

IRISS-C/I

*An Integrated Research
Infrastructure in the
Socio-economic Sciences*

A European Union Approach to Material Deprivation using EU-SILC and Eurobarometer data

by

Anne-Catherine Guio

Alessio Fusco

Eric Marlier





A European Union Approach to Material Deprivation using EU-SILC and Eurobarometer data

Anne-Catherine Guio

IWEPS

Alessio Fusco

CEPS/INSTEAD

Eric Marlier

CEPS/INSTEAD

Abstract The paper discusses methodological issues raised by the construction of indicators on material deprivation, which is defined here as an enforced lack of a combination of items depicting some aspects of living conditions related to housing conditions, possession of durables and capacity to afford basic requirements. More specifically, its focus is on the selection of items, their dimensional structure, their aggregation in a synthetic measure and their weighting. The paper also puts in perspective material deprivation and income-based poverty indicators to emphasise the complementarity of the two approaches. It covers the European Union countries available in the 2007 Community Statistics on Income and Living Conditions (EU-SILC) users data base.

Reference IRISS Working Paper 2009-19, CEPS/INSTEAD, Differdange, Luxembourg

URL <http://ideas.repec.org/p/irs/iriswp/2009-19.html>

The views expressed in this paper are those of the author(s) and do not necessarily reflect views of CEPS/INSTEAD. IRISS Working Papers are not subject to any review process. Errors and omissions are the sole responsibility of the author(s).

A European Union Approach to Material Deprivation using EU-SILC and Eurobarometer data¹

Anne-Catherine Guio
IWEPS (Belgium)

Alessio Fusco²

CEPS/INSTEAD (Luxembourg) & CEMAFI – University of Nice Sophia Antipolis (France)

Eric Marlier
CEPS/INSTEAD (Luxembourg)

[Version dated 23 December 2009]

Abstract:

The paper discusses methodological issues raised by the construction of indicators on *material deprivation*, which is defined here as an *enforced* lack of a combination of items depicting some aspects of living conditions related to housing conditions, possession of durables and capacity to afford basic requirements. More specifically, its focus is on the selection of items, their dimensional structure, their aggregation in a synthetic measure and their weighting. The paper also puts in perspective material deprivation and income-based poverty indicators to emphasise the complementarity of the two approaches. It covers the European Union countries available in the 2007 *Community Statistics on Income and Living Conditions* (EU-SILC) users' data base.

Key words: deprivation, European Union, EU-SILC, Eurobarometer, open method of coordination, poverty, social exclusion, social indicators

JEL: I32

¹ We would like to thank Vincent Dautel, Daniel Defays, Joseph Deutsch and the participants to the workshop on “multidimensional poverty and pro-poor growth in the MENA countries” (CEMAFI - University of Nice Sophia Antipolis, 11-12 June 2009) for helpful comments. These persons should not, however, be held responsible in any way for the present contents.

² Corresponding author. Email address: alessio.fusco@ceps.lu.

1. Introduction

The need for a wide approach to the analysis of “poverty”, focusing on both monetary (*financial poverty*) and non-monetary aspects (*material deprivation*), is explicitly referred to by the European Union (EU) Council of Ministers which, back in 1985 and in line with the approach developed by the late Peter Townsend (1979), defined the “poor” as:

“the persons whose resources (material, cultural and social) are so limited as to exclude them from the minimum acceptable way of life in the Member State to which they belong” (Council, 1985).³

The measurement of material deprivation has been regularly on the EU agenda since at least 2004 and the EU has finally reached an agreement in 2009 on two indicators of material deprivation. Originally proposed by Guio (2009), these indicators are now part of the EU set of commonly agreed social indicators. They are used by the 27 EU Member States and the European Commission to monitor national and EU progress in the fight against poverty and social exclusion in the context of the so-called *Social Open Method of Coordination*.⁴

Based on the *Community Statistics on Income and Living Conditions (EU-SILC)* instrument⁵, the newly endorsed EU indicators on material deprivation focus on the proportion of people living in households who cannot afford at least 3 of the following 9 items: 1) to face unexpected expenses; 2) one week annual holiday away from home; 3) to pay for arrears (mortgage or rent, utility bills or hire purchase instalments); 4) a meal with meat, chicken or fish every second day; 5) to keep home adequately warm; 6) to have a washing machine; 7) to have a colour TV; 8) to have a telephone; 9) to have a personal car. So, these measures aggregate information focused on some key aspects of *material* living conditions; they do not aim at covering all the dimensions of poverty and social exclusion (i.e., health, employment, education, social participation, etc). It is essential to stress that the focus of the material deprivation indicators discussed in this paper is not on the lack of items due to choice and lifestyle preferences but on the *enforced* lack – i.e., people would like to possess (have access to) the lacked items but cannot afford them. This approach, in terms of “enforced lack” due to financial pressures, makes the suggested indices more comparable with income poverty.⁶

The different steps leading to the computation of an aggregated measure of material deprivation are: a) the choice of the relevant dimensions/domains and the set of

³ For an examination of the different approaches to “material deprivation”, see Fusco (2007).

⁴ The Social Open Method of Coordination (OMC) is a mutual feedback process of planning, monitoring, examination, comparison and adjustment of national (and sub-national) social policies, all of this on the basis of common objectives agreed for the EU as a whole (Marlier *et al*, 2007:22-23). The aim of this peer review exercise, which involves the European Commission and all 27 Member States, is to share experiences and good practices with a view to reaching a greater convergence on key EU social protection and social inclusion objectives. For a thorough overview of the Social OMC and the indicators needed in this context, see *inter alia* Atkinson *et al* (2002), Frazer and Marlier (2008), Marlier *et al* (2007 and 2010).

See also the web-site of the European Commission Directorate-General on “Employment, Social Affairs and Equal Opportunities”: <http://ec.europa.eu/social/main.jsp?langId=en&catId=750>.

⁵ Together with the Labour Force Surveys, EU-SILC provides the data for most of the OMC indicators on a comparable basis across all EU Member States. All EU-27 countries as well as a few non-EU countries were covered in the 2007 wave of EU-SILC. In this paper, our focus is on EU countries included in the 2007 wave of the 01.08.09 EU-SILC “Users’ Data-Base” (cross-sectional data-files), i.e. all 27 EU Member States except Bulgaria, Malta and Romania. The data for the two non-EU countries included in this UDB (Iceland and Norway) are not analysed here.

⁶ For a comprehensive presentation of the two EU material deprivation indicators and of all the other commonly agreed indicators used at EU level in the context of the Social OMC (for monitoring progress towards the agreed EU objectives in the field of social inclusion as well as pensions and healthcare and long-term care), see: <http://ec.europa.eu/social/main.jsp?catId=756&langId=en>.

elementary “indicators” representing them, b) the evaluation of deprivation on each of these items and dimensions, c) the aggregation of the elementary indicators into an aggregated index for each dimension, and d) if considered relevant, the aggregation of the different dimensions into an overall index of deprivation (Chiappero and Martinetti, 2000; Nolan and Whelan, 1996).⁷ It is important to distinguish two different forms of aggregation. The first aggregation combines different characteristics at the individual level (e.g. persons or households), which are then summed over individuals to form an aggregate index. This is for instance the approach used for calculating the EU indicators of deprivation discussed here; the focus is then on multiple deprivation at the individual level. Instead of first aggregating across fields for an individual and then across individuals, the second approach aggregates first across people and then across fields. This second approach is thus a combination of aggregate indicators, as with the UN Human Development Index (HDI). To avoid possible confusion between the two forms of aggregation, the former is referred to as “aggregated” indicators and the latter as “composite” indicators (Marlier *et al*, 2007⁸).

A reason why it took about 5 years before an agreement on common measures of material deprivation could be reached at EU level is that the “intuitive appeal” of these measures can explain their popularity but offers little guidance on their practical implementation, whether for statistical analysis or policy design: “the central problem is how to translate intuition into measurement” (Brandolini, 2008:4). This point is a crucial one. As pointed out by Bourguignon (2006:76), the key challenge in the field of poverty “consists of building a set of instruments, starting with a satisfactory definition of poverty that would meet part or all of the critiques of the dominant [income] paradigm, while retaining at least part of its *operationality*”.

This paper discusses some of the methodological issues raised by the construction of material deprivation indicators in the framework of the Social Open Method of Coordination (OMC) and explains the different steps leading to the development of such indicators. It does so by combining evidence drawn from two important EU data sets: EU-SILC and also a special Eurobarometer survey on the perception of poverty and social exclusion conducted throughout the EU in 2007. In addition, the paper puts in perspective material deprivation and income-based poverty indicators to emphasise their complementarity. First, Section 2 focuses on the selection of items. Then, Section 3 analyses the dimensional structure of the selected items and Section 4 the weighting of individual items in an aggregated index of deprivation. Finally, Section 5 presents the main conclusions.

⁷ All multi-dimensional approaches to poverty are confronted to a set of questions related to their operationalisation. For example, discussing the Sen’s capability approach, Klasen (2000:36) notes that “the choice of capabilities to be included in an evaluation, the cardinal interpretation of the value of each component (as it is done by assigning a score to an achievement or calculating an achievement index for each component), and the relative weights given to each may be controversial (...). Each of these steps cannot be axiomatically derived and has to be based, ultimately, on judgment and discussion about the nature, the relative merits and importance of various capabilities. In many cases, the choice of the most basic capabilities may be uncontroversial and at least a range of weights may be agreed upon. Alternatively, the weights of various components of well-being could also be derived empirically through statistical techniques such as principal component analysis, or be based on subjective views of the population (...). There will always remain considerable room for debate about the most appropriate way to identify weight and measure capabilities”.

⁸ Marlier *et al* (2007) discuss the two forms of aggregation in detail. They stress the various technical and political issues raised by composite indicators and conclude by stating that even though composite indicators, like the HDI, undoubtedly can play a valuable role in certain contexts, they should not be employed for monitoring policies. See also Atkinson (2003).

2. Selection of items

The selection of items to be included in a deprivation measure depends on the question(s) we want this measure to address. In the context of the Social OMC, the purpose of EU deprivation indicators is to capture a situation of exclusion from a minimum acceptable way of life due to a lack of resources (EU Council of Ministers, 1985).

Three main groups of (“objective”) items of deprivation can be identified in EU-SILC⁹:

- Economic strain, i.e. the household cannot afford:
 - to face unexpected expenses
 - one week annual holiday away from home
 - to pay for arrears (mortgage or rent, utility bills or hire purchase instalments)
 - a meal with meat, chicken or fish every second day
 - to keep home adequately warm
- Enforced lack of durables, i.e. the household cannot afford (but would like to):
 - to have a washing machine
 - to have a colour TV
 - to have a telephone
 - to have a computer
 - to have a personal car
- Housing, i.e. the household’s dwelling suffers from:
 - leaking roof / damp walls/floors/foundations or rot in window frames
 - accommodation too dark
 - no bath or shower
 - no indoor flushing toilet for sole use of the household
 - lack of space, as measured by the number of rooms available for each household member in the dwelling (which can be used for measures of overcrowded households)

Many authors have proposed theoretical or empirical criteria which, in addition to the availability and quality of the data, can help identify relevant items to be included in an index of deprivation. For example, Guio (2005) underlines that, to be chosen as a ‘lifestyle deprivation’ item at EU level, an item should (1) reflect the lack of an ordinary or minimal living pattern common to a majority or large part of the population in the EU and most of its Member States; (2) allow international comparisons (i.e., convey the same information value in the various countries, and not relate specifically to a ‘national’ context); (3) allow comparisons over time; and (4) be responsive to changes in the standard of living of people. (See also Whelan, 1993.)

⁹ Two other domains could have been included: financial access to healthcare and local environment. Items of access to healthcare available in EU-SILC refer to (self-reported) unmet needs in medical/dental examination. These items could have been used as material deprivation indicators. However, for the monitoring of the Social OMC objectives, the EU considered it important to use them separately and –in particular- to develop a specific indicator on access to healthcare based on the question on unmet need for medical care. As to the items related to the local environment, an important reason why they have been excluded from the EU aggregate is that they tend to reflect a rural/ urban divide rather than actual deprivation. It is important to stress that the EU measures of deprivation do not include subjective items on the feeling of poverty (e.g. items such as “difficulty in making ends meet”...). See Whelan *et al* (2008) and Bossert *et al* (2009) for other analysis of deprivation using EU-SILC.

In this paper, we focus on the first criterion, which can be related to the EU definition of poverty identifying the poor as the individuals who are excluded from a minimum acceptable way of life because of a lack of resources (EU Council, 1985). This rather vague definition leaves room for debate about what is a minimum acceptable way of life.

An option to answer this question is to rely on the opinion of experts to define the needs of individuals. This type of approach is exposed to a risk of “ethnocentrism”, i.e. experts can be wrong concerning the universality of their judgments, and of “paternalism”, i.e. experts could impose their own point of view for the well-being of the others (Fleurbaey *et al*, 1997).

Mack and Lansley (1985) proposed an alternative methodology for the selection of items, namely: to collect the views of the general public (rather than those of “experts” only) about which items they consider necessary to have a decent standard of living. Their approach, by taking into account the consensual judgment of individuals to identify “social needs” (*social consensus criterion*), aims at excluding as much as possible value judgements as to what constitutes an acceptable standard of living; it implicitly defines poverty with respect to a minimum standard of living defined by all the citizens rather than to a norm. According to Mack and Lansley, an item supported by at least 50% of interviewees constitutes a “socially perceived necessity” so that their approach can be seen as a consensual definition of deprivation. Furthermore, contrary to Townsend who simply regarded the lack of a necessity as implying deprivation, they also developed the concept of “enforced lack” and proposed a more adequate format of survey questions to discriminate between preferences and constraints of people.¹⁰

In order to assess the relevance of the items available in EU-SILC for measuring deprivation, and also to identify which other items of deprivation could be relevant to reflect minimum standard of living in the different EU countries, an EU wide Eurobarometer survey on the perception of poverty and social exclusion was carried out in 2007 (see TNS, 2007 for a description of the survey).¹¹ This Eurobarometer is the first EU dataset that allows carrying out a comparative analysis of the items which citizens in the different Member States consider to be necessary for people to have an “acceptable” standard of living in the country where they live. It provides a rich body of information on the 27 EU countries, collected from national samples of adults (aged 15 years and above) living in private households. For identifying socially perceived necessities throughout the EU, Eurobarometer interviewees were asked a series of questions in the following way:

“In the following questions, we would like to understand better what, in your view, is necessary for people to have what can be considered as an acceptable or decent standard of living in [your country]. For a person to have a decent standard of living in [your country], please tell me how necessary do you think it is to ...”

The potential answers were: “absolutely necessary, no one should have to do without”, “necessary”, “desirable but not necessary” and “not at all necessary”. They were coded from 3 (“absolutely necessary”) to 0 (“not at all necessary”).

¹⁰ In EU-SILC, questions regarding durable goods rely on this Mack and Lansley’s format and enable distinguishing between “lack of items” (due to choice) and “enforced lack of items” (people would like to possess/access the items but cannot afford them). Only this latter group is considered as reflecting “deprivation”, in order to exclude lifestyle preferences from the concept of deprivation.

¹¹ The Eurobarometer was conducted on behalf of the European Commission with a view to informing the preparation of a thematic module on Material Deprivation that was included in the 2009 wave of EU-SILC. The data collected through this module will become available in 2011.

As shown in Table 1, Eurobarometer figures largely confirm that the items currently available in EU-SILC and used in the EU deprivation measures are socially validated. Almost all these items are considered absolutely necessary (AN) or necessary (AN + N) to have a decent standard of living by at least 50% of the EU population¹² and also by most (and often all) of the 27 Member States.

Table 1: Proportion of people considering absolutely necessary (AN) and necessary (AN+N) the items, EU-27

	Absolutely necessary (AN)	Necessary or absolutely necessary (AN + N)	No. of countries with consensus AN+N
Economic strain			
unexpected expense	35	78	27
one week holiday away from home	18	50	12
Arrears	62	95	27
	repay loans	52	97
	utility bills	70	98
	rent/mortgage	65	91
Meat, chicken or fish every 2nd day	43	81	27
Keep home adequately warm	63	97	27
Durable goods			
Washing machine	54	90	27
Colour TV	26	65	19
Phone	20	53	14
	mobile phone	19	51
	fixed phone	20	54
Computer	12	38	5
Car	23	56	16
Housing conditions			
No leaking roof, damp walls/floors	69	97	27
not too dark	43	87	27
bath/shower	64	94	27
Indoor flushing toilet	69	96	27
Space	31	73	27
	to invite friends/family	27	69
	to read/write, etc.	35	77

Source: Special Eurobarometer No 279, Wave 67.1, authors' calculation.

Note: Each country, whether small or large, receives the same importance in these EU-27 averages. The 4th column provides the number of EU countries (out of 27) where at least 50% of interviewees have identified the item as "absolutely necessary" or "necessary".

With only 38% of support, the enforced lack of a *computer* is the only item that does not pass the 50% criterion at EU level even when considering both the AN and N

¹² Each country, whether small or large, receives the same importance in the EU-27 averages; these averages are thus not computed on the basis of population weighted national results (contrary to standard practice). For calculating the EU-27 averages, national samples have been reweighted so as to achieve a sample size of 1000 for each country.

responses. (The item “cannot afford one week holiday away from home” just meets the criterion at EU level (with exactly 50% of support), whereas, as shown in the fourth column of Table 1, it meets it only for 12 out of the 27 Member States. Yet, in 14 out of the 15 countries which fail to reach the 50% threshold the level of support is at least 30%; in two countries, it is 47% and in another two 43-44%.)¹³

Another condition put forward by Mack and Lansley for having a social consensus is that the consensus should be achieved in the various social groups, i.e. there should be homogeneity of preferences within countries. As mentioned by Pantazis *et al* (2006:90) “the validity of this consensual approach to measuring poverty rests on the assumption that there is a universal minimum accepted by society that also reflects actual living conditions. The implication of this, which is central to the approach, is that differences in views between social groups, including ranked social strata, concerning what constitutes an acceptable living standard are relatively small. Otherwise, the definition of an unacceptable standard of living just becomes the opinion of one group against the other.” If there is limited agreement over the list of items considered as social necessities and there are class and age differences in the rating of necessities, this could introduce noise into the measurement of deprivation, as judgements of importance may impact upon access to the items.

In the literature, the question of the homogeneity of preferences has been studied through the analysis of the answers given by different subgroups of the population. Research conducted on the 1990 Breadline Britain Survey and the 1999 Poverty and Social Exclusion survey (PSE - Pantazis *et al*, 2006) concluded that there was a high degree of homogeneity around what society considers necessary to have a decent standard of living. Pantazis *et al* (2006:98) explore this question by analysing the PSE answers subsequently for a set of binary socio-demographic characteristics (men/women, younger/ older, richer/ poorer...). We applied the same type of bivariate analysis to assess the influence of age, gender, household type, occupational status and subjective financial difficulty on the definition of socially perceived necessities.¹⁴ At EU-27 level, AN answers are very homogeneous according to gender: differences between men and women never exceed 5%. For the other variables, the gap is higher but exceeds rarely 10% showing quite a high homogeneity of preferences at EU level. An application of the same procedure to individual countries shows that some of the socio-economic variables analysed have a higher impact on the perception of the social necessities. For example in Bulgaria, individuals aged 55+ tend to consider most of the items less often absolutely necessary than those aged 25-39. In Hungary, individuals having an income higher or lower than what they think is needed for making ends meet tend to consider many items more often absolutely necessary than those who perceive their income as more or less what they need to make ends meet. In Bulgaria and Hungary, answers for some items are quite different for some household types. But the number of such cases is limited and on the whole the homogeneity of preferences is quite high across the EU.

¹³ Detailed tables can be obtained upon request.

¹⁴ Age is measured with four dummy variables (16-24; 25-39; 40-54; 55+), occupational status is measured with three dummies (employed, self-employed, not working), subjective financial poverty with 3 dummies (how is your income compared to what is necessary to make ends meets - higher, more or less the same, lower), household type is a combination of the number of adults (15+) and the number of children (less than 15). Detailed tables, for each country, can be obtained upon request (see above).

By simply comparing individuals according to one single characteristic, e.g. men versus women, this bivariate analysis does not take account of other characteristics held by women or men that could explain the results. Moreover, this method cannot be applied to variables defined in a continuous (age) or categorical (marital status) manner. To address these issues, we applied, for each item and each country, ordered probit regressions.¹⁵ These multiple regressions allow assessing the impact of the above mentioned variables, other things being equal. Results of the country by country analysis show that most of the variables have a non significant or moderate impact on the perception of necessity. This does not necessarily mean that all the groups have the same opinion. What it shows is that on average answers from individuals are not significantly differentiated and that the determinants of the perception of necessities are not significantly related to socio-demographics characteristics within each country. If we run the analysis on the pooled EU-27 data, it is interesting to note that when we include countries dummy, the country effect is higher than the socio-economic variables effect on the probability of perceiving an item as (absolutely) necessary. These results were also found by Accardo and de Saint Pol (2009).

So, among the 15 items reviewed above only the “enforced lack of a computer” fails to meet the two selection criteria - social consensus and homogeneity of preferences at EU-27 level. All other 14 items meet these criteria (though with very different levels of support) and have therefore been retained for the next step, i.e. the analysis of the dimensional structure among the selected items.¹⁶

3. Dimensional structure

Once the relevant items have been selected, one option is to keep them all separate and to give a detailed presentation of deprivation shares for each of item. This option makes it hard to draw a comprehensive picture of deprivation in each country, which is needed for international purposes. As mentioned by Marlier *et al* (2007), “the essential interest here is not so much in individual items per se as in the underlying situation of more generalised deprivation that they can help to capture”. This requires an analysis of the dimensional structure of the list of selected items that will then inform the decision on how to aggregate the items in homogeneous dimensions of lifestyle deprivation. The identification of such structures makes it easier to interpret the information available in the list of items and can better highlight different patterns of deprivation determinants in different countries.

To group the items in dimensions, some technical choices have to be made. We can group items together according to the meaning of their underlying characteristics on the basis of arbitrary criteria (for example all housing items together) or empirically through data analysis. Factor analysis is one technique that can be used to identify a limited number of unobservable dimensions of deprivation from the analysis of the correlation

¹⁵ We applied an ordered probit regression to tackle the ordinal nature of each item. As already mentioned, in the previous consensus surveys individuals could only choose between two answer categories: “necessary” and “desirable but not necessary”. In the Eurobarometer, additional modalities were included allowing to better approach the range of views of interviewees.

¹⁶ In a previous analysis of the Eurobarometer data, Dickes *et al* (2010) assess the (in)variance of the structure of the perception of social needs between countries on the basis of an extension of the Multi-Dimensional Scaling (MDS) method. They show that there is a high level of congruence between the 27 national patterns. An important consequence of their analysis is that it tends to support the approach which consists of measuring deprivation on the basis of a same set of (validated) items across all the Member States.

between a large set of manifest items of deprivation. However, this data driven technique is sometimes criticised (see for example McKay and Collard, 2003) as there is a certain degree of arbitrariness in the choice of the number of factors. Despite such limitations, factor analysis remains a useful tool for exploring the underlying structure of the data.

In an exploratory factor analysis, the structure of the latent factor model or the underlying theory is not specified a priori; rather, data are used to reveal the structure of the factors. On the other hand, in a confirmatory factor analysis (CFA), the precise structure of the factor model is assumed and tested. The expected structure is tested to determine whether or not the data meet the conditions necessary for its valid application. CFA is thus more powerful than the exploratory approach as it allows testing the adequacy of the factor structure of the indicator.

A CFA was therefore performed on the 2007 EU-SILC data.¹⁷ A three-factor solution and a two-factor solution were tested on the selected items. The three-factor solution includes the following dimensions:

- economic strain;
- enforced lack of durables; and
- housing.¹⁸

The two-factor solution consists of merging the dimensions “economic strain” and “enforced lack of durables” in a single dimension. Table 2 presents the fit statistics for the two solutions.

Table 2: Fit statistics of the CFA, pooled EU data – 3-factor and 2-factor solutions

Pooled EU data	3-factor solution	2-factor solution
Goodness of fit index (GFI)	0.987	0.977
GFI Adjusted for Degrees of Freedom (AGFI)	0.980	0.968
Root Mean Square Residuals (RMRS)	0.058	0.076
Parsimonious GFI (Mulaik, 1989)	0.784	0.802

Source: EU-SILC 2007 cross-sectional data-files, version Users' Data-Base (UDB) of 01.08.09, authors' calculation (see Annex 1 for an explanation of the fit indices).

The fit statistics of the CFA are reasonably high and confirm that the two solutions are supported by the data. The analysis was also performed at country level and confirmed this result. Moreover, this result is consistent with the previous dimensional structure highlighted on the ECHP and on the 2004 and 2006 EU-SILC data (Guio, 2009).

For two main reasons, the EU has opted for the two-factor solution. First, the covariance between the factor “economic strain” and “durables” in the three-factor solution is very high (0.76 – see Table A1.1); being deprived in one dimension is positively correlated with being deprived in the other. Second, in an EU context it can

¹⁷ The analysis was conducted using SAS, proc CALIS. The matrix of tetrachoric correlations was used as the input for the CFA as it fits better with the binary nature of the items used. Oblique rotation was applied, implying the hypothesis that the dimensions are correlated. For a use of CFA in deprivation literature, see also Whelan *et al* (2001), Eurostat (2002), Jensen *et al* (2002), Carle *et al* (2009), Dekkers (2008).

¹⁸ The items are those presented in Section 2. The item “lack of space” that was considered as relevant to study deprivation in Section 2 has been discarded due to a lack of homogeneity with the other items.

be seen as an advantage in terms of parsimony to present only two aggregations: one based on a larger set of commodities and activities whose access is linked to the financial strain encountered by the household, and the other depicting the housing conditions (housing comfort and housing facilities) (see Marlier *et al*, 2007).

At the EU level, the Cronbach alpha coefficient (which measures the internal consistency of the scale) is reasonably high for the combined “economic strain/durables” factor (0.67 – see Table A1.2 in Annex 1). By country, the majority of countries have alpha values ranging between 0.60 and 0.70 except Spain (0.57) and Luxembourg (0.54).

The results are less satisfactory for the housing deprivation scale with a Cronbach alpha of 0.37 at the EU level with national values ranging between very low values (0.10 in the Netherlands) to satisfactory ones (0.64-0.66 in the three Baltic States). The housing dimension is quite heterogeneous and should normally be split into different aspects. Housing amenities seem to form a distinct factor; and so do also the housing quality items (darkness, damp walls and leaking roof...). Further research on the housing dimension will therefore be needed and in this context full use ought to be made of the thematic module on Housing that was included in the 2007 wave of EU-SILC.

In line with the approach followed in the two commonly agreed indicators on material deprivation adopted by the EU in 2009, it is therefore preferable to solely retain the dimension composed of the nine (“socially validated”) items related to economic strain and durables.¹⁹ By excluding the housing dimension from our analysis and combining the economic strain and durables factors, we move to a uni-dimensional material deprivation framework.

Factor scores resulting from the factor analysis satisfy properties that guarantee the robustness of the aggregated score obtained so that they could be used directly as scores of deprivation (see e.g. Krishnakumar and Nagar, 2008). However, as reminded by Brandolini (2008), it is necessary to be cautious when using mathematical algorithm to answer what is (also) a normative task. Hence, as this practice is not very transparent, CFA has been used solely to cluster the items and proceed to their aggregation in indices in the way presented in the next section.

4. Weighting or not weighting?

At this stage, it is useful to summarise the information from the nine items in an aggregate index of “material deprivation”. Let x_{ij} be the (non-negative) level of deprivation of individual $i=1\dots n$ on item $j=1\dots m$. The nine items that have been retained for measuring deprivation are dichotomous items, so that $x_{ij}=1$ if there is an enforced lack and 0 otherwise. Within each dimension, the simplest form of the deprivation score

¹⁹ As mentioned above, the nine items concern the incapacity to afford: to face unexpected expenses; one week annual holiday away from home; to pay for arrears (mortgage or rent, utility bills or hire purchase instalments); a meal with meat, chicken or fish every second day; to keep home adequately warm; to have a washing machine; to have a colour TV; to have a telephone; to have a personal car. As shown in Section 2 above, all these items satisfactorily meet both the “social consensus” criterion *and* the “homogeneity of preferences” criterion.

u_i for each individual in the sample is the linear aggregation method which is a (weighted) sum over the x_{ij} .²⁰

$$u_i = \sum_{j=1}^m w_j x_{ij}$$

The weights w_j are non negative and can be normalised to sum to one.²¹ The interpretation of such indices is straightforward. A bad performance on the indicator implies a higher value of the index. This index allows to obtain a complete ordering and to summarise the information - at the cost of a (unavoidable) loss of information resulting from the aggregation.

This complete ordering is sensitive to the choices made when building the index. For example, in the context of a benchmarking framework (such as in the EU Social OMC), weights can have a significant impact on the aggregate indicator and on the ranking of countries (Nardo *et al*, 2005). Weights express the trade-off between the items that compose the indicator, i.e. the way in which the lack of an item can be compensated by another. Weights are essentially value judgments, and several procedures can be followed for defining them. Section 4.1 discusses the equal weighting option and Section 4.2, the unequal weighting option. In each of these sections, the pros and cons of the methods are presented as well as illustrative results.²²

4.1. Equal weights

The most straightforward weighting method consists in giving the same weight to each item. At the individual level, this equal weighting approach is a simple count of the number of lacked items.²³ Hence choosing the items could be seen as a crude weighting – giving 1 to each item retained, and 0 to those not in the list.

For Brandolini (2008), equal weighting may result from a wish to reduce the researcher’s interference to a minimum, or from the lack of information about some kind of consensus view. The main advantage of this approach is to make the interpretation of the results simpler; and its main drawback is that no discrimination is made about the items and that there can be a double counting when items overlap.²⁴ In fact, the

²⁰ More complex aggregation formulae, based on a set of axioms about the dimensions and their interrelations, have been proposed in the literature (see e.g. Bourguignon and Chakravarty, 2003). We do not consider these indices here as we focus only on a single dimension (economic strain/durables) where all the items refer to the same underlying construct. If we had kept the housing dimension, it would have been useful to apply multi-dimensional axiomatic indexes. See Brandolini (2008) for an explanation of how using a multi-dimensional index is conceptually different from applying a uni-variate index to an indicator of multi-dimensional well-being.

²¹ The property of additivity of this formula implies that items are perfectly substitutable. To relax this strong hypothesis, it is possible to follow Maasoumi (1986) who suggests that a generalisation of the formula is offered by the class of functions showing constant elasticity of substitution (CES): $S_{\beta i} = \begin{cases} \left[\sum_i w_i x_{ij}^{-\beta} \right]^{-1/\beta}, & \beta \neq 0 \\ \prod_i x_{ij}^{w_i}, & \beta = 0 \end{cases}$

The set of weights sums at unity and β is a parameter governing the degree of substitution between the attributes which are perfect substitutes if $\beta = -1$ and perfect complements if β is equal to infinity. See also Decanq and Lugo (2009) for a more general formula of the deprivation index.

²² For Stata users, -mdepriv- is a useful user written command which allows computing synthetic scores of multiple deprivation similar to that presented in this paper (see Pi Alperin and Van Kerm, 2009). Several alternative weighting rules are available.

²³ When normalised to sum to one, the weight of each item in an equal weighting framework is 1/m. If normalisation is a common practice that allows comparing indices composed of different numbers of items, it is possible to attribute a weight of 1 to each item so that the weights sum to m. In that case, we can talk of a counting approach (see Atkinson, 2003).

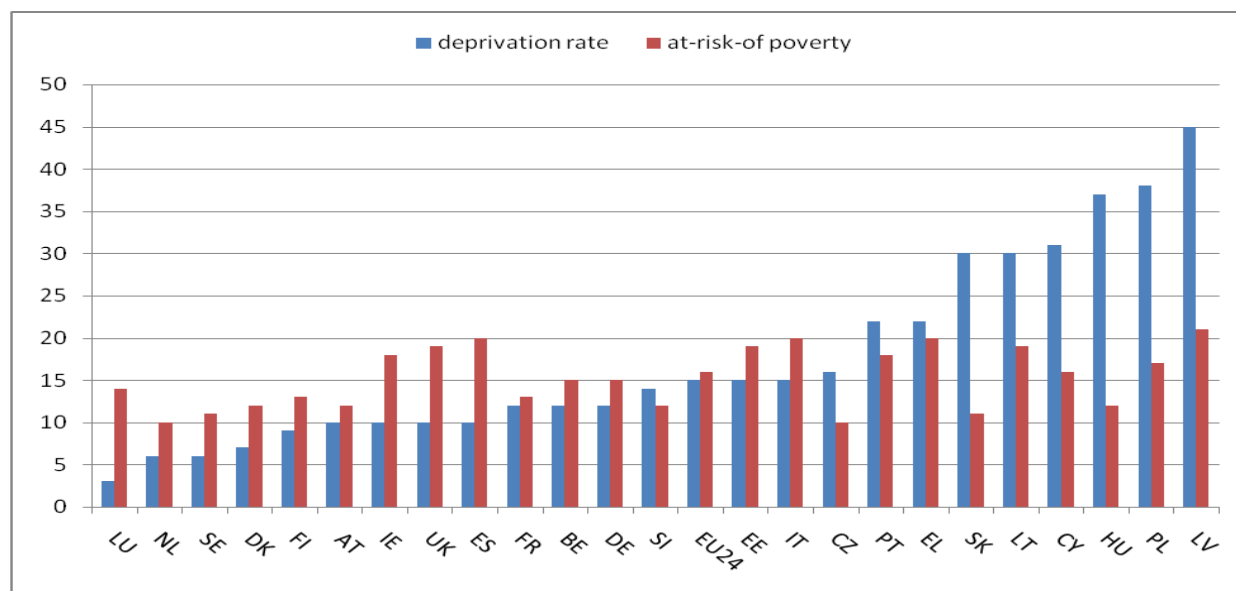
²⁴ In case of redundancy, it has been proposed to introduce in the weighting scheme a correlation component (see Betti and Verma, 2000).

relevance of equal weighting depends on the “absolute” character of the items and on the purpose of the indicator.

First, the issue of weighting depends on whether the focus of the aggregate indicator is solely on essential needs or on a larger set of items. If all the items are considered essential in all 27 EU countries, it can then be argued that access to each of these items has the same normative value - and this, in each country. For such items, equal weights can be more appropriate. If we follow this logic, then the validation of the set of items as “socially perceived necessities” by the answers to the Eurobarometer is an argument to weight equally the nine items selected for our scale. Second, the EU income poverty is a *relative* measure, with a threshold fixed at 60% of the national median equivalised income. Measures of material deprivation are expected to give a more “absolute” view of the standard of living than income poverty. It can be argued that this goal is better reached through equal weighting rather than through weights that would aim at reflecting the relative importance of individual items in the different countries.

The two commonly agreed EU indicators of material deprivation used in the Social OMC are equal weights indicators. The first one is a deprivation rate displaying the proportion of the population living in materially deprived households (see Figure 1). Each person receives a score corresponding to the number of items that his/her household lacks because it cannot afford them; “deprived” individuals are those living in households lacking 3 or more items (out of 9).²⁵ The second indicator measures the severity of deprivation through the mean number (not normalised) of items lacked by the people deprived (see Table 3).

Figure 1: At-risk-of-poverty rates and deprivation rates (EU definitions), 2007



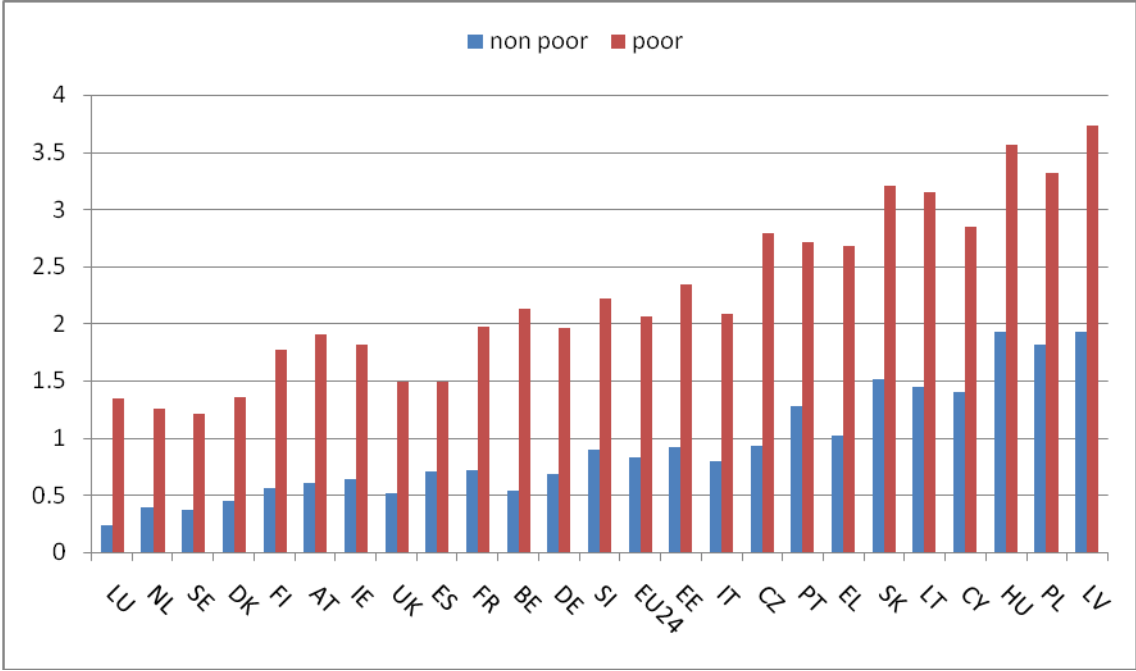
Source: EU-SILC 2007 cross-sectional data-files, version UDB 01.08.09, authors' calculation. Countries are ranked according to their deprivation rate.

Note: For each indicator, the “EU-24” provides the population weighted average for the 24 EU countries for which data are available in the UDB.

²⁵ In the case of the deprivation rate, the choice between a threshold of 2+ or 3+ enforced lacks is arbitrary and can be influenced by different considerations. First and most important, a threshold of 3+ items allows focusing on more severe deprivation and limiting the impact of potential measurement errors and misclassification. Moreover, it offers the advantage of leading to percentages which, in most EU countries, are closer to the value of the poverty rate; this makes it easier to compare the 2 figures.

Figure 1 shows that national deprivation rates vary from 3% up to as high as 45%; the EU average (calculated for the 24 countries available in the EU-SILC users' data-base) is 15%. This range is much wider than that of poverty risk rates, which vary only from 10% to 21% (EU average: 16%). As highlighted by Marlier *et al* (2010), "this reflects the fact that differences in average living standards across countries as well as the distribution within them now come into play". The most striking example in this respect are Hungary and Slovakia (which have high levels of deprivation but low income poverty risk rates) as well as, though to a lesser extent, Cyprus (poverty risks identical to EU average but high deprivation) and the Czech Republic (lowest poverty risk in EU, together with The Netherlands but intermediate performance on deprivation). Latvia combines both the highest poverty risk and highest proportion of deprived in the EU. Conversely, Spain has a high poverty risk whereas it has a below average proportion deprived. In the least deprived countries deprivation rates are lower than poverty risk rates whereas the most deprived countries face deprivation levels higher than poverty risk levels.

Figure 2: National mean numbers of lacked items (out of 9), according to the income poverty status, 2007



Source: EU-SILC 2007 cross-sectional data-files, version UDB 01.08.09, authors' computation.
 Note: For each indicator, the "EU-24" provides the population weighted average for the 24 EU countries for which data are available in the UDB.

As shown in Figure 2, the mean level of deprivation is much higher for those below the poverty risk threshold than above it; this is true in all Member States even if the gap is considerably wider in some countries than in others. It is also worth noting that the mean level of deprivation for those *at risk* of poverty in some of the richest countries is lower than the corresponding figures for those *not at risk* in the poorest countries. So, in Spain and the UK, the mean level of deprivation for the income poor is 1.5, whereas in Hungary and Latvia the corresponding figure for those *not at risk* of poverty is 1.9. As put by Marlier *et al* (2010), "this does not invalidate the poverty measures for the rich

countries, because they relate (supposedly) to norms of acceptability in those countries, but it does help reinforce the long-standing importance assigned by the EU to seeking convergence in average income/ living standards across its Member States.”²⁶ And this clearly “brings out the value of complementing the indicators based on the relative EU at-risk-of-poverty measure with indicators of material deprivation, particularly in the enlarged EU”.

Table 3: National deprivation rates, mean deprivation indices among people deprived and poverty risk thresholds (EU definitions), 2007

Country	People lacking at least 3 items (in %)	Mean number of items among the deprived (out of 9)	Poverty risk threshold (PPS)
LU	3	3.4	36908
NL	6	3.4	22325
SE	6	3.5	20120
DK	7	3.8	21367
FI	9	3.5	19369
AT	10	3.5	22848
IE	10	3.6	22483
UK	10	3.5	23868
ES	10	3.4	16394
FR	12	3.6	19661
BE	12	3.7	21075
DE	12	3.6	21846
SI	14	3.5	16756
EE	15	3.6	8524
IT	15	3.7	18371
CZ	16	3.7	11231
PT	22	3.7	11255
EL	22	3.9	14588
SK	30	3.7	8678
LT	30	4	7376
CY	31	3.6	22970
HU	37	3.9	8355
PL	38	3.9	7187
LV	45	4	7049

Source: EU-SILC 2007 cross-sectional data-files, version UDB 01.08.09, authors' computation.

Note: Countries are ranked according to their deprivation rate. Poverty risk thresholds are annual amounts (in Purchasing Power Standards) calculated for a household consisting of 2 adults and 2 children aged below 14.

²⁶ On the issue of EU convergence in average income/ living standards, Marlier et al. (2007) suggest that the EU portfolio of indicators on social inclusion should be complemented with a “background statistic” based on a common income threshold set at 60% of the EU-wide median. The suggested use of this statistic, which could be calculated from pooled EU-SILC data, “is intended to address the key issue of social cohesion/convergence across the Union rather than capturing absolute poverty” (page 155).)

The extent of material deprivation is generally much higher in the countries with lower poverty risk thresholds and thus with lower levels of median income (see Table 3). Five countries out of the six with the highest proportions deprived (Slovakia, Hungary, Lithuania, Poland and Latvia) are among the six countries with the lowest median income (their national poverty risk thresholds are below 8,678 PPS whereas all other Member States' thresholds are above 11000 PPS). The only exceptions are Estonia, which has a much lower proportion deprived than its median income ranking would suggest, and Cyprus which has a high level of deprivation but also a very high income threshold.

The severity of deprivation, as measured through the mean number of items lacked by people deprived, ranges from 3.4 in Luxembourg, the Netherlands and Spain to 4 in Lithuania and Latvia. These figures show that for a similar proportion of deprived, the severity of deprivation can vary between countries. For example, deprivation rates in Lithuania and in Slovakia are identical (30%), but the severity is higher in Lithuania (4 vs. 3.7).

4.2. Unequal weights

An alternative to equal weighting when aggregating items into a single indicator is to give different weights to the various items in order to reflect their different relative importance in the final result. Each ratio of weights can be seen as a “substitution rate” between two items, i.e. the coefficient by which a deprivation in one item can be compensated by the non-deprivation in another item (see Munda and Nardo, 2005 or Decancq and Lugo, 2009). Two countries with very different penetration rates might then have the same set of weights if the substitution rates between items are identical.²⁷

When deciding on the weights to be attributed to individual items, two questions that we may want to address are: a) Do we opt for EU or national weighting?; and b) Should we go for “prevalence” or “consensus” weighting? (For an extensive discussion of different weighting schemes, see Guio 2009²⁸).

EU or national weighting? Answering this question (which in fact also needs to be asked when measuring income poverty; see above) is related to the choice of the reference population. We can make the hypothesis that, in evaluating their material situation, respondents are influenced mostly by the perceptions they have of how they are doing compared to others in their own country, even if one may argue that, in the EU, comparisons would extend beyond national borders (Whelan *et al*, 2001). In the case of nationally weighted indices of deprivation, the approach would have a relative aspect as the weight of an item would reflect its relative importance in each country.

“Prevalence” or “consensus” weighting? When using aggregate indices, several options can be applied to determine the weights. Here we focus only on two of them. The first one, prevalence or frequency-based weighting, is largely used in the literature and

²⁷ Let's take two countries A and B. In country A, the proportion of individuals possessing a car is 90% and that of individuals having a jacuzzi is 10%. In country B, these proportions are 45% and 5%. The normalised weight for each item in the two countries will be the same (car: $90/100=45/50=0.9$; Jacuzzi: $10/100=5/50=0.1$).

²⁸ See Decancq and Lugo (2009) for a survey of other options to weight the items, including regression based methods and statistical weights. See also Haisken-DeNew and Sinning (2007) proposal to weight components by their subjective contribution to an overall measure of life satisfaction.

consists in “letting the data speak”. Each item is weighted according to the proportion of individuals who possess (have access to) the item.²⁹ This *endogenous* approach can be justified in terms of subjective perception of deprivation. The higher the proportion of people not deprived in a given item, the more likely a person unable to afford this item (but wanting it) is likely to feel deprived. Prevalence weighting could consist in using the proportion of people having the item over the whole population. For EU comparative deprivation measures, EU-SILC provides the reference data source.³⁰ The second option, consensus weighting, suggests that weights should be established *exogenously* on the basis of social judgments about what is necessary for a person to live a decent life (see Mack and Lansley, 1985; Halleröd, 1995). The latter method is more “normative” and may be seen as closer to the notion of “minimum acceptable way of life” than the prevalence approach. It may also be more stable over time as perception of needs change slowly. The Eurobarometer data presented in Section 2 constitutes a unique dataset that precisely allows implementing such a consensual (and participatory) approach in the context of an international comparison. The weight of an item can then be the proportion of people considering this item (absolutely) necessary, or a transformation of this proportion.

So, the hypothesis underlying the prevalence approach implies that the most frequently possessed items receive a higher weight (whatever their perceived social importance). If an essential good/ need is not owned/ accessed by a high proportion of the population, its weight will be low independently of its intrinsic importance. Concretely (see Annex 3), a strict application of this approach would mean for example that in Latvia the base weight of “capacity to keep home adequately warm” would be 77.9 (100-22.1) whereas that of “having a TV” would be 98.9. In the consensus approach, it would be respectively 99% and 81% (i.e., percentages of Eurobarometer respondents considering these items either “necessary” or “absolutely necessary”). A drawback of the prevalence method is that it can lead to a questionable and unbalanced structure of weights.³¹ An additional drawback of prevalence weighting is that it is less easy to understand than consensual weighting and therefore that it can raise serious communication difficulties. (Table A2.1 in Annex 2 displays nationally-defined and EU-defined weights for both the prevalence and consensual approach; these weights have been normalised.)

The practical implications of weighting depend on the homogeneity of the items that are to be aggregated. The closer the prevalence rates of the different items in the dimension (or social judgments in the case of consensual weighting), the more equal the weights will be... and thus the closer they will be to the equal weighting approach. If the selected items are heterogeneous, the weights will differ significantly and the weighted index may then also be very different from the unweighted index.³²

In order to show the implications of different weighting schemes, Figure 3 shows the results for a same indicator of deprivation (the national mean number of lacked items

²⁹ For a similar approach, see: Desai and Shah (1988), Tsakoglou and Papadopoulos (2002), Whelan *et al* (2001), Willits (2006).

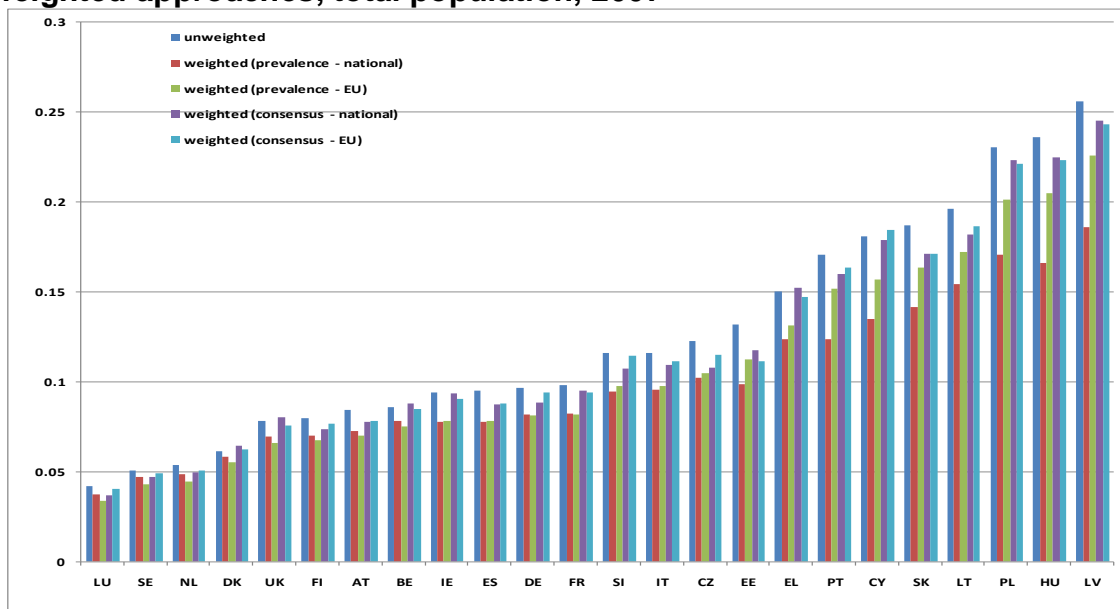
³⁰ Guio (2009) analyses different functional forms of weights, e.g. logarithmic or exponential transformation of the proportion of non-deprived.

³¹ Brandolini (2008) provides the example of an analysis he carried out with D’Alessio showing that in 1995 the share of Italians deprived in terms of health and education could be estimated at 19.5% and 8.6% respectively, which would lead to education receiving a weight more than twice higher than that of health which could be seen as “a matter of disagreement”.

³² See also Boarini and Mira d’Ercole (2006) and Brandolini (2008) for a similar argument.

(out of 9); see above for the list of items³³) weighted according to each of the four options described above (prevalence vs. consensus; national vs. EU).

Figure 3: National mean numbers of lacked items (out of 9), weighted and unweighted approaches, total population, 2007



Source: EU-SILC 2007 cross-sectional data-files, version UDB 01.08.09, authors' calculation.

Note: Indices normalised to one; countries ranked according to "unweighted" (i.e., equal weighting) deprivation indices.

In countries with the least severe deprivation, weights have little incidence on the mean indices (whatever the methodology) as the weights do not differ a lot from one item to the next and are thus closer to equal weighting. By contrast, in the most severely deprived countries there are high differences between prevalence weighted and unweighted scores, because weights give less importance to the most frequently non-possessed items. This therefore reduces the dispersion of the prevalence-EU weighted deprivation index. The use of consensus weighting has less impact, compared with the unweighted indices. The impact of the choice between national and EU reference appears to be more important in the prevalence weighting for the most deprived countries.

So, as could be expected, the cardinal results are sensitive to weighting. To better assess the actual impact of weighting it is useful to check whether the ordinal results in terms of comparisons of groups change. Indeed, what is important is the relative performance between countries and groups more generally. Figure 3 shows that the ranking of countries is quite similar under all five options.

³³ In view of the difficulty to define a deprivation threshold on a weighted indicator, we have opted here for the presentation of the mean weighted indices rather than the deprivation rates.

5. Conclusions

The aim of this paper was to discuss some of the methodological issues raised by the different steps of the construction of material deprivation indicators for use in the EU Social Open Method of Coordination. Highlighting these issues (and the related choices to be made) is important: “Empirical findings confirm that measurement assumptions may considerably influence the results. This is little surprising, but it reinforces the obvious recommendation to carry out thorough sensitivity analysis” (Brandolini, 2008:29).

For our analysis, we have combined evidence from two important EU data sets: EU-SILC, for measuring deprivation (and income poverty), and a special Eurobarometer survey on the perception of poverty and social exclusion, for assessing EU citizens’ consensual judgement.

We have shown that the nine items of “material deprivation” retained in the EU aggregate indicators of deprivation satisfactorily meet the two selection criteria - social consensus as well as homogeneity of preferences. Using the definitions adopted at EU level, we have also shown that the range of national material deprivation rates (from 3 to 45%) is much larger than that of the poverty risk (10 to 21%). If purely income-based indicators of poverty and inequality are essential, they are nevertheless not sufficient to satisfactorily reflect the diversity of living conditions in the 27 EU countries.

As expected, the use of different structure of weights changes the cardinal value of the national results. However, for the five weighting procedures reviewed in the paper, the impact of the weighting scheme on the ranking of countries is limited. There is no clear cut answer to the question of the choice of the weights which reflects in fact implicit value judgments and needs to take account of the purpose of the indicator. In view of these results and because of the advantages of this approach (in particular, its simplicity and transparency), an equal weighting approach seems to be well suited for the construction of an EU material deprivation index. With new data becoming available, the stability over time of the EU indicators in their current form will need to be analysed in order to assess their robustness.

In 2011, when the data collected through the special 2009 EU-SILC module on Material Deprivation become available, it will be important to come back to these measures with a view to refining them. In doing so, it would be very useful if EU-SILC data could again be put in perspective with (updated) social judgments collected through a new Eurobarometer survey to ensure that the selected items still accurately capture expectations of the society.

References

- Accardo J. and de Saint Pol T. (2009), "Qu'est-ce qu'être pauvre aujourd'hui en Europe ? L'analyse du consensus sur les privations", *Economie et Statistique*, No. 421, pp. 3-27.
- Atkinson, T., Cantillon, B., Marlier, E. and Nolan, B. (2002), *Social Indicators: The EU and Social Inclusion*, Oxford, Oxford University Press.
- Atkinson, A.B. (2003), "Multidimensional Deprivation: Contrasting Social Welfare and Counting Approaches", *Journal of Economic Inequality*, Vol. 1, pp. 51–65.
- Betti G., Verma V. (2000), "Measuring the Degree of Poverty in a Dynamic and Comparative Context: The Euro-Mediterranean Countries", in 4^{èmes} Rencontres Euro-Méditerranéennes, *Pauvreté et Inégalités dans les Pays Riverains de la Méditerranée*, Nice, 25-27 Septembre.
- Boarini, R. and Mira d'Ercole, M. (2006), "Measures of Material Deprivation in OECD Countries", OECD Social Employment and Migration Working Papers, No. 37, OECD Publishing.
- Bossert W., Chakravarty S.R., D'Ambrosio C. (2009), "Multidimensional poverty and material deprivation", ECINEQ WP 2009 – 129, 21p.
- Bourguignon, F. (2006), "From income to endowments: the difficult task of expanding the income poverty paradigm", in Grusky D.B and Kanbur R. (eds.), *Poverty and Inequalities*, Stanford University Press, Stanford, California.
- Bourguignon F. and Chakravarty S. (2003), "The measurement of multidimensional poverty", *Journal of Economic Inequality*, Vol.1, pp.25-49.
- Brandolini A. (2008), "On applying synthetic indices of multidimensional well-being: Health and Income inequalities in selected EU countries", Banca d'Italia, Temi di discussione 668.
- Carle A.C., Bauman K.J. and Short K. (2009), "Assessing the measurement and structure of material hardship in the United States", *Social Indicators Research*, Vol. 92, n° 1, pp.35-51.
- Chiappero Martinetti, E. (2000) "A Multidimensional Assessment of Well-Being Based on Sen's Functioning Approach", *Rivista Internazionale di Scienze Sociali*, CVIII, No. 2, pp. 207-232.
- Decancq, K. and Lugo, M.-A. (2009), "Setting weights in multidimensional indices of well-being and deprivation", paper presented at the 2009 AEA conference, January 3-5.
- Dekkers, G. (2008), "Are you unhappy? Then you are poor! Multi dimensional poverty in Belgium", *International Journal of Sociology and Social Policy*, 28, 11/12, 502 - 515.
- Desai M. and Shah A. (1988), "An econometric approach to the measurement of poverty", *Oxford Economic Papers*, No. 40, pp.505-522.
- Dickes, P. (1989), "Pauvreté et Conditions d'Existence. Théories, modèles et mesures", *Document PSELL* No. 8, CEPS/INSTEAD, Walferdange.
- Dickes, P., Fusco, A. and Marlier, E. (2010), "Structure of national perceptions of social needs across EU countries", *Social Indicators Research*, Vol. 95, No.1, January, pp. 143-67, <http://dx.doi.org/10.1007/s11205-009-9454-5>.
- EU Council of Ministers (1985), "Council Decision of 19 December 1984 on Specific Community Action to Combat Poverty" (85/8/EEC), OJEC, L 2, Brussels.
- Eurostat (2002), *Income, Poverty and Social Exclusion: Second Report*, Luxembourg.
- Fleurbaey, M., Herpin, N., Martinez M. & Verger D. (1997), "Mesurer la pauvreté ?", *Economie et Statistiques*, No. 308/309/310, pp. 113-142.
- Frazer, H. and Marlier, E. (2008), "Building a stronger EU Social Inclusion Process: Analysis and Recommendations of the EU Network of independent national experts on social inclusion", Brussels, 2008, available at:

<http://www.peer-review-social-inclusion.eu/network-of-independent-experts/reports/first-semester-2008/synthesis-report-2008-1>.

- Fusco, A. (2007), *La pauvreté: un concept multidimensionnel*, Paris, L'Harmattan.
- Guio, A.-C. (2009), "What can be learned from deprivation indicators in Europe?", Eurostat methodologies and working paper , 40 p. Eurostat, Luxembourg, available from: http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-RA-09-007/EN/KS-RA-09-007-EN.PDF.
- Guio, A.-C. (2005), *Material Deprivation in the EU*, Statistics in Focus, Population and Social Conditions, Living Conditions and Welfare, 21/2005, Eurostat, Luxembourg.
- Haisken-DeNew, J.P., Sinning M. (2007), "Social Deprivation and exclusion of Immigrants in Germany", IZA DP No. 3153, November.
- Halleröd, B. (1995), "The truly poor: direct and indirect measurement of consensual poverty in Sweden", *Journal of European Social Policy*, Vol. 5, No. 2, pp. 111-129.
- Jensen, J., Spittal, M., Crichton, S., Sathiyandra, S. and Krishnan, V. (2002), "Direct measurement of living standards: the New Zealand ELSI scale", Ministry of Social Development, Wellington.
- Krishnakumar J. and Nagar, L. (2008), "On exact statistical properties of multidimensional indices based on principal components, factor analysis, MIMIC and Structural Equation Models", *Social Indicators Research*, 86:481-496.
- Klasen S. (2000), "Measuring poverty and deprivation in South Africa", *Review of Income and Wealth*, series 46, No. 1, pp.33-58.
- Maasoumi E. (1986), "The Measurement and Decomposition of Multi-Dimensional Inequality", *Econometrica*, Vol. 54, Issue 4, pp. 991-998.
- Marlier, E., Atkinson, A.B., Cantillon, B. and Nolan, B. (2007), *The EU and social inclusion: Facing the challenges*, Bristol, Policy Press.
- Marlier, E., Cantillon, B., Nolan, B., Van den Bosch K. and T. Van Rie (2010), "Developing and learning from measures of social inclusion in the European Union". In K. Couch & D. J. Besharov (Series Eds.), K. Couch & N. Gilbert (Vol. Eds.), International policy exchange series. New York: Oxford University Press.
- McKay, S. (2004), "Poverty of preference: what do consensual deprivation indicators really measure?", *Fiscal studies*, 25 (2), pp. 201-224.
- McKay, S. and Collard S. (2003). Developing Deprivation Questions for the Family Resources Survey. Working Paper No. 13, Personal Finance Research Center, University of Bristol.
- Mack, J. and Lansley S. (1985). *Poor Britain*. London, Allen and Unwin.
- Munda, G. and Nardo, M. (2003), "On the methodological foundations of composite indicators used for ranking countries", OECD/JRC Workshop on Composite Indicators of Country Performance, Ispra, Italy, May 12.
- Nardo M., Saisana M., Saltelli A., Tarantola S., Hoffman A. and Giovannini E. (2005), "Handbook on constructing composite indicators: methodology and user guide", OECD Statistics Working Paper, STD/DOC(2005)3.
- Nolan, B. and Whelan, C.T. (1996), *Resources, Deprivation and Poverty*, Oxford, Clarendon Press.
- Nolan, B. and Whelan, C.T. (2009), "Using non-monetary deprivation indicators to analyse poverty and social exclusion in rich countries: lessons from Europe?", draft paper for joint OECD/University of Maryland International Conference, Paris, March.

- Pantazis, C., Townsend, P. and Gordon, D. (2006), "The necessities of life", in Pantazis C., D. Gordon and R. Levitas (eds), *Poverty and Social Exclusion in Britain. The Millennium Survey*, Bristol, The Policy Press, chapter 4, pp. 89-122.
- Pi Alperin, M. N. and Van Kerm, P. (2009), "mdepriv – Synthetic indicators of multiple deprivation", v1.0, CEPS/INSTEAD, Differdange, Luxembourg.
- Silber, J. (2007), "Measuring poverty: taking a multidimensional perspective", *Hacienda Publica Española/Revista de Economía Publica*, 182-(3/2007):29-73.
- Social Protection Committee (2008), *Child poverty and well-being in the EU. Current status and way forward*. Luxembourg: Office for Official Publications of the European Communities.
- Townsend, P. (1979), *Poverty in the United Kingdom*, Harmondsworth, Penguin Books.
- TNS (2007). *Poverty and Social Exclusion. Report on the Special Eurobarometer 279/ Wave 67.1*.
- Tsakoglou, P. and Papadopoulos, F. (2002), "Aggregate level and determining factors of social exclusion in twelve European countries", *Journal of European Social Policy*, Vol. 12, No. 3, pp.211-225.
- Whelan B. (1993), "Non-monetary indicators of poverty", in Berghman J., Cantillon B. (eds.), *The European Face of Social Security: Essays in honor of Herman Deleeck*, Avebury, pp.24-42.
- Whelan, C.T., Layte, R., Maître, B. and Nolan, B. (2001), "Income, deprivation and economic strain. An analysis of the ECHP", *European sociological review*, Vol. 17 No. 4, pp. 357-372.
- Whelan, C.T., Nolan, B. and Maître, B. (2008), "Measuring material deprivation in an enlarged EU", *ESRI Working Paper* No. 249.
- Willits, M. (2006), "Measuring child poverty using material deprivation: possible approaches", Working paper No. 28, Department of work and pensions.

ANNEX 1: Dimensional structure: Confirmatory factor analysis and Cronbach alpha

GFI (Goodness of Fit Index) represents the amount of variances and covariances in the sample covariance matrix that are predicted by the model. Theoretically, its maximal value is 1. However, as GFI is affected by the sample size and the number of indicators, its upper bound can be lower than one, even in the case of perfect fit. A standard rule of thumb is that the GFI for good fitting model should be greater than 0.9.

AGFI (Adjusted Goodness of Fit Index) is the GFI adjusted for degrees of freedom. A value superior to 0.8 is more often used as a cut-off value to consider that the model is well fitted.

RMSR (Root Mean Square Residual) is the square root of the average of the square of the residuals between the sample and modelled covariance matrix. The lower the fit between the model and the data, the larger the RMSR.

PGFI (Parsimonious Goodness of Fit Index) is a variant of the GFI that takes the parsimony of the model into account.

Table A1.1: Covariances between factors, pooled data, 3-factor model

	Economic strain	Durables	Housing
Economic strain	1	0.76	0.59
Durables	0,76	1	0.70
Housing	0.59	0.70	1

Source: EU-SILC 2007 cross-sectional data-files, version UDB 01.08.09, authors' calculation.

Table A1.2: National Cronbach alpha for “economic strain & durables” and for “housing”

Country	Economic strain and durables	Housing
BE	0.69	0.26
CZ	0.66	0.33
DK	0.65	0.16
DE	0.64	0.17
EE	0.62	0.64
IE	0.64	0.36
EL	0.70	0.43
ES	0.57	0.18
FR	0.64	0.29
IT	0.67	0.32
CY	0.64	0.30
LV	0.70	0.66
LT	0.69	0.65
LU	0.54	0.25
HU	0.65	0.58
NL	0.60	0.10
AT	0.63	0.33
PL	0.68	0.58
PT	0.63	0.47
SI	0.61	0.24
SK	0.65	0.53
FI	0.63	0.22
SE	0.65	0.19
UK	0.67	0.18
EU (24)	0.67	0.37

Source: EU-SILC 2007 cross-sectional data-files, version UDB 01.08.09, authors' calculation.

Annex 2: Weighting

Table A2.1: Prevalence and consensus weighting, country and EU level

	Unexpected expenses	Holiday	Arrears	Meat	Home warm	Washing machine	Colour TV	Phone	Car
Unweighted	0.111	0.111	0.111	0.111	0.111	0.111	0.111	0.111	0.111
Weights based on prevalence rate (people who have the item)									
BE	0.096	0.093	0.114	0.117	0.104	0.120	0.121	0.121	0.113
CZ	0.078	0.084	0.120	0.110	0.119	0.126	0.126	0.125	0.112
DK	0.097	0.107	0.113	0.115	0.106	0.117	0.118	0.118	0.108
DE	0.079	0.093	0.116	0.111	0.117	0.123	0.122	0.123	0.117
EE	0.100	0.056	0.121	0.121	0.123	0.124	0.127	0.127	0.102
IE	0.075	0.096	0.112	0.120	0.118	0.122	0.122	0.122	0.112
EL	0.092	0.069	0.096	0.122	0.113	0.128	0.130	0.130	0.119
ES	0.087	0.079	0.114	0.120	0.114	0.123	0.123	0.122	0.118
FR	0.082	0.086	0.112	0.116	0.117	0.122	0.123	0.122	0.119
IT	0.086	0.077	0.110	0.118	0.113	0.125	0.125	0.124	0.122
CY	0.079	0.064	0.104	0.125	0.089	0.135	0.135	0.135	0.133
LV	0.056	0.052	0.134	0.105	0.116	0.139	0.148	0.145	0.105
LT	0.080	0.056	0.125	0.115	0.107	0.130	0.137	0.134	0.117
LU	0.091	0.104	0.113	0.114	0.115	0.116	0.116	0.116	0.114
HU	0.054	0.051	0.118	0.109	0.130	0.141	0.145	0.141	0.112
NL	0.093	0.101	0.112	0.116	0.115	0.117	0.117	0.117	0.111
AT	0.087	0.090	0.117	0.111	0.118	0.121	0.121	0.121	0.114
PL	0.066	0.051	0.118	0.110	0.112	0.143	0.143	0.141	0.116
PT	0.108	0.052	0.125	0.129	0.078	0.130	0.133	0.127	0.119
SI	0.073	0.089	0.108	0.113	0.120	0.125	0.125	0.125	0.121
SK	0.077	0.063	0.126	0.093	0.130	0.136	0.136	0.135	0.104
FI	0.085	0.099	0.110	0.117	0.119	0.119	0.120	0.121	0.111
SE	0.097	0.102	0.110	0.113	0.115	0.117	0.116	0.117	0.113
UK	0.088	0.095	0.110	0.116	0.115	0.120	0.120	0.120	0.115
EU (24)	0.083	0.083	0.114	0.115	0.114	0.124	0.125	0.124	0.117
Weights based on consensus rate (people considering the item as (absolutely) necessary)									
BE	0.129	0.062	0.159	0.144	0.164	0.135	0.068	0.062	0.078
CZ	0.115	0.062	0.163	0.101	0.161	0.163	0.103	0.058	0.075
DK	0.121	0.057	0.176	0.148	0.184	0.112	0.080	0.072	0.051
DE	0.120	0.046	0.163	0.111	0.173	0.157	0.088	0.078	0.064
EE	0.118	0.088	0.135	0.121	0.136	0.128	0.109	0.084	0.082
IE	0.123	0.074	0.144	0.138	0.145	0.130	0.080	0.077	0.089
EL	0.117	0.102	0.123	0.104	0.126	0.121	0.108	0.092	0.107
ES	0.126	0.065	0.145	0.141	0.144	0.144	0.077	0.073	0.086
FR	0.110	0.081	0.145	0.127	0.150	0.133	0.074	0.066	0.113
IT	0.130	0.054	0.148	0.127	0.149	0.135	0.082	0.071	0.102
CY	0.118	0.090	0.124	0.087	0.123	0.124	0.116	0.093	0.124
LV	0.121	0.084	0.137	0.122	0.139	0.125	0.114	0.086	0.073
LT	0.122	0.067	0.141	0.120	0.142	0.131	0.123	0.073	0.081
LU	0.104	0.066	0.145	0.111	0.151	0.147	0.090	0.083	0.102
HU	0.117	0.093	0.142	0.106	0.143	0.140	0.122	0.077	0.061
NL	0.121	0.065	0.170	0.149	0.188	0.164	0.048	0.057	0.038
AT	0.131	0.056	0.164	0.121	0.167	0.157	0.083	0.060	0.061
PL	0.120	0.081	0.139	0.129	0.142	0.139	0.107	0.075	0.069
PT	0.113	0.082	0.130	0.132	0.129	0.129	0.117	0.078	0.090
SI	0.101	0.079	0.140	0.103	0.145	0.144	0.095	0.084	0.109
SK	0.120	0.080	0.128	0.108	0.135	0.135	0.115	0.087	0.091
FI	0.112	0.063	0.162	0.144	0.163	0.142	0.078	0.073	0.064
SE	0.095	0.082	0.168	0.125	0.167	0.134	0.080	0.078	0.071
UK	0.130	0.070	0.165	0.132	0.170	0.146	0.065	0.067	0.054
EU (27)	0.117	0.075	0.143	0.122	0.146	0.135	0.098	0.080	0.084

Sources: EU-SILC 2007 cross-sectional data-files, version UDB 01.08.09 (for prevalence weights) and Eurobarometer special No. 279, Wave 67.1 (for consensus weights). Authors' calculation.

Annex 3: Deprivation proportions, by items and by country (%)

Country	Unexpected expenses	Holiday	Arrears	meat	Home warm	Washing machine	Colour TV	Phone	Car
BE	20.9	23.4	6.1	3.4	14.6	1.6	0.3	0.2	6.6
CZ	38.5	33.6	5.6	13.1	6.1	0.5	0.4	1.1	11.8
DK	18.4	9.4	4.5	2.5	10.2	1.4	0.5	0.0	8.5
DE	36.0	24.0	5.7	10.1	5.1	0.4	0.5	0.3	5.1
EE	22.3	56.6	5.2	5.8	3.6	3.2	0.5	1.2	20.5
IE	39.1	21.4	8.4	2.2	3.5	0.5	0.2	0.4	9.1
EL	29.5	46.9	26.4	6.5	13.8	2.2	0.3	0.7	9.3
ES	29.0	35.9	6.8	2.1	7.2	0.2	0.1	0.3	4.1
FR	33.4	29.9	9.3	6.2	4.7	0.8	0.2	0.7	3.2
IT	32.0	39.1	12.5	6.2	10.4	0.5	0.3	1.0	2.8
CY	42.0	52.8	23.0	7.7	34.6	0.7	0.2	0.2	1.7
LV	62.6	65.2	10.6	29.6	22.1	6.7	1.1	2.7	30.0
LT	42.4	59.8	9.4	17.1	22.4	6.4	1.2	2.9	15.3
LU	21.5	10.1	2.6	1.4	0.5	0.2	0.0	0.1	1.5
HU	62.9	65.0	19.1	25.4	10.8	3.2	0.6	2.8	22.8
NL	21.1	14.2	4.2	1.4	1.6	0.1	0.0	0.0	5.5
AT	28.7	25.6	3.9	8.3	2.6	0.5	0.3	0.2	5.7
PL	54.5	64.8	18.2	23.8	22.8	1.0	0.9	2.1	19.7
PT	19.7	61.5	7.0	4.1	41.9	2.9	0.6	4.9	11.4
SI	41.6	29.6	14.2	10.3	4.2	0.3	0.7	0.4	3.5
SK	43.3	54.1	7.6	32.2	4.6	0.8	0.7	1.4	23.9
FI	29.9	18.0	9.1	2.9	1.1	1.4	1.0	0.1	8.3
SE	17.5	12.7	5.7	3.6	1.7	0.0	0.6	0.0	3.7
UK	26.7	21.4	8.5	4.0	4.6	0.3	0.1	0.2	4.9
EU24	33.5	33.7	9.5	8.3	8.8	0.8	0.4	0.8	7.0

Source: EU-SILC 2007 cross-sectional data-files, version UDB 01.08.09. Authors' calculation.

Reading note: In Belgium, the proportion of individuals who would like to have a TV but cannot afford it (enforced lack) is 0.3 %. In a prevalence weighting approach, this item would receive a base weight of 99.7 (if weights are not normalised afterwards).

Annex 4: Countries' abbreviations

“Old” Member States		“New” Member States	
AT	Austria	CY	Cyprus
BE	Belgium	CZ	Czech Republic
DE	Germany	EE	Estonia
DK	Denmark	HU	Hungary
EL	Greece	LT	Lithuania
ES	Spain	LV	Latvia
FI	Finland	MT	Malta
FR	France	PL	Poland
IE	Ireland	SI	Slovenia
IT	Italy	SK	Slovakia
LU	Luxembourg		
NL	The Netherlands	(BG)	(Bulgaria)
PT	Portugal	(RO)	(Romania)
SE	Sweden		
UK	United Kingdom		

EU-25: In 2004, the “old” EU-15 countries were joined by ten “new” Member States.

EU-27: In 2007, Bulgaria and Romania became in turn EU Member States.



IRISS Working Papers

The IRISS Working Paper Series has been created in 1999 to ensure a timely dissemination of the research outcome from the IRISS-C/I programme. They are meant to stimulate discussion and feedback. The working papers are contributed by CEPS/INSTEAD resident staff, research associates and visiting researchers.

The fifteen most recent papers

Guio A., Fusco A. & Marlier E., 'A European Union Approach to Material Deprivation using EU-SILC and Eurobarometer data', IRISS WP 2009-19, December 2009.

Verme P., 'Happiness, Deprivation and the Alter Ego', IRISS WP 2009-18, December 2009.

Okamura K. & Islam N., 'State Dependence in Labour Force Participation of Married Women in Japan', IRISS WP 2009-17, November 2009.

Liégeois P., Berger F., Islam N. & Wagener R., 'Cross-validating administrative and survey datasets through microsimulation and the assessment of a tax reform in Luxembourg', IRISS WP 2009-16, November 2009.

Longford N. & Nicodemo C., 'A sensitivity analysis of poverty definitions', IRISS WP 2009-15, November 2009.

Conway B., 'Individual-Level Determinants of Religious Practice and Belief in Catholic Europe', IRISS WP 2009-14, October 2009.

Silber J. & Verme P., 'Distributional change, reference groups and the measurement of relative deprivation', IRISS WP 2009-13, October 2009.

Chzhen Y., 'The effects of childbirth on women's activity change and occupational mobility in Europe: Evidence from the European Community Household Panel.', IRISS WP 2009-12, October 2009.

Farvaque E. & Mihailov A., 'Intergenerational Transmission of Inflation Aversion: Theory and Evidence', IRISS WP 2009-11, September 2009.

Bargain O. & Doorley K., 'Caught in the Trap? The Disincentive Effect of Social Assistance.', IRISS WP 2009-10, August 2009.

Strawinski P., 'External Return to Education in Europe', IRISS WP 2009-09, August 2009.

Van Kerm P., 'Generalized measures of wage differentials', IRISS WP 2009-08, August 2009.

Choe C., 'Determinants of Labor Market Outcomes of Disabled Men Before and After the Americans with Disabilities Act of 1990', IRISS WP 2009-07, July 2009.

Choe C. & Chrite E., 'Internal Migration of Blacks in South Africa: Self-selection and Brain Drain', IRISS WP 2009-06, July 2009.

Raileanu Szeles M. & Fusco A., 'Item response theory and the measurement of deprivation: Evidence from PSELL-3', IRISS WP 2009-05, May 2009.

Electronic versions

Electronic versions of all IRISS Working Papers are available for download at
http://iriss.ceps.lu/research/working_papers



IRISS-C/I is a visiting researchers programme at CEPS/INSTEAD, a socio-economic policy and research centre based in Luxembourg. It finances and organises short visits of researchers willing to undertake empirical research in economics and other social sciences using the archive of micro-data available at the Centre.

What is offered?

In 1998, CEPS/INSTEAD has been identified by the European Commission as one of the few *Large Scale Facilities* in the social sciences, and, since then, offers researchers (both junior and senior) the opportunity to spend time carrying out their own research using the local research facilities. This programme is currently sponsored by the European Community's 6th Framework Programme. Grants cover travel expenses and on-site accommodation. The expected duration of visits is in the range of 2 to 12 weeks.

Topics

The major resource offered to visitors is access to a series of internationally comparable longitudinal surveys on living conditions at the household and individual level. The anonymised micro-data provide information on wages and income, health, education, employment and professional activities, accommodation, social relations,... Comparable micro-data are available for EU countries, Central European countries, as well as the USA. These data offer opportunities to carry out research in fields such as *survey and panel data methodology, income distribution and welfare, income and poverty dynamics, multi-dimensional indicators of poverty and deprivation, gender, ethnic and social inequality, unemployment and labour supply behaviour, education and training, social protection and redistributive policies, fertility and family structures, new information technologies in households and firms, ...*

Who may apply?

All individuals (doctoral students as well as experienced academics) conducting research in an institution within the EU-25 or an FP6 Associated State. IRISS-C/I can be meeting place for groups of researchers working on a joint project. We therefore encourage joint proposals by two or more researchers.

For more detailed information and application form, please consult our website: <http://iriss.ceps.lu> or contact us at

IRISS-C/I, CEPS/INSTEAD
BP 48, L-4501 Differdange, G.-D. Luxembourg
Tel: +352 585855 610; Fax: +352 585588
E-mail: iriss@ceps.lu