Lost (in) Dimensions

Consolidating progress in multidimensional poverty research

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LOST (IN) DIMENSIONS:
CONSOLIDATING PROGRESS IN MULTIDIMENSIONAL POVERTY RESEARCH

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Abstract. Identifying, locating and profiling the poor and deprived individuals in a society are the most basic imperatives for good social policy design. Understanding why people are – and remain – poor is the next analytical step. Multidimensional poverty and deprivation estimates are important new tools in this undertaking. This paper reviews the insights of various contributions from research into multidimensional poverty and deprivation and combines them into an internally consistent framework. The framework adds an important element by emphasising that people may experience various types and forms of poverty and deprivation simultaneously. The experience of poverty is often multifaceted and deprivations are interrelated in many cases. This highlights the necessity to clearly separate the different concepts of poverty and to study their overlap. The proposed framework aims at creating more conceptual clarity and overcoming the challenges that have arisen from some earlier efforts; the main challenge is to avoid "getting lost in (a multitude of) dimensions" when carrying out a series of single-dimensional analyses, and avoiding the "loss of dimensions" when reducing multiple dimensions into a multidimensional poverty index. The paper also makes a distinction between household poverty and child poverty, recognising that children may experience poverty differently to adults and that people's needs differ depending on their age. By articulating key decisions which are made throughout the multidimensional poverty analysis this paper intends to create a more informed understanding of multidimensional poverty analysis for children.

Keywords: child poverty; child well-being; multidimensional poverty; poverty overlaps.

JEL classification: I31, I32, J13

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1. INTRODUCTION

Identifying, locating and profiling the poor and deprived individuals in a society are the most basic imperatives for good social policy design. Understanding why people are – and remain – poor and why these unfortunate conditions and choices are passed on to subsequent generations is the next logical analytical step. Multidimensional poverty and deprivation estimates are important new tools in this undertaking. More than a decade of research using these tools has brought significant progress and analysis has become much richer. This paper reviews the insights of various contributions from research into multidimensional poverty and deprivation and combines them into an internally consistent framework. The framework adds an important element by emphasising that people may experience various types and forms of poverty and deprivation simultaneously. The experience of poverty is often multifaceted and deprivations are interrelated in many cases. This highlights the necessity to clearly separate the different concepts of poverty and to study their overlap. The paper also makes a distinction between household poverty and child poverty, recognising that children may experience poverty differently to adults and that people's needs differ depending on their age.

The framework that is proposed in the paper aims at creating more conceptual clarity and overcoming the challenges that have arisen from some earlier efforts; the main challenge is to avoid "getting lost in (a multitude of) dimensions" when carrying out a series of single-dimensional analyses, and avoiding the "loss of dimensions" when reducing multiple dimensions into a single figure creating multidimensional poverty indices.

This framework is the basis of MODA – Multiple Overlapping Deprivation Analysis – a method that has been developed by UNICEF to analyse child poverty and deprivation. The application of the MODA methodology focuses on children and is inspired by UNICEF's efforts to enrich the understanding of poverty and deprivations among the most vulnerable group in society. Its methodology and underlying tools can, however, also be adapted to analyse the situation of adults. MODA encompasses a large set of tools, starting with the analysis of single indicators and dimensions to give an initial insight into the situation of children regarding each of the dimensions that are important for their well-being. The analysis of separate sectors is complemented by the multidimensional deprivation analysis that studies the simultaneous experience of multiple deprivations by a single individual. The multidimensional analysis consists of dimensional deprivation counting and distribution analysis, deprivation overlap analysis and multidimensional indices and their decomposition. Whenever possible, MODA includes monetary poverty in its analysis; it emphasises both the conceptual differences between deprivation and monetary poverty and their joint distribution. The aim of combining these different elements into one single analysis framework is to enhance our understanding of the situation of children within each dimension that is important for their well-being, as well as to measure the experience of children's multiple deprivations by analysing the incidence and depth of deprivation suffered by children. In other words, the MODA methodology is designed to address the challenge of neither getting lost in a multitude of dimensions nor losing multidimensionality. Moreover, not only does the analysis focus on 'what' children are deprived of, but also on 'who' the deprived children are and 'where' they live by describing children's individual and household characteristics. Additionally, it serves as

the first step towards answering the 'why' questions, such as why people are and remain poor and why poverty is reproduced, among others.[1]

In multidimensional analyses, the concepts of 'poverty' and 'deprivation' are often used interchangeably. While traditionally poverty is firmly linked to some form of monetary measurement, multidimensional poverty analyses often incorporate simultaneously monetary and (non-) material deprivation measures, composing aggregate indices. However, the concepts refer to different forms of poverty while occurring to the same individuals. As argued below, incorporating these different concepts into a single measure and applying this to the entire population denies researchers the possibility of analysing the complex relationships between monetary poverty and other forms of (non-monetary) deprivations. Furthermore, composite indices are mostly based on household level data. This, however, is problematic when analysing the well-being of children or other specific groups, as the needs of people differ depending on their age and as the intra-household resource distribution is not always equal.

The confusion in differentiating monetary poverty from material deprivation finds its origin in the fact that both are seen as reflecting a state of "lack of well-being". As agreed by the states represented at the UN World Summit for Social Development in Copenhagen, *"Absolute poverty is a condition characterised by severe deprivation of basic human needs, including food, safe drinking water, sanitation facilities, health, shelter, education and information; it depends not only on income but also on access to social services"* (United Nations, 1995, Chapter II, 19). Conceptual clarity requires distinguishing the elements that compose "poverty" (such as the lack of well-being) and separating them empirically with as few compromises as possible. We distinguish between three main concepts: monetary poverty measuring the lack of financial means; deprivation measuring the non-fulfilment of material and non-material personal needs; and subjective poverty measuring self-assessed experiences of lacking monetary means and (non-) material assets.

This paper is structured as follows: the next section introduces the concept of monetary poverty as a multidimensional concept, followed by a section discussing the measurement of multidimensional deprivation. After the general introduction of the two concepts, Section 4 discusses these poverty measures within the framework of MODA and Sections 5 and 6 give elaborate detailed description of the main elements of the MODA methodology and the description of the possible type of results stemming from such analyses. The paper then addresses the integration of monetary child poverty and multidimensional deprivation analysis, and offers concluding remarks on analysing child poverty and deprivation.

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[1] This paper is complemented by two other papers providing an overview of the methodology and the types of results yielded by the MODA framework and discussing some of the conceptual and technical issues in more detail: *Step-by-step guidelines to MODA* (de Neubourg et al 2012c); and Child Poverty and Deprivation: a Multidimensional Overlapping Deprivation Approach (MODA) (de Neubourg, de Milliano, Plavgo*, forthcoming)*. The various applications of MODA can be found on www.unicef-irc.org/MODA.

2. MONETARY POVERTY AS A MULTIDIMENSIONAL CONCEPT

As argued by Ravallion (2012) monetary poverty should be interpreted and used as a multidimensional concept. That is also clear from the early definition of Rowntree (1901) who defined poverty as not having the financial resources '*necessary to support a person at the subsistence level of food, shelter, clothing and other necessities*'. The distinction between poor and non-poor, in turn, is based on: (1) a definition of the "dimensions" (e.g. nutrition, clothes, shelter and other necessities) relevant to "subsistence"; and (2) the resources (measured in a money-metric form) needed to pay for the minimum quantity of each of the dimensions. Those not having enough money to afford these "dimensions" at subsistence level are poor; the others are not.

Following this standard view, monetary poverty is no more than a special case of multidimensional poverty wherein the weights of each of the dimensions are based on the prices of the relevant goods times the quantities needed at subsistence level. Aggregation over the dimensions is done by accumulating the monetary units of all the selected dimensions. The threshold used to distinguish between poor and non-poor (the poverty line) in a so-called absolute poverty measurement can be set using international standards (i.e. $2 a day, or $1.25 PPP) or is based on the estimated budget needed to pay for a basic basket of goods and services within a given national context (i.e. the Orshansky method used in the USA; see e.g. Orshansky, 1965; Ravallion et al., 1991; Ravallion et al., 2009). In relative monetary poverty measurement the threshold is set by assuming that a certain minimum percentage of the median income (e.g., 50% or 60%) is necessary to cover consumption at subsistence level (as used by the European Union; see e.g. European Commission, 1994).

If quantities and prices are set properly, monetary poverty measurement does not have aggregation and weighting problems, both central themes in the debate on multidimensional poverty. Strictly speaking, weighting is relevant only for the definition of the basket of goods and services used to set the poverty line. The aggregation of the minimum basket of goods is done by accumulating the monetary value of each of the items within the selected basket of goods. The aggregation of a household's resources is done either by accumulating the household members' income from all (or most) sources, or by accumulating the monetary value (price) of each of the items/services bought or consumed by the household. Whether the poor or non-poor actually use their financial resources to buy the subsistence goods or services is irrelevant; they are sovereign consumers and the non-poor are assumed to have enough resources to pay for the minimum basket of goods and services believed to be needed for their survival.

The strength of the monetary poverty approach is based on its elegance, its intuitive simplicity of aggregating equal units and its links with an established economic theory. Its elegance and simplicity, however, become less intuitive outside the realm of developed economies and its underlying economic theory comes with a set of assumptions that are more or less problematic depending on the economy and the population analysed.

Using monetary poverty requires making decisions about the way to measure the resources of a household and express them in monetary units. This is more straightforward in highly monetarised- and developed economies than in low-income countries where many trades and transfers may be in kind and where relatively more resources come from home-production. Even

within the group of highly developed economies it is not always clear how to deal with differences in the definition of public and private goods and services (and thus their prices and the resources needed to pay for them on the level of an individual household). This applies to goods and services such as water, sanitation, health and education. In some countries these goods are (partially) provided by the state blurring the concept of the "market price" implicitly used in setting the monetary poverty line. It makes a big difference whether water, sanitation, health and education have to be paid by households "at competitive market prices" or at prevailing prices that may or may not be reduced by public subsidies. The application of Rowntree's definition may be relatively straightforward for "food, shelter and clothing" but much more difficult for "other necessities" such as water, sanitation, health and education for which markets may be missing or incomplete (see also Thorbecke, 2008; Bourguignon and Chakravarty, 2003; Tsui, 2002).

Using monetary poverty also requires making decisions on the subsistence needs of households with differing compositions. Equivalence scales are widely – but not always – used and often disputed. There is in fact a wide range of equivalence scales (Atkinson et al. 1995; Nolan and Whelan, 1996), each of which are based on technical assumptions about economies of scale and on value judgments concerning the needs of households depending on their composition and the age of the individuals. It is important to note that the identification of poor individuals and the composition of the poor population are directly affected by these value judgments when setting an equivalence scale. De Vos and Zaidi (1997) examining the sensitivity of (relative) poverty statistics in Europe regarding the choice of the equivalence scale, conclude that the composition of the poor population shows considerable changes when different equivalence scales are used, especially among specific household groups, such as households with children. Also note that absolute poverty measures often either do not use equivalence scales at all (i.e. the 1.25 $ a day poverty line) or use implicit equivalence scales by calculating levels of subsistence needs for different types of households (i.e. the Orshansky poverty line used in the USA). In both cases the poverty counts are sensitive for the solutions chosen (Notten and de Neubourg, 2011).

The problems referred to above are especially relevant when measuring child poverty due to children's special position in households: poverty among children is more sensitive to technical decisions concerning equivalence scales and children are more likely to need more goods and services that are subject to missing and incomplete markets, especially in low- and middle-income countries. However, there are two additional problems. First, the financial resources available to children depend on the intra-household distribution of wealth; it may well be that some children in non-poor households are actually poor because they do not receive their fair share of the household resources due to, for instance, discrimination (against girls, against younger children, against children born in other marriages, etc.) (Hulme and McKay, 2008). Secondly, contrary to the assumptions implicitly underlying monetary poverty counts, children are not sovereign consumers who can decide to spend their resources to cover their needs at subsistence level; consumption decisions are (most commonly) not made by children (White et al, 2003). This implies that even in households (just) above the poverty line children may actually be poor because the consumption decisions are not reflecting their specific needs (see also Gordon et al 2003; Minujín et al 2006; Minujín and Nandy 2012; White et al 2003; Waddington 2004, for similar arguments concerning children and monetary poverty).

To take these elements into consideration, approaches complementary to monetary poverty are needed. While monetary poverty gives a good picture of 'the financial resources needed to support household members at a subsistence level of …', it is incomplete when measuring whether all household members have access to the necessary goods and services. As argued above, having enough financial resources does not always mean that this access is guaranteed. This can be due to lack of services or infrastructure, lack of information, administrative restrictions, discrimination and other reasons. At the same time, it may well be that the access to certain goods and services is guaranteed without the need of the financial resources at the household level because, for instance, the goods or services are available for free or almost free (e.g., partially subsidised). Truly free basic health care services for example will require no or few financial means to guarantee access to this necessity; truly free education will require no or few household expenditures to ensure that children go to school.

3. MULTIDIMENSIONAL DEPRIVATION

So-called multidimensional poverty studies originate from the wish to observe and measure to what extent people (children) actually have "food, clothes, shelter" and access to goods and services to cover "other necessities" and thus are living at least "at subsistence level". Like monetary poverty, deprivation is necessarily a multidimensional concept and, similarly to monetary poverty studies, multidimensional deprivation analyses need to address problems of selecting the "needs" that have to be fulfilled, of defining a minimum level of satisfaction of these needs and of aggregation and weighting. In this section, the definition of child poverty is discussed, followed by a discussion on the choice of indicators, dimensions, as well as the process of aggregation, weighting, and the identification of the deprived.

Basic and other needs

Over the last three decades, various multidimensional deprivation (poverty) concepts have been introduced. Following Sen's seminal work on the capability approach (Sen 1976; 1979; Nussbaum, 2003), the field of multidimensional deprivation measurement has seen a wide expansion, including the basic needs approaches (Streeten, 1984; Streeten et al, 1981) and methods for measuring social exclusion (Marlier et al, 2007). Recent child poverty studies have also focused on multidimensional aspects of poverty and deprivation (Gordon et al., 2003; Bradshaw et al., 2006, and others – see below).

During the last few decades the basic human needs approach, the rights-based approach and the capabilities approach have been used to define deprivation poverty. Sen, Townsend, Alkire, Foster, Gordon, Bradshaw and many others have argued that there are essential goods, services and freedoms people need to lead their lives and that money-metric poverty indicators capture the coverage of these needs only partially (for detailed references see below). Peter Townsend was the first to use deprivation indicators to measure poverty (Townsend, 1979). His method was further developed in the Breadline Britain studies (Gordon and Pantazis, 1997). Since then, many multidimensional deprivation studies have been carried out in many different regions and countries, based on various definitions and methodologies. While theory plays a role, in many cases data availability and common wisdom drive the choices of the indicators and their precise definition.

Similar to monetary poverty, multidimensional deprivation can be measured by absolute or relative methodologies. The most commonly used framework for defining deprivation is the basic human rights approach. It is an absolute methodology using internationally accepted declarations and conventions, such as the United Nation's universal human rights declaration (United Nations, 1948), the Convention on the Rights of the Child (United Nations, 1989), and the Millennium Development Goals Declaration (United Nations, 2000; UNDP, 2003) for defining benchmarks.

The definition of child poverty agreed by the UN General Assembly was used by Gordon, Townsend and their colleagues from the University of Bristol for their study on child poverty in the developing world (Gordon et al., 2003). It gives full weight to material deprivation as the main element of child poverty: '...*Children living in poverty are deprived of nutrition, water and sanitation facilities, access to basic health-care services, shelter, education, participation and protection, and that while a severe lack of goods and services hurts every human being, it is most threatening and harmful to children, leaving them unable to enjoy their rights, to reach their full potential and to participate as full members of the society'* (United Nations, 2007; Gordon et al, 2010). Multidimensional child poverty analyses in the developed countries have also been using the rights-based approach. Bradshaw, Hoelscher and Richardson (2006) give voice to the understanding among UN-agencies and human rights advocates that the rights set out in the Convention on the Rights of the Child (CRC) are universal and applicable to children in high-income as well as low- and middle-income countries. The authors use the CRC to frame child well-being, taking into account children's health and nutrition, as well as their spiritual, moral and social development. The rights-based approach is also used for the study *Comparing Child Well-being in OECD Countries*, carried out in the context of the UNICEF Innocenti Report Cards 7 and 10 on Child Well-being in Rich Countries (Bradshaw et al., 2006; Martorano et al, 2013a, 2013b; UNICEF, 2007b, 2013), as well as for the EU and the CEE/CIS country studies (Bradshaw et al, 2007, 2008).

Townsend conceptualised deprivation as relative, defining it as a "state of observable and demonstrable disadvantage relative to the local community or the wider society or nation to which an individual, family or group belongs" (Townsend, 1987, pp. 125). Many studies have used relative deprivation by defining deprivation based on the overall distribution of the indicators selected (e.g. Barnes and Wright 2012; Bradshaw et al 2006, 2007; Notten and Roelen 2011; Želinský 2010). Mack and Lansley (1985) combined relative deprivation with an aspect of subjectivity, and developed the concept of socially perceived necessities by choosing indicators as deprivation indicators if more than a half of the population thought these items were necessities that should not be lacking to people in Britain. Similarly, Barnes and Wright (2012) define child poverty as the lack of items essential for children to have an acceptable standard of living. The list of items defined as essential is selected by a representative sample of the population. The perceived necessity approach is a multidimensional approach that focuses on living standards and not on resources.

Conditions of child well-being can also be understood in terms of 'capabilities' as the opportunities of choices a child has for his/her development. The capability approach is based on the conceptual writings of Amartya Sen (e.g. 1979; 1999; 2004), used by Alkire (2007), Alkire and Foster (2011a; 2011b), and Alkire and Santos (2010), amongst others. This concept is consistent with a basic needs as well as with a relative deprivation and social exclusion perspective. Sen's capability approach is based on opportunities, defining poverty as a deprivation of capabilities or a lack of multiple

freedoms that people value. Sen argues that deprivation should be seen as an absolute deprivation or dispossession (such as starvation and visible hardship), supplemented by a relative deprivation, since deprivation also has to be judged in comparison with the experience of others in the society (Sen, 1979, p. 289). According to Sen (1979), the relative deprivation approach should not be used alone, since this may lead to regarding poverty as an issue of inequality.

Needs, indicators, and dimensions

Regarding the study of deprivation the "lack" of items such as basic goods and services is no longer expressed in terms of the financial resources needed to buy the items; indicators expressing the state of availability of, or access to, the attributes have to be defined. There is surprisingly little debate on what indicators are suitable.[2] This has to be attributed to the fact the empirical applications of multidimensional deprivation concepts are necessarily data-constrained; in most cases researchers only have a small number of options and common wisdom leads the analysts in their choice of the indicators used. Existing multidimensional deprivation and poverty studies very often use data that were not collected to measure (child) overlapping deprivations systematically; the survey-variables that allow measurement of deprivation in existing datasets are almost always by-products of surveys that are usually organised with other objectives, such as monetary poverty or MDG measurement by indicator. The data used are thus not very suitable for measurement of the simultaneous experience of deprivation of each child. Given the growing importance of multidimensional studies, this paper calls for investment in surveys that collect information on potential deprivations (of children) systematically paying attention to the range and the scope of indicators and elaborating an underlying theoretical framework of how to measure, whether, to what extent, and under what conditions children (persons) have access to the things they need. Dedicated deprivation surveys would allow more precise measurement (based on more options and better statistical transformations).[3] Alternatively, the relevant questions that are currently missing could be added to the existing surveys, preferably those that have a consumption or income module so that the outcome variables could be analysed together with the household's financial situation.

Indicators of deprivation can be used separately as a series of single deprivation analyses (dashboard approach to multidimensional poverty – see below); they are, however, often also used in combinations of dimensions and/or in an overall deprivation index (or indices). In order to make that possible, decisions have to be made regarding aggregation and weighting. Monetary poverty analyses solve these issues implicitly by using market prices and quantities needed at subsistence level; deprivation analyses have to deal with the problems explicitly; in all cases nearly all solutions are disputed.

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[2] The issue of selecting indicators is, however, not trivial and the available options have to be considered carefully. The choice for or against an indicator may change the incidence and the nature of the observed deprivation. It matters for example whether access to education is measured by formal enrolment, by actual attendance or by school attainment (or by a combination). Also, indicators are selected because they reflect the potential incidence of a deprivation. In that context, input-indicators are less suited: how far a child lives from school may be used as a proxy for access to education; however, it says nothing about whether the child is attending school and learning effectively; even children living far from school may be attending and learning depending on the conditions of (public) transport and the quality of the school. It is equally not trivial because the choice of the deprivation indicators determines what types of analyses on determinants of deprivation are possible in the later stages of the research.

[3] The selection of indicators does not automatically lead to identifying the deprived. Some indicators may be binary variables (e.g., at school or not), so the distinction between the deprived and the non-deprived is obvious; other variables, however, are continuous, cardinal or ordinal: in these cases a decision on a cut-off point between those deprived and those non-deprived is needed.

Aggregation, weighting, and identifying the deprived

While in monetary poverty measurement the aggregation of the different components has been simplified by giving each product and service in the analysis a certain price (assuming that the price is set correctly), in a multidimensional poverty approach decisions on setting a value for each indicator and dimension and aggregating them into an overall deprivation measure is less straightforward. There is an ongoing debate on how to aggregate the various components of deprivation into an overall deprivation measure that identifies the (multiply) deprived. In answering this question many authors have scrutinised various methods of combining multidimensional poverty measures into an aggregate using axiomatic approaches (Tsui, 1999, 2002; Atkinson, 2003; Bourguignon and Chakravarty, 2003).

The topic of which value or weight each component in the analysis should receive is relevant when combining indicators and/or dimensions. In essence, weighting is the assignment of a value or relative importance to each of the components of the deprivation measurement, which are the indicators and/or the dimensions used to measure deprivation. The decision to weight variables within the analysis can be made to either emphasise certain indicators or dimensions, or to value dimensions with different numbers of indicators similarly. It can also be decided not to assign any weights, which implicitly means that equal weights are assigned to each of the components. 'The aggregate deprivation per person' will be either a 'score' when some form of weighting is applied or a 'count' if the selected deprivations are left with equal values.

Decanq and Lugo (2008) have analysed various methods of setting weights in multidimensional indices to determine the main features and trade-offs of each method. In their article they discuss the use of equal weights, data driven weights (e.g. frequency based, most favourable, statistical and regression based weights), and normative-based weights.[4] They conclude that equal weights are by no means neutral, and should be considered as any other weighting scheme with the accompanied trade-offs as a result.[5] They also show that data driven weights are often not straightforward in their interpretation and therefore lack transparency. In addition, statistical methods, such as multivariate approaches can lead to normatively inappropriate results. The statistically derived weights can appear counterintuitive to people as they are based on algorithms that only consider the frequency and/or distribution of data rather than their normative meaning. Finally, normative weighting incorporates the value judgment (of a subsample) of the society on each dimension into the creation of the weights. This method requires participatory approaches in the derivation of the weights, which are difficult to organise. Besides, according to this approach the weights will represent a subjective perspective to poverty, deprivation and well-being. In the

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[4] A number of additional techniques exist such as for instance price or expenditure-based weighting, where the weights are established based on the good or service's market value or government expenditure (Smeeding et al., 1993). However, as mentioned before on the discussion of the concepts of (child) well-being, this method is not used often, since it is not possible and/or suitable to attach a price to many of the aspects of well-being.

[5] Despite possible trade-offs, most researchers studying multidimensional deprivation give equal weights to each dimension, while indicators are sometimes weighted differently. Alkire and Santos (2010) assign an equal weight to each dimension (33.3% for each of the three dimensions) since, according to the authors, there are no compelling reasons to consider one dimension to be more important than another. The authors, however, use a different number of indicators in each dimension, which results in having different weights for the indicators, varying from 5.6% for indicators in the 'living standards' dimension to 16.7% for the health and education indicators. In the aforementioned analysis of four European countries by Roelen and Notten (2011) the authors use equal indicator weights. In this case the weight is 1/13 for each indicator since there are 13 indicators in total.

context of child poverty and deprivation measurement, a more objective prioritisation of dimensions may be deemed necessary. In a recent paper Paruolo et al. (2013) convincingly argued that weights used in composite indices cannot automatically be seen as reflecting relative importance of the components in the composite index. "*Because socio-economic variables are heteroskedastic and correlated, relative nominal weights are hardly ever found to match relative main effects*" as observed empirically when estimating Karl Pearson's 'correlation ratio' (Paruolo et al., 2013, p. 609). Their arguments add to the caveats when using composite indices and support MODA's choices to emphasise joint distributions in observed deprivations and poverty rather than aggregate indices (see below).[6]

Similarly to a poverty line or poverty threshold which separates the poor from the non-poor after having ranked households on a wealth-vector, the cut-off point in a deprivation analysis delineates the demarcation between those who are deprived and those who are not. This issue is not very controversial when it regards single indicators; it leads, however, to discussions when it is applied to constructed combinations of indicators such as dimensions and indices. The demarcation line between being considered deprived or not refers to a specified score or count on the deprivation scalar. As with weighting, the definition of cut-off points implies implicit or explicit value judgments. Regarding the *identification of the deprived* and setting a cut-off point, three options are available: the union, the intersection and the intermediate cut-off approach[7] (Atkinson, 2003; Bourguignon and Chakravarty, 2002, 2003; Duclos et al., 2003; 2006). Among the three methods, the union approach would identify the largest proportion of people as deprived capturing any person with at least one deprivation,[8] while the intersection approach would focus only on those who are deprived in all dimensions/indicators selected for the analysis. The use of the third method – the intermediate cut-off approach – prevents the dominance of one indicator or dimension, which can be the case with both the union and intersection approaches. This approach is also referred to as a dual cut-off method of identification since the deprivation headcount depends on the within-dimension cut-off and the across-dimension cut-off (Alkire and Foster, 2011a).[9] Regardless of the choice of the method, the decision on the cut-off point involves a certain degree of arbitrariness, which should be explained in the analysis.[10]

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[6] This is also one of the possible underlying reasons why inter-temporal comparisons of composite indices are troublesome and should not be undertaken without reporting the divergence (over time) between the nominal weights used to construct the index and the main effects as measured by Karl Pearson's "correlation ratio'.

[7] The union method of identification classifies a person as deprived if deprived in at least one indicator or dimension. The intersection approach is at the opposite side of spectrum, identifying people as deprived only if they are deprived in all specified dimensions or indicators. The intermediate method, as the name suggests, is a middle way, classifying one as deprived if the number of deprivations a person experiences is equal or above a pre-determined cut-off point.

[8] The union approach is, for instance, used by Gordon et al. (2003), where children are considered severely deprived if they are deprived in at least one out of seven dimensions. They use the union approach since they selected the variables as to measure any circumstance that is '*highly likely to have serious adverse consequences for the health, wellbeing and development of children*'.

[9] For example, Gordon and colleagues, apart from the union approach, also use the cut-off method to identify the absolute poor. They identify children as living in absolute poverty if they suffer from two or more severe deprivations of basic human need (Gordon et al., 2003). Alkire and Santos (2010) identify people as poor if they are deprived in any combination of the ten indicators of which the weighted sum exceeds 30%. The cut-off refers in this case not to a particular number of deprivations, but to an accumulation of weights. In Guio's study (2009) two cut-off points are used to describe material deprivation in the European Union in the combined economic strain and durables dimension, namely lacking two or more, or three or more items out of 9 items. Notten and Roelen (2011) calculate a Relative Cumulative Deprivation Headcount, setting the deprivation threshold relative to the median or average number of deprivations in the child population. In their study on France, Germany, the Netherlands and the UK, the average number of deprivations is two out of 13 deprivations.

[10] Alkire and Roche (2012), for example, recommend computing the results for several cut-offs and then assess the most suitable cut-off according to the robustness of the conclusions. J. M. Roche in his multidimensional child poverty study in Bangladesh, when deciding on the number of dimensions a child should be deprived in to be considered as poor, bases his choice of a cut-off point *k* on results and sensitivity analyses. According to the author, since the headcount ratio is close to 86% if the cut-off point *k*=1, while only 9% if the cut-off point *k*=4, '*the more suitable cut-off point seems to be somewhere between k=1 and k=3*' (Roche, 2009, p. 16).

4. CONCEPTS OF POVERTY WITHIN THE FRAMEWORK OF MODA

Monetary poverty, deprivation and other concepts of poverty[11] are currently being measured either in isolation or merged together as part of an overall index (indices), in order to identify the poor, the deprived, the socially excluded, and other groups of disadvantaged people, depending on the purpose of the analysis and the chosen definition of poverty. The studies that rely on more indicators than monetary poverty are usually referred to as 'multidimensional'. However, as pointed out by Ravallion the existing studies using multidimensional approaches are not all using a similar methodology and frequently lack conceptual clarity about what exactly the researchers are trying to measure (Ravallion, 2010).

In the context of this paper and of MODA, multidimensional deprivation analyses are regarded as complements to money-metric poverty analyses and not as (partial) substitutes. For conceptual and analytical reasons, a firm distinction between monetary poverty and deprivation poverty is very important (especially when children are the unit of analysis). There is a good logical reason why monetary poverty and multidimensional deprivation counts should not be mixed into aggregates. As argued in the second section of this paper monetary poverty is in itself a multidimensional concept that contains (hidden) information on goods and services needed at subsistence level. It would thus be conceptually flawed to combine the monetary equivalent of these deprivations with observations of their material appearance.

UNICEF's Multiple Overlapping Deprivation Analysis for children (MODA) intends to bring more conceptual clarity and argues against the practice of merging monetary poverty analyses and deprivation analyses into a single count, stressing that monetary poverty and deprivations should neither be analysed in isolation nor merged together into an overall index, as this would limit the possibility of looking at the extent and nature of the coincidence of monetary poverty and deprivation (see de Neubourg et al 2012c for details). In the MODA framework, poverty is initially analysed using monetary poverty and deprivation in strict separation. It clearly distinguishes the actual access to (basic or perceived as necessary) goods and services from the financial means that could buy them. Contrary to general practice,[12] MODA removes all (quasi) financial information from the definition of deprivation indicators for children by defining all children being deprived in a specific indicator regardless of whether this deprivation is 'enforced' by the lack of financial means or by something else (for details see: Chzhen and de Neubourg, 2014). Subsequently, the results of the monetary poverty and the deprivation analysis are combined by means of an overlap analysis of monetary poverty and (multidimensional) deprivation, and/or analyses scrutinising the relation between income/consumption and deprivation distributions. Looking at child poverty through a

A sensitivity analysis is used to test the robustness of cut-off points, showing that cut-offs k=1 and k=2 produce the same rankings, leading to a conclusion that the results are robust independently of the decision of cut-offs. In addition, Alkire and Roche emphasise that the choice of poverty cut-off depends on the purpose of the exercise. For example, *'if the measure is for targeting purposes, it might be decided to set a cut-off that corresponds to the proportion of beneficiaries that can be included in the programme'* (Alkire and Roche, 2012, p. 117).

[11] It is important to mention that subjective or self-assessed poverty and social exclusion could be discussed in this overview as well. However, their introduction would complicate the logic of this article and therefore these concepts have not been included in this discussion. It is neither an expression of the lack of interest in the subject, nor a denial of the relevance of the concepts. The omission of these concepts in this discussion is justified by the fact that few multidimensional poverty analyses use these concepts. A discussion on subjective (child) well-being can be found in Bradshaw et al. 2013.

[12] Research related to deprivation measurement in European countries commonly defines material deprivation as enforced lack of durables. This means that individuals/households missing a certain durable or good are deprived of this durable/good only if the reason for lacking it is that they cannot afford it. (See for example de Neubourg et al 2012a; Guio, 2009; Guio et al, 2009; Whelan and Maître, 2012; Nolan and Whelan, 2010; Fusco et al, 2011; and Fusco et al, 2013).

lens of overlapping concepts of poverty and deprivations shows to what extent monetary poverty and deprivation poverty coincide, without losing the particularities of each concept. It allows identifying the individual children on the basis of whether they suffer from monetary poverty, multidimensional deprivations, both, or none of them. This allows exploring the underlying distribution of consumption or income and the relationships between deprivation, multiple deprivation, and monetary poverty. The results and the related analyses may reveal the need for different policy responses depending on which form(s) of poverty different groups of people experience.

5. THE CONSOLIDATED VIEW OF THE MULTIPLE OVERLAPPING DEPRIVATION ANALYSIS (MODA)

For the MODA applications that are available, decisions regarding the issues discussed in the previous sections have been made: some of them are generic and belong to the heart of MODA; others are specific and relevant for the various applications that are available (CC-MODA,[13] N-MODA[14] and EU-MODA[15]) but can be adapted to country-specific datasets and realities and to researchers' preferences in the light of their research objectives.

The generic MODA decisions are:

- MODA is developed to study deprivation and poverty among children, and adopts a child-centred approach which considers the child as unit of analysis;[16]
- MODA adopts a life-cycle approach, capturing age-specific needs;
- MODA analyses both deprivation and monetary poverty, whenever the data allows;
- MODA analyses the full set of options for studying deprivation and poverty; each level brings in another aspect and together the levels are complements in obtaining a comprehensive picture of child poverty and deprivation. MODA consolidates the single dimension analyses (the so-called dashboard approach), analyses of the overlap between dimensions and between monetary poverty and deprivation, and analyses based on multidimensional poverty indices and their decomposition;
- MODA makes an effort to profile the groups of children in each category of deprivation and poverty; group profiles lead to formulating hypotheses and further analytical analyses.

The specific decisions made under the current applications of MODA (CC-MODA, EU-MODA and N-MODA) regard:[17]

- the definition(s) of monetary poverty;
- the definitions of deprivation and its empirical use within indicators and dimensions;

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[13] CC-MODA (Cross-Country MODA) is a special application of the MODA methodology, designed to carry out a comparative study of child deprivation in middle and low-income countries. Standardised datasets (the latest waves of the Demographic and Health Surveys (DHS) and Multiple Indicator Cluster Survey (MICS)), age-groups, dimensions, indicators, and thresholds are used to ensure cross-country comparability. Due to data limitations, only one concept of poverty – deprivation – is analysed (see de Neubourg et al, 2012b).
[14] N-MODA (National MODA) is a country-specific application of the MODA methodology, adopting country-specific definitions of age groups, dimensions, indicators, thresholds, and profiling variables. Datasets are selected on the basis of their relevance to child well-being, applicability to the country context to capture national values and norms, the objectives of the study, and data quality. N-MODA can include several concepts of poverty, such as deprivation, monetary poverty, and subjective poverty, provided that the data used allows for the identification of each individual's (or household's) status in each of the different measures of poverty.
[15] EU-MODA is a special application of the MODA methodology, designed to carry out a comparative study of child poverty and deprivation in 27 EU member states plus Iceland and Norway, using the EU-SILC data (see Chzhen and de Neubourg, 2014).
[16] An adaptation for adults and/or households is also possible.
[17] The *Step-by-step Guidelines to MODA* paper (de Neubourg et al 2012c) highlights each of the decision points for the deprivation analysis in more detail.

- the aggregation methods;
- the weighting of indicators and dimensions;
- the definition of cut-off points;
- technical decisions regarding the treatment of missing values and sensitivity analyses.

The rest of this section briefly discusses each of the decisions.

MODA is child-centred; the individual child is the unit of analysis

Most of the existing poverty studies, whether in monetary or multidimensional terms, have been concentrated on the household environment rather than on the individual. Even if the unit of analysis has been chosen to be at the individual-level, well-being vectors often still refer to the average of the household, e.g. per capita income, household access to services, or the main source of water in the household. Although good predictors of poverty, such studies may blindfold the analysis for possible intra-household differences and do not distinguish between the different needs of household members depending on the life stage they have reached.

In order to take these issues into account, poverty and deprivation measurements in the MODA framework are child-centred and age-specific (to the extent possible). A crucial determinant of the degree to which the analysis can be truly child-specific is the availability of datasets that allow focusing on the child as the unit of analysis. For a child-centred analysis it is essential to use a dataset that has data collected for each child or at least one child per household. For low- and middle-income countries, these are for instance the Demographic and Health Surveys (DHS), the Multiple Indicator Cluster surveys (MICS), or national surveys that contain specific information on the well-being status of all the members of households interviewed during the survey (i.e. information on vaccinations received or children's school attendance status). As a less desirable (but often the only) alternative, household-level data can be used, provided that these contain either child-focused or generic household-level information that is relevant for children. Child-focused variables contain information on the issues that are primarily relevant for children (for EU-MODA for example the 2009 EU-SILC data have been used because they contain a particular child specific module). However, questions revealing this information are often not asked for a particular child, but rather refer to all children of the household regardless of their age and gender. Generic household variables can be used in case they comprise information such as access to services or housing conditions, which are also important for the well-being of all the children in the household. Even though both types of data sources may include relevant information for children, they are not preferred since they mask individual level (intra-household) differences.

In addition, all data should preferably come from a single survey source, rather than combining the aggregated indicators of various sources. While very valuable on their own,[18] using more than one data source with no possibility to merge single observations across datasets does not allow overlap analyses to be performed across the various dimensions and cannot identify the poor who experience multiple deprivations simultaneously, since the data are unlinked at the individual level and different reference populations are used across the samples.

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[18] Different datasets have been used as deprivation indicator sources for studies on the OECD, the EU, and the CEE/CIS countries by Bradshaw et al. (2006; 2007; 2008), and for UNICEF's Report Card 7 and 10 (UNICEF, 2007b; UNICEF, 2012).

MODA and the lifecycle approach

Children's needs are not only different from the needs of the household and their parents; children have different needs according to their gender and age. As stated by Alkire and Roche, '*Children's rights and needs are age-specific and social protection should be designed accordingly*', thus age-specific measures should be used in the identification process (Alkire and Roche, 2012, p.114).

Within the MODA methodology children are not regarded as a homogeneous group with the same needs, as is often done in other multidimensional poverty studies focused on children (Gordon et al, 2003). For instance, knowing whether children are attending school is important for children who are of legal school age, while for children below this age this indicator is less important or irrelevant. For infants one might want to consider using an indicator on breastfeeding as part of the nutrition dimension, while this is irrelevant for older children. Including age-specific indicators is beneficial, because it gives the possibility of including more appropriate indicators in the analysis than only including aspects which are relevant for all children. It can also illustrate the differences in the needs of the children, and can therefore be more specific in what the children are deprived of; Analysing different age-groups of children separately and choosing indicators that are relevant for each age-group is what MODA calls the life-cycle approach (Claeson and Waldman, 2000; UNICEF, 2011).

As an example, one of the MODA applications – the Cross Country MODA (CC-MODA) – analyses two age-groups: children below 5 years and children between 5 and 17 years. For the children under 5 years the analysis includes dimensions on nutrition and health, while the later age-group concentrates on education and access to information. In addition to these age-specific dimensions the analysis also uses dimensions on housing, water, sanitation, and protection from violence, which are relevant for children irrespective of their age. EU-MODA distinguishes three age-groups (1 year to school age; school-age to 15; 17 and 18 years), using a specific set of indicators for each age group.

MODA and monetary poverty

For *measuring monetary poverty* the current applications of MODA use various concepts depending on the available data and the national practices used in the countries under study. EU-MODA uses several poverty lines: the traditional 60% of the national median disposable household income, and the poverty lines set at 50% and 40% of the national median disposable income; moreover, the analysis uses the so-called "anchored poverty threshold" at 60% of the national median income anchored in 2005. For CC-MODA, information on households' financial situation is not available since the survey data that are used for this study[19] generally do not comprise households' income and consumption. One of the exceptions is the MODA case-study for Mali where due to coupling of two surveys both deprivation and monetary poverty are available for the same sample (de Neubourg et al, forthcoming).

MODA and absolute deprivation

For measuring *deprivation*, MODA uses the absolute approach in order to maximise the differences

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[19] Survey data used: MICS – Multiple Indicator Cluster Surveys, and DHS – Demographic and Health Surveys.

with relative deprivation measures that are conceptually closer to subjective poverty. Indicators and dimensions used to measure deprivation are selected using international standards, such as the Convention on the Rights of the Child (United Nations, 1989) as guiding principles. Following this rights-based approach, MODA has selected a list of sixteen dimensions that could be included in the measurement of children's deprivation[20] (for details see de Neubourg et al. 2012c). It is, however, hard to find datasets that contain information on all of these dimensions. For the CC-MODA, for example, eight dimensions have been selected, using thirteen indicators. In the case of EU-MODA, 13 to 16 indicators are combined into six or seven dimensions, depending on the age group (see Chzhen and de Neubourg, 2014).

Aggregation and weighting in MODA

MODA uses the union approach to aggregate indicators into dimensions. This method is insensitive to the severity of deprivation within the dimensions, because the value of the dimension does not change depending on the number of indicators a child is deprived in. This method is used to capture all the children who are deprived in any of the indicators that are part of the same dimension, as they have been selected to represent the fulfilment (or non-fulfilment) of the child's rights and basic needs attributed to the specific dimension.

Following the choice made for the rights-based (absolute) approach in selecting dimensions and indicators, all the deprivations a child is facing are assumed to be of equal importance, since deprivations are understood as non-fulfilment of one or more of the child's rights derived from the CRC and other international standards. For this reason, MODA does not assign any explicit weights to dimensions when counting the deprivations each child suffers from. As explained above, although no explicit weights are used, implicitly equal weights are assigned. This method reveals exactly which deprivations children are facing, making the severity and overlap analysis more transparent. This is important in MODA as its primary focus is not on composite indices. However, the equal weighting scheme is also used when a composite index is presented within MODA.[21] Evidently, other choices can be made and defended when the objectives of the analysis are different.

MODA and cut-off points

As mentioned above, the choice of any method of aggregation and any cut-off point requires value-judgments taking into consideration the aim of the study and the type of (multiple) deprivation one wants to show. To avoid making arbitrary decisions, the current interactive applications of MODA present the outcomes for all possible cut-off points, and thus incorporate all three methods. The union approach is used to identify all of the deprived, since any deprivation is seen as a non-fulfilment of children's rights. However, the application of higher cut-off points is also used as it allows focusing on those children who suffer from more deprivations simultaneously. Allowing the use of multiple cut-off points also enables the comparison of characteristics among the deprived, e.g. moderately and highly deprived children. By providing this

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[20] These sixteen dimensions are based on the authors' selection and serve as a basic set of aspects of well-being. It should be stressed that, although it is already difficult to capture all of these dimensions in one dataset, additional dimensions or more specificity to the dimensions can be added if it serves the purpose of the study.
[21] See also the remarks and caveats made when weighting is discussed in section 3.

flexibility, the MODA methodology leaves options open for analysts to make their own choices. National specific applications (N-MODA) and other further applications can use other decisions regarding the cut-off choice, without endangering the basic consistency of the methodology. It should be noted that by using cut-off points higher than one (k>1) all the results will be biased against deprivations that are relatively more often experienced "in isolation" (meaning not in conjunction with other deprivations). [22]

6. MULTIPLE DEPRIVATION ANALYSIS IN MODA

When looking at previous studies regarding poverty and deprivation measurement, three strains of analysis to measure multidimensional poverty can be identified (Roelen and Gassmann, 2008; Ferreira and Lugo, 2012). The first approach accounts for the severity of deprivation by counting the number of deprivations experienced by each child. The second approach uses scalar indices to combine the multiple aspects of deprivation into one single figure. The last approach builds mainly on the counting approaches towards multidimensional poverty, but expands the analysis by measuring the overlap between deprivations, or between poverty and deprivation. The next two sections elaborate the MODA practice for handling multidimensional poverty/deprivation analyses based on counting, distribution, overlap, and multidimensional indices.

Deprivation counting and distribution

Counting approaches have a long history in applied poverty reports, such as the analysis by Townsend (1979), and Mack and Lansley (1985) on poverty in the United Kingdom, and the more recent work on the European Union by Nolan and Whelan (2010; 2011) reporting the number of deprivations experienced by households. Counting measures are individual (or household)-centred approaches, because the method concentrates foremost on the number of deprivations that are experienced by each individual. While it is possible to calculate a single poverty figure using this approach (e.g. the proportion of people experiencing x number of deprivations), the method is mainly focused on the joint experience of deprivations.

One of the best-known examples of the "counting approach" is UNICEF's Global Study on Child Poverty and Disparities (2007a) initiated and developed by Gordon et al. (2003). This series of studies applies the deprivation analysis to the data of low- and middle-income countries to measure deprivation in an internationally comparable manner. The methodology, which is also referred to as the Bristol approach, defines deprivations as denials of basic child needs and rights, using internationally accepted declarations and conventions to select relevant dimensions. The approach belongs to the counting measures because it assesses for each child how many dimensional deprivations he or she has. Depending on the number of dimensional deprivations that a child experiences, the child is classified as non-deprived, absolutely deprived or severely

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[22] There is a series of additional technical decisions to be made. Without doubt the most important regards the handling of missing data values since it is often an important issue due to its quantitative importance in the data at hand. The current application of CC-MODA handles missing data differently in the single- and the multidimensional parts of the analysis. In the single deprivation part, children with missing observations are excluded from the calculations of deprivation rates by indicator/dimension. In the multidimensional part of the analysis a child is implicitly regarded as "non-deprived" in the dimension(s) for which data are missing for this child, whereas equal denominators are required across each of the dimensions. This may have an important impact on the results; therefore a sensitivity analysis is executed and the percentage of observations with missing values per indicator and dimension are reported. In most countries, the effects are mild, although some exceptions apply. For detailed information on the treatment of missing data in CC-MODA see de Neubourg et al., 2012b.

deprived. Children with one or more severe deprivations of a basic human need are identified as severely deprived, children with two or more severe deprivations are considered absolutely poor. These outcomes use deprivation headcount ratios, showing the proportion of deprived children as a percentage of the total child population. Besides the deprivation headcount ratios of the aggregated number of deprivations, the Bristol approach also concentrates on the analysis of single dimensions, which is examined by region.

Delamonica and Minujín (2007) use the results of the Global Study on Poverty and Disparities as a basis for further analysis of the depth and severity of deprivation. They demonstrate in their paper that countries or households with the same incidence of deprivations experience different levels of severity. They explore the deprivation distribution to measure the so-called depth (the average number of deprivations), and severity (the distribution of the total number of deprivations) of deprivation among children.

Concerning the counting of deprivations, MODA's methodology builds upon the Global Study on Child Poverty and Disparities (Bristol) methodology. Both methodologies follow a rights-based approach to child well-being and account for the number of deprivations experienced by each child. CC-MODA and the Global study use the same datasets (of different years) to compare child deprivation across low- and middle- income countries. There are, however, differences between the studies: the Global Study adopts a continuum approach to deprivation within a dimension, meaning that multiple thresholds are used to measure mild, moderate, severe and extreme deprivation, while MODA uses single thresholds. The Global study lacks the life-cycle definition of the dimensions and indicators and is limited to the counting approach[23] while MODA goes beyond that and incorporates analyses of deprivation indices and deprivation overlaps. Moreover, in contrast with the Global Study, MODA includes child protection (protection from violence) as an additional dimension of deprivation poverty (UNICEF, 2007a; Gordon et al., 2003).

Deprivation overlap analysis

Deprivation overlap analysis has been used as an addition to counting analyses to extract further information about the simultaneous experience of deprivations. Overlap analyses demonstrate that deprivations are not often experienced in isolation and that in order to free a child from deprivations multiple (sectoral) issues should be addressed (Ferreira and Lugo, 2012).

The CC-MODA application uses two types of overlap analysis as an illustration, whereby the first identifies the degree to which a given dimension overlaps with one or more other dimensions. The second examines the overlap (and non-overlap) for particular combinations of (selected) dimensions.

The objectives of the overlap analysis for MODA are threefold. First, the overlap analysis helps to inform about the severity of deprivation; an overlap analysis highlights the proportion of the population that experiences only one deprivation, two deprivations, three or more deprivations, all of the possible deprivations, or no deprivations at all. Second, the overlap analysis compares multiple deprivations without losing information on the type of deprivation. To give an example,

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[23] However, since not all of the indicators used apply to all children, children of different ages have a different number of 'potential' deprivations.

the analysis does not only show the proportion of people deprived in two dimensions (selected out of all possible combinations), but illustrates in which particular dimensions the deprivation takes place. This type of analysis is useful, especially with regard to policy-making, because it points out which sectors should receive additional attention. Moreover, the overlap analysis may also show that for some people in the population an integrative response to policy is required to raise them out of poverty and/or deprivation.

Lastly, as suggested by Bradshaw and Finch (2003) people with different levels of deprivation may have different characteristics. Profiling children in the deprivation overlap may therefore help to identify the most deprived. In CC-MODA and EU-MODA Venn-diagrams are constructed for each possible combination of three dimensions. Profiling people in the overlap is done to give an idea of who the more severely deprived are. Nevertheless, also the non-overlap or partly overlapping groups can be profiled to help in the identification of children experiencing certain combinations of deprivation. As further addressed in the following sections, the (dimensional) overlap analyses and the profiling of the various groups of children/persons helps to formulate hypotheses on the underlying determinants for the observed inequalities.

Deprivation indices

Alkire, Foster, and Santos (2011) argue that headcount ratios for each dimension separately "*do not answer basic questions required of a poverty methodology: Who is poor overall? How many poor people are there?*" (Alkire et al, 2011, p.503) and thus look across dimensions to arrive at a more adequate identification method. The authors use multidimensional poverty indices, or what Tsui calls "*a numerical representation of shortfalls of basic needs from some pre-specified minimum levels*" (Tsui, 2002, p. 69) to report on the multiply deprived.[24] According to their analysis, an index is a powerful and attractive tool which allows presenting a single figure for 'simple' comparisons of socioeconomic performance across countries and between sub-groups. Nevertheless, the use of indices as a form of multidimensional poverty measurement is heavily debated,[25] because aggregating various dimensions of poverty into one index involves a risk of losing valuable information on the multidimensionality of poverty. As Bourguignon and Chakravarty (2003) have pointed out, aggregating various attributes into a single index essentially implies reducing multidimensional poverty into a one-dimensional concept. They underline that a multidimensional approach to poverty ought to define poverty as a shortfall from a threshold on each dimension of an individual's well-being. To focus on the multidimensionality of poverty, they suggest establishing a poverty line for each dimension and to consider that a person is poor if he/she falls below at least one of these various lines (Bourguignon, Chakravarty, 2003). Also Ravallion (2010) argues that it is often unclear what the composite indices mean and how they should be interpreted. A composite index normally has a large number of parameters, which researchers are essentially free to set. Ravallion agrees that the simplicity of these indices is often appealing because they merge multiple dimensions into just one figure allowing carrying out country

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[24] The distinction between the multidimensional 'counting' and 'index' approaches may be slightly blurred as both methods use the total number of deprivations per person to report on deprivation; however deprivation/poverty indices usually take multidimensional poverty analysis beyond the mere use of deprivation incidence rates.
[25] For further information see: *Journal of Economic Inequality,* vol. 9, iss. 2 and 3, 2011; and the discussion on the Oxfam blogs starting from July 2010 - retrieved from http://www.oxfamblogs.org/fp2p/?p=3070

rankings. However, the author expresses his doubts about the usefulness and the policy relevance of these indices, suggesting monitoring the different components separately (Ravallion, 2010).

On the other hand, proponents of the use of indices argue that indices are useful tools to summarise complex realities. As illustrated with the examples below, the single value results are particularly valuable in comparative contexts and as tools for policy-making to stimulate discussions and emphasise the need for further attention of particular groups in the society (Alkire and Foster, 2011b; Alkire, Roche and Seth, 2011; Roelen et al., 2011). On technical grounds indices can be divided between those which combine results of various datasets at the macro-level, and those which use only one (micro)-data source. The distinction is important mainly to understand the technical particularities and the ability of the index to serve as a basis for further analysis. One of the most widely known examples of a 'macro' development index is the Human Development Index (HDI) as used in UNDP's annual Human Development Reports (e.g. 2010; 2013). It incorporates three components – health (life expectancy), education (average years of schooling and expected years of schooling), and standard of living (GNI per capita PPP), collecting national level data from separate sources and aggregating them into a composite index. This composite is used to compare countries across the globe and across time. The choice of its indicators and the method are principally driven to permit coverage of a large number of countries (UNDP, 2013). With regards to child well-being, Bradshaw et al. (2006, 2008) have designed an index comprising indicators that refer directly to child well-being. The results are used to create a rank-order of child deprivation among various middle and higher income countries as well as to measure the depth of deprivation within these countries (Bradshaw et al., 2006; UNICEF, 2007b; 2013). As highlighted by the examples, this type of study often uses aggregate indicators in a higher level comparative context without looking at the multiple experience of deprivation of each household/individual.

The Multidimensional Poverty Index (MPI) developed by Alkire and Santos (2010) serves as an example of a 'micro' index, and uses the same three dimensions that are included in the HDI.[26] The MPI is based on the methodology developed by Alkire and Foster (2011a), designed following the Foster-Greer-Thorbecke approach for monetary poverty and embracing Sen's capability approach (Sen, 1979; 1999; Foster et al., 1984; Alkire, 2002). To identify the poor, the Alkire and Foster method follows a two-step procedure in which individuals are first identified as deprived with regards to a given indicator and then are subsequently identified as multidimensionally deprived through a second cut-off point. This information is then transformed to population-wide poverty index measures (Alkire and Foster, 2011a). Alkire and Santos (2010) use the latter in a comparative analysis of multidimensional poverty in developing countries, comparing 104 developing countries.[27] Alkire and colleagues at the Oxford Policy and Human Development Initiative (OPHI) have also published a variety of work in which they use the MPI-methodology for more in-depth analysis on, for instance, contributions of each deprivation to the overall deprivation level through decomposition (Alkire, Roche and Seth, 2011; Alkire and Roche, 2012), and multiple deprivation trends over time (e.g. Alkire and Seth, 2013; Roche, 2013). These types of analyses use a single

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[26] Even though dimensions are largely similar (i.e. health, education, and standard of living), the indicators and the method of aggregation for MPI differs, since the MPI uses only micro data from the same source.
[27] The OPHI team has applied the Alkire and Foster method to various international, national and subnational contexts. For more information see: http://www.ophi.org.uk/policy/national-policy/

data source to be able to analyse the multiple experience of deprivation of each observation (i.e., a household or an individual) in the data.

Multidimensional poverty indices have shown to be a powerful tool in policy-making as has been shown in, for example, Mexico, Colombia and Ireland, which were among the first countries to integrate elements of multidimensional poverty measurement into their national policy strategies. Mexico integrated a combination of economic well-being and deprivation as an official measurement of poverty, officially adopting this measure in 2008 (CONEVAL, 2010). Following the example of Mexico, Colombia has also adopted a multidimensional poverty-reduction strategy. Colombia uses the Alkire and Foster methodology with five dimensions: education, childhood and youth, labour, health and access to public services and living conditions (Angulo et al, 2011). In Ireland, an overlap measure called "consistent poverty" has been adopted as one of the official poverty measures. This measure identifies the overlap between low income and enforced lack of two or more goods or services considered essential for a basic standard of living (Office of Social Inclusion, 2007).

As explained above, the use of indices to present multidimensional poverty outcomes has received criticism as not being intuitive and therefore lacking explanatory power of the poverty situation of a particular population. It is argued that aggregating information on deprivations into one index is inherently problematic in terms of weighting and for the risk of masking deprivations in particular dimensions with the performance of the other dimensions included in the index. Most of these comments are addressed within other parts of the MODA methodology (i.e., the single deprivation analysis and the overlap analysis). MODA sees multidimensional poverty indices as merely one element of what multidimensional poverty analyses should do: enlighten our understanding of deprivation and monetary poverty as experienced by children (and adults) in specific country settings. Moreover, the indices used in the MODA studies allow comparing outcomes between countries, regions and population groups in order to profile children and their families belonging to various groups of the population.

MODA calculates the poverty headcount ratio (H), the average intensity of poverty among the deprived (A) and the adjusted poverty headcount (M_0) that combines the first two measures into a single index. Following Alkire and Foster (2011a), the adjusted headcount is decomposed to answer such questions as 'What is the contribution of specific population groups to the total deprivation level?' and 'What is the contribution of each dimension to the total deprivation level?'

7. INTEGRATING MONETARY CHILD POVERTY AND MULTIDIMENSIONAL DEPRIVATION ANALYSIS

In an effort to combine the results of the various methods of measuring poverty, and in search of a middle ground in multidimensional poverty research, overlap analyses have been used. Many researchers, including Roelen and Notten (2011), Roelen et al. (2011), Perry (2002), de Neubourg, Roelen, Gassmann (2010), Bradshaw et al. (2008), Nolan and Whelan (2011), and Mansour (2012) have concentrated on analysing the degree of overlap and non-overlap between different concepts of poverty. Their studies show that monetary indicators do not identify the same groups of people as deprivation indicators. For instance, one of the key findings of Perry's work is that there is a discrepancy between income poverty and deprivation measured by indicators signifying

unacceptably low living standards for New Zealand and various other high-income countries (Perry, 2002). These findings are confirmed for a larger sample of rich countries in UNICEF's Report Card 10 (UNICEF, 2012). Roelen, Gassmann, and de Neubourg (2011)[28] compare child poverty outcomes in Vietnam on the basis of an absolute monetary approach with a country-specific multidimensional approach that aims to be a direct measure of child poverty beyond economic resources. The degree of overlap between the two methods of identification was found to be limited. The analysis also reveals that targeting of policies on the basis of monetary poverty potentially has unfavourable effects for those identified as multidimensionally poor, and vice versa. The authors conclude that a poverty analysis based on a combination of the two approaches can overcome the danger that a poverty analysis focuses only on a one-sided conception of poverty. The study carried out by Bradshaw and Finch (2003) reveals similar remarks, concluding that it is not safe to base policy only on one measure of poverty. The authors argue that those identified as poor on more than one measure are more likely to find themselves in more severe poverty than those who are poor only on one measure. Moreover, they find that people with more than one type of poverty have socio-economic features that are distinct from people who are not poor, or are poor in only one measure. They conclude that using a combination of poverty measures is more secure, in terms of finding the "real poor", than the use of single measures.

The different results of the various approaches lead to different policy recommendations. Nolan and Whelan (2011), when analysing the European Union's poverty reduction measure (The EU 2020 Poverty Target) suggest that combining relative income poverty and material deprivation and focusing on the group where they overlap is worth consideration because such a measure can serve as a way of distinguishing a sub-set of the population deserving priority in framing anti-poverty policy. Also Roche's study on multidimensional child poverty in Bangladesh shows that results based on wealth measures are considerably different to those obtained with multidimensional poverty measures. Based on his findings, the author suggests that '*if the aim is to produce policy-relevant information to tackle child poverty, a multidimensional poverty measure would be more appropriate than income measure*' (Roche, 2009, p. 20).

The MODA methodology strongly encourages using analyses that show the relation between (multidimensional) deprivation and monetary child poverty, whenever the data provides the possibility. It is important to acknowledge that the two measures of poverty are based on different concepts and both offer policy-relevant information, so they should be measured both separately and by looking at their relationship and intersecting distributions, rather than choosing one over the other or only focusing on the intersection of the two measures. Overlap analyses between monetary child poverty and deprivation, whether deprivation indicators, dimensions or the aggregated multidimensional deprivation headcount, are valuable to make the overlap and non-overlap between the various concepts of poverty visible. It is also encouraged to move beyond the overlap analyses by carrying out further analyses, such as analyses comparing income/consumption distributions and household's/person's deprivation status, or descriptive regression models demonstrating the correlation between (multiple) deprivations and income/consumption levels.

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[28] These authors have also contributed to studies in which further applications of overlap analysis are described in the context of e.g. Congo Brazzaville (Notten et al., 2012), and Senegal (de Neubourg et al, 2010).

8. CONCLUDING REMARKS: MULTIDIMENSIONAL POVERTY ANALYSIS USING MODA AS A STEPPING STONE TO BETTER ANALYSES

Over the last two decades considerable progress has been made in enhancing our understanding of how to handle the multidimensional nature of poverty both theoretically and empirically. The major contributions in these debates have been discussed in this paper; and they are combined into a single methodological framework called MODA (Multiple Overlapping Deprivation Analysis). The current applications of this methodology are focused on child deprivation and monetary poverty in a wide selection of high-, middle- and low-income countries. The MODA framework is presented in an interactive web-portal which makes the information stemming from these analyses accessible (see footnote 1).

The overall framework encompasses many aspects of multidimensional poverty research ranging from single deprivation analyses through multidimensional counting and overlap analyses to multidimensional poverty indices and their decomposition. The methodology includes efforts to make each of the decisions throughout the analysis process as clear and transparent as possible, and to avoid internal inconsistencies.[29] MODA pays a lot of attention to clearly defining the concepts of poverty and deprivation by adopting the human/child rights approach. Headcount, severity and severity adjusted headcount ratios play a specific role. The first part of the analysis is to estimate *how many* children (persons) are (multidimensionally) poor and/or deprived under the definitions used. Knowing how many people (children) are multidimensionally poor and deprived is very important. However, multidimensional poverty research goes beyond mere adding up of individuals. Studying *who* the poor and deprived children (persons) are, *where* they live and what their other *characteristics* are or the characteristics of their environment (household, family, community), is valuable. MODA provides this type of knowledge by *profiling* the various groups (of children). As such it forms the first step in obtaining information that can be used in more comprehensive causal analyses aiming at answering questions of *why* people are poor, remain deprived and pass on their unfortunate conditions and choices to the next generations.

The information arising from the single deprivation analysis, the multidimensional overlap analysis, and the decomposition of the multidimensional indices is complementary to each aspect and will inspire research or further action as appropriate. The single deprivation analysis reveals for example how many children in a particular country are not attending school, *who* they are (gender, age, ethnicity, etc.), what the characteristics of their *family members* are (how many siblings, educational level of the mother, gender of the household head, number of employed adults in the households, relative wealth position of the household, etc.) and *where* they live (urban/rural, geographical area, availability and quality of the community services).[30] Answering the question

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[29] For example, the definitions and measurement of monetary and deprivation poverty have been constructed to avoid problems of "measurement contamination" by shunning all financial information from the deprivation measurements; the calculation of "wealth indices" has been revised to exclude information that is used for deprivation indicators. There are limits to this practice because, in the end, forms of deprivations and poverty are neither theoretically nor empirically fully separable. For example, the nutrition deprivation that can be measured by stunting among children or adults implicitly uses information that is directly linked to other forms of deprivation, since stunting is not only the result of malnutrition, but also neglect, lack of access to clean water and lack of access to timely healthcare. While MODA is strict when financial information is concerned and tries to be reasonably strict when forms of deprivation are concerned (e.g., stunting is not used as an indicator in the nutrition dimension in CC-MODA), it should be acknowledged that specific analyses may relax the decisions depending on the objective of the analyses, the further use of the indicators/ratios/indices in causal models and the availability and quality of the data.

[30] Almost all of these breakdowns are available in many countries included in the currently available MODA studies (although with different definitions depending on the data).

why these children are not attending school requires that we explore supply side constraints, demand side constraints, and social constraints. Supply side constraints may be the following: there are no schools within reasonable distance, there are no affordable schools, the quality of the schools is insufficient to go through the effort of sending the children to school (there are no teachers, no textbooks, teachers are not qualified/not paid), there are no appropriate schools (schools are dangerous for girls, there is no proper sanitation for girls, there are no female teachers). Demand side constraints could be: parents do not think that attending school is important for (all, girls, older) children, parents need the economic input of the children, and parents need the input of the children in household tasks. Social constraints that could be considered are e.g. families belonging to an ethnic, religious group, caste, political group that is discriminated against; or all boys are expected to go to the army at a young age. MODA starts with providing answers to some of these questions without immediately being able to provide information on all these variables. MODA is very helpful in formulating hypotheses and lining up elements that a more in depth (causal) analysis should cover.

The objective of combining the analysis of multiple dimensions is to show the joint experience of deprivations by children. The starting point is that children should not only be seen as potential school children, but as children whose well-being depends on multiple aspects at the same time. So besides not attending school, in what other dimensions is this child deprived? And what are the most prevailing combinations of lack of school attendance and other deprivations? Are children who are not attending school also living in financially poor families or not? So again, *who* are these multiply deprived children? *What* are their and their family's characteristics? *Where* do they live? A possible response to these questions is distilled when comparing the results with other groups of children (who are e.g. only deprived in nutrition, who are only poor but attending school and who are simultaneously severely deprived and poor). In providing and making the information easily accessible, MODA inspires the development of theories that take more than one issue/sector at a time into consideration.[31]

Estimating the number of children (persons) who suffer from multiple deprivations and poverty and mapping the composition of the deprivations have proven to be complicated tasks. Bringing all the information together without getting lost in the multitude of dimensions or taking refuge in a single figure has been a challenge. Using all the information for answering questions on why children become and stay deprived and poor, is a complex undertaking. The methodology offered through MODA intends to contribute to systematic research on what children suffer from and how the related problems could be addressed. The analysis could serve as a stepping stone helping to direct further research, such as costing analyses and causality analyses, and therefore help to improve child-sensitive policy design and analysis.

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[31] Decomposition of adjusted deprivation indices (as advocated by Alkire and Foster, 2011a) in turn may reveal other types of information, especially related to relative weights of various groups in the total deprivation "load" of a country. Combined with the rest of the information provided in MODA, it allows to distinguish the potential effects of addressing the deprivation problems of a relatively small, but severely deprived group of children with addressing the deprivation problems of a large group with a milder level of deprivations. Combined with costing tools, MODA can increase the level of sophistication that ex ante policy design could take.

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