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Working Paper

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An International Study of Childhood Poverty

Weighting Deprivations using Subjective Well-being

An Application to the Multidimensional Child Poverty Index in Vietnam

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Contents

Abstract

Although multidimensional approaches to child poverty have received growing attention in Vietnam, proper investigation of how to assign weights to different dimensions when constructing single aggregation indices has not been done. Using Young Lives data, this study attempts to fill this gap by examining a weight estimation method which takes children's perspectives into account. This approach consists of computing analytical weights from estimated parameters of a subjective well-being regression model, where children's subjective well-being is explained by their outcomes/achievement in dimensions included in multidimensional poverty indices. This means that the resulting weights reflect the value judgements of children about what a good life is and that they are not based on a normative approach. Estimation results indicate that the revealed preferences of children change over time and vary across sub-groups of children. More importantly, this paper demonstrates that children do not give the same value to all dimensions, contrary to the assumptions underlying the most common approach to the calculation of weights that gives equal weight to each dimension. Children attach more importance to deprivations that impact their well-being immediately, such as deprivations in shelter and in water and sanitation, than to deprivations that may affect their well-being negatively in the long term, although some groups of children attach most importance to the dimension of education.

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About Young Lives

Young Lives is an international study of childhood poverty, following the lives of 12,000 children in 4 countries (Ethiopia, India, Peru and Vietnam) over 15 years. **www.younglives.org.uk**

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1. Introduction

In the academic literature as well as the policy debate, there is common agreement that poverty is a multi-faceted phenomenon. It is widely acknowledged that the monetary approach to poverty suffers from a number of limitations. Firstly, this approach excludes all the dimensions of people's well-being that cannot be purchased in the market. Secondly, and more generally, it does not take into account the freedom and the opportunity of people to achieve 'functioning combinations', as discussed in Amartya Sen's seminal capability approach (Sen 1985).

In Vietnam, the multidimensional approach to poverty measurement and analysis has received a growing recognition among researchers, policymakers and practitioners, thanks to a number of initiatives introduced in recent years. Among such initiatives was an influential study on multidimensional child poverty in Vietnam, conducted by UNICEF in 2006 in collaboration with the Social Assistance Department of the Ministry of Labour, Invalids and Social Affairs (MOLISA), the General Statistics Office (GSO) and several line ministries. They highlighted that the monetary and multidimensional approaches produced substantially different results with regard to the identification of poor children. Using data from the Vietnam Household Living Standards Survey (VHLSS) 2006, the resulting report found that only 12 per cent of children were identified as poor by both monetary and multidimensional measures, as opposed to 30 and 23 per cent identified as poor under the multidimensional and monetary approaches respectively (MOLISA et al. 2008). As a result of this initiative, indicators of multidimensional child poverty have been adopted by the GSO in their periodic reports on the results of VHLSSs since 2008 (see, for example, GSO 2008).

Other reports have also painted different pictures of poverty in Vietnam drawn from the two approaches. An urban poverty assessment conducted in 2009 in the largest cities of Vietnam, Hanoi and Ho Chi Minh City (Le et al. 2010), found relatively low income-based poverty rates of below 5 per cent in both cities. However, the poverty picture looked considerably less optimistic when measured multidimensionally. Numerous people who were classified as non-poor by income lacked access to social protection and appropriate shelter, and consequently they were highly vulnerable to various types of shocks. At the national level, the *Viet Nam Human Development Report 2011*, which looked into multiple dimensions of well-being and poverty, noted that Vietnam's fast economic growth had not been accompanied by the corresponding level of improvements in life expectancy and education. The report argued that these areas should receive due attention from policymakers (UNDP 2011).

As a result of policy dialogue activities, the multidimensional approach to poverty has begun to be adopted by Vietnam's national institutions. Notably, the MOLISA, which is mandated by the Government to coordinate poverty reduction policies and programmes, has recently proposed a comprehensive project on reforming the country's approach to poverty reduction, focusing on a gradual shift away from the monetary approach toward the multidimensional one. Consequently, the multidimensional approach is expected to be employed in the national poverty alleviation programme for the 2016–20 period.[1] Furthermore, Vietnam joined

1 Conclusion of Mr Nguyen Trong Dam, a deputy minister of MOLISA, at a workshop on multidimensional poverty jointly organised by MOLISA, UNDP and Irish Aid in June 2013.

the Multidimensional Poverty Peer Network coordinated by Oxford Poverty and Human Development Initiative (OPHI) in June 2013.[2]

However, commentators from both the policymaking and research communities in Vietnam have raised concerns about the use of equal weighting across poverty dimensions – the weight-setting method that has so far been applied in all studies of multidimensional poverty in Vietnam. On the one hand, people argue that each dimension corresponds to a human right, and that all the rights should be equally important. On the other hand, some commentators point out that different population groups may have different sets of values and that they may attach different weighting to different dimensions of well-being as a consequence.

In an attempt to contribute to this debate, the current study proposes a new method of estimating the weights of dimensions in the study of multidimensional child poverty in Vietnam. By taking advantage of data from Young Lives surveys, the method integrates into the weighting scheme the value set by each child in the sample on the different dimensions of poverty. It relies on linking measured outcomes of different dimensions of children's lives and their subjective evaluation of their well-being. Individuals will have different outcomes/achievements[3] in the selected dimensions, and their views on their overall well-being implicitly reveal the judgements they attach to these dimensions. Hence, the association between the subjective evaluations and the achievements will provide a set of weights reflecting children's assessments of the relative importance of the dimensions. This approach is known as the 'hedonic' approach, classified as a hybrid approach by Decancq and Lugo (2013), as compared to data-driven and normative approaches.

This paper is organised as follows. After a brief discussion of the conceptual background of the method in Section 2, Section 3 presents the methodological approach to derive the weight, by discussing firstly the meaning of weights in the Multidimensional Poverty Index (MPI), and then by detailing formulae to derive them and introducing the dataset and the dimensions of poverty that will be analysed. Section 4 provides descriptive statistics, and presents estimation strategy and results. Section 4 presents the results of the weight estimation and compares poverty headcounts estimated with the equal weight approach and with weights estimated from our approach. Section 5 draws conclusions.

2. Conceptual background

Although the multidimensional approach to poverty is widely accepted in the literature, how to measure multidimensional poverty still debated. Most of the main criticisms of aggregated indices of multidimensional poverty are related to the way they assign relative weights to each dimension, as this is indicative of the trade-offs between the dimensions of well-being (Ravallion 2011). Indeed, weights are often defined arbitrarily, reflecting particular value judgements on what is a 'good life', although it is very likely that individuals in a society disagree on the relative importance of the various dimensions of their well-being.

2 http://www.ophi.org.uk/vietnam-joins-peer-network-as-it-moves-to-adopt-multidimensional-poverty-measure/

3 'Achievements' in this context refers to deprivation statuses in specific dimensions.

Most studies on the topic give equal weight to all dimensions, as do studies in Vietnam (MOLISA et al. 2008; GSO and UNICEF Vietnam 2011; UNDP 2011). Besides having the advantage of simplicity, the equal weight approach relies on the view that all dimensions are equally important as far as human rights are concerned. MOLISA et al.'s report adopted a position in which all the rights in the United Nations Convention on the Rights of the Child (UNCRC) were of equal importance as far as poverty dimension weightings were concerned. However, two main critiques of the equal weight approach are emerging from the literature. The first one questions on the universality of children's rights, as formally expressed in UNCRC. For instance, Camfield et al. (2009) argue that 'the development and best interests of children are likely to be defined differently in different places and contexts' (p.77). The second critique looks at the place of children in this approach, advocating a child-focused perspective. According to this view, children are social actors and should be allowed to take a role in defining what counts as child well-being (Ben-Arieh 2005). To address the first critique, some authors rely on data-driven approaches, which depend solely on the relative severity of deprivations and do not credit any value judgements on the trade-offs between them (Decancq and Lugo 2013). For instance, the frequency-based weight approach supposes that individuals attach a higher importance to the deprivations that are less widely shared in their society. However, it makes an implicit assumption that when a deprivation is alleviated in a society, the weight of this deprivation will change, even if individuals do not change their value judgement on the trade-offs. Consequently, both the data-driven and normative approaches fail to take into account individuals' views (or preferences) on what constitutes a 'good life', as different groups may have different sets of values (Castilla 2012; Alem et al. 2014; Schokkaert et al. 2011).

In this paper, we propose a way of setting weightings that overcomes this limitation by introducing the preferences of children regarding the trade-offs between dimensions. Incorporation of children's preferences allows us to take into account children's perspectives, which are generally overlooked in child poverty analysis, dominated as it is by a rights-based approach with equal dimension weights (Jones and Sumner 2011). As children's views on their well-being are, presumably, different from those of adults (Bhatnagar and Gupta 2011), a more justifiable weighting scheme could be derived by incorporating children's perspectives. To the best of our knowledge, only one study integrates children's perspectives while computing an index of multidimensional child poverty. Fernandes et al. (2013a, 2013b) set the weights for this type of index in Portugal by considering the degree of importance the child gives to each dimension of deprivation. They asked children to rank several dimensions in order of importance, and for each child, the weights are computed to reflect this ranking, following a procedure similar to that adopted by De Kruijk and Rutten (2007) for the adult poverty index of the Maldives. The index of well-being then combines objective items with children's subjective perceptions of them. Such data has not yet been collected in Vietnam.

In this paper, we propose another approach – one that relies on emerging measures of subjective well-being. Like Schokkaert (2007), we consider that 'if one accepts that the opinions of the people concerned should play some role in the evaluation of the trade-offs between different dimensions of well-being, the information about what makes people feel "more satisfied with their life as a whole" seems relevant within the capability approach' (p. 415).

Indeed, a recent and promising literature uses measures of self-reported life satisfaction to identify what the preferences are for each dimension. Fleurbaey et al. (2009) and Decancq et al. (2013) use the estimation of the self-reported satisfaction level to identify the preferences

of individuals regarding the different deprivation dimensions, relying on longitudinal data collected in Russia. Schokkaert et al. (2011) compute an index of job quality where the weights of the different dimensions of a job are based on the importance of each dimension in the explanation of job satisfaction. Since preferences are not homogenous, all these estimations take into account differences in the preferences of different groups of the population.

This literature is based on the assumption that people are able to provide an accurate measure of psychological feelings of well-being. According to the growing literature on happiness, self-reported satisfaction is a reliable measure of subjective well-being as long as some idiosyncratic individual factors are controlled for. As 'adaptation, expectations and relative deprivation' (Schokkaert et al. 2011: 687) also determine the satisfaction, we have to remove effects of these factors from the association. In other words, subjective well-being is also determined by 'a frame of reference' or the aspirations of each individual (Fleurbaey et al. 2009). Since these factors are 'personal responsibility', we have to remove their effects to have a clean picture of the link between subjective well-being and deprivation dimensions.

One may argue that subjective well-being could be used as an aggregate measure of poverty. However, this measure suffers from a number of shortcomings. Firstly, since both individual aspirations and heterogeneity in preferences determine the overall satisfaction, as discussed above, the use of subjective well-being as an aggregate measure of poverty can be biased because the measure may not correctly reflect the deprivation status of respondents. In addition, these factors may change over time, which means that the aggregate measure of poverty purely based on subjective well-being will not be easily comparable across time. Lastly, measures of subjective well-being do not provide information on the relative importance of each dimension in the overall picture. Hence, there is little information for the detail policy design and monitoring.

3. Weights in multidimensional poverty measurement

In the previous section, the possibility of using subjective well-being to reveal people's judgements on achievements in different dimensions of their lives was briefly discussed. In this section, we attempt to quantify the link between these judgements and the achievements/outcomes and then empirically derive weights in the MPI (Alkire and Foster 2011b) from this association. We first recall Alkire and Foster's MPI and investigate the meaning of weights in this index. Formulae for calculating weights from an empirical equation that expresses the association between subjective well-being and achievements in different dimensions of people's lives will subsequently be presented.

Indeed, the method proposed in the current study can be employed to estimate weights in any indices that are based on a linear combination of dimensions. However, we apply it directly to the Alkire Foster index as an illustration because of its popularity.[4] Another reason for the application of the method to the Alkire Foster index is purely pragmatic: this index is

4 Since 2010, the UNDP has used this method to estimate the Multidimensional Poverty Index Included in Human Development Reports.

being proposed (by MOLISA) to estimate multidimensional poverty figures for Vietnam's national poverty reduction programme for the 2016–20 period.

3.1. Alkire and Foster's Multidimensional Poverty Index

Let y_{ij}, g_{ij}^0 denote achievement and deprivation status of individual *i* in dimension *j* respectively, and z_j be the deprivation cut-off of the dimension.

We have g_{ij}^0=$w_j D_j$ where w_j is the weight for the dimension *j*, and D_j a dummy that takes the value 1 if $y_{ij} < z_j$, and 0 otherwise. As noted in Alkire and Santos (2010), weights are nested, which means $\sum_{j=1}^{d} w_j = d$, where *d* is number of dimensions.

Deprivation counts *c* of individual *i* is just the sum of g_{ij}^0 , given by:

$$c_i = \sum_{j=1}^{d} g_{ij}^0 = \sum_{j=1}^{d} w_j D_j \quad (1)$$

We define *k* as a second cut-off, which is called a poverty cut-off (Alkire and Foster 2011b) for identifying the multidimensional poverty status, ρ_k. The identification function is:

ρ_k=0 if $c_i < k$ and ρ_k=1 if $c_i \geq k$. (2)

If we take a mean of ρ_k across households/individuals, we will have the multidimensional poverty headcount ratio, *H*. However, this measure does not have the desired property of monotonicity. Thus, Alkire and Foster introduced an index called the Adjusted Headcount Ratio, M_0. When dimensions, indicators and weights are specified, M_0 is called the Multidimensional Poverty Index (MPI). M_0 is defined as 'the weighted sum of the deprivations the poor experience divided by the total number of people times the total number of dimensions considered' (Alkire and Santos 2010: 10). To estimate M_0, we sum up g^0 of all the multidimensionally poor people across all dimensions and then divide by total individuals in the sample, multiplying the number of dimensions.

To put it differently, MPI can be expressed as the product of two computable components: the poverty headcount ratio (*H)* and the Intensity of Poverty (*A*). *A* is the weighted average proportions of deprivations a poor person suffers. Consequently, the estimation of both components of the MPI needs an index, deprivation count, *c*, with weights and dummies for achievements of individual dimension, *D*.

With the linear expression in (1), the nature of weights is the capacity of substitution across dimensions and the Marginal Rate of Substitution (MRS) between dimension j and dimension *s* is $^{w_j}/_{w_s}$.

3.2. Empirical model and deriving weights

3.2.1. Empirical model

To formulate the association between subjective well-being and the achievement of dimensions, we employ the explicit form of Fleurbaey et al. (2009), which is applied to estimate 'equivalent income' based on the achievements of individuals, taking in account differences in their preferences. Specifically, subjective well-being is explained by achievements in different dimensions as well as by the characteristics of respondents.

$$SWB_i = \beta_0 + \sum_{j=1}^{d} D_{ij}\beta_j + \sum_{j=1}^{d}\sum_{q=1}^{c} D_{ij}C_{iq}\partial_{jq} + \sum_{q=1}^{z} C_{iq}\theta_q + \varepsilon_i \quad (3)$$

where SWB_i,D_{ij} *and* $C_{iq}$are reported subjective well-being, achievement of dimension *j* and characteristics *q* of respondent *i* respectively. $\beta_0, \beta_j, \partial_{jq}$ and θ_q are estimated coefficients, and ε_i is the residual term.

The second component on the right-hand side of equation (3) is a vector of achievements, and its estimated coefficients reveal the judgements of a group of individuals who act as the base group. The third component reflects interactions between personal characteristics and achievements which capture differences in judgements across sub-groups of the population with different characteristics. Although the model allows differences in preferences, it assumes that individuals with the same observable characteristics have identical preferences, as noted in Fleurbaey et al. (2009). In the fourth component, personal characteristics are separately included in the model as proxy measures for aspiration levels or 'the frame of reference'. More precisely, some individuals' characteristics may be associated with expensive tastes, in which a higher level of aspiration may dampen an individual's satisfaction, or on the contrary they could be associated with limitation of aspiration through an adaptive process to the objective circumstances (Elster 1985). As discussed in Section 2, the effect of these factors has to be removed from the association between deprivation and an individual's satisfaction.

3.2.2. Deriving weights

We now turn to an important question, which is how to derive weights from (3). In equation (3), it is assumed that MRSs across dimensions reveal the opinions of respondents on the 'trade-off' between dimensions. Therefore, MRSs across dimensions in equation (3) are estimations of MRSs in equation (1).

Given the ordinal nature of the subjective well-being question and answer, equation (3) is often estimated with an ordered logit model. In Appendix 1, it is demonstrated that the MRS between dimensions D_m and D_n is:

$$MRS_{D_m/D_n} = \frac{\beta_m + \sum_{q=1}^{c} C_q \partial_{mq}}{\beta_n + \sum_{q=1}^{c} C_q \partial_{nq}} \quad (4)$$

With the nested condition, as noted above, we have weight of dimension j as:

$$w_j = \frac{d(\beta_j + \sum_{q=1}^{c} C_q \partial_{jq})}{\sum_{j=1}^{d} \beta_j + \sum_{j=1}^{d} \sum_{q=1}^{c} C_q \partial_{jq}} \quad (5)$$

Equation (3) allows for differences in revealed judgements across sub-groups of respondents with certain characteristics (such as gender or ethnicity). Therefore, weights defined by equation (5) do not depend on subjective well-being as well as achievements across dimensions but they vary with personal characteristics *C* of respondents.

It should be noted that weights in the Alkire and Foster (2011b) MPI are based on an assumption of the substitutability between dimensions. Furthermore, the framework here suffers from two limitations. Firstly, there is possible existence of unobserved heterogeneity in judgements as well as aspirations. Secondly, dimensions are correlated, which results in large standard errors and difficulties in extracting the individual effects of dimensions (Decancq and Lugo 2013). To address the first limitation, we include educational aspirations as a proxy for unobservable overall aspirations. Furthermore, we explore the feasibility of fixed-effect models.

3.3. Data

Data are sourced from Young Lives surveys in Vietnam. Young Lives is a longitudinal study of 12,000 children in four countries: Ethiopia, Peru, Vietnam and India (Andhra Pradesh).[5] Since 2002, the study has been tracking 1,000 children born in 1994/5 (the Older Cohort) and 2,000 children born in 2000/1 (the Younger Cohort) in each country. To date, four survey rounds, have been conducted to collect information on children and their families as well as their community: in 2002, 2006, 2009 and 2013.

In Vietnam, the sample covers five purposively selected provinces in four regions and it is equally allocated across provinces in both cohorts. Principally, communes are selected as sentinel sites, with a random sample of 50 and 100 children in the Older and Younger Cohorts respectively. However, a number of communes did not have sufficient number of children who met the age requirements and two communes were combined to form a sentinel site for these cases. Consequently, the sample initially includes 31 communes.[6]

In this paper, we focus on the Older Cohort, which comprises children aged 11–12 in Round 2 and 14–15 in Round 3 for a pragmatic reason: information on subjective well-being is available for the Older Cohort in those two rounds, and available only in one round (Round 3) for the Younger Cohort. Consequently, it is not possible to conduct panel analysis for the Younger Cohort.

As the Young Lives sample is not nationally representative, a frequent question raised is how the Young Lives data reflect (or alternatively, deviate from) the national picture. Table 1 presents rates of deprivation across selected indicators calculated from Young Lives data and the 2008 VHLSS as well as the 2006 Multiple Indicator Cluster Survey (MICS); these last two are both nationally representative surveys.

Table 1. *Deprivation rates in selected indicators from Young Lives surveys and nationally representative surveys (%)*

Indicators	12 years old (2006)	15 years old (2009)	MICS (2006)	VHLSS (2008)
Children living in a household without electricity	4.85	3.09		4.07
Improper flooring	17.80	13.40	21.95	
Improper roofing	5.77	3.40	9.01	
Children living in a household without a sanitary latrine	41.41	35.05		40.87
Children living in a household without clean water	16.67	10.49		12.92

Source: GSO and UNICEF (2011) and the authors' calculation from Young Lives' data R2 and R3, Older Cohort.

As the table shows, Young Lives rates of deprivation of electricity, water and sanitation are only slightly different from those calculated from VHLSS 2008. Therefore, the Young Lives data compare well with the nationally representative data in these indicators. However, differences in the rates of improper flooring and roofing from nationally representative

5 Since the start of the Young Lives study, Andhra Pradesh state has been split into Andhra Pradesh (new) and Telengana states.

6 Since the start of the Young Lives study, some communes/wards have been split and the number has increased to 35.

samples are more pronounced, especially the roofing one. Therefore, Young Lives data are capable of reflecting the national situation in a number of aspects, but not all.

3.4. Selecting the dimensions for a multidimensional poverty index

A crucial step in constructing an MPI is to select the informational basis for the indices. Scholars may take as 'inputs' capability, i.e. 'ability to do or be something' (Saith 2001: 7). Another approach is to define poverty status based on 'functionings', i.e. achievements in different aspects of people's life. For each approach, a set of dimensions and indicators are consequently defined. However, in the case of children, the capability approach has the critical disadvantage that children do not fully control their capability. To put it another way, their realisation of capability into outcomes is affected by environmental factors such as family or community (MOLISA et al. 2008). Therefore, we adapt the choice of dimensions made by MOLISA et al. in their report – which is based on the functioning approach. This work has been regarded as one of the most comprehensive multidimensional child poverty studies in Vietnam, and we want to ensure comparability with it where possible.

The MOLISA et al. report defines several steps in the selection of dimensions. In the first step, a list of domains/dimensions was constructed from a concept of child poverty, which is in turn based on the 1989 UNCRC, the basic needs concept used in Vietnam, the general consensus in literature and other general consensuses such as the Millennium Development Goals. Next, participatory processes were used to include the views and opinions of various stakeholders and key informants in Vietnamese society. The final step was to assess data availability. With these steps having been followed, it is safe to say that the domains and indicators are based on a sound theoretical framework as well as 'a fair representation of child poverty in Vietnam' (MOLISA et al. 2008).

The list of dimensions used in the report comprises seven dimensions (education deprivation, health deprivation, shelter deprivation, water and sanitation deprivation, child work, leisure deprivation, social inclusion and protection deprivation) and their corresponding indicators. However, when that list is applied to the dataset used in the current paper, some adjustments need to be made. Firstly, the health indicators in the aforementioned list are only applicable for children aged 2–4 years old. However, nutrition data are available in our data source and they are used as a substitute for the health indicators. Secondly, information on leisure poverty, as measured by indicators in the list (having toys, having at least one book), is not available in our data source. One may look at playing time as an alternative indicator of the leisure dimension. However, it does not properly reflect the leisure status of children, as it is frequently the case that children in poor households may report higher playing time because they do not spend appropriate time studying. Therefore, this dimension is excluded. Furthermore, social protection is measured by the status of the household head but information for identifying household heads is not available in Round 3 of the Young Lives survey and this dimension is also excluded from our study. The dimensions included in our investigation as well as their indicators are listed in Table 2.

Table 2. *Dimensions and indicators*

Dimensions	Indicators	Deprivation cut-offs/Notes
1 Education	Children not strictly following the normal educational progress in terms of age	The normal educational progress is defined as children enrolled at school at the age of 6 and completing a grade per year
	Children not strictly following the normal educational progress in terms of age (or not completing lower secondary school if they've already left school)	See the note above
2 Health	Stunting	Z-score is smaller than −2 and no flag
3 Shelter	Children living in a dwelling without electricity	Self-statement
	Children living in dwelling without proper flooring	Natural/improper floor includes materials as earth, simple bamboo and palm
	Children living in dwelling without proper roofing	Natural roof includes thatch, straw, palm leaf, bamboo tree trunk and wood
4 Water and sanitation	Children living in a dwelling without a hygienic sanitation facility or without a sanitation facility	Hygienic sanitation includes flush toilet, *sulabh* and double-vault compost latrine.
		Toilets directly over water, other facilities or no toilet are considered unhygienic.
	Children not drinking safe drinking water	Safe drinking-water sources include private tap water from inside and outside the house, deep drill wells, hand-dug and reinforced wells, hand-dug, non-reinforced and covered wells, protected springs, rainwater and bought water.
		Unsafe drinking water includes unprotected springs, small water tank, water tank, rivers, lakes and ponds and others
5 Child work	Children that have worked for an employer or in household production	Child work includes having worked for a wage/salary, in household production or trading or in business for the household, regardless of the number of hours or days worked, in the twelve months before the survey.

Source: Adapted from Table 3 and Annex 1 in MOLISA et al. (2008)

As shown in Table 2, some dimensions, such as shelter or water and sanitation, include more than one indicator. Therefore, one has to aggregate deprivations in indicators into deprivations in dimensions. In the current paper, we follow the method of aggregation in the report of MOLISA et al. (2008), namely that children are regarded as deprived in a dimension if they are deprived in one or more indicator(s) of the dimension. For example, a child is considered as deprived in the shelter dimension if he or she lives in a house either without electricity or with improper flooring or roofing.

4. Estimation results

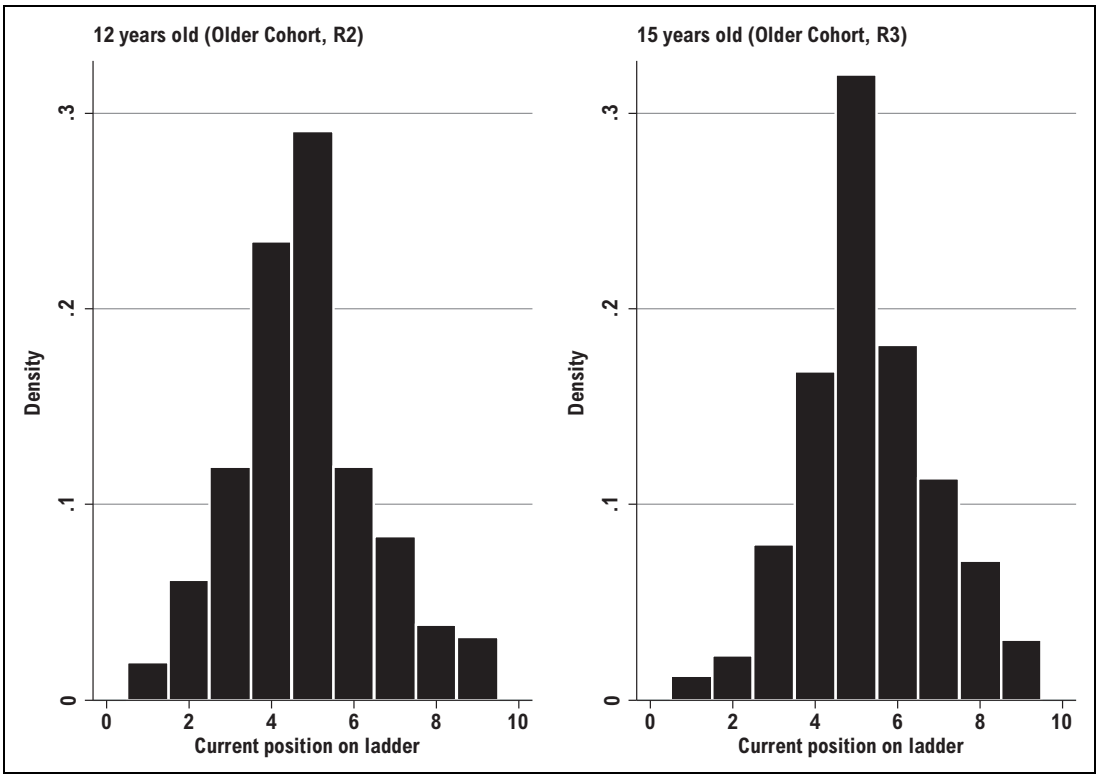
4.1. Data description

Before embarking on the estimation exercise and derivation of weights, it is worth analysing variances in subjective well-being and shortfalls of children in different dimensions. This kind of analysis provides useful information for model specifications and the formulation of estimation strategies.

For subjective well-being, the question asked in different rounds of the Young Lives survey follows the common ladder form: 'There are nine steps on this ladder. Suppose we say that the ninth step, at the very top, represents the best possible life for you and the bottom represents the worst possible life for you. Where on the ladder do you feel you personally stand at the present time?' Hence, the answers provide ordered data and therefore the higher the step ticked by the respondent, the higher their subjective well-being is.

The distribution of children's answers to the subjective well-being question is presented in Figure 1. For children at the ages of both 12 and 15 years old, the subjective well-being variable roughly follows a normal distribution.

Figure 1. *Distribution of responses to the subjective well-being question by children at the ages of 12 and 15*



Source: Young Lives, R2 and R3, Older Cohort.

Turning to variances in dimensions, Table 3 presents the deprivation rates related to each dimension in each survey round and to the direction of change/transitions between the two rounds, as well as the level of satisfaction associated with each transition. The five

dimensions can be divided into two groups; the first group includes education, health and work, which are measured at the child level; the second group of shelter and water and sanitation are measured at the household level. Consequently, behaviours vary across the two groups. Except for the health dimension, for which we cannot make *a priori* predictions regarding changes over time, deprivation in the two remaining dimensions of the first group is expected to increase as children get older. Meanwhile, deprivation rates in the second group normally improve over time, especially in the case of Vietnam. As depicted in Table 3, changes in deprivations in different dimensions are generally in line with expectations. Prevalence of deprivations in the first group of dimensions increases across the two rounds, by approximately 9 and 4 percentage points for the dimensions of education and child work respectively. Meanwhile, shortfalls in the shelter and water and sanitation dimensions have declined by almost 5 and 9 percentage points respectively.

With regard to transitions, the two groups of dimensions also have different transition patterns. For the group of dimensions measured at the household level, moving into deprivation is limited, with only 2.2 and 4.6 per cent of households/children falling into deprivation in the dimensions of shelter and water and sanitation respectively. By contrast, there is only one direction of falling into deprivation for the education dimension, due to its definition. Meanwhile, variances in both directions are observed for the two other dimensions measured at the child level.

Table 3 also reports the changes in subjective well-being of specific transition groups (deprived in one or both rounds) for each dimension. The pattern of these changes is somewhat in line with expectations for the dimensions of education, water and sanitation and child work, as moving out of or falling into deprivation results in greater or smaller changes in subjective well-being as compared to staying in deprivation or non-deprivation. However, for the health and shelter dimensions, increases in the subjective well-being of children who fall into poverty are higher than of those who stay free of deprivations, even if the differences are statistically insignificant. This may indicate changes in the preferences of children over time.

Table 3. *Incidences of deprivations in Rounds 2 and 3, transition direction and related level of satisfaction (%)*

Dimension	Round 2	Round 3	PP	Change	PN	Change	NP	Change	NN	Change
Education deprivation	17.0	26.6	17.1	0.8	0		9.5	−0.24	73.3	0.52
Nutrition deprivation	29.5	23.7	17.5	0.57	12.5	0.85	6.1	0.64	63.9	0.42
Shelter deprivation	19.6	14.7	12.6	0.36	7.3	1.09	2.2	1.16	77.9	0.48
Water and sanitation deprivation	45.7	36.9	32.5	0.58	13.8	0.87	4.6	−0.02	49.4	0.43
Child work	33.7	38.2	20	0.56	14.1	0.88	18.2	0.4	47.7	0.42

PP: Deprived in both rounds; PN: Deprived in Round 2, non-deprived in Round 3; NP: Non-deprived in Round 2, deprived in Round 3; NN: Non-deprived in both rounds; Change: Absolute changes in subjective well-being across rounds with the 9-step-ladder measure.

Four children with an abnormal change in the education deprivation status (from deprived to non-deprived) are dropped from the sample.

Source: Authors' calculation from Young Lives data, R2 and R3, Older Cohort.

In short, the patterns of changes in deprivations in dimensions vary: improvements are observed for dimensions measured at the household level and increases are found for dimensions measured at the child level. Furthermore, deprivations in the three dimensions of education, shelter, and water and sanitation mainly change in only one direction. Meanwhile, the subjective well-being assessments are unusual for some sub-groups of children who experience specific transitions: falling into deprivation in health or shelter resulted in larger increases in subjective well-being than staying in the non-deprivation status category.

4.2. Estimation strategy

The estimation strategy relies on cross-sectional analysis as well as on panel analysis. In the cross-sectional analysis, we estimate equation (3) with ordered logit models using data collected in Rounds 2 and 3. To control for heterogeneity in the 'frame of reference', as discussed in Section 3.2, characteristics of the children that are likely to shape their 'frame of reference' are introduced in the model, including gender, living area (urban versus rural), ethnicity[7] and religion. The educational aspiration of the children as a proxy for the overall aspiration is also included in the model.[8] However, unobserved characteristics may affect the level of subjective well-being and their omission could lead to an endogeneity bias in the estimation of the coefficients β_j, ∂_{jq}. To address this issue, a fixed-effects model is also estimated in an attempt to eliminate the bias generated by unobserved time-invariant characteristics. However, fixed-effects models raise other concerns, which shall be detailed in Section 4.2.2.

4.2.1 Cross-sectional estimation

We aim to derive weights as generally as possible. This advocates for aggregating the two rounds together. However, it makes sense only if the preferences of the children do not change over time or, in other words, only if judgements of the base group captured by the second component in equation (3) and differences in judgements across sub-groups captured by the interactions between deprivations and individual characteristics as the third component in equation (3) are the same over time. For this reason, we firstly do estimations for the two age groups separately.

An exclusion test was conducted for the interaction variables and only significant interaction variables were kept at the final stage of estimation. Results of the estimation of equation (3) with full interactions and the model after dropping insignificant interactions are given in Table 4.[9] Statistics of the log likelihood ratio test and critical values for rejecting the hypothesis of the exclusions are provided at the bottom of the columns. All statistical values are smaller than the critical values so exclusions of insignificant interaction variables do not cause econometrical problems.

7 Vietnam has 54 ethnic groups and Kinh is the majority. Ethnic minority groups are often less economically developed than the majority. However, the level of development of the Hoa group is comparable with that of the Kinh. Therefore, we group Hoa with Kinh to form the Kinh-Hoa group versus ethnic minorities.

8 To construct children's educational aspirations these questions were used in Rounds 2 and 3 respectively: 'Imagine you had no constraints and could stay at school as long as you liked, what level of formal education would you like to complete?' and 'What level of formal education would you like to complete?'. The educational aspiration is converted into three levels: completing lower secondary school, completing upper secondary school and finishing college/university.

9 To save space, we only present in Table 4 information on coefficients for the dimensions and their interactions, which are of our main interest. The rest of the estimation results (i.e. estimated coefficients for control variables) are provided in Appendix 2.

Table 4. *Estimation results of the coefficient of the dimensions with the cross-sectional models*

	12-year-olds with full interactions (1)	12-year-olds with significant interactions (2)	15-year-olds with full interactions (3)	15-year-olds with significant interactions (4)
Education deprivation	-0.782**	-0.469**	-0.335	-0.403**
	(0.364)	(0.182)	(0.449)	(0.177)
Health deprivation	-0.062	-0.282**	-0.385	-0.155
	(0.330)	(0.142)	(0.392)	(0.145)
Shelter deprivation	-0.477	-0.897***	-0.870*	-0.831***
	(0.362)	(0.203)	(0.468)	(0.231)
Water and sanitation deprivation	-0.266	0.091	-0.319	-0.553***
	(0.497)	(0.463)	(0.508)	(0.162)
Child work	0.078	-0.376***	-0.837**	-0.283*
	(0.373)	(0.130)	(0.426)	(0.145)
Education deprivation*Boy	0.202		0.196	
	(0.379)		(0.321)	
Education deprivation*Urban	0.546		-0.750	-0.848**
	(0.841)		(0.506)	(0.395)
Education deprivation*Religion	-1.436*	-1.209*	-0.263	
	(0.842)	(0.685)	(0.694)	
Education deprivation*Kinh-Hoa	0.166		-0.244	
	(0.379)		(0.475)	
Health deprivation*Boy	-0.412		0.355	
	(0.281)		(0.288)	
Health deprivation*Urban	-0.210		-0.324	
	(0.459)		(0.397)	
Health deprivation*Religion	-0.404		0.188	
	(0.871)		(0.843)	
Health deprivation*Kinh-Hoa	0.018		0.107	
	(0.346)		(0.390)	
Shelter deprivation*Boy	-0.127		-0.092	
	(0.338)		(0.418)	
Shelter deprivation*Kinh-Hoa	-0.526		0.085	
	(0.405)		(0.491)	
Water and sanitation deprivation*Boy	0.265		-0.094	
	(0.287)		(0.293)	
Water and sanitation deprivation*Religion	-0.098		-0.409	
	(0.862)		(0.672)	
Water and sanitation deprivation*Kinh-Hoa	-0.853*	-1.093**	-0.203	
	(0.504)	(0.489)	(0.516)	
Child work*Boy	-0.359		0.009	
	(0.248)		(0.279)	
Child work*Urban	-0.426		-0.173	
	(0.375)		(0.587)	
Child work*Religion	0.788		0.401	
	(0.817)		(0.626)	
Child work*Kinh-Hoa	-0.304		0.606	
	(0.375)		(0.428)	
Observations	967	967	930	930
Log pseudo likelihood	-1708.311	-1714.309	-1645.374	-1648.4
Pseudo R2	0.070	0.067	0.049	0.0467
Wald chi2	271.47	252.98	180.79	172.48
Prob> chi2	0	0	0	0
Values of log likelihood ratio statistics		11.996		6.051
Number of interactions dropped		15		16
Critical values		24.996		26.296

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Three interactions of shelter and urban and religion and water and sanitation and urban, which have 10 or fewer observations, are excluded.

Source: Authors' estimation from Young Lives data, R2 and R3.

At first glance, the results of the two age groups are significantly different. There are two significant interaction variables for the 12-year-old group, which are education deprivation with the dummy for having a religion, and water/sanitation deprivation with the dummy for belonging to an ethnic minority. For the 15-year-old group, the interaction variable between education deprivation and living area is significant. From this result, we can draw the conclusion that preferences vary across groups and are not stable over time, as discussed in Section 4.1. The significant interaction variables indicate that we have four different preferences for sub-groups in terms of religion and ethnicity and two different preferences for sub-groups in terms of living area for the 12-year-old and 15-year-old groups respectively. Consequently, the test for combination is not necessary and we should estimate the models as well as the weights for each age group separately.

4.2.2 Panel estimation

To overcome a potential endogeneity bias in the estimation of parameters in model (3) that is due to unobserved time-invariant characteristics, we rely on fixed-effects models as well. However, it should be noted that fixed-effects models with discrete dependent variables suffer from the problem of incidental parameters. A number of estimation procedures have been proposed to overcome the problem for the ordered logit model (Dickerson et al. 2011). The current paper uses the procedure suggested by Baetschmann et al. (2011, 2013) as it can work effectively in the case of a small number of observations in specific values of the dependent variable. However, this method is inefficient compared to other methods of minimum distance or generalised methods of moments (Baetschmann et al. 2013).

Another limitation of applying fixed-effects models to our case is that changing patterns of some predictor variables vary greatly across children but have limited variations over time for each child. Specifically, in all dimensions except the dimension of child work, fewer than 20 per cent of children have changed their deprivation status between the two rounds. Furthermore, for three out of five dimensions, changes mainly happened in one direction, as noted in Section 4.1. As fixed-effect models only exploit the within-individual differences, they are very likely to be imprecise and to have large standard errors (Allison 2009). This inefficiency does not only lead to large standard errors but also to unreliable estimates that might be far away from the true relationship (Plümper and Troeger 2007).

Appendix 3 shows the results of the fixed-effect estimation. As expected, standard errors are very large. In particular, for education deprivation, estimates become insignificant, even if education deprivation plays a crucial role in the subjective well-being assessment, according to the cross-section analysis.

As highlighted by Allison (2009), a trade-off between bias and efficiency has to be found. Given these problems with the fixed-effect results and because the deprivation status varies greatly across children, while exhibiting little variation over time for each child, we decide to derive weights from results of the cross-sectional estimation. In addition, one may suspect that bias due to the omitted variable may be small because the introduction of the variable of educational aspirations should capture the effect of most of the unobserved traits of the children that can affect the subjective well-being assessment.

4.3. Estimated weights

Columns (2) and (4) of Table 4 present final estimation results of the associations between subjective well-being and achievements in dimensions for 12-year-old and 15-year-old children respectively. These results shall be employed to derive weights via equation (5).

We can observe that almost all estimated coefficients are statistically significant at conventional levels. In Column (2), only the coefficient for water and sanitation deprivation is statistically insignificant. Because the ethnic minority belonging is the base group, the insignificance of this variable can be attributed to the small number of children from ethnic minority groups who are living in households with improved water and sanitation (only 15 observations). It is more difficult to explain the insignificance of the coefficient for the health dimension in the estimation results for the 15-year-old children. Possibly, children have adapted to their long-term health status, as captured by the stunting indicator, and they may not attach importance to this status as they grow up.

Inserting the estimated coefficients of the Columns (2) and (4) into equation (5), we can derive weights for different groups of children, as presented in Table 5. Because there are two significant interaction variables – education deprivation with religion; water/sanitation deprivation with ethnicity – in the estimation results for 12-year-old children, we have different sets of weights for four sub-groups of children, defined by their religion status and ethnicity. However, there are only seven ethnic minority children belonging to a religion. Thus, weight calculation for this sub-group of children does not make sense. Weights are therefore calculated for three sub-groups of 12-year-olds. In the same vein, a very small number of 12-year-old ethnic minority children were living in households with improved water and sanitation. Hence, weights are calculated for this group by including only four dimensions out of five i.e. by excluding the dimension of water and sanitation. Meanwhile, two sub-groups of 15-year-old children – those living in rural areas and those residing in urban areas – secure enough observations to derive weights.

For the 12-year-old ethnic minority children, the shelter dimension receives the highest weight, followed by the education dimension, the child work, and then the health dimension, as shown in column (A) of Table 5. For the 12-year-old Kinh-Hoa children who do not belong to a religion, which constitutes the largest group, the dimension of water and sanitation is introduced and it has the highest weight, even if the weight associated with shelter deprivation is very close (column (B) of Table 5). The order of the remaining dimensions is the same as that observed for 12-year-old ethnic minority children (education, child work, and then health deprivation). However, belonging to a religion changes the preferences for education for the 12-year-old Kinh-Hoa children. These children value education much more, which is reflected by the highest weight being given to the education dimension compared to the third-highest weight for their counterparts who do not belong to a religion. Water and sanitation is the second most important dimension, followed once again by shelter, and then child work and health. However, the weak number of observations for this group of children casts a shadow of doubt over the robustness of these results.

Table 5. *Estimated weights*

Dimensions	12-year-old children			15-year-old children	
	Ethnic minority and not belonging to a religion	Kinh-Hoa and not belonging to a religion	Kinh-Hoa and belonging to a religion	Rural	Urban
	(A)	(B)	(C)	(D)	(E)
Education	1.159	0.775	1.981	0.906	2.036
Health	0.697	0.466	0.333	0.347	0.252
Shelter	2.216	1.482	1.059	1.867	1.352
Water and sanitation	N/A	1.656	1.183	1.243	0.900
Child work	0.929	0.621	0.444	0.636	0.461
Number of observations	**120**	**784**	**57**	**745**	**185**

Source: Authors' estimation from Young Lives data, R2 and R3.

Two sets of weights for 15-year-old children have been estimated separately according to the rural or urban living areas (presented in Columns (D) and (E) of Table 5 respectively). The 15-year-old children living in rural areas do not attach the same importance to water and sanitation deprivation and shelter deprivation as the 12-year-old Kinh-Hoa children without religion (the main sub-group of children aged 12). They give the first position to the water and sanitation dimension, and the second one to the shelter dimension, whilst the former group values the shelter dimension the most, and then the water and sanitation dimension. Meanwhile, the order of the remaining dimensions is the same (education, child work and lastly health).

The key difference between 15-year-old children living in urban areas and their counterparts in rural areas is the weight given to the education dimension. Children living in urban areas give an extremely high weight to education and keep the relative order of other dimensions the same as that of their counterparts in the rural areas. Higher educational requirements for jobs, higher educational aspirations of other household members and peer effects in urban areas are potential explanations for this result. In addition, preference for education is higher for these children than for the largest group of children aged 12 (Kinh-Hoa without religion). It may indicate that the children become more aware of the importance of education for reaching their life goals as they grow up.

Nevertheless, the salient result of Table 5 is undoubtedly that using equal weights for all dimensions does not reflect the preferences of the children. First, children give much less importance to health deprivation and the fact of working than do the rights-based approaches with equal dimension weighting. Indeed, the weights we obtained for these two dimensions were less than 1, whatever the age and other characteristics of the children. The fact that working does not affect the children's evaluation of their well-being very much may be interpreted in the following way. From the children's perspective, the negative aspects of working can be compensated for by the positive ones: working not only enhances their self-esteem and helps to support their family, but also increases their self-reliance, or their self-confidence, by testing their capacity to ensure a productive adult life. As far as health deprivation is concerned, we have to recall that the health deprivation indicator is based on the nutritional status (stunting) of the child. This status reflects the long-term health trajectory of the child. Consequently, children may align their preferences with their long-term health status, especially if it is shared by their peers.

In order to test the robustness of the result saying that the estimated weights for health and work dimensions are less than 1, we estimate the models (2) and (4) where one of the dimensions is excluded, and this for the two main groups of children (groups (B) and (D) of Table 5). The coefficient of the health (resp. work) dimension did not change significantly when the work (resp. health) dimension was removed from the models and the corresponding weight remained less than 1. The same holds true when the shelter or water and sanitation dimensions are excluded.

Second, children over-evaluate shelter deprivation compared to the equal weight approach. Shelter symbolises their relative socio-economic status in the community and deprivation in this dimension may be a source of stigma. The same appears true for water and sanitation, with the exception of urban 15-year-old children.[10] These results are robust to the change of specification of models (2) and (4). For the 12-year-old Kinh-Hoa children who do not belong to a religion and for the 15-year-old rural children, the coefficient is stable and the estimated weight for shelter deprivation (resp. water and sanitation) remains higher than 1 when the water and sanitation dimension (resp. shelter deprivation) is excluded from models (2) and (4).

Results are less clear for education deprivation, as it depends on the group of children under consideration: compared to the rights-based approach, ethnic minority children or Kinh-Hoa children belonging to a religion over-value education when they are 12 years-old, as do urban 15-year-old children; by contrast, Kinh-Hoa children not belonging to a religion aged 12 and rural 15-year-old children under-value education in their preferences.

Another result is that the frequency-based weight approach, described in Section 2, does not reflect the judgements of the children. Comparing the weights of Table 5 with Appendix 4, which provides deprivation rates for sub-groups of both ages, we can observe that the highest prevalence of shortfalls or deprivations is not systematically associated with the lowest weights, as suggested by this approach. The negative correlation between prevalence of deprivations and weights does not hold for health deprivation or for water and sanitation deprivation. For the health dimension, a relatively low prevalence of deprivation is associated with weak preferences of children, and not with high weight, as expected by the frequency-based weight approach.[11] Water and sanitation deprivation is one of the most severe (except in urban areas) but the importance given by the children to this deprivation is also one of the highest, especially for the 12-year-old children. By contrast, the negative relationship between prevalence of deprivation and weight is observed for the child work and shelter dimensions: children attach a high importance to shelter deprivations, which is one of the less widely shared deprivations among the sample, and they give little importance to child work, which has a relatively high prevalence. Here again, it is difficult to draw a conclusion from the results on education deprivation, as the inverse relationship between prevalence of deprivations and weights is observed for the 12-year-old ethnic minority children and somehow for the 15-year-old children living in the rural areas but not for the other sub-groups. Hence, the inverse link between people's judgements and frequency of deprivation may exist but there are also other factors that influence people's valuations.

10 The lower weight for urban 15-year-old children may be explained by the very few cases of water and sanitation deprivation (around 5 per cent of these children are deprived in this dimension as shown by Appendix 4).

11 The health dimension is ranked second or third according to prevalence of deprivation in a declining scale, and is ranked fourth or fifth according to the level of weight.

To sum up, the children's preferences are not reflected either by the equal weight approach nor by the frequency-based approach. The equal weight approach overstates the importance of child work and health deprivation compared to the children's judgements, and gives too little significance to shelter deprivation and water and sanitation deprivation. The frequency-based approach would give too much importance to health deprivation and not enough importance to water and sanitation deprivation as regards children's preferences.

4.4. Estimates of multidimensional child poverty measurements

In order to make further comparisons of the methodology proposed in this paper, which reflects the preferences of the children, with the rights-based approach with equal weightings, we estimate the Alkire Foster MPI and its components using equal weights, and the sets of weights estimated in the previous section. We conduct these estimations for 12-year-old Kinh-Hoa children who do not belong to a religion and for 15-year-old children living in rural and urban areas, as these constitute the three biggest groups. We also employ two deprivations as the cut-off for defining poverty, the same definition as was used in MOLISA et al. (2008). The results are presented in Table 6.

Table 6. *Estimates of multidimensional child poverty measurements (%)*

	Equal weights			Weights derived from subjective well-being		
	Headcount	Poverty Intensity	MPI	Headcount	Poverty Intensity	MPI
12-year-old Kinh-Hoa children not belonging to a religion	12.75	63.92	8.15	31.5	57.85	18.22
15-year-old rural children	22.72	72.56	16.49	29.06	68.77	19.99
15-year-old urban children	3.19	73.33	2.34	19.68	51.06	10.05

Source: Authors' estimation from Young Lives data

In general, poverty headcount rates with weights derived from subjective well-being are higher than under the equal weight assumption in all three groups, especially for the 15-year-old children living in urban areas, and for the 12-year-old Kinh-Hoa children who do not belong to a religion though to a lesser extent. The difference for 12-year-old Kinh-Hoa children who do not belong to a religion is driven by the dimension of water and sanitation. This dimension is not only the one in which deprivation is most prevalent but it also has the largest weight in the sub-group, and consequently it raises the prevalence of deprivations in general. More specifically, 146 out of 153 children whose status changes from non-poor to poor when the weights derived from subjective well-being are used are deprived in the dimension of water and sanitation. This dimension and, to a lesser extent, the dimension of shelter drive the differences in the poverty headcount for the group of 15-year-old children living in the rural areas as well. Meanwhile, education dimension with its very high weight is the unique factor underlying the increase in the MPI of the 15-year-old children living in urban areas when the weights derived from subjective well-being are applied. Therefore, when the equal weight approach is applied, the prevalence of child poverty is understated mainly because it does not take into account the high priority given by the children to the water and sanitation deprivation and to a lesser extent to the shelter dimension. High preferences for the education dimension among urban children aged 15 also play a key role in understating poverty (if measured with equal weights) among this group.

5. Conclusion

The current paper aims at deriving a new and justifiable set of weights for dimensions in multidimensional poverty indices for children in Vietnam, by adopting a child-focused perspective that reflects particular value judgements of children on what is a 'good life'. The theoretical arguments demonstrate that the association between the children's subjective well-being and achievements in dimensions included in the multidimensional poverty indices can reveal children's judgements on these dimensions. Weights can be subsequently derived from this association. Five dimensions are included in the analysis: education, health, shelter, water and sanitation, and child work. The selection of these dimensions follows the 2008 MOLISA et al. report on applying a multidimensional approach to the measurement of child poverty in Vietnam.

To estimate the association between the subjective well-being of the children in our sample and their deprivation status in these five dimensions, we rely on both cross-sectional and panel analysis. However, limited variances of predictors for each child, and one-way changes of the deprivation status over time increase the standard errors of estimates in the panel model with fixed effects. This is the reason for the poor performance of the panel model. Consequently, cross-sectional ordered logit models are used to derive weights. In order to limit potential bias in the estimation due to unobserved heterogeneities across children, educational aspirations have been included in the estimation model as a proxy for overall aspirations.

A first result is that children's judgement about what is a 'good life' not only changes over time but also varies across different sub-groups of children. Preferences depend on the age, religion, ethnicity or rural/urban living area. At the age of 12, religion is the main characteristic altering orders of preferences. At the age of 15, differences in preferences are driven by the living areas, urban versus rural. Thus the supposition of universality of judgement implicit in the equal weight approach proves to be a very strong assumption. However, translating this result into policy can be hazardous, as it could be practically and ethically difficult to set different criteria for defining poverty across sub-groups of children.

More importantly, this paper demonstrates that the derived weights are not equal across dimensions, as long as children's perspectives are taken into account. Hence, using equal weights for all dimensions does not reflect the judgement of children. Children give much less importance to long-term health deprivation, measured by the incidence of stunting, and to child work than does a rights-based approach with equal weights. By contrast, they attach more importance to shelter deprivation and water and sanitation deprivation than does the equal weight approach. Children then attach more importance to deprivations which impact immediately on their well-being than to deprivations which may affect their well-being negatively in the long term. An exception is education, which is highly valued by older urban children in particular.

As a consequence, the headcount poverty rates for children that are calculated on the basis of the weights derived from subjective well-being are larger than the ones derived on the assumption of equal weights. This result is mostly driven by the relatively high weights that children give to the dimension of water and sanitation and its high prevalence and the very high weight given to the education dimension by 15-year-old children living in urban areas. Therefore, using equal weights in the calculation of the MPI leads to the incidence of child poverty being understated, as compared to the approach based on the children's

judgements. Policymakers need, therefore, to question the implicit assumptions behind the normative approach they have adopted in the way they calculate the poverty rate for children in Vietnam, as it will exclude from the poverty reduction policy children who would be deemed poor if their own perspective was taken into account.

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Appendix 1. Deriving weights

The MRS across dimensions when (4) is estimated with the ordered logit model can be derived and it does not depend on specific values of dependent or independent variables.

The probability of a given observation having *i*th category of the dependent variable for ordered logit is:

$$p_{ij} = \Pr(y_j = i) = \Pr\left(k_{i-1} < \sum_{j=1}^{k} D_{ij}\beta_j + \sum_{j=1}^{k}\sum_{q=1}^{c} D_{ij}C_q\partial_{jq} + u < k_i\right) =$$

$$\frac{1}{1+\exp\left(-k_i+\sum_{j=1}^{d} D_{ij}\beta_j+\sum_{j=1}^{d}\sum_{q=1}^{c} D_{ij}C_q\partial_{jq}\right)} - \frac{1}{1+\exp\left(-k_{i-1}+\sum_{j=1}^{d} D_{ij}\beta_j+\sum_{j=1}^{d}\sum_{q=1}^{c} D_{ij}C_q\partial_{jq}\right)} \quad (6)$$

where k_{i-1} and k_i are cut-off points of *i*th category of the dependent variable.

As definition, MRS between dimensions D_m and D_n is: $(p_{ij})'_{D_m} \Big/ (p_{ij})'_{D_n}$ (7)

We have the derivative of p_{ij} with respect to D_m as:

$$(p_{ij})'_{D_m} = \left(\frac{1}{1+\exp\left(-k_i+\sum_{j=1}^{d} D_{ij}\beta_j+\sum_{j=1}^{d}\sum_{q=1}^{c} D_{ij}C_q\partial_{jq}\right)} - \frac{1}{1+\exp\left(-k_{i-1}+\sum_{j=1}^{d} D_{ij}\beta_j+\sum_{j=1}^{d}\sum_{q=1}^{c} D_{ij}C_q\partial_{jq}\right)}\right)'_{D_m} =$$

$$-\frac{\left(1+\exp\left(-k_i+\sum_{j=1}^{d} D_{ij}\beta_j+\sum_{j=1}^{d}\sum_{q=1}^{c} D_{ij}C_q\partial_{jq}\right)\right)'_{D_m}}{\left(1+\exp\left(-k_i+\sum_{j=1}^{d} D_{ij}\beta_j+\sum_{j=1}^{d}\sum_{q=1}^{c} D_{ij}C_q\partial_{jq}\right)\right)^2} + \frac{\left(1+\exp\left(-k_{i-1}+\sum_{j=1}^{d} D_{ij}\beta_j+\sum_{j=1}^{d}\sum_{q=1}^{c} D_{ij}C_q\partial_{jq}\right)\right)'_{D_m}}{\left(1+\exp\left(-k_{i-1}+\sum_{j=1}^{d} D_{ij}\beta_j+\sum_{j=1}^{d}\sum_{q=1}^{c} D_{ij}C_q\partial_{jq}\right)\right)^2} =$$

$$-\frac{\left(\beta_m+\sum_{q=1}^{c} C_q\partial_{mq}\right)\left(\exp\left(-k_i+\sum_{j=1}^{d} D_{ij}\beta_j+\sum_{j=1}^{d}\sum_{q=1}^{c} D_{ij}C_q\partial_{jq}\right)\right)}{\left(1+\exp\left(-k_i+\sum_{j=1}^{d} D_{ij}\beta_j+\sum_{j=1}^{d}\sum_{q=1}^{c} D_{ij}C_q\partial_{jq}\right)\right)^2} +$$

$$\frac{\left(\beta_m+\sum_{q=1}^{c} C_q\partial_{mq}\right)\left(\exp\left(-k_{i-1}+\sum_{j=1}^{d} D_{ij}\beta_j+\sum_{j=1}^{d}\sum_{q=1}^{c} D_{ij}C_q\partial_{jq}\right)\right)}{\left(1+\exp\left(-k_{i-1}+\sum_{j=1}^{d} D_{ij}\beta_j+\sum_{j=1}^{d}\sum_{q=1}^{c} D_{ij}C_q\partial_{jq}\right)\right)^2} =$$

$$-\left(\beta_m + \sum_{q=1}^{c} C_q\partial_{mq}\right)\left(\frac{\exp\left(-k_i+\sum_{j=1}^{d} D_{ij}\beta_j+\sum_{j=1}^{d}\sum_{q=1}^{c} D_{ij}C_q\partial_{jq}\right)}{\left(1+\exp\left(-k_i+\sum_{j=1}^{d} D_{ij}\beta_j+\sum_{j=1}^{d}\sum_{q=1}^{c} D_{ij}C_q\partial_{jq}\right)\right)^2} -\right.$$

$$\left.\frac{\exp\left(-k_{i-1}+\sum_{j=1}^{d} D_{ij}\beta_j+\sum_{j=1}^{d}\sum_{q=1}^{c} D_{ij}C_q\partial_{jq}\right)}{\left(1+\exp\left(-k_{i-1}+\sum_{j=1}^{d} D_{ij}\beta_j+\sum_{j=1}^{d}\sum_{q=1}^{c} D_{ij}C_q\partial_{jq}\right)\right)^2}\right)$$

Similarly, the derivative of p_{ij} with respect to D_n is:

$$-\left(\beta_n + \sum_{q=1}^{c} C_q\partial_{nq}\right)\left(\frac{\exp\left(-k_i+\sum_{j=1}^{d} D_{ij}\beta_j+\sum_{j=1}^{d}\sum_{q=1}^{c} D_{ij}C_q\partial_{jq}\right)}{\left(1+\exp\left(-k_i+\sum_{j=1}^{d} D_{ij}\beta_j+\sum_{j=1}^{d}\sum_{q=1}^{c} D_{ij}C_q\partial_{jq}\right)\right)^2} -\right.$$

$$\left.\frac{\exp\left(-k_{i-1}+\sum_{j=1}^{d} D_{ij}\beta_j+\sum_{j=1}^{d}\sum_{q=1}^{c} D_{ij}C_q\partial_{jq}\right)}{\left(1+\exp\left(-k_{i-1}+\sum_{j=1}^{d} D_{ij}\beta_j+\sum_{j=1}^{d}\sum_{q=1}^{c} D_{ij}C_q\partial_{jq}\right)\right)^2}\right)$$

Hence, the MRS between D_m and D_n:

$$MRS_{D_m/D_n} = \frac{\beta_m+\sum_{q=1}^{c} C_q\partial_{mq}}{\beta_n+\sum_{q=1}^{c} C_q\partial_{nq}} \quad (8)$$

Recalling that the MRS between D_m and D_n in (3) is: ${}^{w_m}/_{w_n}$

from (10), we have: $${}^{w_m}/_{w_n} = \frac{\beta_m + \sum_{q=1}^{c} c_q \partial_{mq}}{\beta_n + \sum_{q=1}^{c} c_q \partial_{nq}} \quad (9)$$

We have q-1 MRS, and recalling the nested condition that $\sum_{j=1}^{d} w_j = q$, we have a system of q equations. Solving the system of equation, we have:

$$w_j = \frac{d\left(\beta_j + \sum_{q=1}^{c} c_q \partial_{jq}\right)}{\sum_{j=1}^{d} \beta_j + \sum_{j=1}^{d} \sum_{q=1}^{c} c_q \partial_{jq}} \quad (10)$$

Appendix 2. Estimation results of other controlling variables

VARIABLES	12-year-olds with full interactions (1)	12-year-olds with significant interactions (2)	15-year-olds with full interactions (3)	15-year-olds with significant interactions (4)
Gender of children: Male	0.126	0.004	-0.228	-0.144
	(0.181)	(0.116)	(0.174)	(0.121)
Living area: Urban	-0.610**	-0.624***	0.185	0.099
	(0.242)	(0.216)	(0.231)	(0.212)
Northern Uplands	-0.064	-0.005	0.072	0.076
	(0.201)	(0.199)	(0.187)	(0.183)
Red River Delta	0.753***	0.784***	0.183	0.173
	(0.216)	(0.215)	(0.182)	(0.179)
Mekong River Delta	1.064***	1.008***	0.620***	0.578***
	(0.253)	(0.234)	(0.214)	(0.204)
Belonging a religion	0.463	0.525*	0.356	0.348
	(0.298)	(0.269)	(0.302)	(0.230)
Kinh-Hoa	0.597	0.561	0.195	0.421*
	(0.507)	(0.465)	(0.515)	(0.244)
Education aspiration – Lower secondary	-0.768***	-0.747***	-0.139	-0.129
	(0.262)	(0.244)	(0.303)	(0.286)
Education aspiration – Upper secondary	-0.120	-0.152	-0.299*	-0.325**
	(0.180)	(0.173)	(0.169)	(0.165)
Cut1	-4.543***	-4.582***	-5.131***	-4.874***
	(0.559)	(0.538)	(0.605)	(0.415)
Cut2	-2.929***	-2.981***	-4.072***	-3.817***
	(0.543)	(0.520)	(0.562)	(0.329)
Cut3	-1.739***	-1.798***	-2.690***	-2.443***
	(0.521)	(0.501)	(0.536)	(0.306)
Cut4	-0.399	-0.465	-1.459***	-1.218***
	(0.518)	(0.498)	(0.534)	(0.302)
Cut5	1.053**	0.978**	0.075	0.311
	(0.519)	(0.498)	(0.536)	(0.301)
Cut6	1.885***	1.806***	1.048*	1.279***
	(0.521)	(0.500)	(0.538)	(0.306)
Cut7	2.831***	2.748***	1.962***	2.188***
	(0.524)	(0.503)	(0.542)	(0.313)
Cut8	3.685***	3.599***	3.302***	3.526***
	(0.537)	(0.515)	(0.552)	(0.343)

Source: Authors' estimation from Young Lives data, R2 and R3.

Note: Column numbers are matched with those in Table 4.

Appendix 3. Estimation result of the fixed-effects panel model

VARIABLES	Fixed-effect model – full interactions (1)	Fixed-effect model – dropping insignificant interactions (2)
Education deprivation	0.516	0.019
	(1.444)	(0.383)
Health deprivation	-0.265	-0.388*
	(0.573)	(0.205)
Shelter deprivation	-1.767**	-0.559*
	(0.879)	(0.298)
Water and sanitation deprivation	-0.789	-0.820***
	(0.536)	(0.228)
Child work	-0.559	-0.234
	(0.455)	(0.156)
Education aspiration – Lower secondary	-0.247	-0.281
	(0.363)	(0.371)
Education aspiration – Upper secondary	0.100	0.073
	(0.199)	(0.199)
Education deprivation*Boy	-0.488	
	(1.118)	
Education deprivation*Urban	-0.938	
	(0.829)	
Education deprivation*Kinh-Hoa	0.172	
	(1.028)	
Health deprivation*Boy	0.146	
	(0.447)	
Health deprivation*Urban	0.486	
	(0.581)	
Health deprivation*Kinh-Hoa	-0.279	
	(0.631)	
Shelter deprivation*Boy	0.137	
	(0.594)	
Shelter deprivation*Boy	0.328	
	(1.332)	
Shelter deprivation*Kinh-Hoa	1.312	
	(0.877)	
Water and sanitation deprivation*Boy	0.514	
	(0.447)	
Water and sanitation deprivation*Urban	-0.785	
	(1.393)	
Water and sanitation deprivation*Kinh-Hoa	-0.285	
	(0.564)	
Child work*Boy	-0.091	
	(0.319)	
Child work*Urban	-0.091	
	(0.457)	
Child work*Kinh-Hoa	0.448	
	(0.445)	
Observations	2,924	2,924
Log pseudo likelihood	-964.08315	-973.934
Pseudo R2	0.0486	0.0389
Wald chi2	35.83	23.90
Prob> chi2	0.0317	0.0012
Values of log likelihood ratio statistics		19.7017
Number of interactions dropped		15
Critical values		24.99579

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Four children with an abnormal change in the education deprivation status (from deprived to non-deprived) are dropped from the estimation sample.

Source: Authors' estimation from Young Lives data, R2 and R3.

Appendix 4. Deprivations of sub-groups

Dimension	12-year-old children			15-year-old children	
	Ethnic minority and not belonging to a religion	Kinh-Hoa and not belonging to a religion	Kinh-Hoa and belonging a religion	Rural	Urban
Education deprivation	53.33	11.06	24.14	27.11	18.38
Health deprivation	61.67	25.4	15.52	25.37	19.46
Shelter deprivation	47.5	15.84	10.34	17.85	2.70
Water and sanitation deprivation	87.5	40.37	27.59	44.97	4.86
Child work	72.5	28.7	18.97	42.15	18.92

Source: Authors' calculation from Young Lives data, R2, R3.

Weighting Deprivations using Subjective Well-being: An Application to the Multidimensional Child Poverty Index in Vietnam

As India comes close to realising universal enrolment at primary and upper primary levels, the universalisation of secondary education has become critical if the country is to achieve equitable social development and build a skilled workforce. The Rashtriya Madhyamik Rashtriya Shiksha Abhiyan (the National Mission for Secondary Education) was launched to increase access and improve quality, but in 2013/14 only 46 per cent of children were enrolled in secondary school. This mixed-methods paper uses Young Lives longitudinal data to explore factors affecting completion of secondary education.

We find that a multitude of factors across the household, individual, educational and social demographic domains affect children's secondary school completion.

- Girls remain disadvantaged and are 45 per cent less likely to complete secondary education than boys.
- Children with good reading skills at the age of 8 were found to be 1.7 times more likely and children with good writing skills were 3.3 times more likely to complete secondary education than children who had relatively poor reading or writing skills at age 8.
- Children with a higher self-efficacy index are found to be nearly 1.7 times more likely to successfully progress through secondary education than children with low self-efficacy.
- Children who spent three or more hours per day doing domestic chores at age 12 were 70 per cent less likely to complete secondary education, while those who did paid work at age 12 were 54 per cent less likely to get a secondary school certificate.

The fact that boys are almost twice as likely as girls to complete secondary education requires urgent policy attention, particularly in rural areas. Much more attention needs to be given to pre-school education and literacy skills in the early primary years, since there is a strong co-relation with the completion of secondary education. It is also important that children in primary school are not drawn into paid work, since this has a detrimental effect on their long-term schooling – and lowers the chances that they will complete secondary education.

Young Lives
An International Study of Childhood Poverty

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About Young Lives

Young Lives is an international study of childhood poverty, involving 12,000 children in 4 countries over 15 years. It is led by a team in the Department of International Development at the University of Oxford in association with research and policy partners in the 4 study countries: Ethiopia, India, Peru and Vietnam.

Through researching different aspects of children's lives, we seek to improve policies and programmes for children.

Young Lives Partners

Young Lives is coordinated by a small team based at the University of Oxford, led by Professor Jo Boyden.

- *Ethiopian Development Research Institute, Ethiopia*
- *Pankhurst Development Research and Consulting plc, Ethiopia*
- *Save the Children (Ethiopia)*
- *Centre for Economic and Social Studies, Hyderabad, India*
- *Save the Children India*
- *Sri Padmavathi Mahila Visvavidyalayam (Women's University), Andhra Pradesh, India*
- *Grupo de Análisis para el Desarollo (GRADE), Peru*
- *Instituto de Investigación Nutricional, Peru*
- *Centre for Analysis and Forecasting, Vietnamese Academy of Social Sciences, Vietnam*
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