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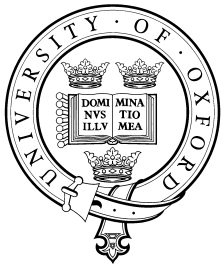

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Multidimensional poverty measurement for EU-SILC countries

Sabina Alkire[1], Mauricio Apablaza[2] and Euijin Jung[3]

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Abstract

This paper presents a set of experimental indices of multidimensional poverty, using cross-sectional EU-SILC data. The indices use the Alkire Foster (AF) methodology – a widely-used flexible methodology which can accommodate different indicators, weights and cut-offs. In constructing three sets of illustrative indices we review the joint distribution within and among potential indicators of multidimensional poverty. We draw on existing EU-2020 indicators, as well as on indicators of health, education and the living environment. The time series data enable an analysis of multidimensional poverty dynamics, including analyses of changes in overall poverty and in indicators. The paper also decomposes poverty results by gender – finding women to be poorer across countries and time – and by age categories.

Keywords: Multidimensional poverty, Counting measures, Material deprivation, Multidimensional poverty dynamics

JEL classification: I3, I32, D63

1 University of Oxford, United Kingdom.
2 Facultad de Gobierno, Universidad del Desarrollo (Chile) and the University of Oxford (UK).
3 Korea Research Institute for Vocational Education & Training (KRIVET).

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Introduction

Methodologies of multidimensional poverty measurement that draw on the 'counting' approach have been used in policy applications since the 1970s (Townsend 1979; see also Atkinson 2003, Nolan and Whelan 2011, and Alkire et al. 2015 Ch 4 for reviews), and are gaining greater momentum (Erikson 1993, Callan *et al.* 1999, Atkinson 2003, Chakravarty and D'Ambrosio 2006, Whelan *et al.* 2014). To date many studies have focused on understanding the structure among deprivations, and on identifying the normative, policy, and statistical tools that can best justify the collection of data on distinct indicators (Atkinson *et al.* 2002; Atkinson *et al.* 2005, Atkinson and Marlier 2010b and the references therein). Others have used statistical methods to justify why indicators might be aggregated into a composite indicate covering one relevant dimension such as material deprivation (Guio *et al.* 2012; OECD 2008). Drawing upon such studies, this paper presents a set of experimental indices of multidimensional poverty which use an adjusted headcount ratio M_0 that builds on a counting-based dual-cut-off methodology (Alkire and Foster 2011a, 2011b). We show how these measures can be used to provide diverse and specific descriptive analyses, hence why they may complement existing measurement approaches.

The methodology is flexible in that different indicators, cut-offs and weights can be used, including cardinal, ratio-scale, binary, ordinal and categorical variables. Unlike the headcount ratio which has been traditionally used with counting-based measures in both Europe and Latin America, the AF family of measures incorporate the joint distribution of deprivation and include a new feature of *intensity* – which shows the percentage of dimensions in which the average poor person is deprived. Incorporating intensity into the measure itself enables the multidimensional poverty measure to be broken down by indicator (after identification), to show the levels and composition of deprivations poor people experience. This is not possible with counting-based headcount ratios. Measured poverty also changes if intensity changes. Where data permit, the measure and each of its consistent indicators can be further broken down by subgroups such as gender, age, social groups or regions. The global Multidimensional Poverty Index (MPI) which is released by UNDP's *Human Development Reports* and covers 108 countries in 2014 is based on this methodology (Alkire and Santos 2010; UNDP 2010), as are official national measures of multidimensional poverty, such as those of Mexico, Colombia, the Philippines, and Bhutan.

The first application of the AF method in OECD countries, was implemented using the 2009 EU-SILC dataset by Whelan Nolan and Maitre in 2014. This paper extends Whelan *et al.*'s work by constructing AF poverty measures across time periods 2006-2012, using, necessarily, a more limited set of indicators. In doing so, we demonstrate the analysis of the multidimensional poverty indicator in one period and across time, by headcount, intensity, and indicator. The contribution of this paper is to show the kinds of policy analyses that could be done using this methodology, were a set of dimensions and indicators to be agreed upon by a legitimate process, and were fully consistent and comparable variable definitions to be used.

The paper proceeds as follows. Section 1 briefly situates our topic in the literature and Section 2 introduces the AF methodology. Section 3 introduces the data then presents three experimental indices of multidimensional poverty, using cross-sectional EU-SILC data and the individual as unit of analysis. It first presents the non-response and longitudinal availability of information and describes the deprivations in each indicator ('uncensored headcount ratios') for each country, then explores associations across indicators, and three weighting structures. Section 4 presents the AF results, first showing the poverty cut-off for each decile across time and across measures to illustrate the likely robustness of analyses. Choosing a poverty cut-off for each measure, it then presents the overall results of the three measures across all countries having data in all periods and their component partial indices: the headcount ratio or percentage of the population identified as multidimensionally poor (H), and the intensity, or average percentage of weighted deprivations experienced by poor people (A), and censored headcount ratios. Censored headcount ratios show the percentage of people who are identified as poor and are deprived in each particular indicator. All three measures show a significant reduction in poverty 2006-12, although patterns vary. Across dimensions, the composition of poverty varies across the three measures according to the weights. Section 4.2 illustrates the level and composition of poverty by countries in 2009, and also compares uncensored and censored headcount ratios on each indicator to see which are most highly associated with poverty. Section 4.3 presents annual time comparisons on aggregate and by country, and assesses the significance of changes over time. As the measure uses individual level data, Section 4.4 decomposes results by gender and age group, finding women to be poorer across time and space. Section 5 concludes.

1. Motivation

Multidimensional approaches to poverty and deprivation have a long and distinguished history in conceptual and philosophical work (Sen 1992). In terms of policy, the late 1960s and early 1970s saw the entrance of policy applications, with the 1968 Swedish Level of Living Study (Johannson 1973, Allardt and Uusitalo 1972); Jacques Delors' 1971 *Les indicateurs sociaux* and P.Ch. Ludz's *Materialien zum Bericht zur Lage der Nation* (1971), each providing independent impetus in different countries and across Europe for this effort.

In more recent literature, significant attention has been paid to the relationship among deprivations, to ways of communicating these, and to methodologies to validate indicators used in composite or multidimensional indices (Atkinson *et al.* 2002; Alkire *et al.* 2015, Callan et al 1993; Gordon et al 2003; Layte et al 2001, Nolan and Whelan 1996, 2010, 2011, OECD 2008, Saunders and Adelman 2006; Whelan 2007). Drawing on the 2004 EU-SILC data, Guio and Maquet (2006) proposed a multidimensional indicator of Material Deprivation, which reflected deprivations such as poor housing, lack of durable assets, and an inability to afford to meet basic needs. The indicator was designed to be comparable across time and across the EU and most member states, and to provide meaningful trend data showing improvements in material deprivation over time. Whelan (2007) used the Irish component of the 2004 EU-SILC dataset to develop an 11-item 'consistent poverty' index; and Whelan and Maître (2009) use a range of statistical methods such as correlation and factor analysis; goodness of fit tests like root mean square error of approximation; and reliability tests like Cronbach's Alpha, to identify three dimensions of material deprivation (consumption, household facilities, and neighbourhood environment) and examine their relationship to income poverty. Coromaldi and Zoli (2012) clarify the added value of non-linear principal component analysis, NLPCA, to these techniques. Guio *et al.* (2012) provide a systematic exposition of an expanded range of techniques to justify a new severe material deprivation index using the 2009 EU-SILC dataset. A set of parallel papers explores similar questions with respect to child poverty (Bradshaw 2009, Notten and Roelen 2010, Gabos et al 2011, Guio et al 2012, and Adamson 2012). Naturally, this deep analysis of the structure of deprivations resulted in a set of empirical and policy studies on the relationship between income and other deprivations (Verbist and Lefebure 2008, Whelan and Maitre 2009, Jana et al 2012) and also gave rise to applied multidimensional measures (Whelan *et al* 2014).

The EU-SILC dataset has also been used by academic studies to illustrate multidimensional poverty measurement methodologies (Chakravarty and D'Ambrosio 2006; Bossert, et al 2013, among others). Brandolini (2007) explored Atkinson's (2003) counting approach using data for France, Germany and Italy and a headcount ratio associated with the minimum proportion of deprivations a person has, and compared the various deprivation measures with income poverty measures. He drew attention to the sensitivity of cross-national comparisons to weights, and also to the deprivation cut-off.

This paper adds to this already significant recent literature by illustrating the rich variety of analyses that can be accomplished using one particular methodology, drawing on three experimental measures which differ in indicator weights.

2. AF Methodology

This section briefly introduces the class of M_α measures developed by Alkire and Foster (AF) that build on the Foster Greer Thorbecke (FGT) index, using the notation found in other works (Alkire and Foster 2011a). The three experimental measures use the M_0 methodology in this class.

There are a total of n persons and the wellbeing of each is measured in a total of d dimensions. When referring to a particular person we call them i, and we call a particular dimension, j. The whole dataset is collected in a matrix, where row i tells us the achievement for person i on each of the different dimensions j from 1 to d, and where column j tells us the score on dimension j of each person i from 1 to n. So looking across a row of the matrix gives the full picture for one person, and looking down a column gives the full picture for a given dimension. In weighting dimensions (not people) we use weights w_j where these sum to 1.

For each column of the matrix, we set a cut-off, z_j, for that dimension of deprivation. We then construct a deprivation matrix g^0 by going down each column, and setting the entry for person i equal to w_j if they are below the cut-off. Where they are at the cut-off or above the entry is set to zero. So a person who is not deprived on any dimension has a row of zeroes. For each person we now look at the row and add up the positive entries. This gives us a new column, with entries c_i where i goes from 1 to n. This is the sum of the weighted deprivations suffered by person i. We call the column vector of c_i entries the "count" vector, and each entry c_i show's a person's weighted deprivation score.

Next, we identify who is multidimensionally poor. A poverty cut-off k is selected whose value is greater than zero but less than one, and is applied across column vector c. A person is identified as poor if their weighted deprivation score $c_i \geq k$. For example, if a person is deprived in 40% of the dimensions (that is their weighted deprivation score is 40%) and the poverty cutoff is 20%, that person is identified as poor because 40% $\geq$ 20%. This can be called a *dual cut-off* identification method, because it uses the *deprivation* cut-offs z_j to determine whether a person is deprived or not in each dimension, and the *poverty* cut-off k to determine who is to be considered multidimensionally poor.[1]

Having identified the poor, construct a censored deprivation matrix $g^0(k)$, obtained from g^0 by replacing its i^{th} row g_i^0 with a vector of zeros whenever $c_i < k$. This *censored* deprivation matrix contains the weighted deprivations of those persons who have been identified as poor and *replaces* deprivations of the non-poor with zeros. The censored deprivation matrix is the basis of the dimensional partial indices. For example, the censored headcount ratios are simply the mean of its columns, divided by the weight of that column. The measure M_0 is the mean of the censored vector of deprivation scores ($c_i(k)$).[2]

M_0 can also be expressed as the product of the (multidimensional) headcount ratio (H) and the average deprivation share among the poor (A). H is simply the proportion of people that are poor, or q/n where q is the number of poor people. A is the average share of weighted deprivations poor people experience – $A = \sum_{i=1}^{n} c_i(k)/q$ – and reflects the average *intensity* of multidimensional poverty.

M_0 satisfies a number of useful axioms, specifically: replication invariance, symmetry, poverty focus, deprivation focus, weak monotonicity, non-triviality, normalisation, dimensional monotonicity, subgroup decomposability, dimensional breakdown, ordinality and weak re-arrangement (Alkire and Foster 2011a, 2013). These axioms are joint restrictions on the methodology that includes both identification and aggregation steps. If data are cardinal, other measures within the M_α family can be computed. These measures can reflect the depth and severity of multidimensional poverty, and satisfy

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1 This identification strategy can also be represented, following Bourguignon and Chakravarty (2003), by an *identification function* $\varrho: \mathbb{R}_+^d \times \mathbb{R}_{++}^d \rightarrow \{0,1\}$, which maps from person i's achievement vector $y_i \in \mathbb{R}_+^d$ and cut-off vector z in $\mathbb{R}_{++}^d$ to an indicator variable in such a way that $\varrho(y_i; z) = 1$ if person i is poor and $\varrho(y_i; z) = 0$ if person i is not poor.

2 M_0 is the mean of the matrix when the weights sum to d. In this notation, because weights sum to 1, M_0 is the mean of the matrix multiplied by the number of columns or dimensions d.

other axioms related to monotonicity and transfer. However these are beyond the scope of this paper because most of the EU-SILC variables are not cardinally meaningful.

For tracking changes across time, different approaches are possible. Naturally the number, level and significance of changes in poverty measures and their associated partial indices can be directly compared, and absolute and relative rates of change can be analysed. Alkire *et al.* 2015 Ch 9 provides a systematic presentation of different methodologies for assessing poverty dynamics using repeated cross-section data.[3]

3. Data and Indicators

In 2001, the Laeken European Council endorsed a set of 18 indicators of social inclusion for Europe which were subsequently refined, consolidated and extended, using normative, statistical, and policy reasoning. Atkinson et al. (2005) traces how this process led to the agreement of common social indicators related to deprivation, housing and services, which in turn gave rise to common survey instruments. The European Union Statistics on Income and Living Conditions (EU-SILC) was developed precisely to compare deprivation and social exclusion across European countries. Data are available annually for most countries, with the earliest data being available from 2005, and other countries being added gradually. Atkinson and Marlier (2010b) provide an overview of the survey initiation (Chapter 2, Figure 2.1). The datasets provide harmonized information needed to assess being at-risk-of-[income]-poverty as well as indicators such as (quasi) joblessness, health, housing and the lived environment.

This paper selects an illustrative set of 12 indicators and compares three measures made from these indicators across time and space. It is important to note that the illustrative measures are limited by variable definition (comparable variables must be present across time periods and must be accurate at the unit level rather than only on average) as well as by data availability (missing values in any variable must be low). Particular challenges are evident in the educational data because the years of schooling

[3] If the strong assumptions underlying theoretical decompositions required can be justified, Shapley value decompositions (Roche 2013) and other decompositions (Apablaza and Yalonetzky 2011) can be used to explore the percentage of poverty reduction which can be attributed to a reduction in headcount vs. intensity, and by indicator and demographic changes. However the required assumptions for either approach are difficult to justify empirically (Alkire Roche Vaz 2014).

that correspond to primary education vary across EU-SILC countries as may educational quality. Also, data for some indicators including the health variables are subjective or self-report, and may not accurately proxy the level or trend of objective outcomes. For income poverty and material deprivation our indicators are constructed like the EU2020 multidimensional poverty measure component indicators[4]. The lack of detailed information regarding part-time jobs before 2009 renders unnecessary the precise replication of the EU2020 quasi-joblessness indicator, but does provide comparability across years for a similar indicator. In our (quasi) joblessness indicator, we constructed a quasi-joblessness condition considering all members of relevant households. Households that *exclusively* contained any one of the following three groups: children 0-18, students in self-defined current economic status 18-24, or persons aged 60 and above; were considered non-deprived in (quasi) joblessness.

Also, because of data limitations we are not able to implement the 2009 severe material deprivation index with improved indicators proposed in (Guio *et al.* 2012), nor to replicate Whelan *et al.* (2014) multidimensional poverty measures, because both draw on variables that are present from 2009 but not in previous periods.

Where aggregate figures are reported, these include information only from countries with data available across all years. The aggregate figures include (population-weighted) data of Austria, Cyprus, Czech Republic, Denmark, Estonia, France, Germany, Greece, Hungary, Iceland, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden and United Kingdom. We excluded from the aggregate results information of Belgium (2012), Bulgaria (2006), Croatia (2006-2010), Ireland (2012), Malta (2006-2007), Romania (2006) and Switzerland (2006-2007). Additionally, due to irregularities in the education variable PE040 (Highest ISCED level attained), Finland (2007) was also excluded. Finland shows that all individuals have primary education across all years except in 2007. In 2007, 18% of the populations did not have primary education. For national results, we include all countries[5].

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4 To measure severe material deprivation we identify households as deprived if they have 4 or more deprivations in the 9 indicators used in the EU-2020 measure (listed in Table 5).

5 We also observed uncommon changes in housing in Hungary (2008) and Bulgaria (2007-2008) and unmet Medical Needs in Portugal (2007) but numbers were contrasted and corroborated with official statistics. For proof see http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ilc_mdho01&lang=en; and for unmet Medical Needs see http://epp.eurostat.ec.europa.eu/portal/page/portal/employment_social_policy_equality/social_protection_social_inclusion/indicators/health_long_term_care

Regarding the sample weights, a subset of countries (Denmark, Finland, Iceland, Netherlands, Norway Slovenia and Sweden) have a lower sample size for health variables due to their use of registry data. MPIs are calculated only for respondents having all indicators, and aggregated using the specific weight for this sub-selected population (PB060). To maintain the comparability of the aggregate and pooled results we reweighted the data using the retained sample for each country (dropping missing values as reported in Table 1) to correspond to the number of individuals of each country as in the original dataset. Regarding the analysis over time, point estimates calculations are complemented with the analysis of standard errors and tests of differences of mean, following the structure proposed by Goedemé (2010, 2013).

3.1 Unit of Analysis: Individuals 16 years and above

Different units of identification are possible using the EU-SILC dataset: individual adults; individual children; adults or children by household, and households.[6] Here we use the individual adults as a unit of identification. The measures that follow combine individual and household level information, and identify each individual aged 16 and above as multidimensionally poor or non-poor based on his or her own achievements in the health and education indicators for which this information is available. Household level variables are used to identify individuals as deprived or non-deprived in terms of at risk of income poverty, severe material deprivations, (quasi) joblessness, housing, noise, crime and pollution. This way of proceeding is useful because the resulting measures can be disaggregated by gender and age. However normatively iusing the individual adult as a unit of identification overlooks (and does not foster) intra-household sharing and caring in the individually measured dimensions. For example having a chronic disability in a household which can effectively care for such a person is very different than having the same health condition and living alone. Nor does it capture the possibility of externalities in the household such as an educated member helping another. Some policy aims support a household focus.

It would be possible to use the household as a unit of identification for a poverty measure built with EU-SILC data. In this case, a household would be deprived in education, and health indicators depending upon the joint deprivations of all household members (which might include children) for whom data were available. This method – which was used for example in the global MPI – can reflect

6 For an extensive discussion of the household structure in Europe, see Chapter 4 by Maria Iacovou and Alexandra Skew in *Income and living conditions in Europe* (Atkinson and Marlier, 2010).

intra-household sharing and child deprivations. In this case, the results still can be aggregated using individual sampling weights such that the unit of *analysis* (individual) reflects the proportion of people who are poor (unit of analysis is individual) or the proportional of households who are poor (unit of analysis is the household). Here, the household was not used as the unit of identification or analysis in these measures, in part because household structures vary across Europe (Iacovou and Skew 2010). Also, the appropriate 'cut-off' for household level indicators built with individual education and health data would require separate analysis.[7] Finally, in the EU-context, social rights tend to be individually based. For that reason, in the experimental measures the individual is taken as a unit of identification, with the consequence of not including child poverty.

3.2 Dimensions, Indicators, and Weights

The dimensions and indicators of deprivation in this paper draw upon an earlier paper in which we implemented four experimental measures, each having three to six dimensions and a variety of differently defined indicators, using data from 2006-10 (Alkire Apablaza and Jung 2012), as well as an interim draft in which we implemented further experimental measures, including one that omitted chronic health conditions. Based on these results, and the editors' and others' comments upon them, we revised the dimensions and indicator definitions a third time. The three experimental indices presented in this paper have four, five and six dimensions. They use nested weights in that each dimension is equally weighted, and each indicator within a dimension is likewise equally weighted. Dimensions of health and education and some form of economic welfare are present in most descriptions of multidimensional poverty (Appendix 1, Alkire 2002). Drawing on the arguments provided in Whelan et al (2014) and Guio and Maquet (2006), all measures adds to these a dimension of the living environment, which includes housing and neighbourhood considerations: noise, pollution and safety. In all measures, education, health, and the living environment each enter as separate dimensions. In Measure 1, the EU-2020 indicators together form the fourth dimension. In Measure 2,

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[7] The aggregation of intra-household data and the setting of deprivation cutoffs require normative, policy, and empirical exploration to justify. They can be set based on a 'counting' approach across household members or some alternative aggregation. For example, a household can be considered deprived in education, if a) **one** household member has not attained a certain educational level; b) **no one in the household** has attained a certain educational level; c) **at least one-third** of household members have not attained a certain level, or d) if the **average achievement level** across household members is less than some threshold. Of course, households differ in kind as well as by cultural or geographical group: nuclear or extended families differ from student houses and migrant workers sharing accommodation, and the assumptions of intra-household sharing must be considered for distinct household types (Alkire and Santos 2014).

AROP and quasi-joblessness form one dimension and material deprivation is a separate fifth dimension. In Measure 3, each indicator of the EU-2020 poverty index becomes its own separate dimension making a total of six dimensions. Effectively, this changes the relative weight of different poverty components – in Measure 1, EU-2020 indicators contribute 25% of the total weight; in Measure 2, 40% and in Measure 3 it rises to 50%. Taken together a comparison across these measures also illustrates the robustness of the analysis to changes in weights.

Terminologically, dimensions are organising concepts which in this case govern the weights attached to indicators. They may also be used to communicate the results in public. Once again, the discussion of the appropriate dimensions to organise the measurement of deprivation has a long history, which can inform present discussions. Because these measures are experimental we do not provide an extensive normative justification of the dimensions drawing on people's own values, the theoretical literature, the policy purpose of the measure, and other considerations. Such an extensive justification is provided in the case of official multidimensional poverty measures. Appendix one provides a set of dimensions and in some cases indicators that have been used in the European context (see also Atkinson *et al* 2002).

The indicators of these measures are data constrained. EU-SILC indicators tend to be defined in the space of resources, in the case of AROP, severe material deprivation or housing – or common proxies for functionings, such as levels of schooling and employment status. Some draw upon self-assessments – for example, evaluations of noise and safety and health – which may not reflect the objective risk of violence or noise vibrations in a neighbourhood. If a measure is intended to reflect deprivations in the functionings or capabilities that poor people experience (Sen 1992), then it would be necessary to examine in what way each indicator could be interpreted to proxy functionings and the anticipated accuracy of such proxies for diverse individuals. Rather than doing so, in this case we draw upon the rich existing literature justifying the EU-SILC indicators (Atkinson and Marlier 2010).

Table 5 describes each component indicator of the experimental measures and its deprivation cut-off. Several notes may be in order. First, other studies have not necessarily included education, perhaps due to country differences in the definition of levels of education. These measures retain education because of its importance, and consider a person to be deprived if they have not completed primary school. But the indicator is not necessarily comparable, because the same *levels* of education may correspond to differing number of *years* in different countries.

In terms of the severe material deprivation indicator, Guio et al. (2009) and subsequent work had used a cut-off of three out of nine indicators to signify material deprivation. In more recent work (Guio et al. 2012, Atkinson et al 2010), both the variables and the cut-offs have been re-assessed using the 2009 EU-SILC dataset. In this paper we follow Guio et al.'s (2012) stricter version of the indicator – severe material deprivation – with a cut-off to four out of nine using the original Guio et al (2009) indicators. In employment, we had to modify the (quasi) joblessness indicator proposed by EU-2020 to apply to the entire population. Although ours follows the same structure[8], we identify as non-deprived the people not included in the original indicator: children (<18), students between 18 and 24 and elderly (>60). The At-Risk-Of-[Income]-Poverty indicator follows the EU-2020 standards, and considers a person at risk of poverty (AROP) if their household income is less than 60% of the national median equivalised disposable income.

3.3 Non-Response

In this analysis, we have adopted a rigorous approach to the issue of missing values. At the country level we excluded countries with unavailable or inconsistent data across periods from aggregate results. At the individual level, we drop respondents having a missing value in *any* indicator. The EU-SILC data for the retained sample are then adjusted for missing observations using sampling weights. By reweighted the retained sample, we maintain the original population of each country.[9] For countries with registry data the measure is constructed only from respondents with information in all indicators and using the specific sampling weight for this subgroup (PB060). The proportion of the sample with registry data is given on the far right column.

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[8] Based on Geodeme (2010) whose do file is available at http://www.ua.ac.be/main.aspx?c=tim.goedeme&n=95420 and Anne-Catherine Guio's comments.

[9] Our bias analyses do not show significant differences between the remaining population and the individuals excluded due to non-response or missing variables in all countries. To test for bias when there are large (15% or more) drops in sample size we compare the uncensored headcount ratios for the retained and dropped groups of the population, and conduct a *t* test for differences between means following Alkire and Santos 2014. For more information on the use of register data in the the EU-SILC survey, see Jäntti, Törmälehto and Marlier (2013).

Table 1: Non-Response and Missing Values across deprivation indicators

	2006	2007	2008	2009	2010	2011	2012	reg. data
AT	*0.25%*	*0.13%*	*0.04%*	*0.13%*	*0.13%*	*0.07%*	*0.04%*	*0.00%*
BE	*6.79%*	*10.27%*	*5.15%*	*2.07%*	*2.53%*	*2.60%*		*0.00%*
BG		*17.81%*	*1.85%*	*1.49%*	*1.33%*	*1.16%*	*1.60%*	*0.00%*
CH			*1.02%*	*0.74%*	*0.61%*	*0.73%*	*0.89%*	*0.00%*
CY	*1.60%*	*1.53%*	*1.63%*	*1.30%*	*1.12%*	*1.14%*	*0.81%*	*0.00%*
CZ	*10.00%*	*10.47%*	*14.05%*	*16.80%*	*20.93%*	*26.02%*	*24.55%*	*0.00%*
DE	*4.11%*	*4.69%*	*8.16%*	*6.12%*	*7.04%*	*8.88%*	*8.42%*	*0.00%*
DK	*5.21%*	*4.95%*	*4.62%*	*8.44%*	*4.22%*	*2.56%*	*2.28%*	*37.30%*
EE	*0.35%*	*0.93%*	*11.56%*	*19.96%*	*21.59%*	*19.69%*	*21.00%*	*0.00%*
EL	*2.89%*	*2.89%*	*2.77%*	*2.10%*	*2.15%*	*1.68%*	*1.65%*	*0.00%*
ES	*6.23%*	*5.78%*	*5.96%*	*5.70%*	*5.63%*	*6.13%*	*5.16%*	*0.00%*
FI	*15.17%*	*14.58%*	*3.54%*	*3.71%*	*4.81%*	*4.61%*	*7.36%*	*41.60%*
FR	*1.38%*	*6.44%*	*1.59%*	*1.63%*	*1.60%*	*1.67%*	*1.83%*	*0.00%*
HR						*44.13%*	*44.34%*	*0.00%*
HU	*0.29%*	*0.49%*	*0.43%*	*3.70%*	*1.53%*	*0.42%*	*0.61%*	*0.00%*
IE	*2.10%*	*1.87%*	*1.96%*	*3.15%*	*12.01%*	*3.80%*		*0.00%*
IS	*1.36%*	*1.48%*	*1.07%*	*1.37%*	*1.56%*	*1.70%*	*1.54%*	*47.27%*
IT	*0.35%*	*4.57%*	*4.83%*	*4.41%*	*3.97%*	*6.08%*	*5.27%*	*0.00%*
LT	*2.18%*	*2.01%*	*19.58%*	*15.92%*	*16.10%*	*14.49%*	*18.31%*	*0.00%*
LU	*2.02%*	*1.20%*	*0.87%*	*1.89%*	*2.29%*	*3.05%*	*1.87%*	*0.00%*
LV	*0.29%*	*0.18%*	*0.25%*	*1.59%*	*1.32%*	*1.17%*	*1.22%*	*0.00%*
MT			*2.29%*	*1.63%*	*1.74%*	*1.39%*	*1.01%*	*0.00%*
NL	*2.53%*	*2.00%*	*2.11%*	*1.99%*	*1.82%*	*1.97%*	*1.81%*	*44.44%*
NO	*2.77%*	*3.30%*	*4.06%*	*5.18%*	*3.53%*	*6.12%*	*2.77%*	*39.12%*
PL	*0.24%*	*0.27%*	*0.24%*	*0.17%*	*0.19%*	*8.25%*	*7.36%*	*0.00%*
PT	*13.22%*	*12.75%*	*12.31%*	*11.37%*	*11.06%*	*10.87%*	*12.16%*	*0.00%*

RO		*4.30%*	*2.21%*	*1.98%*	*1.75%*	*3.74%*	*3.59%*	*0.00%*
SE	*10.45%*	*10.02%*	*3.06%*	*2.57%*	*3.04%*	*2.93%*	*4.97%*	*40.72%*
SI	*0.39%*	*0.14%*	*0.70%*	*0.63%*	*0.57%*	*0.55%*	*0.42%*	*55.72%*
SK	*1.26%*	*0.74%*	*5.84%*	*4.20%*	*3.27%*	*3.64%*	*2.35%*	*0.00%*
UK	*11.19%*	*10.27%*	*15.95%*	*18.13%*	*18.20%*	*19.83%*	*12.21%*	*0.00%*

3.4 Uncensored headcount ratios of deprivations in each indicator

The deprivations in all indicators in the years 2006 and 2012 are reported in Table 4 below. The table includes all deprivations of all individuals for whom no data on any indicator is missing. There are several points to note. First, the AROP percentages roughly match those published in other sources (Nolan et al 2010).[10] Second, in the aggregate data, of the three indicators used in the EU-2020 poverty measure, deprivations in income (15.3% in the selected EU-SILC countries) are the highest although this varies by country. (Quasi) joblessness and severe material deprivation tend to be lower and are, on average, 10.1% and 7.7%, respectively.

The indicators that tend to have the highest incidence overall are perceptual data of chronic health status, and the self-reported incidence of noise or housing problems. However incidence varies considerably across countries. The challenges inherent in interpreting the subjective indicator levels and trends are biases from personality and adaptive preferences or knowledge asymmetries – that may evolve over time. The fact that these indicators carry a lighter weight may ease interpretation of the trends somewhat.

In education we merely remind the reader that educational deprivations depend in part upon the definition of primary school, and the duration thereof varies across the included countries. Finally, across the self-reported environmental indicators we see less variation overall than in other indicators which raises questions about whether they reflect shifting aspirations.

Several empirical techniques could be useful to understand the interrelationships between indicators. For these illustrative measures, rather than provide a full justification as in Guio *et al.* 2012 or Whelan *et al.* 2014 (to which we refer readers), we present correlations and redundancy measures across the binary deprivation indicators using the pooled data across all persons in all years.

10 We are grateful to Brian Nolan and Bernard Maitre for direction in constructing this variable.

In the case of binary deprivation indicators, correlations generate Cramer's V. There are high intra-correlations among the health indicators (which are addressed below) and otherwise relatively low correlations. Low associations are desirable when a measure seeks to bring into focus multiple aspects of poverty; however the robustness of such measures to changes in weights must be ascertained, and also correlation analysis may not be the most precise tool (Alkire *et al.* 2015). Cramer's V results are presented in Table 2.

Table 1: Uncensored Headcount ratios of all indicators, 2006 & 2012

	AROP	*q-jobless*	*ser. mat dep*	*Education*	*noise*	*pollution*	*crime*	*housing*	*health*	*chr. illness*	*morbidity*
AT	12.1%-13.7%*	7.6%-7.2%	3.5%-3.7%	1.1%-0.9%	18.8%-19.9%	7.6%-11%**	12%-11.8%	10.1%-11%	7.9%-9%*	21.9%-33%**	9.4%-9.5%
CY	16.9%-14.8%*	4.7%-7.1%**	12.8%-14.5%*	24.9%-20.7%**	36.5%-26.6%**	24.8%-15.7%**	12.7%-15.4%**	35.3%-30.5%**	9.4%-6.7%**	29%-32.4%**	8.5%-7.8%
CZ	8.5%-8.9%	8.5%-6.3%**	9.1%-6.4%**	0.1%-0.1%	18.8%-14.2%**	19.3%-15.4%**	14%-13.1%	20.5%-10.2%**	13.4%-12.8%	29.8%-30%	6.8%-6.2%*
DE	12.3%-15.3%**	10.7%-7.7%**	4.6%-4.6%	3.4%-2.9%*	27.2%-25.9%*	23.7%-21.9%**	12.4%-11.8%	14%-12.7%*	9.3%-8.6%*	38.2%-36.9%*	8.2%-10.9%**
DK	12.2%-13.8%*	8.4%-9.8%*	2.9%-2.7%	0.2%-0.1%	18.8%-17.8%	7.6%-5.8%**	13.4%-10.5%**	8.3%-16.9%**	7.8%-7.6%	29.6%-29%	0%-6.8%**
EE	18%-17.8%	6.9%-9.2%**	7.1%-9.4%**	5.4%-3.1%**	22.8%-12.9%**	21.5%-11.8%**	20.2%-15.6%**	23.3%-19.3%**	15%-16.3%*	38.5%-43.6%**	9.5%-9.8%
EL	20.3%-22.7%*	21.2%-15.2%**	20.4%-25.1%**	17.1%-26.2%**	8.4%-19.8%**	35.7%-26.4%**	9.2%-9.3%	20.2%-23.7%*	6%-10%**	11.9%-19.6%**	23.1%-31%**
ES	19.2%-21%*	7.5%-14.7%**	3.2%-5.5%**	31.4%-24.8%**	27%-14.9%**	17.1%-7.9%**	19.9%-10.3%**	17.1%-12%**	12.2%-8%**	23.8%-26.1%**	8.6%-5.1%**
FR	12.6%-12.9%	8.8%-7.7%*	4.8%-4.9%	23.9%-17.2%**	19.6%-16.8%**	15.8%-11.1%**	16.1%-14.6%*	11.6%-12.2%	9.5%-8.5%**	34.3%-36.5%**	6.3%-8.7%**
HU	13.9%-12.5%	11.9%-10.6%*	20.1%-24.3%**	8.1%-3.5%**	17.2%-10.1%**	13.1%-11.8%*	9.9%-10.1%	26.7%-23.2%**	20.3%-15.9%**	35.6%-35.8%	13.4%-7.8%**
IS	9%-7.1%**	3.2%-5.8%**	1.9%-2.2%	3.5%-2.2%**	12.4%-11.2%	8.2%-8.4%	2.4%-3.3%*	12.1%-17.2%**	4.7%-5%	24.4%-28.8%**	5.7%-10.1%**
IT	18.7%-18.2%	11.4%-10.8%	6.2%-14%**	26.7%-20.5%**	25.1%-17.7%**	21.6%-17.1%**	14.9%-14.8%	21.9%-21.2%	10.5%-12.4%**	21.5%-24.5%**	7%-9.4%**
LT	19.8%-18.4%	8.7%-10.9%*	26.2%-20.4%**	9.6%-9.4%	19.9%-13.2%**	14.1%-14.7%	7.7%-4.9%**	28.1%-17.7%**	18.1%-20.4%**	33.4%-29.5%**	10.2%-8.1%**
LU	12.8%-13.5%	5.7%-6.5%	0.9%-1.2%	29%-24.7%**	23%-16.5%**	17.8%-13.3%**	11.5%-14.1%*	14.2%-16.2%*	7.3%-7.3%	23.6%-20.1%**	7%-5.8%*
LV	22.6%-18.4%**	7%-12%**	30.8%-25.4%**	3.7%-2.8%**	20.8%-15.7%**	32.1%-21.9%**	25.7%-16.9%**	31.7%-28%**	19.4%-15.2%**	35.1%-35.8%	10.1%-7%**
NL	9%-9.6%	10.5%-7.7%**	2%-2%	10.8%-8.3%**	31.4%-24.2%**	14.2%-13.8%	16.3%-18.2%*	16%-15.7%	5.2%-5.7%	32%-34.5%**	8.2%-5.8%**
NO	12.1%-10.7%*	8.1%-6.8%*	2.9%-1.7%**	0.2%-0.3%	12.5%-11%	7.6%-9.6%*	4%-5.9%**	7.6%-7.7%	9.4%-6.3%**	33.7%-30.8%*	8.7%-4.3%**
PL	17.8%-16.3%*	14.3%-11.8%**	27.8%-13.5%**	20.4%-16.4%**	19.8%-14.4%**	12.9%-11%**	8.9%-6.4%**	41.2%-10.4%**	17.3%-14.6%**	32.4%-34.4%**	6.2%-7.4%**
PT	18.1%-17.2%	7.2%-10.5%**	8.9%-8.3%	54.5%-47.2%**	25.5%-23.8%	20.4%-15.4%**	12%-11%	19%-22%*	20%-18.2%*	30.8%-37%**	11.5%-21.8%**
SE	11.9%-14.3%**	6.2%-9%**	1.9%-1.3%*	9.6%-8.3%**	13%-13.1%	6.9%-7.9%*	13.1%-9.5%**	6.6%-7.2%	5.8%-4.2%**	35%-33.8%	8.2%-6.1%**
SI	11.6%-13.5%**	8%-8.5%	5.3%-6.8%**	21.4%-3.1%**	18%-14.1%**	20.6%-16.2%**	9.5%-8.2%**	21.8%-31.6%**	15.7%-12.4%**	36.4%-35.3%	8.4%-11.4%**

SK	10.7%-11.9%*	7.1%-7.2%	17.8%-10.3%**	1.4%-0.6%**	19.8%-16%**	19.8%-15.3%**	8.3%-9.7%*	6.3%-8.4%**	18%-12.5%**	27.4%-29.7%**	11.1%-10%*
UK	18%-15.7%**	13.6%-9.8%**	3.9%-6.9%**	0%-0%	22%-17.8%**	13.4%-8.2%**	27.6%-19.5%**	13.2%-16%**	6.5%-8.2%**	38.1%-32.8%**	8.5%-10.6%**
Aggregate	**15.3%-15.6%**	**10.5%-9.7%****	**7.5%-7.8%**	**15.1%-11.6%****	**23.3%-18.5%****	**17.4%-13.6%****	**15.8%-13.1%****	**17.9%-14.6%****	**10.8%-9.9%****	**31.8%-32.4%****	**7.9%-9%****
Countries with missing years											
BE: 06-11	14.6%-14.6%	14.1%-20.5%**	22.5%-19.1%**	15.7%-16.3%	17.9%-15.4%*	15%-14.3%*	8.4%-9.6%	24.7%-26.1%*	7.8%-8.4%*	5.7%-5.1%*	31.8%-31.5%
FI: 06-12	13.1%-13.7%	4.3%-5.8%*	16.4%-14.3%*	12.8%-8.9%**	15%-8.6%**	0%-0%	9.9%-6.8%*	43.1%-46.7%	12.1%-7.2%**	3.4%-3%	26.9%-29.1%*
IE: 06-11	17.8%-14.7%	14.6%-10.9%**	14.3%-9.2%**	8.5%-4%**	16%-10.4%**	21.9%-17.6%**	3.2%-2.9%	25.4%-26.3%	6.1%-4.9%*	4.1%-7.2%*	20.9%-29.1%**
BG: 07-12	20.9%-20%	13.7%-13%	15.4%-11.9%*	24.2%-14.4%**	27.4%-26.9%	10%-6.2%**	16.7%-11.8%**	28.7%-18.6%**	2.4%-3.9%*	57.9%-43.7%*	28.2%-23.8%**
RO: 07-12	23.1%-21.1%*	29.1%-14.8%**	34.6%-26.9%**	18.4%-17.5%	14.7%-13.6%*	10.8%-8.4%*	10.2%-9.5%	20.1%-20%	7.4%-8%	36.4%-28.5%**	21.1%-21.8%
CH: 08-12	15.3%-15.6%	7.5%-11.9%*	18.4%-19.2%*	13%-10.3%*	12.6%-16.9%**	18.7%-16.3%*	3.2%-3.1%	31.7%-34%**	5.2%-5.7%	1.9%-0.8%	20.1%-21.4%*
MT: 08-12	14%-13.4%**	6.9%-11%**	25.1%-30.6%**	36.6%-40.5%**	9.9%-12%**	22.1%-21.5%	4.3%-3.4%	24.5%-28.9%*	2.6%-2.8%	3.7%-7.6%*	21.8%-21.3%
HR: 09-12	21.2%-20.2%*	15.1%-13.7%*	11.1%-10.2%	7%-7.1%	3.4%-3.2%	9.2%-7.2%*	26.9%-25.7%*	36.9%-29.3%**	7.8%-5.2%*	14.9%-15%	30.3%-30.5%

Table 3: Correlations (Cramers' V) across uncensored headcount ratios

	q-jobless	*sev. mat dep*	*education*	*noise*	*pollution*	*crime*	*housing*	*health*	*chr. illness*	*morbidity*	*u.m. needs*
AROP	0.44	0.45	0.23	0.24	0.16	0.18	0.25	0.23	0.36	0.21	0.23
q-jobless	1.00	0.30	0.19	0.26	0.18	0.20	0.23	0.20	0.45	0.20	0.15
sev. mat dep		1.00	0.22	0.30	0.22	0.22	0.40	0.23	0.41	0.15	0.20
education			1.00	0.20	0.15	0.13	0.21	0.34	0.48	0.28	0.16
noise				1.00	0.61	0.46	0.32	0.25	0.36	0.25	0.30
pollution					1.00	0.38	0.24	0.19	0.37	0.19	0.23
crime						1.00	0.24	0.17	0.37	0.18	0.20
housing							1.00	0.24	0.37	0.21	0.28
health								1.00	0.91	0.65	0.22
chr. illness									1.00	0.93	0.50
morbidity										1.00	0.16
u.m. needs											1.00

Table 3 presents a measure of Redundancy which is a more precise assessment for our purposes. It draws on the cross-tabulation of the dichotomised deprivation status of persons in each indicator (Alkire *et al* 2015, 7.2). The redundancy value is the percentage of the population experiencing both deprivations, divided by the lower of the two marginal headcount ratios of deprivation. Each redundancy value shows the percentage of people who are deprived in both indicators as proportion of those deprived in the one with the lower headcount, hence it ranges from 0 to 100%.

For example: in the case of **(quasi-) joblessness and at-risk-of-[income]-poverty**, only 27% of the people who are quasi-jobless are also at-risk-of-income-poverty. The highest redundancy of 55% is between morbidity and health – that is, 55% of those who are deprived in terms of morbidity have low self-reported health. Redundancy complements correlation analysis in important ways: despite the fact that morbidity and self-reported health have a high correlation of over 0.9, this more precise redundancy indicator shows that in 45% of cases, persons who report deprivations in morbidity do *not* experience low self-reported health, and for this reason, both variables are retained.

Table 4: Redundancy values across uncensored headcount ratios

	q-jobless	*sev. mat dep*	*education*	*noise*	*pollution*	*crime*	*housing*	*health*	*chr. illness*	*morbidity*	*u.m. needs*
AROP	0.27	0.22	0.09	0.03	0.01	0.03	0.10	0.07	0.03	0.05	0.06
q-jobless	1.00	0.18	0.06	0.04	0.02	0.05	0.07	0.11	0.09	0.10	0.05
sev. mat dep		1.00	0.07	0.06	0.05	0.06	0.18	0.12	0.05	0.07	0.14
education			1.00	-0.01	-0.01	-0.01	0.06	0.19	0.14	0.12	0.02
noise				1.00	0.41	0.25	0.12	0.03	0.04	0.03	0.05
pollution					1.00	0.25	0.10	0.03	0.05	0.03	0.05
crime						1.00	0.09	0.03	0.05	0.03	0.05
housing							1.00	0.07	0.04	0.04	0.08
health								1.00	0.42	**0.55**	0.11
chr. illness									1.00	0.39	0.10
morbidity										1.00	0.08
u.m. needs											1.00

3.5 Definition of Experimental Measures: Dimensions, Indicators, Cut-offs and Weights

Having described the deprivations, we now set out the experimental measures that are implemented as described in Table 5.

As mentioned above, three measures are constructed with varied weighting structures. The measures are computed and reported for all available time periods to analyse changes across time. All measures include the same 12 indicators. Three are indicators of the EU2020 multidimensional poverty index: income poverty (framed as being at-risk-of-poverty - AROP); severe material deprivation; and (quasi-) joblessness. Health has four indicators: self-reported health, the presence of a chronic illness, activity limitations due to poor health and unmet medical needs. Living Environment has four indicators: housing, pollution, crime and noise. Table 5 explains the indicators and cut-offs, and measure-specific weights.

In Measure 1, the 12 indicators are organized into four dimensions. Each dimension is equally weighted, and each indicator within a dimension is equally weighted. Measure 2 replicates Measure 1 except that the indicator of material deprivation is consider a fifth dimension. Measure 3 organises the

12 indicators into 6 dimensions by breaking up (and effectively trebling the weight on) the EU-2020 indicators, which are each considered separate dimensions. In Measure 3, the weight on AROP, (quasi) joblessness and severe material deprivation are 1/6 each, as are the weights on health, education and environment.

Table 5: Dimensions, Indicators and Weights for Measures (M) 1, 2 and 3

Dimension	*Variable*	*Respondent is not deprived if:*	*M1*	*M2*	*M3*
EU 2020	*AROP*	The respondent's equivalized disposable income is above 60 per cent of the national median	1/12	1/10	1/6
	Quasi-Joblessness	The respondent lives in household where the ratio of the total number of months that all - household members aged 16-59 have worked during the income reference year and the total number of months the same household members theoretically could have worked in the same period is higher than 0.2	1/12	1/10	1/6
	Severe material deprivation	The respondent has at least six of the following: the ability to make ends meet; to afford one week of holidays; a meal with meat, chicken, fish or vegi equivalent; to face unexpected expenses; and, to keep home adequately warm. Or the respondent has a car, a colour TV, a washing machine, and a telephone.	1/12	1/5	1/6
Education	*Education*	The respondent has completed primary education	1/4	1/5	1/6
Environment	*Noise*	The respondent lives in a household with low noise from neighbourhood or from the street	1/16	1/20	1/24
	Pollution	The respondent lives in a household with low pollution, grime or other environmental problems	1/16	1/20	1/24
	Crime	The respondent lives in a household with low crime, violence or vandalism in the area	1/16	1/20	1/24
	Housing	The respondent lives in a household with no leaking roof, damp walls, rot in window frames of floor	1/16	1/20	1/24
Health	*Health*	The respondent considers her own health as fair or above	1/16	1/20	1/24
	Chronic Illness	The respondent has no chronic illness or long-term condition	1/16	1/20	1/24
	Morbidity	The respondent has no limitations due to health problems	1/16	1/20	1/24
	Unmet Med. Needs	The respondent does not report unmet medical needs	1/16	1/20	1/24

4. Results

This section presents the results for three measures across seven periods.

4.1 Identification of multidimensional poverty

The first step is to identify who is poor. The AF dual cut-off methodology identifies a person as poor if the weighted sum of his or her deprivations is greater than or equal to the poverty cut-off. It censors the deprivations of the non-poor, in order to focus attention strictly on the poor. Having identified the poor, the methodology then aggregates information regarding the poor into an overall poverty measure.

We first calculate the poverty measure using ten poverty cutoffs at 10% increments, for all measures in all periods 2006-2012. Using Measure 1 and data of three years: 2006, 2009 and 2012, Figure 1 compares the level of poverty of four geographic regions according to United Nations' definitions[11]. Clearly, Northern and Western Europe are significantly the two least poor regions (respectively) regardless the year and cut-off. Southern Europe is the poorest region up to the 40% cut–off. At 50% and more, differences between Eastern and Southern Europe are not significant.

[11] http://millenniumindicators.un.org/unsd/methods/m49/m49regin.htm. United Nations classify Cyprus as Western Asia; however, we included it into Southern Europe as otherwise Cyprus would have been excluded.

Figure 1: Measure 1 Adjusted Headcount Ratio (M_0) by poverty cut-off 2006-2009-2012

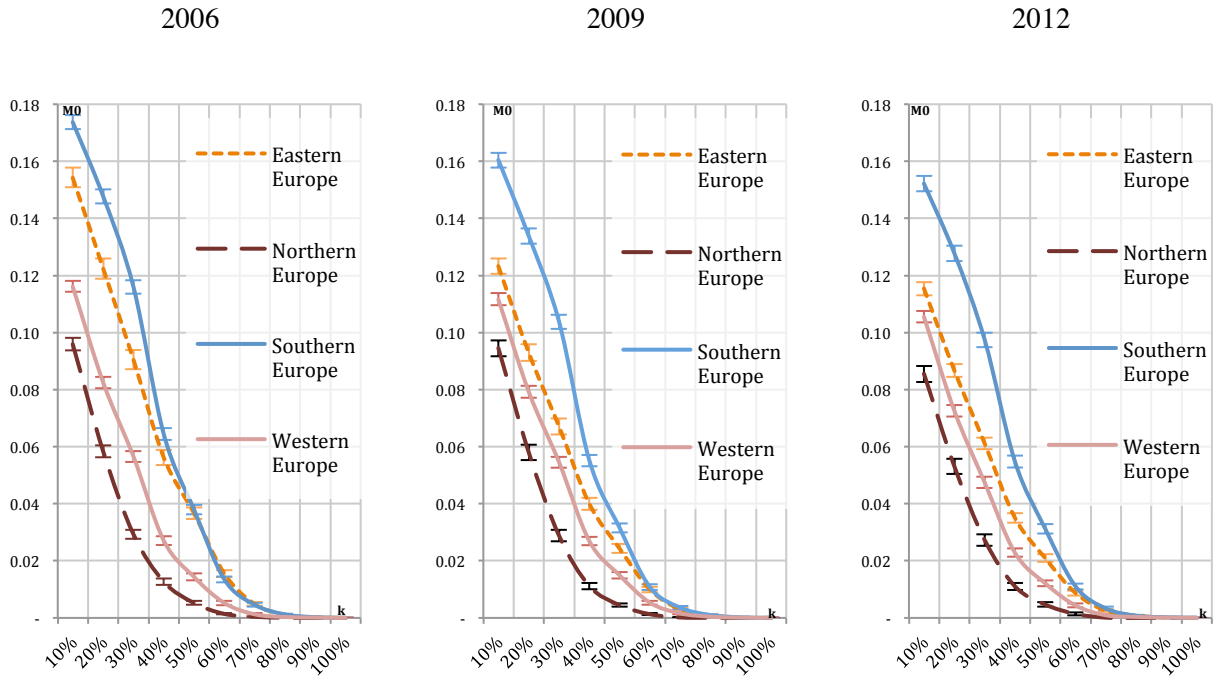
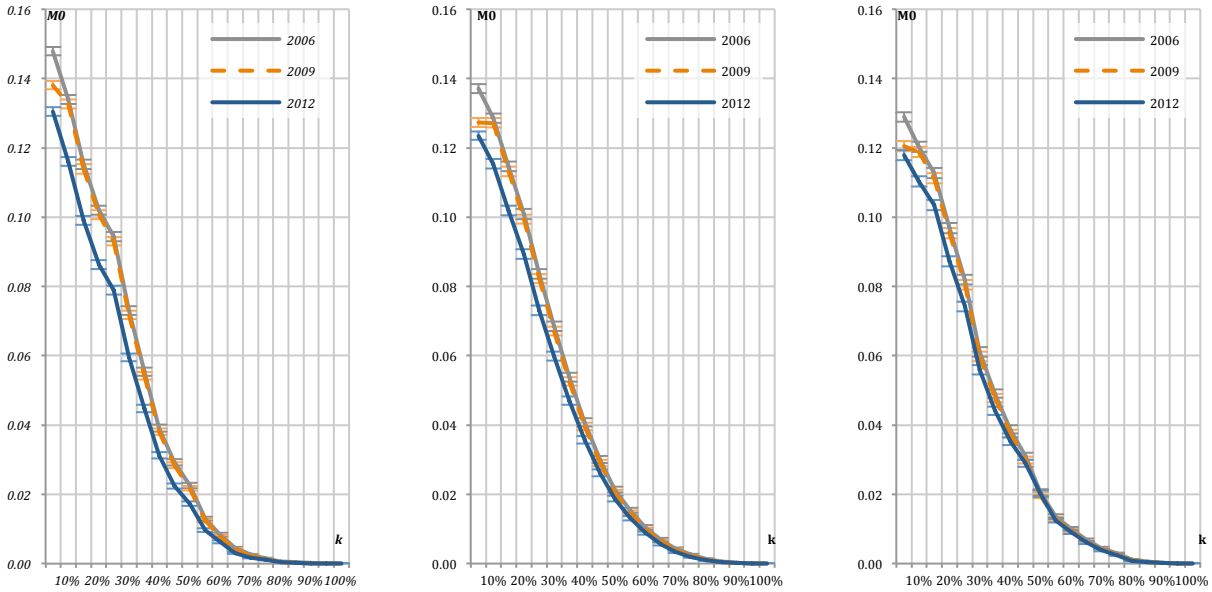


Figure 2 analyses the pooled information of countries over time including only countries with consistent and available information across years (as listed in the beginning of Section 3). Measures 1 and 2 show a significant reduction in multidimensional poverty in Europe between 2006 and 2012 (for cut-offs of 60% and higher, this difference is not significant); dominance is not clear between 2006 and 2009. For instance, in Measure 1 and 2, poverty reduction is only statistically significant with a cut-off of 10%. In Measure 3, there is not clear dominance for any poverty cut-offs above 40% in any pair of consecutive years, although for cut-offs 40% and below, poverty in 2012 is significantly lower than in other years.

Figure 2: Measure 1,2 & 3: Adjusted Headcount Ratio (M_0) by poverty cut-off 2006-2009-2012

Measure 1 Measure 2 Measure 3



In what follows we have selected poverty cut-offs which require a person to be poor in strictly greater than one dimension or the equivalent sum of weighted deprivations drawn from several dimensions. This definition assures that each person identified as poor is indeed deprived in two or more dimensions, which coheres with popularion understandings of 'multidimensional' poverty.[12] Table 6 presents results for all Measures in 2006, 2009 and 2012. The poverty cut-offs of 26% and 21% used in Measures 1 and 2 identify a person as multidimensionally poor if they are deprived in strictly more than one dimension, or in some equivalent set of weighted indicators. Measure 3's poverty cutoff of 34% identifies a person as multidimensionally poor if they are deprived in strictly more than two dimensions or the equivalent weighted indicators.

12 We are grateful to Tony Atkinson for suggesting that this conceptual issue needs to be addressed and, when the purpose of the measure permits, satisfied.

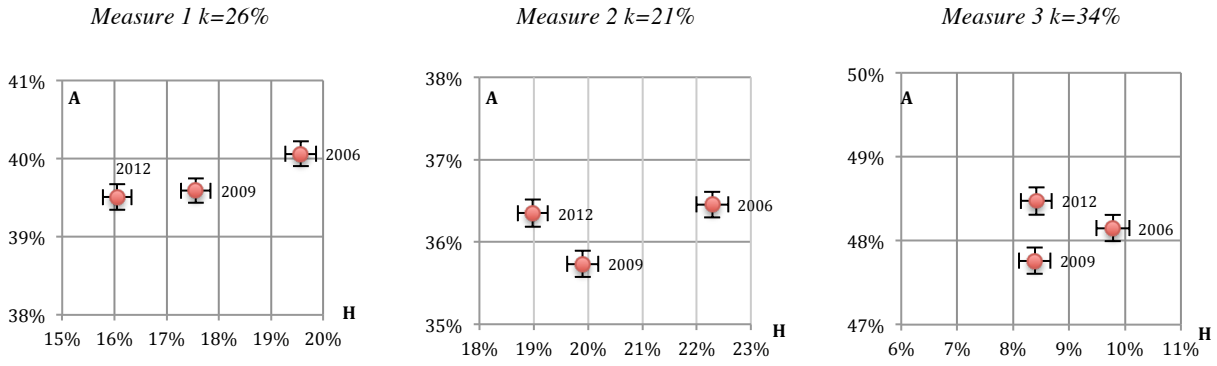
Table 6: Aggregate Results and consistent partial indices 2006-2009-2012

	Measure 1 k=26%			*Measure 2 k=21%*			*Measure 3 k=34%*		
	2006	*2009*	*2012*	*2006*	*2009*	*2012*	*2006*	*2009*	*2012*
Adjusted Headcount Ratio (M_0)	0.078	0.070	0.063	0.081	0.071	0.069	0.047	0.040	0.041
Headcount Ratio (H)	19.6%	17.6%	16.1%	22.3%	19.9%	19.0%	9.8%	8.4%	8.4%
Intensity (A)	40.1%	39.6%	39.5%	36.5%	35.7%	36.4%	48.2%	47.8%	48.5%
Censored Headcount ratios:									
AROP	7.4%	6.8%	6.5%	8.7%	8.1%	8.1%	6.9%	6.2%	6.2%
(Quasi)-Joblessness	5.5%	4.7%	4.7%	6.5%	5.6%	5.8%	5.3%	4.6%	4.8%
Severe material deprivation	4.8%	3.6%	4.4%	6.9%	5.4%	6.7%	4.5%	3.6%	4.3%
Education	12.3%	11.0%	9.4%	12.3%	11.0%	9.4%	5.0%	4.1%	3.7%
Noise	7.7%	6.7%	5.6%	8.1%	7.1%	6.0%	3.7%	3.2%	2.8%
Pollution	6.1%	5.3%	4.3%	6.2%	5.5%	4.5%	2.7%	2.4%	2.1%
Crime	5.4%	4.9%	4.2%	5.6%	5.2%	4.5%	2.7%	2.4%	2.1%
Housing	7.3%	5.5%	5.1%	8.2%	6.1%	5.8%	4.4%	3.1%	3.1%
Health	6.8%	5.9%	5.7%	6.9%	6.0%	5.8%	3.4%	2.8%	2.7%
Chronic Illness	11.8%	11.3%	10.7%	12.4%	11.9%	11.3%	5.5%	4.9%	4.9%
Morbidity	4.7%	4.7%	4.9%	4.7%	4.7%	4.9%	2.2%	2.1%	2.2%
Unmet Med. Needs	3.2%	2.7%	2.6%	3.5%	2.9%	2.8%	1.9%	1.5%	1.6%
Percentage Contributions (weighted)									
AROP	7.9%	8.2%	8.6%	10.7%	11.4%	11.8%	24.2%	25.7%	25.4%
(Quasi)-Joblessness	5.9%	5.6%	6.2%	7.9%	7.9%	8.3%	18.7%	19.0%	19.6%
Severe material deprivations	5.0%	4.4%	5.8%	16.9%	15.2%	19.5%	16.0%	14.8%	17.7%
Education	39.1%	39.4%	37.1%	30.2%	30.8%	27.3%	17.5%	17.0%	15.3%
Noise	6.1%	6.0%	5.5%	5.0%	5.0%	4.3%	3.3%	3.4%	2.9%
Pollution	4.8%	4.7%	4.3%	3.8%	3.9%	3.3%	2.4%	2.5%	2.1%
Crime	4.3%	4.4%	4.1%	3.5%	3.7%	3.2%	2.4%	2.5%	2.2%

Housing	5.8%	5.0%	5.0%	5.1%	4.3%	4.2%	3.9%	3.3%	3.2%
Health	5.4%	5.3%	5.6%	4.2%	4.2%	4.2%	3.0%	2.9%	2.7%
Chronic Illness	9.4%	10.2%	10.5%	7.6%	8.4%	8.2%	4.9%	5.1%	5.0%
Morbidity	3.7%	4.2%	4.8%	2.9%	3.3%	3.5%	2.0%	2.2%	2.2%
Unmet Med. Needs	2.5%	2.5%	2.6%	2.1%	2.1%	2.1%	1.7%	1.6%	1.6%

We see that the level of poverty is lowest in Measure 3, followed by Measure 1 and then Measure 2. This is likely to reflect the poverty cut-offs, which are highest in Measure 3 and lowest in Measure 2. The identification of who is poor in each measure is different, and reflects both the poverty cut-offs and the weights, and we see a markedly lower level of deprivation in Education, Environment and Health indicators for Measure 3, where these dimensions have a lower weight of 1/6.

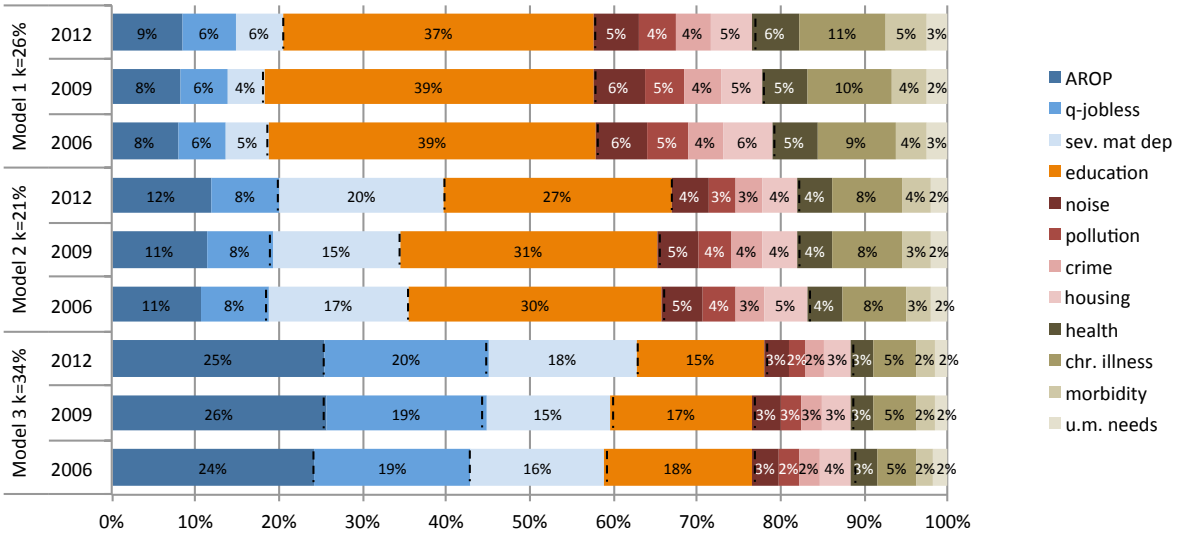
Figure 3: Headcount ratio and intensity SILC selected countries 2006-2009-2012



Across years and measures, the reduction in the level of multidimensional poverty clearly reflects the reduction in the percentage of poor individuals as seen in figure 3. Each point represents a multidimensional poverty level base on the headcount ratio (horizontal axis) and the intensity (vertical axis). Each additional point shows confidence intervals for the headcount ratio and intensity.

In Measure 1, the headcount ratio was 19.4% in 2006 and fell significantly to 16.1% in 2012. The intensity of poverty in the pooled sample dropped marginally but significantly by 0.05%, but with large differences across countries. Measure 2 and 3 show significant reductions in the headcount ratio and intensity between 2006 and 2009. Between 2009 and 2012, Measure 2 displays a small but significant reduction in the headcount (from 19.9% to 19.0%) and an increase in the intensity reaching a level similar to 2006. During the same period, Measure 3 presents a marginal rise in the headcount ratio and an insignificant increase in the intensity from 47.8% to 48.5%.

Figure 4: Dimensional Breakdown SILC selected countries 2006-2009-2012



The percentage contributions of each indicator to overall poverty reflect the weights and the censored headcounts. We see a tremendous difference here: in Measure 1, the three EU-2020 indicators together contribute around 18-21% to poverty (less than their joint weight of 25%) whereas in Measure 3, they contribute 59-63% to poverty (greater than their joint weight of 50%). Education contributes 39% in Measure 1, but only 15-17% in Measure 3, and health and environment both contribute 19-24% in Measure 1, and 10-12% in Measure 3. Thus the measures, as designed, do indeed illuminate different deprivation profiles according to their composition.

4.2 Poverty across countries

This section presents and discusses the three measures' results in the year 2009. To make comparisons we use the previously mentioned poverty cut-off for each measure. For each measure, we present the M_0 value as well as its associated partial indices (H) and (A):.

From Table 7, we see first of all that each of the three measures in 2009, which differ in weights and indicators, generate relatively similar country rankings. Kendal tau b rank correlations across the countries range from 0.69 (between Measures 1 and 3) to 0.85 (between Measures 2 and 3), which

suggest that more detailed robustness tests may find the measures to be relatively robust in indicators and weights.[13]

Table 7: Aggregated Results by Measure and country in 2009

	Measure 1 k=26%			*Measure 2 k=21%*			*Measure 3 k=34%*		
	M0	*H*	*A*	*M0*	*H*	*A*	*M0*	*H*	*A*
NO	*0.014*	*4.1%*	*34.2%*	*0.017*	*4.9%*	*33.9%*	*0.012*	*2.6%*	*46.1%*
IS	*0.018*	*5.1%*	*34.7%*	*0.017*	*5.5%*	*30.9%*	*0.006*	*1.3%*	*45.0%*
DK	*0.019*	*5.5%*	*34.6%*	*0.023*	*7.0%*	*33.0%*	*0.016*	*3.6%*	*45.9%*
FI	*0.020*	*5.9%*	*33.9%*	*0.026*	*7.8%*	*33.6%*	*0.020*	*4.3%*	*46.4%*
AT	*0.028*	*7.6%*	*36.2%*	*0.033*	*9.5%*	*35.0%*	*0.020*	*4.2%*	*48.3%*
CZ	*0.027*	*7.6%*	*34.7%*	*0.035*	*10.1%*	*34.4%*	*0.019*	*4.0%*	*47.6%*
UK	*0.031*	*8.9%*	*34.3%*	*0.037*	*11.2%*	*32.9%*	*0.029*	*6.4%*	*45.5%*
SE	*0.042*	*11.4%*	*37.0%*	*0.040*	*12.3%*	*32.6%*	*0.021*	*4.7%*	*44.9%*
NL	*0.045*	*12.1%*	*37.2%*	*0.042*	*13.0%*	*32.7%*	*0.021*	*4.5%*	*46.6%*
SK	*0.033*	*9.3%*	*35.4%*	*0.046*	*13.2%*	*35.2%*	*0.024*	*5.0%*	*47.9%*
DE	*0.044*	*11.7%*	*37.8%*	*0.048*	*13.5%*	*35.8%*	*0.033*	*6.8%*	*48.9%*
SI	*0.042*	*11.2%*	*37.8%*	*0.049*	*13.7%*	*35.3%*	*0.026*	*5.5%*	*47.9%*
CH	*0.059*	*15.5%*	*37.8%*	*0.054*	*16.2%*	*33.0%*	*0.025*	*5.6%*	*44.9%*
EE	*0.050*	*13.5%*	*36.9%*	*0.057*	*16.1%*	*35.3%*	*0.037*	*7.7%*	*47.9%*
BE	*0.071*	*17.6%*	*40.5%*	*0.072*	*19.4%*	*36.9%*	*0.047*	*9.6%*	*49.2%*
LU	*0.089*	*22.9%*	*39.1%*	*0.078*	*23.5%*	*33.3%*	*0.032*	*7.0%*	*45.3%*
IE	*0.077*	*19.5%*	*39.7%*	*0.080*	*22.3%*	*35.8%*	*0.055*	*11.8%*	*46.7%*
FR	*0.086*	*21.6%*	*39.8%*	*0.082*	*23.7%*	*34.8%*	*0.037*	*7.8%*	*47.8%*
HU	*0.057*	*14.8%*	*38.7%*	*0.083*	*22.4%*	*36.9%*	*0.045*	*9.2%*	*48.8%*
MT	*0.091*	*22.4%*	*40.6%*	*0.086*	*24.2%*	*35.4%*	*0.045*	*9.4%*	*47.5%*
LT	*0.071*	*17.7%*	*39.9%*	*0.090*	*23.8%*	*37.6%*	*0.057*	*12.0%*	*47.7%*
ES	*0.102*	*25.9%*	*39.6%*	*0.094*	*27.3%*	*34.4%*	*0.046*	*10.1%*	*46.0%*

13 The Kendall Tau-b between Measures 1 and 2 is 0.80. For assessments of robustness to weights and cut-offs see Alkire and Santos 2014, Alkire *et al.* 2015; Ura *et al.* 2012.

IT	*0.099*	*24.0%*	*41.3%*	*0.097*	*26.4%*	*36.6%*	*0.053*	*11.0%*	*47.8%*
PL	*0.097*	*22.9%*	*42.4%*	*0.108*	*27.4%*	*39.3%*	*0.066*	*13.2%*	*49.7%*
CY	*0.110*	*25.7%*	*42.6%*	*0.108*	*28.7%*	*37.5%*	*0.060*	*12.7%*	*47.1%*
LV	*0.087*	*22.7%*	*38.2%*	*0.114*	*29.7%*	*38.4%*	*0.077*	*15.8%*	*49.1%*
EL	*0.124*	*29.6%*	*41.9%*	*0.122*	*32.4%*	*37.7%*	*0.066*	*13.5%*	*48.5%*
RO	*0.086*	*21.4%*	*40.2%*	*0.130*	*34.0%*	*38.2%*	*0.072*	*15.0%*	*48.1%*
BG	*0.090*	*22.3%*	*40.3%*	*0.147*	*37.3%*	*39.5%*	*0.090*	*17.9%*	*50.4%*
PT	*0.168*	*40.0%*	*41.9%*	*0.151*	*41.1%*	*36.7%*	*0.071*	*14.8%*	*48.1%*

As before, the levels of poverty provided by Measure 1 tend to be the highest, followed by Measure 2 and 3. In Measures 1 and 2, Portugal has the highest poverty rates; and Norway - followed by Iceland and Denmark - has the lowest poverty rates. In Measure 3, Bulgaria is the poorest and Iceland the least poor. Intensity varies considerably – from 34% to 43% in Measure 1, and 31% to 40% in Measure 2 – whereas in Measure 3 the range is only 45% to 50%. Intensity is not necessarily highest in the countries with highest poverty, a finding that contrasts with other studies. For example in Measure 2, Belgium with 20% of person's being poor, has a marginally higher point estimate of intensity than Portugal, where 41% of people are poor. Similarly in Measure 3, Austria in which 4.2% of people are poor has a higher point estimate of intensity than Portugal or Romania.

After censoring the deprivations of non-poor people, the Adjusted Headcount Ratio can be broken down by indicator. Figures 5, 6 and 7 provide the percentage contribution of each indicator of poverty Measure 1, 2 and 3 in the year 2009, respectively. The countries are ranked from those having highest rates of poverty to those with lowest rates.

Measure 1 has four equally weighted dimensions. The percentage contribution of education varies greatly across countries and increases strikingly in the poorer countries. This reflects differences in achievements, but also in definitions of primary school, so unfortunately is not strictly comparable. The relative contribution of (quasi) joblessness declines as overall poverty in a country increases, as do the relative contributions of the health variables. In general, in the least poor countries the relative contribution of educational deprivations is lower and of EU-2020 indicators (with some exceptions) is higher. This interesting finding draws attention to the need to consider non-EU-2020 indicators. The environmental indicators in the pink hues show relatively less variation across countries.

Figure 5: Dimensional Decomposition Measure 1 k=26% by country (2009)

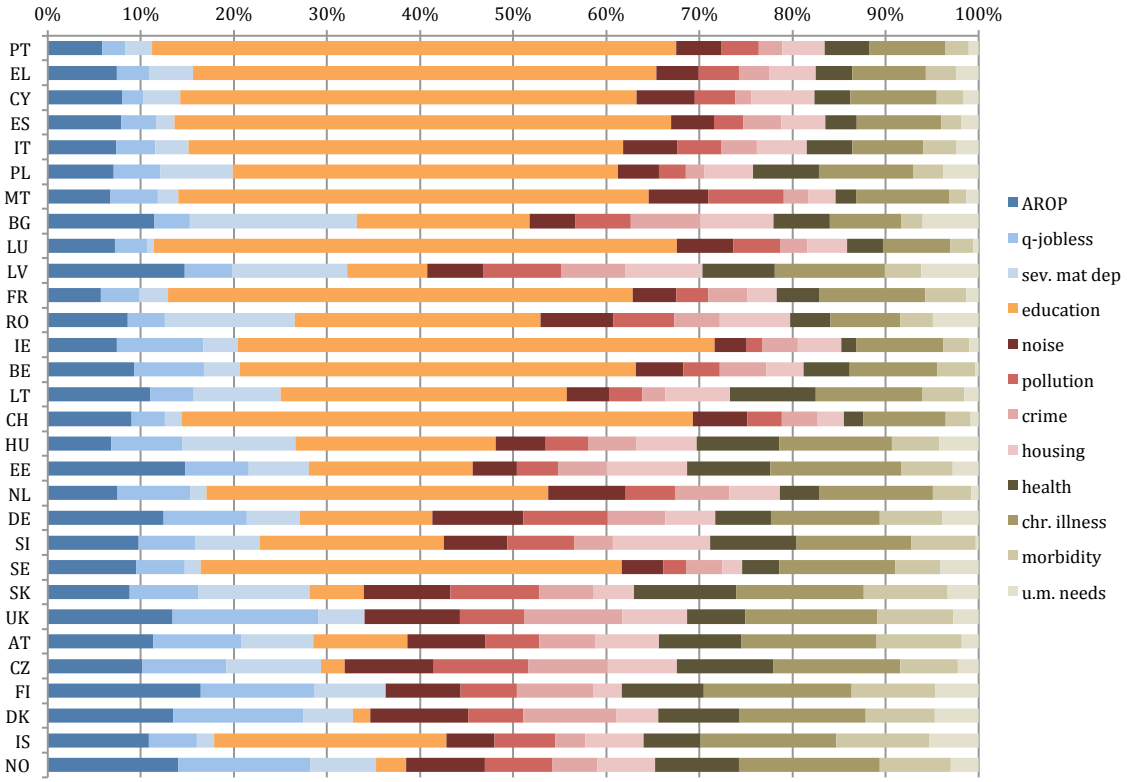


Figure 6: Dimensional Decomposition Measure 2 k=21% by country (2009)

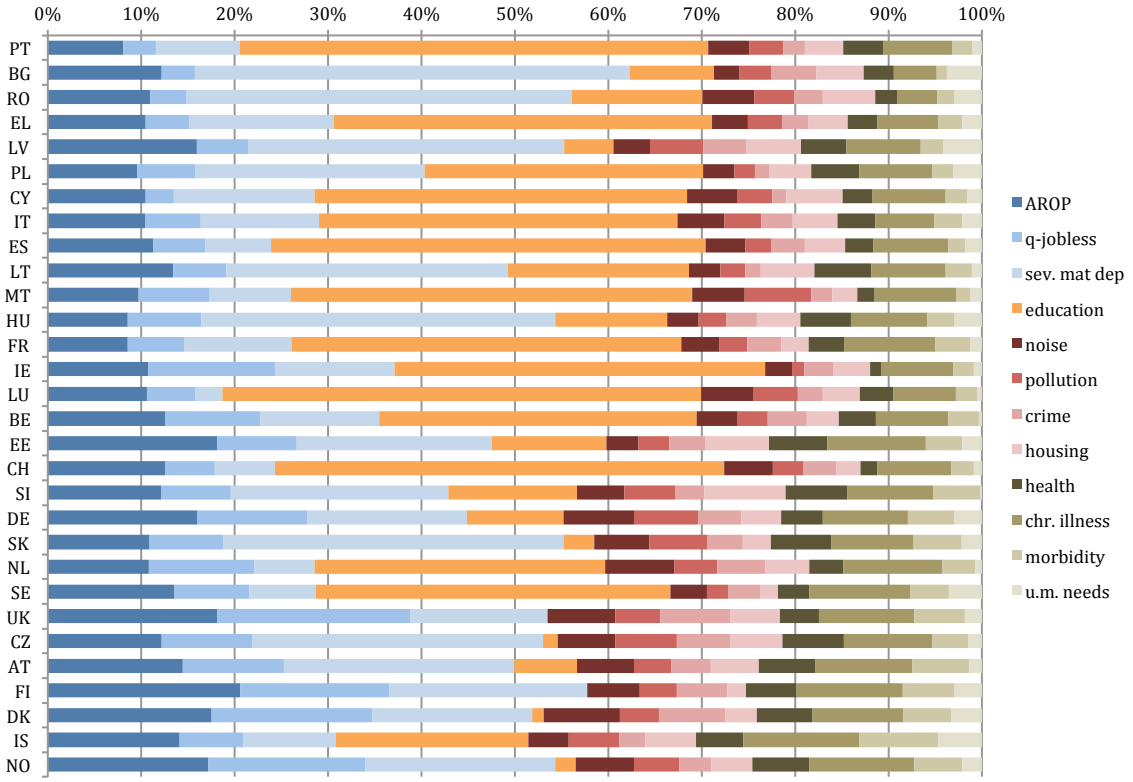
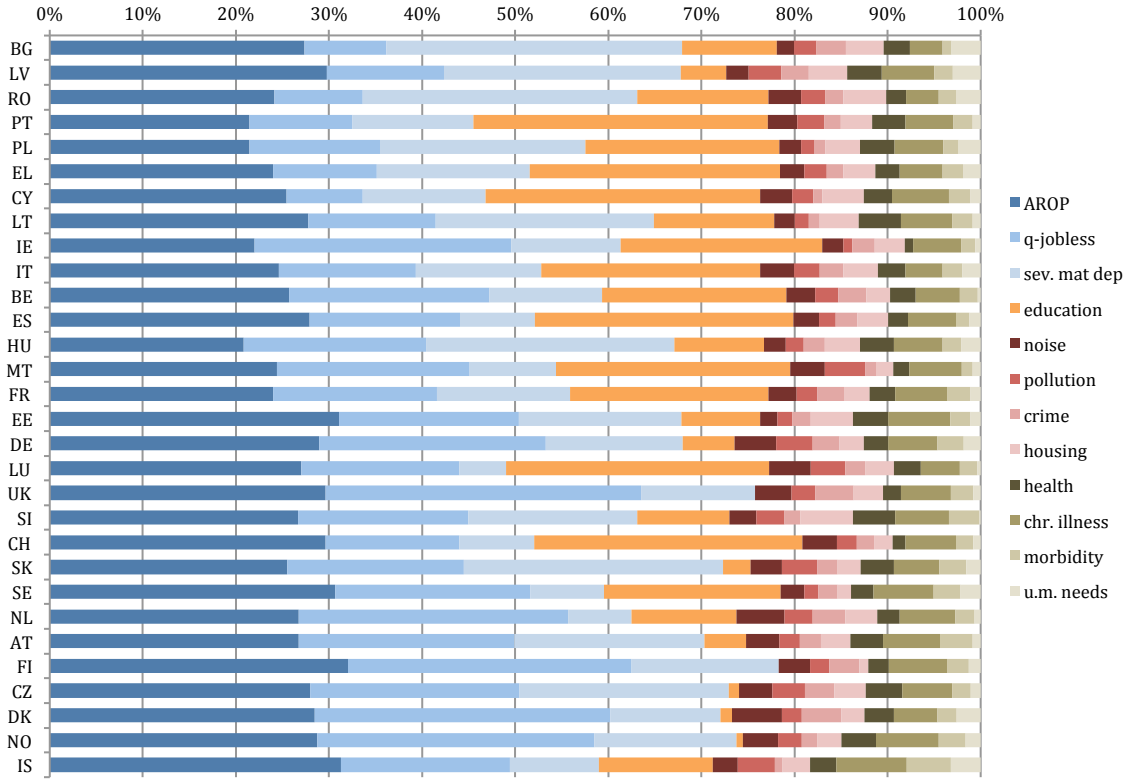


Figure 7: Dimensional Decomposition Measure 3 k=34% by country (2009)



In Measure 2, severe material deprivation and education lead the dimensional contribution to multidimensional poverty. In Measure 3, the EU-2020 indicators AROP, severe material deprivation and (quasi) joblessness contribute more than 50% to poverty in all but three countries.

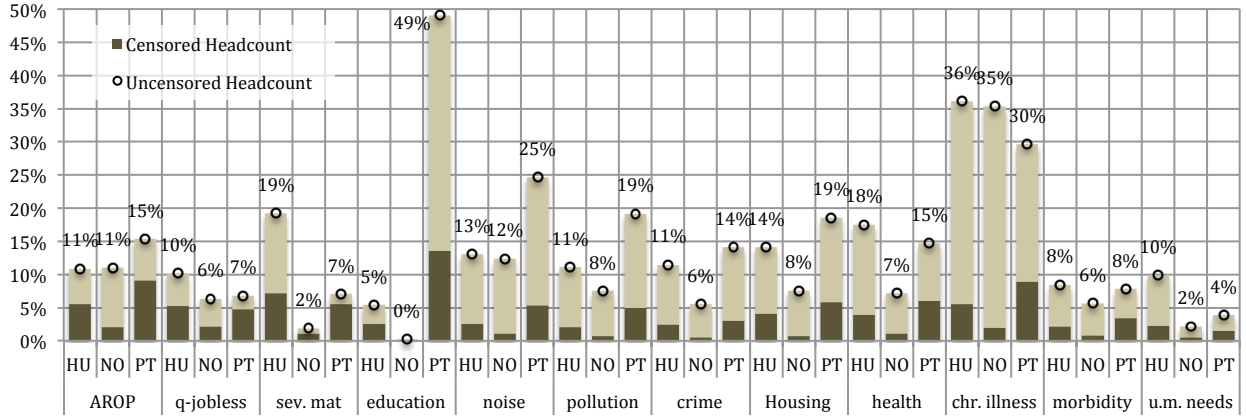
Naturally the composition of poverty is affected both by the censored headcount ratios of each indicator and also by its weights. It can also therefore be useful to view the levels of deprivation in each indicator individually, separately from the weights. To do this we construct censored headcount ratios, which as mentioned previously show the percentage of people who are identified as poor and are deprived in each particular indicator. Note that the poverty measure M_0 is merely the weighted average of the censored headcount ratios – that is, the sum of the censored headcount ratios of each indicator, where censored headcount is multiplied by its respective weight.

Figure 8 below provides the uncensored and censored headcount ratios of indicators in three countries: Norway, Hungary and Portugal, using Measure 3 (k=34%) in 2009. The total height in light grey show the uncensored ('raw') headcount ratios whereas the dark portion depicts the censored headcount ratios. Necessarily, the censored headcount ratios are equal to or lower than the

uncensored headcount ratios. The difference between these shows whether some persons who are deprived in that indicator are not simultaneously deprived in enough other indicators to be identified as multi-dimensionally poor

The difference between uncensored and censored headcount ratios is particularly noticeable in chronic illness, health and housing as well as noise, crime and pollution. In this way the poverty cut-off may be used to 'clean' the observations of deprivations that do not signify poverty – in some cases because they may reflect varying frames of reference (noise), or standards (housing). Note also that the deprivations with the highest weight (AROP, (quasi) joblessness, education) have relatively less differences between uncensored and censored headcount ratios than the others because one requires fewer additional indicators to be identified as poor. Of these three, the differences between uncensored and censored headcount ratios in AROP tend to be larger, but this is not a fixed rule.

Figure 8: Raw and Censored Headcount Ratios Measure 3 k=34% for Norway, Hungary and Portugal (2009)



In Norway, 35% of the population is deprived in chronic illness. However, the dual cut-off approach shows that in many cases self-reported chronic illness is not associated with sufficient additional deprivations to identify a deprived person as poor. The percentage of the population who are poor in 34% or more of the weighted indicators, and who are deprived in chronic illness, is only 2.1%. A similar gap between uncensored and censored headcount ratio can be perceived in indicators like AROP and noise. Hungary and Portugal find a similar pattern for chronic illness as Norway. Over 30% of people are deprived in chronic illness, nevertheless only 6% and 9% of the population is poor and deprived in Hungary and Portugal, respectively.

Hungary has a higher match between deprivations and poverty in AROP, (quasi) joblessness and education. The raw headcount of AROP, (quasi) joblessness and education deprivation is 11%, 10%

and 5%, respectively; and the censored headcount shows that 6% of the population is AROP and poor; meanwhile 5% is deprived in (quasi) joblessness and poor; and, 3% of the population is education and poor. Still, in each of these at least 40% of those who are deprived are not identified as poor.

Finally, in Portugal, the gap between raw and censored headcount ratios is proportionally smallest for AROP, (quasi) joblessness and severe material deprivation, and largest for chronic illness, crime, noise and education.

This section has illustrated the basic analyses of multidimensional poverty measures and their partial indices; the appended tables provide comprehensive results for all measures across all years, with varying poverty cut-offs. The next section analyses changes in multidimensional poverty across time.

4.3 Poverty across time: 2006-2012

According to all measures, on average across all countries, multidimensional poverty measured by M_0 shows a significant decrease between 2006 and 2012 in absolute terms. Table 8 presents the absolute changes between 2006 and 2012 for each country and overall. There are significant absolute reductions in the headcount ratio in all measures between 2006 and 2012. However, intensity shows a significant change only in Measure 1. If we consider reductions in relative terms, Measure 1 shows the highest reduction (poverty reduced by 19% from its 2006 level, or by 0.015 in absolute terms), followed by Measure 2 (15%-0.012) and Measure 3 (13%-0.006).

In Measure 1, the poverty reduction occurs across both periods: 2006-2009 and 2009-2012. In Measure 2, the first triennium explains more than the 80% of the total reduction of poverty. Finally, in Measure 3, all poverty reduction is explained by changes in the period 2006-2009.

Table 8: Aggregate Results by country 2006 and 2012, Measures 1, 2 and 3

	Measure 1 k=26%						*Measure 2 k=21%*						*Measure 3 k=34%*					
	2006			***2012***			***2006***			***2012***			***2006***			***2012***		
	M0	***H***	***A***	***M0***	***H***	***A***	***M0***	***H***	***A***	***M0***	***H***	***A***	***M0***	***H***	***A***	***M0***	***H***	***A***
AT	*0.019*	*5.5%*	*35.1%*	*0.023*	*6.7%*	*35.2%*	*0.025*	*7.6%*	*33.3%*	*0.030*	*8.8%*	*33.8%*	*0.015*	*3.2%*	*47.4%*	*0.019*	*4.1%*	*46.6%*
CY	*0.121*	*27.4%*	*44.3%*	*0.105*	*25.1%*	*41.7%*	*0.124*	*31.5%*	*39.2%*	*0.114*	*30.8%*	*37.1%*	*0.072*	*14.7%*	*48.7%*	*0.062*	*13.2%*	*46.9%*
CZ	*0.035*	*9.6%*	*35.9%*	*0.023*	*6.8%*	*34.5%*	*0.048*	*13.2%*	*36.1%*	*0.033*	*9.3%*	*34.9%*	*0.029*	*5.7%*	*50.4%*	*0.019*	*4.2%*	*46.8%*
DE	*0.043*	*11.7%*	*37.1%*	*0.040*	*10.8%*	*37.3%*	*0.048*	*13.8%*	*35.1%*	*0.044*	*12.3%*	*35.7%*	*0.032*	*6.7%*	*47.8%*	*0.030*	*6.1%*	*49.2%*
DK	*0.015*	*4.3%*	*33.7%*	*0.023*	*6.8%*	*33.8%*	*0.020*	*6.0%*	*34.0%*	*0.028*	*8.5%*	*32.7%*	*0.016*	*3.6%*	*45.4%*	*0.020*	*4.3%*	*45.3%*
EE	*0.067*	*17.0%*	*39.7%*	*0.053*	*14.3%*	*37.3%*	*0.072*	*19.3%*	*37.3%*	*0.067*	*18.6%*	*36.2%*	*0.048*	*9.7%*	*49.4%*	*0.047*	*9.6%*	*48.6%*
EL	*0.129*	*31.1%*	*41.6%*	*0.132*	*30.9%*	*42.7%*	*0.129*	*34.0%*	*37.8%*	*0.150*	*37.6%*	*39.8%*	*0.073*	*15.1%*	*48.5%*	*0.096*	*18.9%*	*50.9%*
ES	*0.115*	*28.0%*	*41.0%*	*0.088*	*22.3%*	*39.5%*	*0.103*	*29.1%*	*35.4%*	*0.088*	*24.9%*	*35.1%*	*0.052*	*11.2%*	*46.5%*	*0.052*	*10.8%*	*47.9%*
FR	*0.095*	*23.6%*	*40.1%*	*0.071*	*18.0%*	*39.6%*	*0.089*	*25.3%*	*35.0%*	*0.070*	*19.9%*	*35.1%*	*0.043*	*9.0%*	*47.4%*	*0.035*	*7.4%*	*47.7%*
HU	*0.083*	*20.5%*	*40.7%*	*0.061*	*15.8%*	*38.7%*	*0.107*	*27.4%*	*38.8%*	*0.096*	*25.1%*	*38.2%*	*0.065*	*12.9%*	*50.8%*	*0.059*	*11.8%*	*50.2%*
IS	*0.016*	*4.7%*	*34.8%*	*0.020*	*5.6%*	*36.0%*	*0.018*	*5.7%*	*31.4%*	*0.022*	*6.6%*	*32.9%*	*0.006*	*1.4%*	*43.1%*	*0.011*	*2.3%*	*45.7%*
IT	*0.113*	*27.1%*	*41.7%*	*0.100*	*23.9%*	*41.7%*	*0.108*	*29.0%*	*37.1%*	*0.109*	*28.6%*	*38.1%*	*0.062*	*12.8%*	*48.4%*	*0.063*	*12.9%*	*48.9%*
LT	*0.086*	*21.5%*	*40.1%*	*0.076*	*19.3%*	*39.1%*	*0.121*	*31.7%*	*38.3%*	*0.102*	*26.9%*	*38.1%*	*0.075*	*15.4%*	*48.8%*	*0.066*	*13.5%*	*48.5%*
LU	*0.091*	*22.6%*	*40.1%*	*0.078*	*19.8%*	*39.5%*	*0.078*	*23.2%*	*33.8%*	*0.068*	*20.2%*	*33.8%*	*0.032*	*6.9%*	*45.7%*	*0.029*	*6.2%*	*46.4%*
LV	*0.105*	*27.1%*	*38.8%*	*0.075*	*19.8%*	*37.7%*	*0.142*	*36.0%*	*39.5%*	*0.112*	*29.5%*	*38.0%*	*0.089*	*18.0%*	*49.3%*	*0.073*	*14.9%*	*49.1%*
NL	*0.052*	*13.6%*	*37.8%*	*0.041*	*11.1%*	*37.2%*	*0.048*	*14.5%*	*33.3%*	*0.041*	*12.7%*	*32.6%*	*0.023*	*5.0%*	*46.4%*	*0.021*	*4.6%*	*45.2%*

NO	*0.019*	*5.5%*	*34.0%*	*0.013*	*3.8%*	*33.9%*	*0.023*	*6.9%*	*32.9%*	*0.016*	*4.8%*	*33.2%*	*0.014*	*3.1%*	*45.8%*	*0.012*	*2.7%*	*44.9%*
PL	*0.130*	*30.6%*	*42.6%*	*0.085*	*20.3%*	*41.6%*	*0.159*	*39.1%*	*40.6%*	*0.095*	*24.8%*	*38.4%*	*0.102*	*20.4%*	*50.1%*	*0.056*	*11.2%*	*50.1%*
PT	*0.176*	*42.4%*	*41.6%*	*0.174*	*40.6%*	*42.8%*	*0.157*	*43.0%*	*36.4%*	*0.157*	*42.0%*	*37.5%*	*0.070*	*14.4%*	*48.6%*	*0.080*	*16.4%*	*48.4%*
SE	*0.038*	*10.5%*	*36.4%*	*0.036*	*9.8%*	*36.3%*	*0.036*	*11.4%*	*31.9%*	*0.035*	*10.9%*	*32.3%*	*0.015*	*3.4%*	*45.1%*	*0.021*	*4.7%*	*43.9%*
SI	*0.090*	*22.0%*	*40.8%*	*0.040*	*10.7%*	*37.6%*	*0.086*	*23.7%*	*36.2%*	*0.050*	*13.9%*	*35.6%*	*0.045*	*9.2%*	*48.4%*	*0.031*	*6.4%*	*48.2%*
SK	*0.038*	*10.9%*	*35.2%*	*0.030*	*8.4%*	*36.0%*	*0.062*	*17.8%*	*34.9%*	*0.045*	*12.6%*	*36.1%*	*0.029*	*6.2%*	*47.3%*	*0.028*	*5.5%*	*50.0%*
UK	*0.033*	*9.6%*	*34.6%*	*0.030*	*8.6%*	*34.5%*	*0.040*	*11.8%*	*33.6%*	*0.041*	*11.6%*	*35.2%*	*0.030*	*6.4%*	*46.4%*	*0.028*	*5.9%*	*47.8%*
Aggregate	***0.078***	***19.6%***	***40.1%***	***0.063***	***16.1%***	***39.5%***	***0.081***	***22.3%***	***36.5%***	***0.069***	***19.0%***	***36.4%***	***0.047***	***9.8%***	***48.2%***	***0.041***	***8.4%***	***48.5%***
BE	*0.066*	*16.5%*	*40.0%*				*0.068*	*18.5%*	*36.5%*				*0.044*	*9.0%*	*48.9%*			
BG				*0.075*	*18.5%*	*40.2%*				*0.138*	*35.7%*	*38.6%*				*0.083*	*16.3%*	*51.1%*
CH				*0.057*	*15.0%*	*38.1%*				*0.051*	*15.7%*	*32.7%*				*0.024*	*5.5%*	*44.4%*
FI	*0.024*	*7.0%*	*33.4%*	*0.018*	*5.3%*	*33.6%*	*0.029*	*8.8%*	*33.2%*	*0.025*	*7.6%*	*32.8%*	*0.020*	*4.3%*	*46.3%*	*0.019*	*4.3%*	*45.0%*
HR				*0.075*	*18.6%*	*40.3%*				*0.094*	*24.1%*	*39.0%*				*0.069*	*13.8%*	*49.9%*
IE	*0.083*	*20.6%*	*40.4%*				*0.081*	*22.5%*	*36.1%*				*0.052*	*10.6%*	*49.2%*			
MT				*0.095*	*23.8%*	*40.1%*				*0.094*	*26.7%*	*35.3%*				*0.045*	*9.5%*	*47.3%*
RO				*0.073*	*18.0%*	*40.8%*				*0.114*	*30.1%*	*37.9%*				*0.063*	*13.2%*	*47.7%*

Figure 9: Changes in the adjusted headcount ratio M_0 by region over time

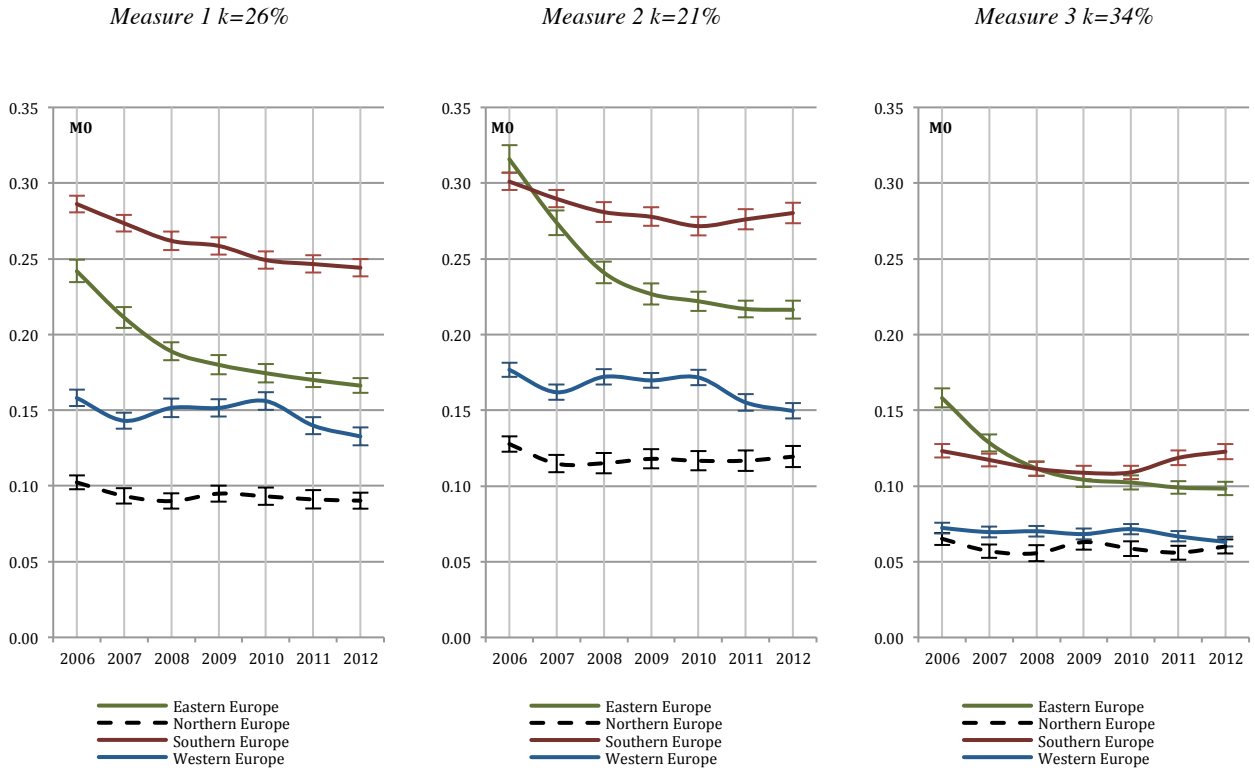


Figure 9 shows the evolution of the adjusted headcount ratio M_0 between 2006 and 2012 for the European subregions. All measures show a reduction in the poverty level of Eastern Europe; however, this reduction is faster and significant during the first years. Southern Europe shows a parsimonious reduction till 2010, at which time it had the highest poverty in all measures. In Measure 1, changes in Southern Europe are not significant between consecutive years; however, they become significant when longer periods are analysed. In Measures 2 and 3, there is an apparent increase in poverty in Southern Europe from 2010 onwards, but these changes are not significant.

Western Europe significantly reduces poverty during the first year in Measures 1 and 2 then small increments and finally a decline from 2010. In Measure 3, Western Europe does not show any significant change in any period but 2010-2012. Finally, Northern Europe presents slight ups and downs during the first three years in all measures. Later, multidimensional poverty in the area only shows insignificant changes.

Table 8 shows the evolution of all countries in all measures between 2006 and 2012. We see that three countries – Poland, Latvia and Slovenia – had the largest absolute reduction in poverty (M_0) according

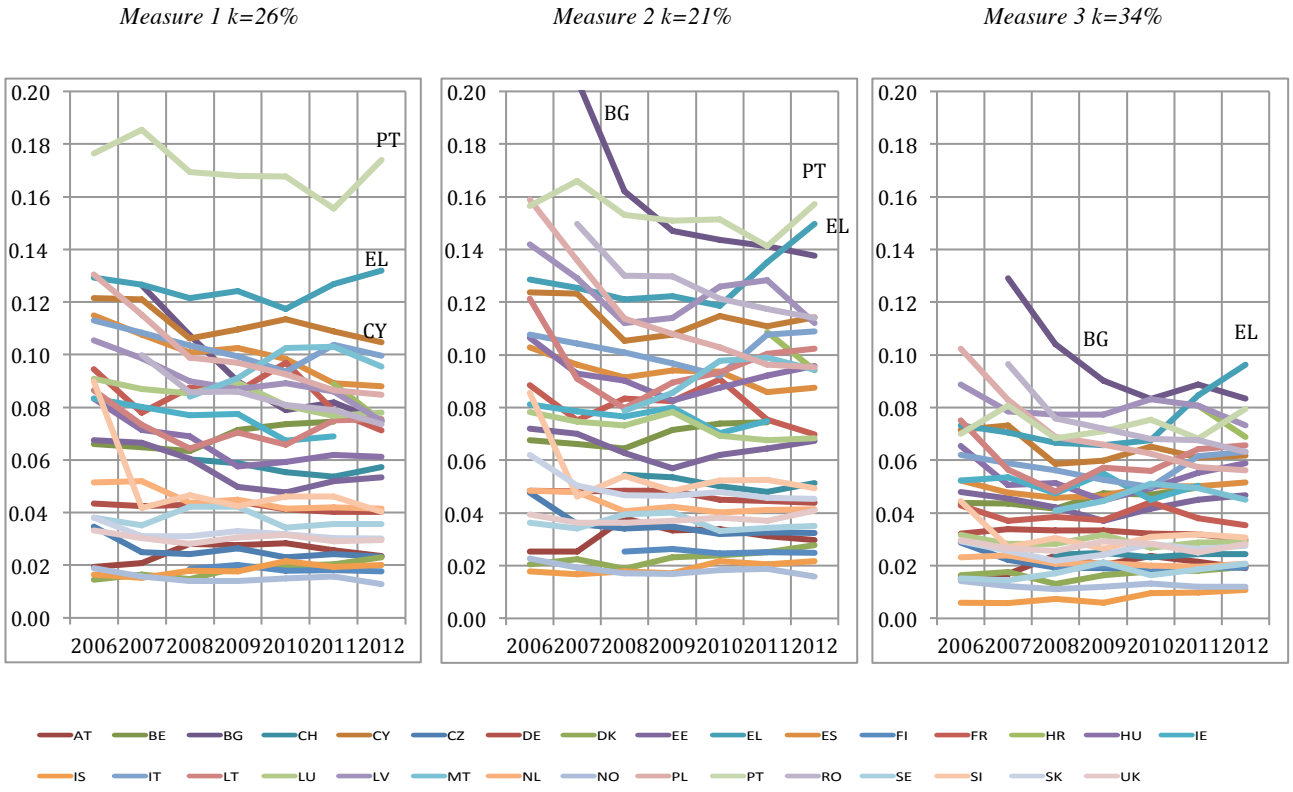
to all three measures. France and Spain did the next best in terms of poverty reduction by Measure 1; in Measure 2 it was France and Lithuania, and in Measure 3 it was Cyprus and the Czech Republic. Table 9, 10 and 11 present absolute changes for all countries, years and models. Changes significant at 10% are marked with * in each cell and at 1% with **.

Figure 10 below shows the evolution of M_0 across time for each measure across all countries. The empty gaps for some countries and years are due to the lack of comparable data. According to Measure 1, 19 countries – which are 83% of the countries with comparable data (all except Austria, Denmark, Greece and Iceland, that is) – experienced poverty reduction. Highest poverty reductions were seen in Poland and Slovakia from 0.130 to 0.085 and 0.090 to 0.040, respectively.

Measures 2 and 3 show a similar pattern. More than 72% of the countries experienced reductions in their poverty levels between 2006 and 2012 (77% or 17 countries and 73% or 16 countries in Measures 2 and 3, respectively). Unfortunately according to both measures, Austria, Denmark, Greece, Iceland and Italy have higher poverty levels in 2012 than in 2006. In Measure 1, the United Kingdom; and, in Measure 3, Portugal and Sweden also increased their poverty levels. In both measures the reduction is led by Poland.

Most countries show low or no decrease from 2009 to 2012. In Measures 1 and 2, there is a relatively stronger decrease in poverty from 2008-9. Some of this apparent decrease may be due to drops in the (relative) AROP poverty rates due to the financial crisis, illustrating the need for care in interpreting mixed relative and absolute indicators. Patterns vary considerably by country.

Figure 10: Adjusted Headcount Ratio for all Measures by country (2006-2012)



Portugal clearly has the highest level of poverty across time in the first two measures except in Measure 2 between 2006 and 2008 where Bulgaria was the poorest. In Portugal, poverty increased in 2006, then it decreased until 2010 – not significantly between 2008 and 2010 - to increase again in the last period. In Measure 1, Greece is consistently the second poorest country. Norway and Iceland were the least poor countries in Measures 2 and 3; however, changes were mainly insignificant (except for the last period in the case of Norway and 2010-2011 in the case of Iceland).

Across countries, Poland is the only country that consistently decreases poverty in all Measures and periods; however, this change is not significant in 2008-2009 in Measures 1 and 2 and 2007-2009 and 2011-2012 in Measure 3. Bulgaria – with Poland and Slovenia - presented sharp poverty reductions from 2007 (data are not available for 2006) except in 2011 (Measures 1 and 2). Germany and UK, on the other hand, remain stable without significant changes in any period – except Germany 2009-2010 in Measure 2.

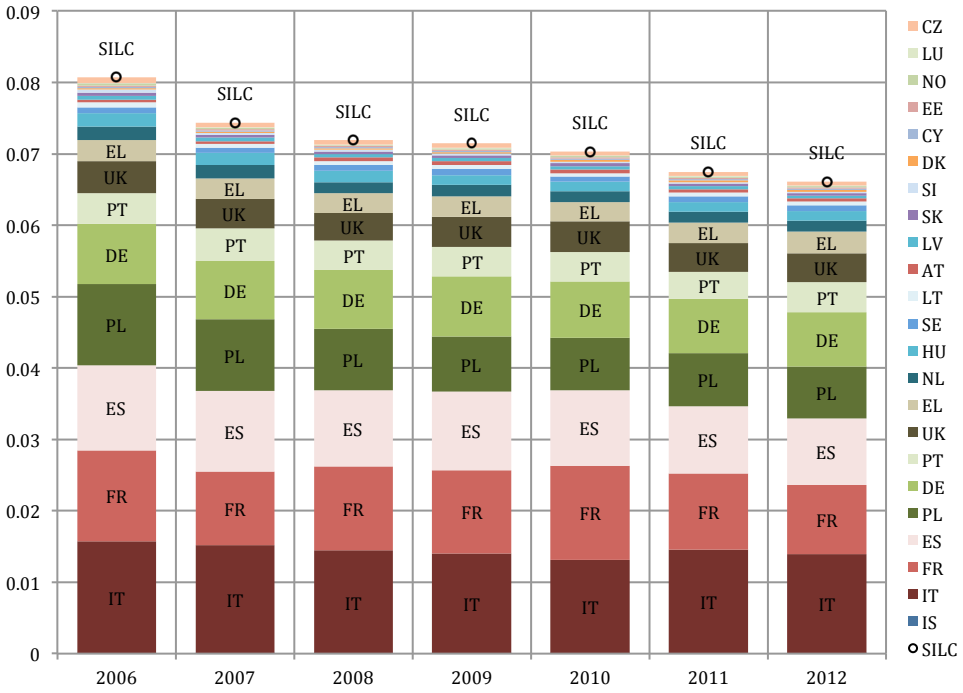
In Measure 2, Spain displays a constant reduction in poverty during the first periods. In 2008, poverty increases marginally to decrease in the next period. None of these changes is significant. From 2010

poverty falls but the decrease is significant only between 2010 and 2011. In Measure 2 and 3, changes in 2008 and 2012 are positive, but insignificant. Italy presented sustained poverty reduction till 2010 when the level sharply increases. Between, 2011 and 2012, the situation was ambiguous. Measures 1 suggests a reduction in poverty while Measures 2 and 3, on the contrary, report a new increment. France shows a single trend. Positive and negatives changes are interspersed in all periods and year before 2011. Austria, Belgium and Denmark seem to show the highest increase in poverty.

Normally the poverty analyses are undertaken at the country level to facilitate national policy design. However it can be quite interesting from a human-centric perspective to look across countries, and see where the people who are identified as poor by each measure live, and what proportion of poverty each country contributes to the whole. Figure 11, below, provides this information. Among the 22 countries used in this analysis, we have aggregated their M_0 measures using annual population figures for each of the years 2006 to 2012. The height of the stripe associated with each country depicts that countries' relative contribution to the overall M_0 of the 22 countries together.

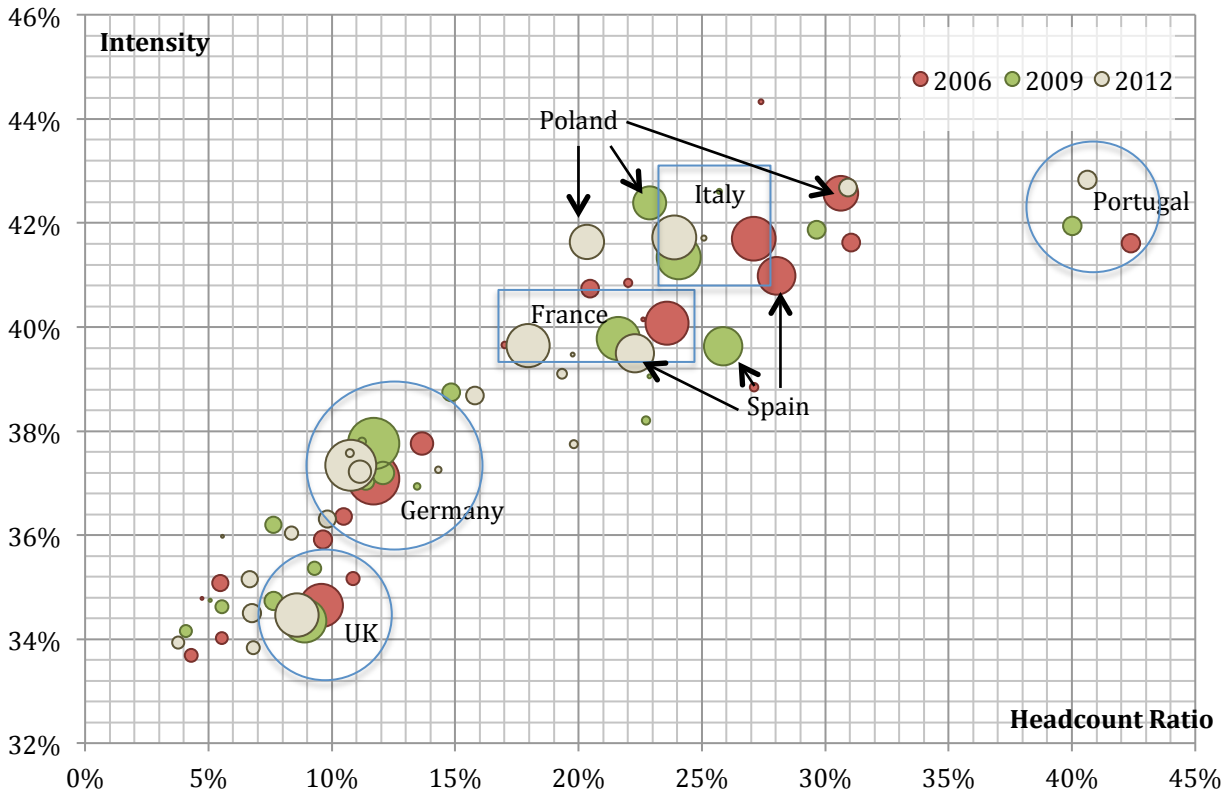
The graphic also depicts what was already seen earlier, namely the sharp drop between 2006-2007 and the relative stability of poverty 2007-2012. Due to their size, Italy, France, Spain, Poland and Germany dominate poverty trends in Europe. Italy reduces its relative contribution during the whole period but 2011. France's and Spain's contribution consistently falls only from 2010. Poland is the only country that reduces its relative contribution in all periods. Such depictures are useful complements to detailed national analyses. Furthermore, with changes in population share it is possible to decompose changes in multidimensional poverty that might arise from demographic shifts across countries.

Figure 11: Poverty contributions by country, population-weighted Measure 1



The value of including the intensity in the poverty measure is evident in Figure 12 below. The bubble graphic plots the headcount and intensity of every country. The different periods are shown in contrasting colours. The size of the bubble corresponds to the population size of the country. We see, first of all, that across all countries and all periods, the intensity of poverty is highest in the countries which simultaneously have high headcount ratios of poverty – located in the upper right hand corner. However we also see that at the same headcount ratio the intensities vary. We also see that in some countries the reduction of poverty does occur by reducing intensity strongly (e.g. Spain 2006-2009). A measure focused solely on the reduction of the prevalence of poverty would overlook these important changes. Further, as was mentioned above, such a measure could not be broken down by indicator into consistent sub-indices (Alkire Foster and Santos 2011).

Figure 12: Bubble graph of changes Measure 1 by H and A 2006-2009-2012



Poverty in Portugal - on the right hand side - increased between 2006 and 2012. Between 2006 and 2009, there was a reduction in the percentage on poor people and a slightly increase in their intensity. From 2009 to 2012, the change is mostly explained by the higher intensity. Poland reduced poverty mainly by reducing the headcount ratio and marginally by the intensity reduction.

Italy decreased poverty by reducing the headcount ratio between 2006 and 2009. Between 2009 and 2012, the headcount ratio decreases only marginally and the intensity almost returned to 2006 levels. On the other hand, Spain shows two completely different patterns across years. In the first triennium poverty reductions were based mainly on intensity; and, from 2009 to 2012, these changes depended on reduction in the percentage of poor people. France displays a constant reduction in their poverty levels by reducing the headcount ratio, although the intensity remained nearly constant between periods.

During the first triennium, Germany increased poverty because of the rise in intensity. The second triennium is characterized by the reduction of intensity and partially by the decline in the percentage of poor individuals. Finally, the United Kingdom decreases poverty mainly based on the headcount

ratio between 2006 and 2012. In the first triennium there is also a decrease in the intensity that is partially reversed between 2009 and 2012.

Table 9: Absolute change Multidimensional Poverty 2006-2012, Measure 1, k=26%

	2006-2007			*2007-2008*			*2008-2009*			*2009-2010*			*2010-2011*			*2011-2012*		
	ΔM0	*ΔH*	*ΔA*	*ΔM0*	*ΔH*	*ΔA*	*ΔM0*	*ΔH*	*ΔA*	*ΔM0*	*ΔH*	*ΔA*	*ΔM0*	*ΔH*	*ΔA*	*ΔM0*	*ΔH*	*ΔA*
AT	0.2	0.2	1.7	0.7**	2.2**	-1	0	-0.2	0.4	0.1	-0.1	1.3*	-0.3	-0.4	-1.7*	-0.2	-0.5	-0.7
BE	-0.1	0	-0.7	-0.1	-0.6	0.5	0.8*	1.7*	0.7	0.2	0.3	0.6	0.1	0.3	-0.1			
BG				-1.9*	-4*	-0.8	-1.8**	-3.5**	-1.4*	-1.1*	-2.9**	0.4	0.3	0.4	0.5	-0.7*	-1.3	-0.9
CH							-0.2	-0.6	0.4	-0.3	-0.9	0	-0.2	-0.6	0.2	0.4	1	0.1
CY	0	-0.1	0	-1.5**	-2.5*	-1.5**	0.3	0.9	-0.2	0.4	0.8	0.2	-0.5	-1.1	0	-0.4	-0.4	-1*
CZ	-1**	-2.4**	-1.5**	-0.1	-0.2	-0.1	0.2	0.6	0.4	-0.4*	-1*	-0.4	0.1	0.4	-0.1	-0.1	-0.3	0.3
DE	-0.1	-0.2	-0.3	0.1	0	0.6	0.1	0.2	0.3	-0.3	-0.7	-0.3	-0.1	-0.2	-0.1	0	0	0
DK	0.2	0.4	1	-0.2	-0.5	-0.1	0.4*	1.3*	0	0.1	0.1	0.5	0.1	0.6	-2.2*	0.3	0.6	0.9
EE	-0.1	0.2	-0.9*	-0.6*	-1.4*	-0.3	-1.1**	-2.3**	-1.5**	-0.2	-0.6	0.2	0.4	1.2	-0.1	0.1	0.3	0.2
EL	-0.3	-0.5	-0.1	-0.5	-1.4*	0.2	0.3	0.5	0.2	-0.7	-1.6	0	0.9*	2	0.3	0.5	0.9	0.5
ES	-0.7**	-1.5*	-0.5*	-0.7*	-1	-1.1**	0.2	0.3	0.2	-0.4	-0.9	-0.2	-0.9**	-2.5**	0.3	-0.1	-0.2	-0.2
FI							0.2	0.4	0.6	-0.2	-0.7*	0	0	0.2	-0.6	-0.1	-0.2	0.3
FR	-1.7**	-3.7**	-0.9**	1**	2.1**	0.6*	-0.1	-0.4	0	1.1**	2.4**	0.6*	-1.8**	-4.2**	-0.5	-0.7*	-1.8*	-0.2
HR																-1.4**	-2.7**	-1.6**
HU	-1.2**	-2.2**	-1.6**	-0.3	-0.8	0.4	-1.1**	-2.6**	-0.8*	0.2	0.6	-0.4	0.3	0.4	0.8*	-0.1	-0.1	-0.4
IE	-0.3	-0.8	0	-0.3	-0.6	-0.4	0	0.3	-0.4	-1*	-2*	-1.3*	0.2	0	0.8			
IS	-0.1	-0.4	0.5	0.3	0.9*	-0.9	0	-0.2	0.4	0.4*	1*	0.9	-0.2	-0.6	-0.2	0.1	0.1	0.5
IT	-0.5*	-1.2*	0.2	-0.5*	-1.2*	-0.1	-0.4	-0.7	-0.5*	-0.6*	-1.2*	-0.5*	1**	1.8**	1.3**	-0.4	-0.8	-0.4
LT	-1.3**	-3.4**	0.3	-0.9*	-2.3*	0	0.6	1.8*	-0.5	-0.5	-0.8	-0.9*	0.9*	2.1*	0.5	0.1	0.4	-0.4
LU	-0.4	-0.3	-1.2*	-0.2	-0.5	0.1	0.4	1.1	-0.1	-0.9*	-2.1*	-0.2	-0.4	-1.1	0.2	0.1	0.1	0.4
LV	-0.7	-1.7	0	-0.9*	-2.7*	0.8*	-0.3	0.1	-1.5**	0.2	0.4	0.3	-0.3	-0.5	-0.6*	-1.1**	-2.9**	-0.1
MT							0.7*	1.4*	0.6	1.2**	2.6**	0.4	0	0.3	-0.3	-0.8*	-1.5*	-0.6

NL	0	-0.1	0.4	-0.8**	-2.2**	0.2	0.1	0.7	-1.2*	-0.4	-0.9	-0.2	0.1	0.1	0.1	-0.1	-0.2	0.1
NO	-0.3	-0.9	0	-0.2	-0.6	0.5	0	0	-0.3	0.1	0.3	-0.1	0.1	0	1.3	-0.3*	-0.7	-1.4
PL	-1.5**	-3.5**	-0.1	-1.6**	-3.6**	-0.3	-0.2	-0.6	0.2	-0.4*	-0.9*	-0.2	-0.6**	-1.1*	-0.8**	-0.2	-0.6	0.2
PT	0.9	1	1.2*	-1.6*	-2.4	-1.4**	-0.2	-0.9	0.5	0	-0.4	0.3	-1.2*	-2.4*	-0.6	1.9**	3.3*	1.2**
RO				-1.4**	-2.9**	-1*	0	0.2	-0.4	-0.5	-1.6	0.7	-0.2	-0.4	-0.1	-0.6	-1.4	0
SE	-0.3	-0.9*	0.5	0.7**	1.9**	0.1	0	0	0.1	-0.8**	-1.9**	-0.8*	0.1	0.2	0.6	0	0.1	-0.5
SI	-4.8**	-10.9**	-3.3**	0.5*	1.4*	-0.3	-0.4*	-1.3*	0.6	0.4*	1*	0	0	0	-0.1	-0.6**	-1.5**	-0.2
SK	-0.7**	-2.1**	0.2	0	0.1	-0.4	0.2	0.4	0.4	-0.1	-0.3	0	-0.2	-0.4	-0.1	0	-0.2	0.8
UK	-0.3	-0.8*	0.1	-0.2	-0.4	-1.3**	0.3	0.5	0.9*	0.1	0.1	0.4	-0.2	-0.5	-0.7	0.1	0.1	0.4

Table 10: Absolute change Multidimensional Poverty 2006-2012, Measure 2, k=21%

	2006-2007			*2007-2008*			*2008-2009*			*2009-2010*			*2010-2011*			*2011-2012*		
	ΔM_0	ΔH	ΔA	ΔM_0	ΔH	ΔA	ΔM_0	ΔH	ΔA	ΔM_0	ΔH	ΔA	ΔM_0	ΔH	ΔA	ΔM_0	ΔH	ΔA
AT	0	-0.4	1.9	1.3**	3.6**	-0.2	-0.5	-1.3*	0	0	-0.1	0.7	-0.3	-0.4	-1.2	-0.1	-0.2	-0.7
BE	-0.1	-0.2	-0.3	-0.2	-0.6	0.3	0.7*	1.8*	0.4	0.2	0.3	0.5	0	0.1	0			
BG				-4.2**	-10**	-0.2	-1.5*	-2.4	-1.4*	-0.3	0.1	-1*	-0.2	-1.6	1*	-0.4	-0.1	-1*
CH							-0.1	-0.4	0.3	-0.4	-1	-0.2	-0.2	-0.6	0	0.3	1.1	-0.2
CY	0	-0.8	0.9*	-1.8**	-3**	-2.1**	0.2	1	-0.5	0.7	1.7	0.2	-0.4	-1.1	0	0.3	1.4	-0.6
CZ	-1.2**	-3**	-1.2	-0.2	-0.3	-0.6	0.1	0.2	0.2	-0.3	-0.7	-0.4	0.1	0.2	0	0	-0.3	0.8
DE	0	-0.1	0.2	0	0.1	0.1	0	-0.2	0.4	-0.3*	-0.9*	-0.2	-0.1	-0.4	0.6	-0.1	0	-0.4
DK	0.2	0.6	0	-0.4	-0.8	-1.8	0.4*	1.2*	0.8	0.1	0	1	0.1	0.8	-1.9*	0.3	0.6	0.6
EE	-0.2	0.1	-	-	-	-0.3	-	-	-0.6	0.5	1.2	0.4	0.2	0.3	0.7	0.3	1	-0.2

			1.2*	0.7*	1.9*		0.6*	1.4*										
EL	-0.3	-0.8	0	-0.4	-1.1*	-0.1	0.1	0.3	0	-0.4	-1.1	0.2	1.7**	3.5**	1*	1.4*	2.8*	0.9
ES	-0.7**	-1.6*	-0.5*	-0.5*	-0.7	-0.8**	0.3	0.5	0.3	0	-0.2	0	-0.8**	-2.6**	0.5*	0.2	0.4	0.1
FI							0.1	0.2	0.3	-0.2	-0.4	-0.3	0	0.2	-0.1	0	0	-0.5
FR	-1.4**	-3.5**	-0.6*	0.8**	2.3**	0.3	-0.1	-0.4	0.1	0.8**	1.8*	0.8*	-1.5**	-4.2**	-0.3	-0.6*	-1.4*	-0.2
HR																-1.4**	-3.2**	-0.7
HU	-1.4**	-2.5**	-1.5**	-0.3	-0.8	0.1	-0.8*	-1.7*	-0.6	0.5	1.3	0.1	0.5	0.4	1.2**	0.4	1	0
IE	-0.2	-0.6	-0.2	-0.2	-0.7	0.2	0.3	1.1	-0.3	-1*	-2.2*	-0.9	0.5	0.8	0.9			
IS	-0.1	-0.4	0.5	0.1	0.6	-1.3	-0.1	-0.3	0.3	0.5*	1.2*	1.2	-0.1	-0.4	0.3	0.1	0.3	0.4
IT	-0.4	-1*	0	-0.3	-0.8	-0.1	-0.4	-0.8	-0.4	-0.5*	-1.1*	-0.3	1.6**	3.2**	1.4**	0.1	0	0.4
LT	-3**	-8.1**	0.3	-1.1*	-2.2*	-1.2*	1*	2.5*	0.2	0.4	1.6	-0.8	0.7	1	1.2*	0.2	0.5	0
LU	-0.4	-0.4	-1*	-0.2	-0.6	0.2	0.5	1.4	0.2	-0.9*	-2.5*	-0.4	-0.2	-0.8	0.4	0.1	-0.1	0.4
LV	-1.3*	-2.9*	-0.4	-1.7**	-5**	0.9	0.2	1.6	-1.5**	1.2*	2.7*	0.4	0.2	1	-0.5	-1.6**	-4**	-0.4
MT							0.7*	1.4	0.8*	1.2**	3**	0.5	0.1	0.6	-0.4	-0.5	-1.2	-0.2
NL	0	-0.2	0.2	-0.7**	-2.3**	0.2	0.2	0.9	-1	-0.2	-0.8	0.3	0.1	0.3	-0.1	0	0.1	-0.3
NO	-0.3	-1	-0.5	-0.2	-0.8	0.6	0	-0.2	1	0.1	0.6	-0.8	0	-0.1	1.5	-0.3	-0.6	-1.3
PL	-2.3**	-5**	-0.9**	-2.2**	-5.3**	-0.4	-0.6*	-1.5*	0	-0.5*	-1.2*	-0.1	-0.7**	-1.1*	-0.9**	-0.1	-0.3	0.1
PT	1	1.4	1*	-1.3*	-2.2	-1.1*	-0.2	-1.1	0.4	0	-0.4	0.5	-1	-2	-0.7	1.6**	3.3*	0.9*

RO				-2**	-3.7*	-1.5**	0	0.3	-0.4	-0.8	-2.5	0.4	-0.4	-0.8	-0.3	-0.3	-0.5	-0.4
SE	-0.2	-0.7	0.2	0.5**	1.8**	-0.3	0.1	-0.1	0.7*	-0.7**	-1.9**	-0.6	0.1	0.3	0.4	0.1	0.2	-0.1
SI	-3.9**	-10.6**	-0.9*	0.8**	2.2**	0.1	-0.6*	-1.5*	-0.1	0.4*	1*	0.1	0	0	0.1	-0.3	-0.9	0.1
SK	-1.2**	-3.4**	0.1	-0.4	-0.9	-0.4	0	-0.3	0.6	0.1	0.3	0.4	-0.2	-0.4	-0.4	0	-0.4	0.9
UK	-0.3	-1.1*	0.3	0	0.4	-1.2*	0.1	0.1	0.2	0.1	-0.1	1.3*	-0.1	-0.2	-0.5	0.4	0.6	1.6**

**Changes significant at 10% ** Changes significant at 1%*

Table 11: Absolute change Multidimensional Poverty 2006-2012, Measure 3, k=34%

	2006-2007			*2007-2008*			*2008-2009*			*2009-2010*			*2010-2011*			*2011-2012*		
	ΔM0	*ΔH*	*ΔA*	*ΔM0*	*ΔH*	*ΔA*	*ΔM0*	*ΔH*	*ΔA*	*ΔM0*	*ΔH*	*ΔA*	*ΔM0*	*ΔH*	*ΔA*	*ΔM0*	*ΔH*	*ΔA*
AT	0.2	0.3	1.3	0.7**	1.5**	-0.8	-0.4	-0.8	0.4	0.3	0.7	-0.2	-0.2	-0.4	-1.1	-0.2	-0.4	-0.4
BE	0	0	-0.2	-0.2	-0.4	0	0.6	1.1	0.5	-0.1	-0.3	1	0.3	0.6	-0.3			
BG				-2.5**	-3.7*	-2.4**	-1.4*	-2.5*	-0.8	-0.7	-1.4	0.2	0.5	0.8	0.7	-0.5	-0.9	-0.2
CH							0.1	0.2	0	-0.2	-0.5	0.5	0.1	0.3	-0.3	0	0	-0.7
CY	0.2	0.1	0.9	-1.5**	-2.6**	-1.4*	0.1	0.6	-1.2	0.5	1.2	-0.2	-0.4	-1	0.4	0.1	0.2	-0.4
CZ	-0.7*	-1.2*	-1.6	-0.3	-0.5	-0.7	0	0	-0.5	-0.1	-0.1	-0.3	0.1	0.2	0.4	0	0.2	-0.9
DE	0.2	0.3	0.1	0	-0.1	0.1	0	-0.1	0.8	-0.1	-0.3	0	0	-0.1	0.5	-0.2	-0.4	-0.1
DK	0.1	0.2	0.9	-0.4*	-0.8*	-1.8	0.3	0.6	1.5	0.1	0.2	1.2	0	0.3	-3*	0.1	0.2	1.1
EE	-0.2	-0.3	-0.8	-0.4	-0.6	-0.8	-0.5*	-1.1*	0.1	0.5	0.9	0.3	0.3	0.5	0.7	0.2	0.5	-0.5
EL	-0.2	-0.6	0.2	-0.4	-0.9	0.5	-0.1	0	-0.7	0.2	0.4	0	1.7**	2.9**	1.6*	1.2*	2*	0.8
ES	-0.5*	-0.9*	-0.3	-0.2	-0.2	-1.1*	0.1	0	0.8*	0.4	0.7	0.3	0	-0.3	1.3**	0.2	0.3	0.3
FI							0.2	0.3	0.9	-0.1	-0.2	-0.3	0.1	0.2	-0.8	0	0	-0.3
FR	-0.6**	-1.2**	-0.5	0.2	0.2	0.5	-0.1	-0.3	0.4	0.7**	1.2*	1	-0.6**	-1.2**	-0.6	-0.3	-0.5	-0.6

HR																-1.2**	-2.3**	-0.3
HU	-1.5**	-2.6**	-1.6**	0.1	0.2	-0.3	-0.7*	-1.3*	-0.1	0.5	0.9*	0.2	0.6	1	0.9	0.4	0.7	0.2
IE	0.1	0.6	-1.6*	-0.6	-1.3	0.3	0.7	1.8*	-1.1	-1*	-2.2*	0.1	0.6	1.1	0.3			
IS	0	-0.1	2.1	0.2	0.4	-2.8	-0.1	-0.4	2.6	0.4*	0.8*	-0.8	0	0.1	-0.2	0.1	0.1	1.7
IT	-0.3	-0.6	-0.1	-0.3	-0.6	0.4	-0.4	-0.6	-0.8*	-0.3	-0.6	0.4	1.2**	2.3**	0.4	0.2	0.3	0.2
LT	-1.9**	-4**	0.5	-0.8*	-1.4*	-1.7**	0.9*	1.9*	0.1	-0.1	-0.3	0.1	0.8*	1.6*	0.5	0.1	0.2	0.1
LU	-0.3	-0.7	-0.7	0	-0.1	0.9	0.3	0.8	-0.5	-0.5	-1.1	0.2	0.2	0.3	1	0	0.1	-0.1
LV	-1*	-2.2*	0.4	-0.1	-0.4	0.4	0	0.3	-1*	0.6	0.9	0.8*	-0.2	-0.3	-0.6	-0.8*	-1.5*	-0.2
MT							0.4	0.7	0.6	0.7*	1.4*	0	-0.2	-0.2	-0.7	-0.4	-1	0.4
NL	0.1	0.2	-0.7	-0.3	-0.8	1.5	0	0.1	-0.6	-0.1	-0.2	0	0	-0.1	-0.1	0.1	0.4	-1.4
NO	-0.2	-0.4	0.1	-0.1	-0.3	0.6	0.1	0.2	-0.4	0.1	0.3	-0.1	-0.1	-0.4	3.1*	0	0.2	-4.2*
PL	-1.9**	-3.8**	-0.3	-1.4**	-2.8**	-0.3	-0.3	-0.7	0.3	-0.3	-0.7	0.3	-0.5*	-0.9*	-0.5	-0.1	-0.4	0.6
PT	1.1*	1.9*	0.7	-1.2*	-2.3*	-0.9	0.3	0.7	-0.2	0.4	0.5	1.2*	-0.7	-1.3	-0.5	1.1*	2.5*	-0.4
RO				-2.1**	-4**	-0.6	-0.4	-0.7	-0.3	-0.4	-0.7	-0.2	0	0	-0.4	-0.5	-1	0.2
SE	-0.1	-0.1	-0.1	0.3*	0.7*	-1.3	0.4*	0.8*	1.2*	-0.5**	-1.1**	-0.4	0.2	0.5	-0.1	0.2	0.5	-0.5
SI	-1.8**	-3.6**	-0.2	0.3	0.7	0.3	-0.4*	-0.8*	-0.5	0.4*	0.9*	-0.1	0.1	0.2	0.1	-0.1	-0.3	0.4
SK	-0.4*	-0.9*	0.5	-0.4*	-0.6	-1.4*	0.2	0.3	1.6*	0.4*	0.8	0.7	-0.2	-0.4	-0.1	0.1	0.1	1.4
UK	-0.3	-0.8*	0.5	-0.1	0	-1.6*	0.4	0.8	0.2	-0.1	-0.5	2**	-0.3	-0.5	-1.1	0.3	0.6	1.3*

**Changes significant at 10% ** Changes significant at 1%*

4.4 Decomposition

Because the AF methodology satisfies subgroup-consistency and subgroup decomposability, it is possible to break down the measure by any sub-groups for which the data are representative and the measure is appropriate. Decompositions are also useful to check the adequacy of indicators for different subgroups. To illustrate this, we decompose all three measures by gender and by age category for all periods.

4.4.1 By gender

The gender findings are, sadly, stunning. Across all measures, women are poorer than men in all countries in 2006. Women remain poorer than men in all countries in Measures 1, 2, and 3 although their relative disparity evolves. In 2012, women's poverty is higher than men's poverty in all countries except Denmark for some measures. Figure 13 below shows the pooled M_0 levels for all measures for each year. We see that overall women are poorer than men in all periods according to all measures.

Figure 13 Multidimensional Poverty (M_0) by Measure, Gender and year

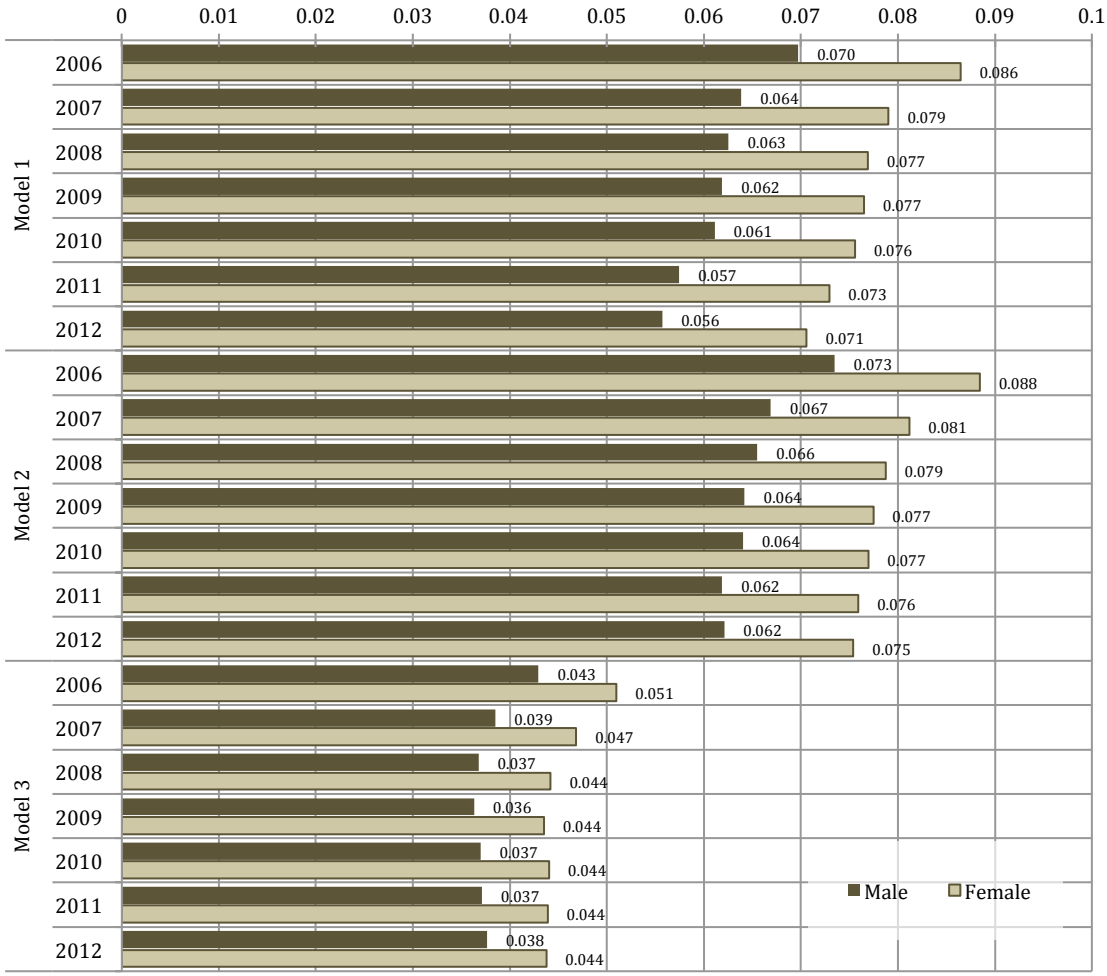


Figure 14a below, provides the country-specific contributions of each gender to overall M_0 for each country for Measure 1 in the year 2006. The height of the bar is the level of M_0. You can see that the gender differentials vary by country. Italy and Spain have nearly the same M_0 but in Italy the gender disparity in poverty is higher.

Figure 14a Contributions to National Multidimensional Poverty (M_0) by Gender 2006 (Measure 1)

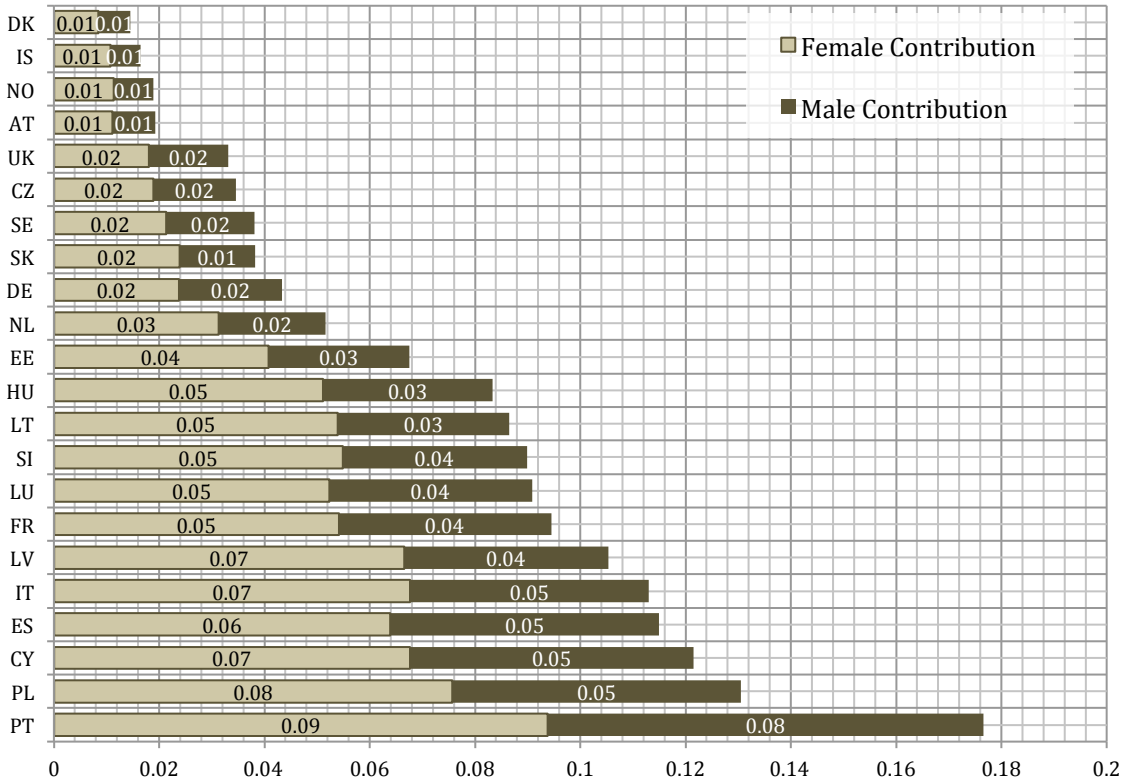
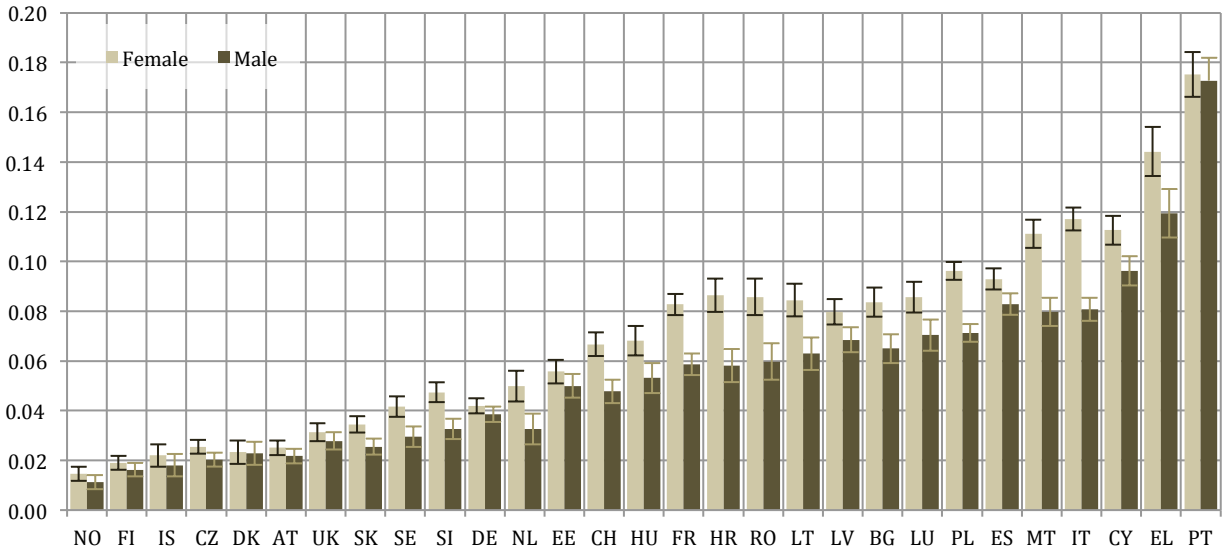


Figure 14b shares the same information, but with the M_0 for women and men side by side, with confidence intervals. We see that while all point estimates show higher female poverty, women are significantly poorer than men in 18 out of 29 countries with data available for 2012.[14]

14 Women are statistically significantly poorer than men according to Measure 1, 2012 in: SE SK SI NL CH HU FR HR RO LT LV BG LU PL MT IT CY and EL.

Figure 14b Contributions to National Multidimensional Poverty (M_0) by Gender 2012 (Measure 1)



To see the comparisons more transparently, we map the percentage contributions of men and women to overall poverty (Figure 15). If their contributions were equal, we would see each bar making up half of the overall height. Instead we see that for all countries, the women's bar (right) exceeds 50%, with Portugal having nearest to parity – but still lacking parity once we take into account the intensity of women's poverty. We also see visibly the strong reduction of poverty in Poland, Latvia and Slovenia, mentioned above. Naturally, the question arises how the composition of poverty for women and men varied.

Figure 15 Gender Decomposition of M_0 by Country 2006 and 2012 (Measure 3)

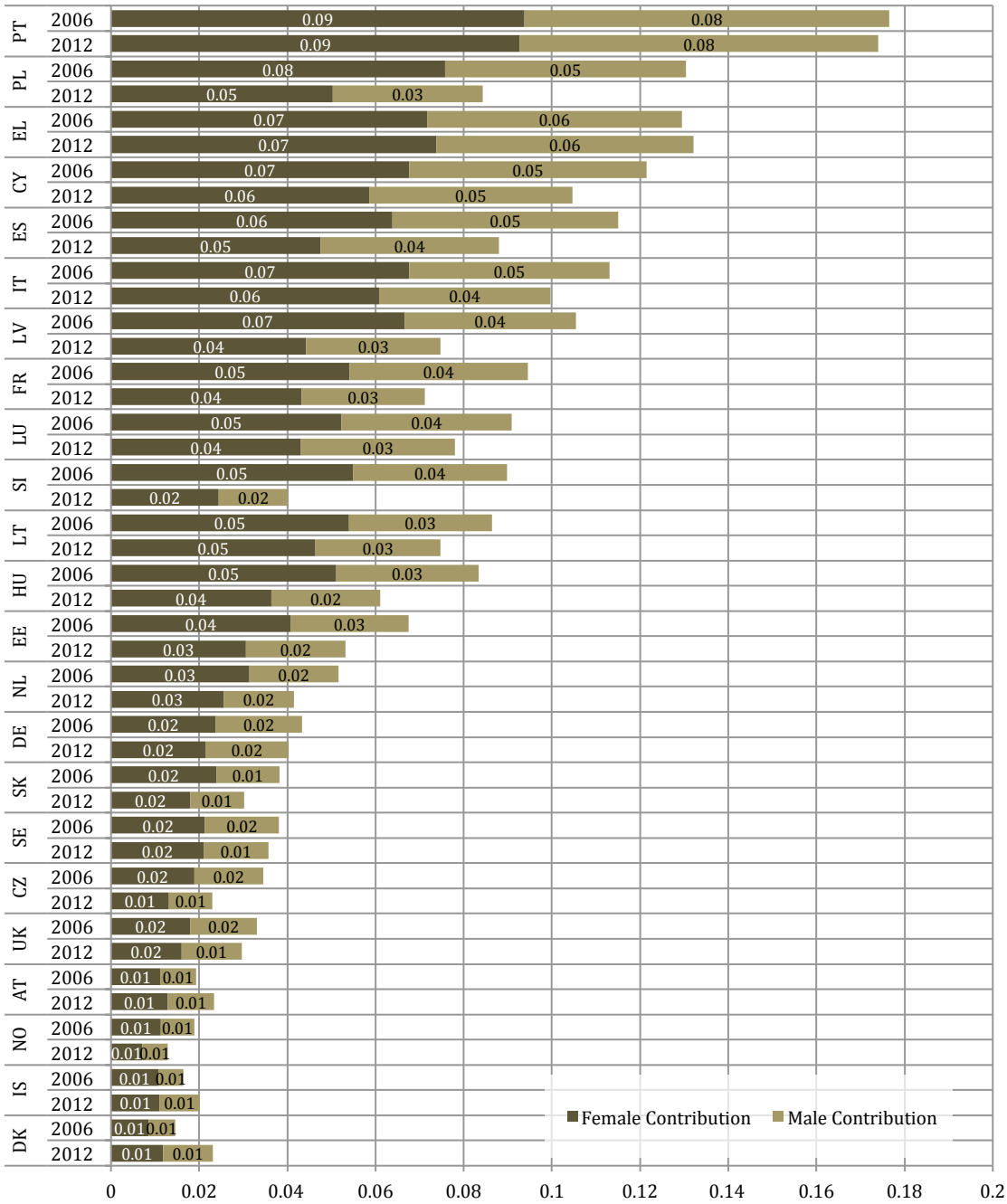
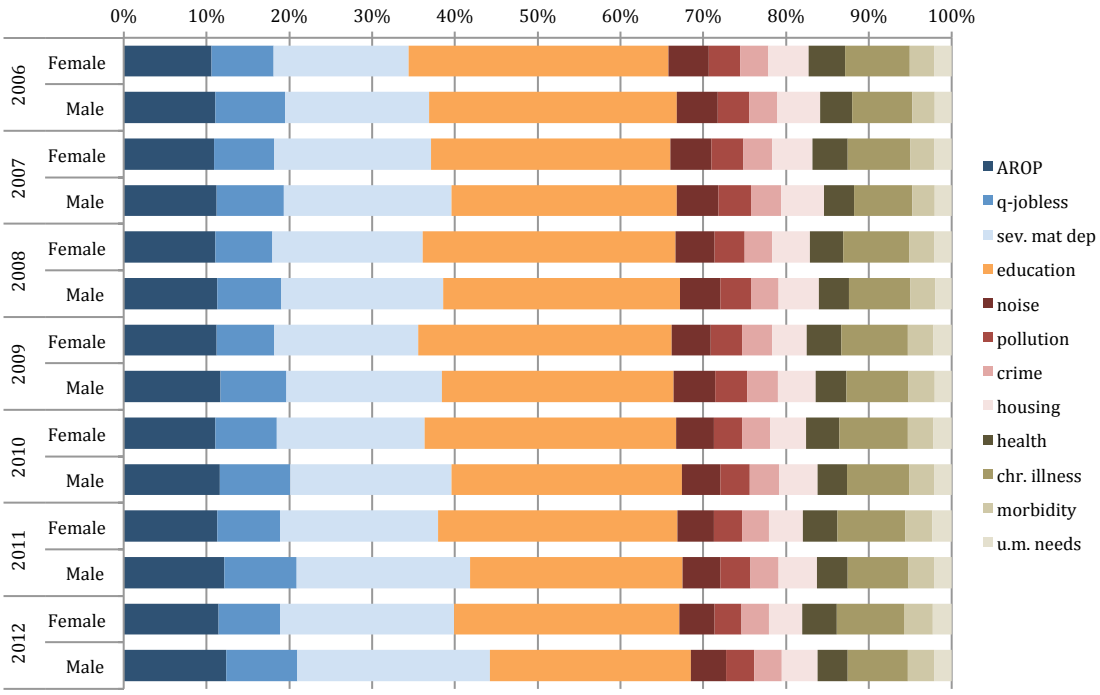


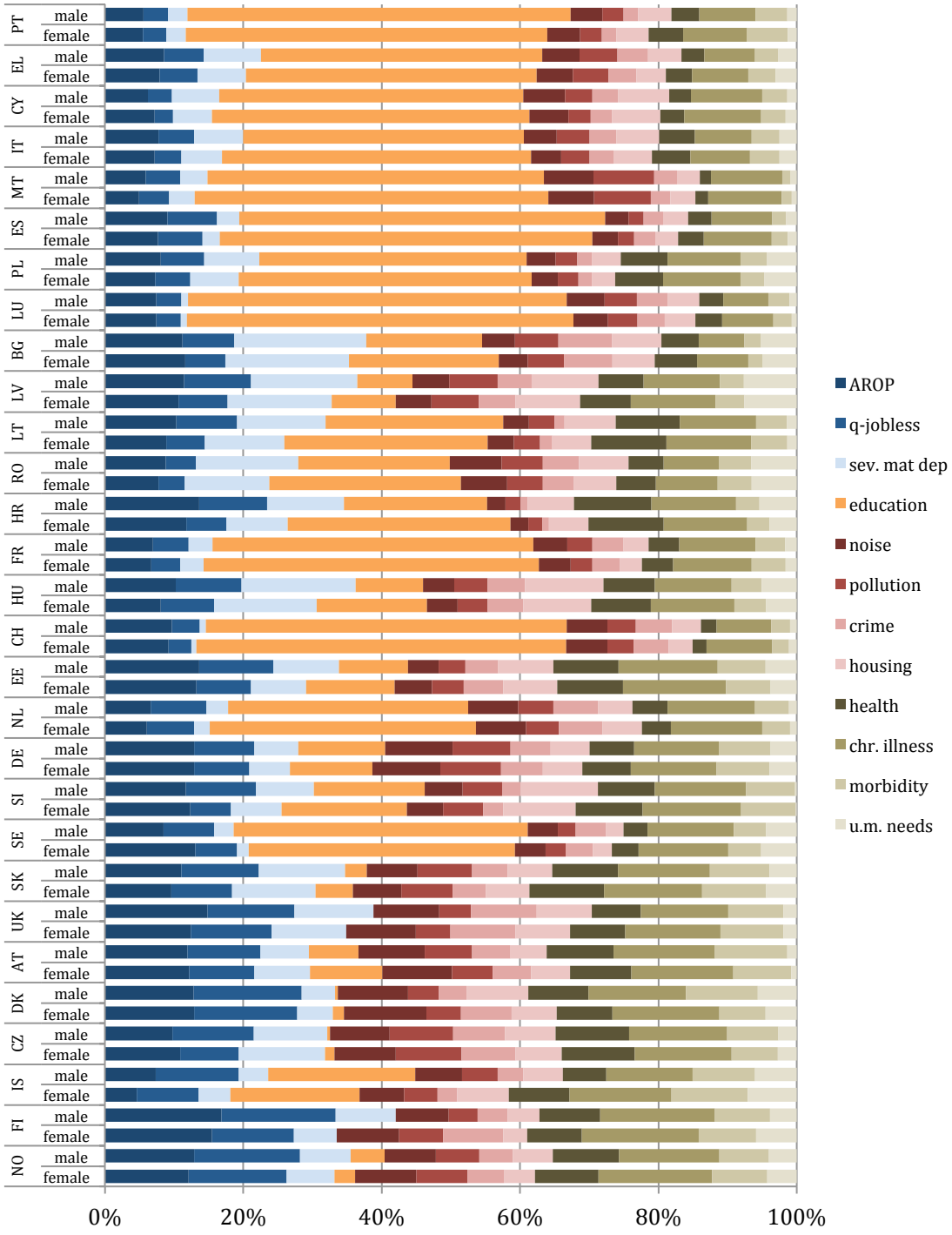
Figure 16a below shows that gendered differences in poverty composition for the pooled data are relatively low – even for education (the orange stripe) which is a wholly individual dimension, although education and health deprivations are higher for women than men. Obviously part of the similarity is from the shared household level indicators that are used in the measure.

Figure 16a Aggregate Multidimensional Poverty (M_0) by Gender and year Measure 2



As a final step, we might consider gendered poverty profiles by country, to see how these vary. A fascinating picture emerges, actually, because while the poverty profiles vary considerably by country, the male and female profiles for a given country tend to similar, with some exceptions such as Croatia and Latvia. We can see, too, the visibly higher educational deprivations of women in many countries.

Figure 16b Multidimensional Poverty (M_0) by Gender and country Measure 1 2012



4.4.2 By age

Next, we decompose the measures by five age categories: 18-24, 25-34, 35-49, 50-64 and above 65 years of age. Figure 17a shows a clear pattern between age and poverty levels, particularly in the 60+

category. In society as a whole, 9-15% of the population were in the youth category, and 15-23% in the elder category. In all countries elder poverty was higher than youth poverty in 2006 – as expected – but in many countries elder poverty was disproportionally high. For example in France, 11.8% of the population are youth, and 22% are elderly, but among the poor population in France, less than 5% were youth and nearly 50% were elderly.

Figure 17a Percentage contributions to Multidimensional Poverty (M_0) by age and year Measure 1

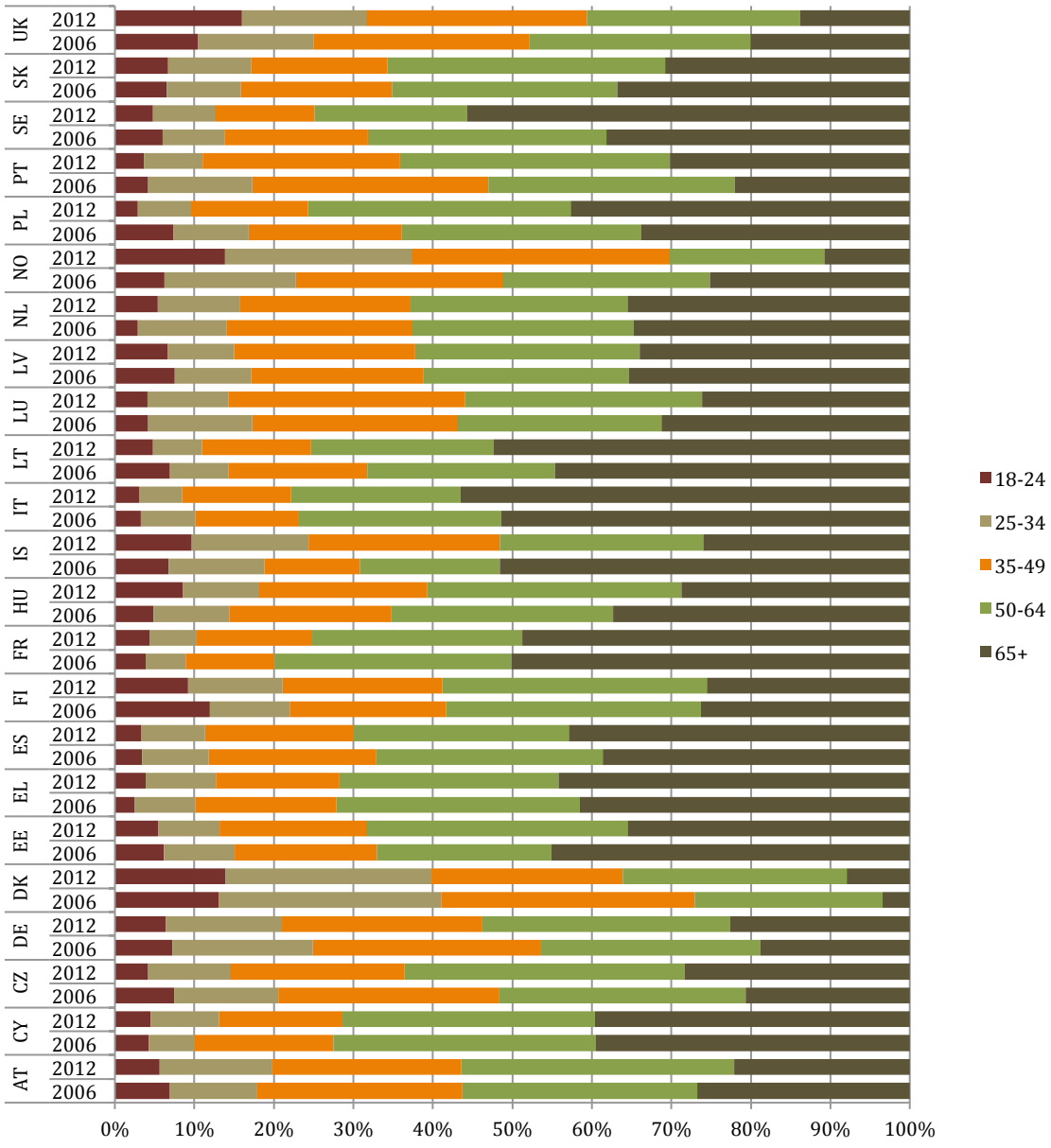
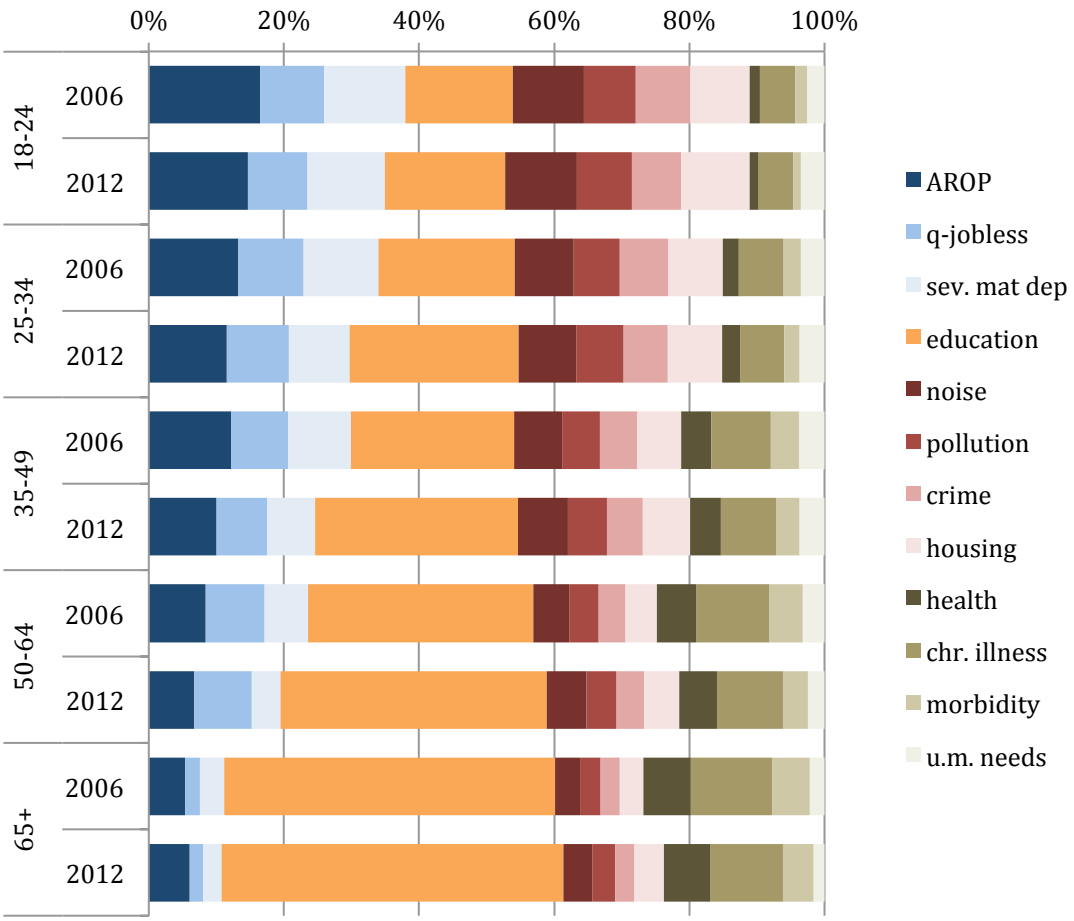


Table 12: Age structure across national populations 2006 and 2010

	2006						2010					
Country	18-24	25-34	35-49	50-64	65+	Total	18-24	25-34	35-49	50-64	65+	Total
AT	11.3	15.9	30.1	22.6	20.1	100	11.4	14.7	27.9	24.8	21.2	100
CY	14.9	20.1	28.2	21.6	15.3	100	14.4	21.2	26.0	22.3	16.1	100
CZ	11.2	20.9	24.5	26.3	17.1	100	10.4	18.1	26.7	25.1	19.6	100
DE	8.7	14.9	30.0	23.4	23.0	100	9.0	14.8	26.3	25.7	24.2	100
DK	9.3	17.0	28.3	25.8	19.5	100	11.2	14.8	27.4	24.4	22.2	100
EE	13.6	17.4	25.9	22.4	20.7	100	12.2	18.3	24.8	23.9	20.8	100
EL	10.2	18.8	27.0	21.6	22.5	100	8.5	16.8	27.7	23.4	23.6	100
ES	10.6	21.0	28.3	20.2	20.0	100	8.9	18.0	30.3	22.2	20.7	100
FR	11.8	16.5	27.1	23.7	21.0	100	10.9	15.9	26.2	25.3	21.8	100
HU	11.6	18.9	25.7	25.0	18.9	100	12.3	14.8	24.9	28.9	19.1	100
IS	13.7	19.6	29.5	22.3	15.0	100	13.6	17.5	27.2	24.9	16.8	100
IT	9.1	17.3	28.0	22.1	23.5	100	8.5	14.6	28.8	23.3	24.8	100
LT	13.5	17.2	28.8	20.9	19.5	100	12.5	15.2	26.0	24.2	22.1	100
LU	10.6	17.6	32.3	22.3	17.2	100	10.9	18.3	30.6	23.4	16.9	100
LV	12.9	17.7	27.3	22.3	19.9	100	11.8	16.6	25.1	24.3	22.4	100
NL	11.1	16.9	30.0	25.1	17.0	100	9.8	15.4	28.2	26.9	19.7	100
NO	10.5	17.5	29.0	23.9	19.0	100	9.9	15.1	29.4	25.5	20.1	100
PL	14.7	19.3	26.2	23.1	16.8	100	11.6	20.2	24.5	26.5	17.2	100
PT	11.1	19.2	26.8	21.8	21.1	100	9.3	16.0	27.4	23.6	23.7	100
SE	10.0	16.6	27.5	25.5	20.5	100	10.7	15.9	25.8	23.5	24.2	100
SI	11.4	16.9	28.4	24.1	19.2	100	10.5	16.7	28.3	26.3	18.2	100
SK	15.2	18.3	26.4	24.0	16.1	100	14.5	18.0	25.9	25.3	16.3	100
UK	11.6	16.6	28.5	23.1	20.2	100	12.2	16.9	26.1	23.2	21.7	100

When we probe the composition of poverty by age cohort in Figure 17b, we see striking differences across the age cohorts. Comparing this to the demographic structure of each country (Table x), we see that educational and health deprivations contribute far more to elder poverty, whereas economic and living environmental deprivations are foremost among the young. The age differential raises further questions as to whether to use the same variables and cutoffs in health and education across age cohorts – making this an absolute comparison – or whether to use different definitions of some deprivations across cohorts. Yet it also draws attention to the importance of considering non-economic deprivations for all age groups, although which deprivations are prominent vary by age.

Figure 17b Percentage contributions to Multidimensional Poverty (M_0) by age, dimension and year Measure 1



5. Concluding Remarks

This paper has presented three experimental multidimensional poverty indices, which have been implementing with the EU-SILC datasets for seven waves from 2006-2012 using the Alkire Foster Methodology. The same twelve indicators are used in each experimental measure; only weights change.

Section one surveys the extensive counting-based literature in Europe on multiple deprivations (and the Appendix provides different indicators and dimensions relevant for European poverty discussions). Section 2 introduces the AF methodology, which builds on the counting tradition but adds new features of intensity, which permit the construction of a set of consistent partial indices including the headcount ratio, intensity, and censored headcount ratios for each of the included

indicators. The AF methodology can also be used to analyse changes over time by country, by subgroup, and by changes in each indicator.

Section 3 introduces the data, indicator definition, and treatment of missing values; then describes indicators in terms of the level of deprivations and their joint distribution, using correlation and redundancy matrices. It then sets out the structure of the three experimental measures.

Section 4 first presents the results pooled across all countries for which there is consistent data, then shows individual country trajectories over time for each measure. Honing into the composition of poverty, we study again both the aggregate composition and its evolution from 2006-2012, and look at snapshots of country comparisons. We then track the changes in poverty over time for our main poverty measure, the adjusted headcount ratio M_0, as well as for the headcount ratio and intensity. To explore further the poverty of different population subgroups, we decompose results by gender and by age category.

All Measures confirm that poverty decreased in average between 2006 and 2012 due to a strong reduction in the percentage of multidimensionally poor people. The analysis within years shows an initial reduction in poverty and then marginal increments that in many cases are insignificant.

Results show that the poorest region is Southern Region of the continent followed by Eastern Europe. Results also show that the Northern area is consistently the least poor region regardless of the measure and cut-off. Evidence coincides with the aggregate results. There is a stronger reduction in poverty during the first triennium. Simple subgroup decompositions show that the variability of the aggregate measure is mainly explained by changes in East Europe and South Europe. There are however a few cases of poverty reduction in North and Western Europe, such as in France.

Across countries, results show the heterogeneous behaviour of the countries. However, more than 70% in all measures show a decrease in poverty in the analysed period. Only Poland shows a consistent and substantive improvement across all years. Between 2006 and 2012, Poland reduce significantly poverty from 0.13 to 0,85 according to Measure 1, from 0.159 to 0.095 and from 0.102 to 0.056, according to measures 2 and 3 respectively. Nevertheless, the poverty alleviation is not significant across all years. For instance, in Measure 3, changes are only significant between 2006-2007, 2007-2008 and 2010-2011.

Slovakia shows the second highest-level poverty reduction. On the extremes, Portugal and Bulgaria vie for the position of the poorest country in the SILC area. Norway and Iceland were the least poor countries in 2 measures. Across years, in general, there is significant reduction of poverty primarily due to reductions in the headcount ratio during the first years. However, starting in 2009, further poverty reduction disappears or becomes insignificant.

Regarding the composition of poverty, we explored the relevance of the construction and the implication for the analysis. The relative contribution of education,(quasi) joblessness declines as overall poverty in a country increases, as do the relative contributions of the health variables.

Additionally, we find that women are significantly poorer than men 18 out of 29 periods, and more generally across all time periods, and also that elder poverty contributes disproportionately to overall poverty.

This study also drew attention to incomparabilities in definitions of the educational variables, and other issues in health and environment indicators. We noted that unfortunately the level of education variable is not comparable across countries, hence would recommend that years of schooling be used as this might facilitate more precise comparisons. We also raise concerns regarding adaptive preference in self-reported indicators such as fear of violence and self-reported health. This may affect the comparability of these subjective or self-report indicators across context and over time. It would be possible and relevant to explore objective indicators covering violence and health.[15]

For space limitations, we cannot include further descriptive results – for example a deeper analyses of the dimensional changes in poverty over time. These additional components of a full analysis of changes in multidimensional poverty over time, and their associated statistics are available elsewhere (Alkire Roche and Vaz 2014, Alkire et al. 2015 Chapters 8, 9). We are also unable in this paper to present the full complement of robustness results that would be required for a policy-relevant measure.

Naturally the next step beyond a fuller description of changes in poverty over time is to undertake analysis of those changes in relation to macroeconomic variables, to policies, and to demographic characteristics. Such studies are a necessary complement to the analysis contained in this paper, and will greatly enrich the design of policy that is informed by multidimensional poverty measurement.

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15 Some sample questions are present in the MPPN survey which is available here.

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Appendix 1: Dimensions or Indicators of Poverty, Social Exclusion, Quality of Life or Welfare

Allardt (1993) Comparative Scandinavian Welfare Study	Laeken European Council Meeting (2001) Presidency Conclusion	Sten Johansson, Allmanna Forlaget, (1970), Stockholm: Johansson, Sten
1.*Having:* econ resources, housing, employment, working conditions, health, education 2.*Loving:* attachments/ contacts with local community, family and kin, friends, associations, work-mates *3. Being* self-determination, political activities, leisure-time activities, meaningful work, opportunities to enjoy nature.	*1.* At-risk-of-poverty rate; *2.* At-risk-of-poverty threshold (illustrative values); *3.* Income quintile ratio; *4.* Persistent at-risk-of-poverty rate; *5.* Relative median poverty risk gap; *6.* Regional cohesion; *7.* Long-term unemployment rate; *8.* Population living in jobless households: children; *9.* Population living in jobless households: prime-age adults; *10.* Early school leavers not in education or training; *11.* Low reading literacy performance of pupils; *12.* Life expectancy; *13.* Self-defined health status by income level; *14.* Dispersion around the at-risk-of-poverty threshold; *15.* At-risk-of-poverty rate anchored at a moment in time; *16.* At-risk-of-poverty rate before social cash transfers; *17.* Gini coefficient; *18.* Persistent at-risk-of-poverty rate (50% of median income); *19.* Working poor (in-work poverty risk); *20.* Long-term unemployment share; *21.* Very long-term unemployment rate *22.* Persons with low educational attainment;	1. health, 2. nutritional habits, 3. residence, 4. living conditions during childhood and family relations, 5. education, 6. degree of employment and work conditions, 7. economic resources, 8. political resources, 9. leisure

Galtung 1994: HR in Another Key (1994)	Whelan, C.T., Nolan, B. and Maitre, B. (2012) Multidimensional Poverty Measurement in Europe: An Application of the Adjusted Headcount Approach	Whelan, C.T. (2007) Understanding the Implications of Choice of Deprivation Index for Measuring Consistent Poverty in Ireland	Whelan, C.T. and Maître, B. (2008) The 'Europeanisation' of Reference Groups: A Reconsideration Using EU-SILC
1. Survival needs: *to avoid violence* individual & collective 2. Well-being needs: *to avoid misery:* nutrition, water, air, movement, excretion, sleep, sex, protection against climate, against diseases, against	Basic Deprivation: comprising items relating to enforced absence of a *1.* meal, *2.* clothes, *3.* a leisure activity, *4.* a holiday, *5.* a meal with meat or a vegetarian alternative, *6.* adequate home heating,	Basic Deprivation: *1.* Two pairs of strong shoes *2.* A warm waterproof overcoat *3.* Buy new rather than second hand clothes *4.* Eat meals with meat, chicken or fish (or vegetarian equivalent) every second day	Household Income: the total annual disposable household income; Material Deprivation: *1.* Cannot afford meal with meat, chicken, fish (or vegetarian) every second day; *2.* Inability to keep home adequately warm;

heavy degrading boring work, self-expression, dialogue, education 3. Identity needs: *to avoid alienation*: creativity, praxis, work, self-actuation, realising potentials, well-being, happiness, joy, being active subject, not passive client/object, challenge and new experiences, affection, love, sex; friends, offspring, spouse, roots, belongingness, networks, support, esteem, understanding social forces, social transparency, partnership with nature, a sense of purpose, of meaning , closeness to the transcendental, transpersonal education 4. Freedom needs: *choice :* in receiving/ expressing information & opinion, of people/places to visit and be visited, in consciousness formation, in mobilization, confrontation, occupation, job, spouse, goods/services, way of life	*7.* shoes; Consumption Deprivation: Comprising three items relating a *1.* PC, *2.* car *3.* internet connection; Health: comprising three items relating to *1.* The health of the HRP, namely current reported self-assessed health status, *2.* Restrictions on current activity *3.* The presence of a chronic illness; Neighbourhood Environment: comprising five items comprising *1.* reported levels of litter, *2.* damaged public amenities, *3.* pollution, *4.* crime/violence/vandalism *5.* noise in the neighbourhood	*5.* Have a roast joint (or its equivalent) one a week *6.* Go without heating during the past twelve months *7.* Keeping the home adequately warm *8.* Replace any worn out furniture *9.* Buy presents for family or friends once a year *10.*Have family or friends for a drink or meal once a month *11.*Have a morning, afternoon or evening out in the past fortnight for entertainment	*3.* Cannot afford to have a car; *4.* Cannot afford a telephone; *5.* Cannot afford a PC; *6.* Cannot afford a colour TV; *7.* Cannot afford a washing machine; *8.* Cannot afford a week of holiday away from home; *9.* Cannot afford to pay unexpected required expenses; *10.* Experiencing arrears on rent, mortgage, utility bills or hire purchase payments; Economic stress: Qualitative answers to the question "Thinking now of your household's total income, from all sources and from all household members, would you say that your household is able to make ends meet""

Bossert, W., Chakravarty, S.R. and D'Ambrosio, C. (2009) Multidimensional Poverty and Material Deprivation, CIREQ (Material deprivation)	Coromaldi, M. and Zoli, M. (2012) Deriving Multidimensional Poverty Indicators: Methodological Issues and an Empirical Analysis for Italy
1. The dwelling has a leaking roof, damp walls/doors/foundations, or rot in doors, window frames or door. *2.* The household lacks the ability to keep the home adequately warm *3.* The dwelling does not have a proper room with a bath or shower *4.* The dwelling does not have an indoor using toilet for the sole use of household *5.* The household has been in arrears at any time in the last 12 months on mortgage or rent payments *6.* The household has been in arrears at any time in the last 12 months on utility bills *7.* The household has been in arrears at any time in the last 12 months on hire purchase instalments or other loan payments *8.* The household cannot afford to pay for a one-week annual holiday away from home *9.* The household cannot afford a meal with	Maintenance capacity: *1.* Arrears on utility bills *2.* Holiday *3.* Capacity to afford a meal (with meat…) *4.* Capacity to face unexpected expenses *5.* Ability to make ends meet *6.* Ability to keep home adequately warm *7.* Financial burden of the total housing cost *8.* Ability to purchase food *9.* Ability to purchase clothes *10.* Capacity to spend money for health *11.* Capacity to spend money for education *12.* Capacity to spend money for transport *13.* Capacity to spend money for paying taxes *14.* Capacity to spend money for medical treatment *15.* Capacity to spend money for dental examination; Consumption deprivation: *16.* Possession of Mobile *17.* Possession of Telephone *18.* Possession of Computer *19.* Possession of Car *20.* Possession of Dishwasher

meat, chicken, (or vegetarian equivalent) every second day *10*. The household lacks the capacity to face unexpected required expenses *11*. The household cannot afford a telephone (including mobile phone) *12*.The household cannot afford a colour TV *13*.The household cannot afford a computer *14*.The household cannot afford a washing machine *15*.The household cannot afford to have a car *16*.The dwelling has noise from neighbours or noise from the street *17*.The household lives in an area with pollution, grime or other environmental problems caused by traffic or industry The household lives in an area with crime, violence or vandalism.	*21*. Possession of VHS *22*. Possession of Camera *23*. Possession of Aerial *24*. Access to Internet; Health Status: *1*. General health *2*. Suffer from chronic illness *3*. Limitation in activities because of health problems *4*. Incapacity to look for a job because of personal illness; Housing facilities: *1*. Possession of TV *2*. Possession of washing machine *3*. Possession of fridge *4*. Problems with dwelling (darkness) *5*. Bath or shower in dwelling *6*. Indoor toilet *7*. Hot water in dwelling; Other housing related problems: *1*. Problems of noise *2*. Problems of pollution *3*. Problems of crime *4*. Problems of leaking roof *5*. Problems with dwelling (dampness) *6*. House density *7*. Financial burden of mortgage *8*. Arrear on mortgage Financial burden of rent

Fusco, A., Guio, A. and Marlier, E. (2011) Income poverty and material deprivation in European countries, CEPS	Guio, A., Fusco, A. and Marlier, E. (2009) A EU Approach to Material Deprivation using EU-SILC and Eurobarometer data, IRISS Working Paper Series	Guio, A. and Maquet, I.S. (2006) "Material deprivation and poor housing" What can be learned from the EU-SILC 2004 data? How can EU-SILC be improved in this matter?	Adamson, Peter, (2012), 'Measuring Child Poverty: New league tables of child poverty in the world's rich countries', UNICEF Innocenti Research Center, Report Card 10

Income poverty: 1. at-risk-of-poverty; 2. the median at-risk-of-poverty gap; Material deprivation: 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.	Material deprivation: 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.	Economic strain: Could not afford – 1. One week annual holiday away from home 2. Arrears (mortgage or rent, utility bills or hire purchase instalments) 3. A meal with meat, chicken or fish every second day 4. To keep home adequately warm 5. Capacity to face unexpected expenses; Durables: Enforced lack of 1. Colour TV 2. Telephone 3. Personal car 4. Washing machine; Housing: 1. Leaking roof, damp walls/floors/foundations, or rot in window 2. Frames or floor 3. Accommodation too dark 4. Bath or shower in dwelling 5. Indoor flushing toilet for sole use of the household	1. Three meals a day 2. At least one meal a day with meat, chicken or fish (or a vegie equivalent) 3. Fresh fruit and vegetables every day, 4. Books suitable for the child's age and knowledge level (not including schoolbooks) 5. Outdoor leisure equipment (bicycle, roller-skates, etc.) 6. Regular leisure activities (swimming, playing an instrument, participating in youth organizations etc.) 7. Indoor games (at least one per child, including educational baby toys, building blocks, board games, computer games etc.) 8. Money to participate in school trips and events 9. A quiet place with enough room and light to do homework 10. An Internet connection 11. Some new clothes (i.e. not all second-hand) 12. Two pairs of properly fitting shoes(including at least one pair of all-weather shoes) 13. The opportunity, from time to time, to invite friends home to play and eat 14. The opportunity to celebrate special occasions such as birthdays, name days, religious events, etc.

Whelan, C.T. and Maître, B. (2008) Measuring Material Deprivation in the Enlarged European Union	Gabos, A., Ozdemir, E., Ward, T. (2011) Material Deprivation among Children	Jana, S., Nad'a, B., Jana, T. (2012) Material Deprivation in Selected EU Countries According to EU-SILC Income Statistics
Consumption deprivation: *1.* Afford to pay unexpected required expenses; *2.* Weeks holiday away from home; *3.* Meals with meat, chicken, fish (or vegetarian); *4.* Can afford a PC?; *5.* Arrears relating to mortgage payments, rent, utility bills, hire purchase; *6.* Inability to keep home adequately warm; *7.* Respondent for household can afford to have a car; Household facilities: *8.* Bath or shower in dwelling; *9.* Indoor toilet; *10.* Can afford a telephone?; *11.* Can afford a colour TV? *12.* Can afford a washing machine?; Neighbourhood environment: *13.* Pollution, grime or other environmental problems in the area caused by traffic or industry; *14.* Noise from neighbours or noise from the street; *15.* Crime, violence or vandalism in the area; Others: *16.* Rooms too dark, light problems; *17.* Leaking roof, damp walls/ceilings/floors/foundations, rot in doors, window frames	Basic Needs: *1.* Some new clothes; *2.* Two pairs of shoes; *3.* Fresh fruit daily; *4.* Three meals a day; *5.* One meal with meat; Education and leisure needs: *1.* Books; *2.* Outdoor leisure equipment *3.* Indoor games; *4.* Celebration on Special occasions; *5.* Invite friends; *6.* Participate in school trips; *7.* Place to study; *8.* Outdoor space to play;	*1.* Household ability to pay rent, mortgage, loans and utility bills, *2.* ability to keep the home adequately warm, *3.* the ability to face unexpected expenses, *4.* to eat meat or proteins regularly, *5.* to go on holiday once a year, *6.* whether the household has a TV, a refrigerator, a car and a telephone