mean proportion of the 5 yrs	
		zero	1 yr	2 yrs	3 yrs	4 yrs	5 yrs	1 yr	2 yrs	3 yrs	4 yrs		5 yrs
DK	<b>1</b>	1,19	0,26	0,45	0,27	0,22	0,15	0,98	1,66	1,00	0,82	0,57	0,27
NL	<b>2</b>	1,18	0,31	0,33	0,36	0,37	0,33	0,91	0,96	1,06	1,09	0,98	0,34
D	<b>3</b>												
FR	<b>4</b>	1,23	0,42	0,47	0,55	0,47	0,41	0,95	1,04	1,22	1,06	0,92	0,45
BE	<b>5</b>	1,30	0,45	0,49	0,37	0,32	0,31	1,24	1,37	1,02	0,88	0,85	0,36
IRL	<b>6</b>	1,26	0,50	0,45	0,55	0,50	0,42	1,06	0,96	1,17	1,06	0,89	0,47
UK	<b>7</b>												
IT	<b>8</b>	1,33	0,44	0,42	0,46	0,40	0,37	1,09	1,04	1,15	0,98	0,91	0,40
ES	<b>9</b>	1,31	0,47	0,48	0,49	0,50	0,44	1,01	1,01	1,03	1,07	0,93	0,47
EL	<b>10</b>	1,29	0,59	0,55	0,61	0,57	0,46	1,11	1,03	1,14	1,07	0,86	0,53
PT	<b>11</b>	1,23	0,68	0,68	0,67	0,69	0,53	1,10	1,11	1,10	1,12	0,87	0,61
simple average excluding D & UK		1,25	0,46	0,49	0,50	0,47	0,42	1,03	1,15	1,09	1,02	0,88	0,46

**Table A.1. The sample base.**

**Number of persons (of all ages) enumerated in sample households: ECHP 1994-1998 (waves 1-5)**

COUNTRY	A. Original Sample Sizes					B. Full-information Sample Sizes					C. Panel Sample		
	1994	1995	1996	1997	1998	1994	1995	1996	1997	1998	% of B:	Wave 1*	Wave 5
D 1 ECHP	12,435	11,730	11,441			12,263	11,557	11,248			12,263		
51 SEP	16,284	16,682	16,304	15,942	15,251	16,124	16,526	16,131	15,688	14,969	12,281	76	82
DK 2	7,693	7,200	6,568	6,204	5,665	7,683	7,189	6,544	6,167	5,629	4,287	56	76
NL 3	13,029	12,791	12,897	12,584	12,373	12,750	12,448	12,524	12,474	12,278	8,984	70	73
BE 4	9,149	8,839	8,398	7,916	7,408	8,973	8,714	8,295	7,820	7,276	6,031	67	83
L 5	2,807	2,672	2,590			2,805	2,655	2,572					
FR 6	18,916	17,408	16,985	15,758	14,849	18,179	17,285	16,840	15,632	14,799	12,175	67	82
UK 7 ECHP	14,342	11,282	9,322			14,240	11,046	8,993					
57 BHPS	12,844	12,508	12,547	12,397	12,432	12,336	12,010	12,286	12,148	12,007	9,548	77	80
IRL 8	14,585	12,577	10,887	9,952	9,000	14,378	12,351	10,705	9,711	8,889	7,594	53	85
IT 9	21,934	21,757	21,506	20,074	19,310	21,108	21,425	21,212	19,834	19,077	15,182	72	80
EL 10	16,321	15,309	14,384	13,491	12,298	16,181	15,183	14,252	13,328	12,202	10,384	64	85
ES 11	23,025	20,708	19,712	18,167	16,728	22,809	20,363	19,203	17,838	16,525	13,614	60	82
PT 12	14,706	14,826	14,627	14,428	14,085	14,497	14,711	14,515	14,350	13,990	11,251	78	80
AT 13		9,579	9,249	8,733	8,184		9,505	9,219	8,683	8,147			
FIN 14			11,214	10,887				11,188	10,853				
S 15				13,361	13,230				12,552	12,425			

-  included in the panel analysis using balanced sample for ECHP waves 1-5.
-  included only for income analysis because of insufficient data on life-style indicators
-  not included in longitudinal analysis because of incomplete panel

A: Number of persons in "successfully enumerated" households

B. Number of persons in households where information on household income and on at least 33 out of the 39 life-style indicators obtained

C. Number of persons who have been resident in a "full-information" household during all waves 1-5.

\* Apart from children born in sample households since wave 1 (not included in the balanced panel), this col. is the attrition rate since wave 1. To this must be added the non-response in wave 1 itself to obtain the total loss in the sample originally selected.



## **A.1 Data sources for cross-sectional and longitudinal analyses**

The cross-sectional analyses (reported in section 1) have been carried out using the data of the Users' Data Base (UDB) for waves 1 to 5 or covering years 1994 to 1998.

The longitudinal analyses have been mostly carried out on 'balanced panels' covering the four survey years 1994-98, comprising of individuals enumerated in all the five rounds.

For income distribution statistics, this has been possible in all the countries with the following exceptions:

Sweden and Finland: No data are presented for Sweden (where only one reconstructed survey, for 1997, is available), and Finland where only three years (ECHP surveys for 1996, 1997 and 1998) are available.

Austria: analysis could be carried out covering only four years 1995-98, since the ECHP began a year later than other countries.

Luxembourg: analysis could be carried out covering only three years 1994-96, since the data are only available through 1996, based on the converted PSEL-1 which stopped in 1996, and data from the PSEL-2, which covered the period from 1997 through the end of the ECHP are not yet available.

Germany and the UK: Income distribution statistics for the whole duration 1994-98 are based on the national panels which replaced the original ECHP samples in the countries as of 1998. The original ECHP samples for 1994-96 have not been used in these countries for income distribution analysis because they do not cover five years longitudinally. Anyway the national panel replacing the ECHP do not collect sufficient information for constructing the life-style deprivation index.

## **A.2 Imputations of non-monetary deprivation items**

Non-monetary deprivation items which are of particular relevance for the analysis in chapters 6 and 7 are not available for all households, thus had in part to be imputed. The imputation procedures have been based on the 'sequential regression multivariate imputation' (SRMI) approach adopted by the imputation software IVE-ware. The method proposed by the authors of the software builds the imputed values by fitting a sequence of regression models and drawing values from the corresponding predictive distribution, under the hypothesis of Missing at Random (MAR) mechanism, infinite sample size and simple random sampling.<sup>9</sup>

All those households for which household income was available (~98.5 percent) *and* the number of missing non-monetary items was below 7 (~99.5 percent) could be imputed. All other households (and individuals therein) had to be excluded from further analysis. Thus approximately two percent of households which were originally in the ECHP Users Data Base had to be excluded for the present analysis.

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## Longitudinal measures of income poverty and life-style deprivation

### Abstract

This paper goes beyond the conventional study of poverty based simply on the *poor/non-poor* dichotomy defined in relation to some chosen poverty line. Poverty is treated here as a matter of degree determined in terms of the individual's position in the income distribution. The state of poverty is thus seen as a *fuzzy set*, to which all members of the population belong but to varying degrees. Comparing and contrasting the conventional and this alternative poverty measures illuminates differentials in the level and intensity of poverty among subgroups in the population. More importantly, making use of the basic theorems of the union and intersection of fuzzy sets, we demonstrate the potential of this approach in studying changes in the relative income poverty situation of individuals over time, including the construction of seemingly conventional indices such as measures describing the movement of individuals into and out of poverty and the experience of persistent poverty. By appropriately weighting non-monetary indicators of deprivation to reflect their dispersion and correlation, we construct indices of life-style deprivation in its various dimensions and study them in the longitudinal context. The approach also allows us to meaningfully combine income poverty and life-style deprivation indices at the micro-level and, furthermore, to study them in combination dynamically over time.

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