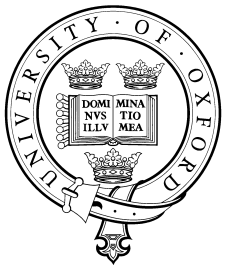
Oxford Poverty & Human Development Initiative (OPHI)
Oxford Department of International Development
Queen Elizabeth House (QEH), University of Oxford



OPHI WORKING PAPER NO. 79

A Multidimensional Poverty Index for Latin America

Maria Emma Santos*, Pablo Villatoro**, Xavier Mancero*** and Pascual Gerstenfeld****

January 2015

Abstract
This paper proposes a new Multidimensional Poverty Index for Latin America (MPI-LA). The index builds upon the rich tradition in poverty measurement in the region in terms of both the Unsatisfied Basic Needs (UBN) approach and the Poverty Line approach and the recent conceptual and methodological developments in the area of multidimensional poverty measurement. The index combines monetary and non-monetary indicators, includes some new indicators not typically used in the region, and updates deprivation cutoffs for certain traditional UBN indicators, aiming to maximize regional comparability within the data constraints. The index is estimated for 17 countries of the region

* Maria Emma Santos: Instituto de Investigaciones Económicas y Sociales del Sur (IIES), Departamento de Economía, Universidad Nacional del Sur (UNS) – Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), 12 de Octubre 1198, 7 Piso, 8000 Bahía Blanca, Argentina. Oxford Poverty and Human Development Initiative, University of Oxford. msantos@uns.edu.ar; maria.santos@qeh.ox.ac.uk.

** Pablo Villatoro: Comision Economica para America Latina y el Caribe (CEPAL), División de Estadísticas. . Dag Hammarskjöld 3477, Vitacura, Santiago, Chile. pablo.villatoro@cepal.org.

*** Xavier Mancero: Comision Economica para America Latina y el Caribe (CEPAL), División de Estadísticas. . Dag Hammarskjöld 3477, Vitacura, Santiago, Chile. xavier.mancero@cepal.org .

**** Pascual Gerstenfeld: Comision Economica para America Latina y el Caribe (CEPAL), División de Estadísticas. Pascual. . Dag Hammarskjöld 3477, Vitacura, Santiago, Chile. pascual.gerstenfeld@cepal.org

This study has been prepared as a joint activity of OPHI and the Economic Commission for Latin America and the Caribbean (ECLAC), under the framework of the cooperation agreement between both institutions and within OPHI team on Multidimensional Poverty Measurement. Any opinions and views on policy expressed are those of the authors and not necessarily those of CEPAL.

OPHI gratefully acknowledges support from the German Federal Ministry for Economic Cooperation and Development (BMZ), Praus, national offices of the United Nations Development Programme (UNDP), national governments, the International Food Policy Research Institute (IFPRI), and private benefactors. For their past support OPHI acknowledges the UK Economic and Social Research Council (ESRC)/(DFID) Joint Scheme, the Robertson Foundation, the John Fell Oxford University Press (OUP) Research Fund, the Human Development Report Office (HDRO/UNDP), the International Development Research Council (IDRC) of Canada, the Canadian International Development Agency (CIDA), the UK Department of International Development (DFID), and AusAID.

ISSN 2040-8188 ISBN 978-19-0719-466-5

in two points in time – one around 2005 and the other around 2012. Overall, we estimate about 28% of people are multidimensionally poor in 2012 in the region, although with great variability across countries. An encouraging result is that we find statistically significant reductions of poverty in most countries, both in terms of incidence and intensity over the period under analysis. However, important disparities between rural and urban areas remain. Statistical scrutiny of the index suggests that it captures the state of poverty relatively well while maintaining a certain parsimony and being highly robust to changes in weights, indicators, and poverty cutoff.

Keywords: poverty measurement, Latin America, Unsatisfied Basic Needs, Poverty Line.

JEL classification: D31, I32, O54

Acknowledgements
We are grateful to Sabina Alkire, Roberto Angulo Salazar, Ernesto Espíndola, Natalie Gomez, Vivian Milosavljevic, Sonia Montaño, Nieves Rico, Claudia Robles, Jorge Rodríguez, Alejandra Silva, Lucía Scuro, Varinia Tromben and Iliana Vaca-Trigo for valuable comments and suggestions. We would particularly like to acknowledge the use of the Advanced Research Computing (ARC) for intensive computations.

Acronyms:
UBN: Unsatisfied Basic Needs
ECLAC: Economic Commission for Latin America and the Caribbean (CEPAL in Spanish).
MDG: Millennium Development Goals

Citation: Santos, M. E., Villatoro, P., Mancero, X. and Gerstenfeld, P. (2015). "A Multidimensional Poverty Index for Latin America". *OPHI Working Paper* 79, Oxford University.

The Oxford Poverty and Human Development Initiative (OPHI) is a research centre within the Oxford Department of International Development, Queen Elizabeth House, at the University of Oxford. Led by Sabina Alkire, OPHI aspires to build and advance a more systematic methodological and economic framework for reducing multidimensional poverty, grounded in people's experiences and values.

Oxford Poverty & Human Development Initiative (OPHI)
Oxford Department of International Development
Queen Elizabeth House (QEH), University of Oxford
3 Mansfield Road, Oxford OX1 3TB, UK
Tel. +44 (0)1865 271915 Fax +44 (0)1865 281801
ophi@qeh.ox.ac.uk http://www.ophi.org.uk

1. Introduction

The reduction of poverty is an essential aim of national public policies and international agreements. It is not only the first stand-alone Millennium Development Goal (MDG) but also a cross-cutting one. It is also a central element in the discussion on the Post-2015 Development Agenda and many countries have targeted their social policy towards the eradication of poverty.

In this context, the multidimensionality of poverty has been increasingly acknowledged as fundamental to poverty measurement for various reasons. First, there is the recognition that new conceptual frameworks such as the rights approach and the capability approach have gained in the past two decades, fuelled by participatory studies which show that the poor themselves describe their deprivations in terms beyond lack of income (Narayan et al., 2000; UNDP, 2013). Second, new multidimensional poverty measurement methodologies have been recently developed that overcome some of the problems in aggregating different deprivations (Alkire and Foster, 2007, 2011). Third, the MDG themselves represent an international call for a comprehensive look at deprivations in order to reveal the various aspects that are at the core of poverty.

Two levels of multidimensional poverty measures have been recently constructed. On the one hand, there is the global Multidimensional Poverty Index (MPI) (Alkire and Santos, 2010, 2014; UNDP, 2010), an internationally comparable index to measure acute poverty in the developing world in which poverty is understood as a person's inability to meet minimum international standards in indicators related to the MDG and to core functionings.[1] On the other hand, official national multidimensional poverty measures have been released in Mexico (CONEVAL, 2010), Colombia (Angulo et al., 2013) and Chile (Ministerio de Desarrollo Social, 2015) as well as in Bhutan and The Philippines[2]. Other national measures are also under construction, especially in the Latin American region.

In this scenario, we propose a Multidimensional Poverty Index for Latin America (MPI-LA hereafter) and we estimate it for 17 countries in two points in time – one around 2005 and the other around 2012. We intend to cover a gap: an intermediate level between national poverty measures and international poverty ones. National measures are relevant for the particular country, but they might not be applicable to monitoring poverty at the regional level and informing international policies in the region. Similarly, international poverty measures allow cross-country comparisons of widely disparate developing regions,

[1] It is also worth noting that the Oxford Poverty and Human Development Initiative (OPHI) and the Multidimensional

[2] See http://www.mppn.org/areas-of-work/national-poverty-measures/.

but they may fall short of accounting for what is considered to be poor in the Latin American context (Santos, 2014). In fact, Latin America is estimated to be the second least acutely poor (MPI-poor) region in the developing world (Alkire and Santos, 2014).

The need for a Latin American MPI was expressed in Roche and Santos (2013), who explore ways in which the global MPI could be adjusted. In this paper, in line with Santos (2014) and ECLAC (2013), we take a side step from the global MPI and construct this MPI-LA by considering the dimensions and indicators that could be meaningful for the region in particular, building upon the rich regional tradition in poverty measurement. With this index we intend to offer an instrument for monitoring and informing public policy in a cross-country comparable way, replicable over time and relevant for the Latin American population in general.

Of course, the MPI-LA is still far from an ideal poverty measure, primarily due to data constraints. Even though household surveys in the region have made significant progress in the past decades, further advancements are still needed, particularly in view of the post-2015 development agenda. "Data gaps, data quality, compliance with methodological standards and non-availability of disaggregated data are among the major challenges to MDG monitoring" (UN, 2014, p.6) In that sense we hope that rather than being interpreted as a sufficient instrument, the evident limitations of the MPI-LA will foster improvements in data collection in the region in the near future.

The paper is organised as follows. Section 2 briefly presents a historical review and the conceptual framework of the MPI-LA. Section 3 describes the index – the measure on which it is based (the M_0 measure of the Alkire-Foster methodology), the data sources used, the selection of dimensions, indicators and deprivation cutoffs, the weighting structure and the poverty cutoff, and the limitations of the index. Section 4 evaluates the index with respect to three desirable characteristics: comprehensiveness, parsimony, and robustness, finding it suitable in the three aspects. Section 5 presents the main results. Finally, Section 6 concludes. Detailed estimation results are presented as Supplementary Data.

2. Brief Historical Review and Conceptual Framework

Multidimensional approaches to poverty measurement are not new in Latin America. At the beginning of the 80s, ECLAC introduced the Unsatisfied Basic Needs (UBN) method, by which the poor were identified by counting the number of deprivations they experienced. Then, the method started to be used as a complementary method to the Poverty Line (PL) method, i.e. an income poverty measure. It was understood that the PL method did not capture the satisfaction of needs that do not require spending, whereas the UBN method did not capture the failure to satisfy needs that can be satisfied

using income. Quite early, Beccaria and Minujin (1985) and Kaztman (1989) proposed an "integrated method" cross-tabulating the UBN poor with the income poor in a contingency table, also called the bi-dimensional method. Later on, Boltvinik (1992) developed an "Improved Integrated Method to Measure Poverty", which intended to eliminate redundancies between the UBN and PL methods, and aggregated the UBN score with an income deprivation score, thereby obtaining an overall poverty score that was compared against a cutoff score.[3]

During the 90s, it became common in the countries of the region to produce two official measures, income poverty and UBN. In many cases the two were cross-tabulated. However, it must be noted that the selection of the UBN indicators had been based primarily on their association with income poverty and availability in census data rather on normative judgements. Also, the UBN method gave equal weights across indicators, which effectively meant a disproportionate incidence of certain indicators. Moreover, as time passed, the deprivation cutoffs used by the UBN method started to become out-dated. On top of that, the UBN index had axiomatic limitations, as it simply used the headcount ratio, being insensitive to the number of deprivations experienced by the poor.[4]

As mentioned in the Introduction, since year 2000 there has been a renewed interest in multidimensional methods globally and particularly in the Latin American region. This has been influenced by the than of new methodological frameworks such as the human rights approach and the capability approach, which can be better articulated with multidimensional measures rather with the limited income ones. From a capability approach standpoint, poverty measurement based on resources is insufficient as it does not provide information on what people actually do with such resources (Sen, 1985). In turn, from a rights approach perspective, the poor are no longer viewed as people with needs who require help, but as possessors of rights who are entitled to demand particular forms of provision and conduct (Abramovich, 2006).

In light of these frameworks, new measurement methodologies have been developed. Among them is the Alkire-Foster (AF) methodology (2007, 2011, Alkire, Foster et al. 2015), which links the tradition of the counting approach to identifying the poor with the axiomatic approach, generating measures that are sensitive to the number of deprivations the poor experience. Among other advantages, the AF method

[3] Boltvinik's method was applied in Mexico (see Boltvinik 1995 and 1996, for example), but it was not implemented on a broader scale. This is likely because (a) it requires a number of complex estimations, such as those related to time use and monetary valuations of UBN indicators; (b) it attaches a cardinal meaning to categories of response in ordinal variables – thus the *depth* of the UBN index depends on the particular cardinalisation used; (c) some steps, such as the cardinalisation of ordinal data and the consideration of negative gaps, prevents the resulting measure from satisfying some properties considered relevant by several authors; and (d) in trying to accomplish too much, the method loses intuition, especially the intuition that characterises counting the number of deprivations to identify the poor (Santos, 2013).

[4] The UBN poor are those who experience at least one deprivation (i.e. a union criterion is used).

offers measures that account for the joint distribution of deprivations, are subgroup decomposable and can be broken down into dimensions, and one of them is robust to changes in the scale of ordinal variables. These properties have made it suitable for implementation at the global level in the global MPI, as well at the national level in Mexico, Colombia, and Chile, as described in the Introduction.

The MPI-LA presented here draws on the regional tradition and the recent developments in the field of poverty measurement. Conceptually, it borrows from three conceptual approaches, taking them as complementary: the basic needs approach, the capability approach, and the rights approach. The reason to adopt this broad view is essentially pragmatic. In practice household surveys typically collect information on *deprivations*, which can be simultaneously interpreted as the inability to satisfy needs, as indicators of infringed rights, or as obstacles to achieving certain functionings (ECLAC, 2013). In fact, direct measurement of functionings is not common in the periodic household surveys of the region.[5] Moreover, even when functionings and even some basic needs can be considered of intrinsic value, not all of them can be translated into rights which can be legally enforced.

The index innovates with respect to previous poverty measures in the region in three ways. First, it combines monetary and non-monetary indicators. Second, among the non-monetary indicators, it updates the deprivation cutoffs of the traditional UBN indicators in order to better align them with current living standards. Third, it goes beyond the traditional UBN indicators by including deprivations in the employment and social protection as well as the schooling gap.

With these three innovations we aim to capture not only the more extreme and acute forms of poverty, but also a 'second layer' of poverty. Some may argue that we are departing from a notion of absolute poverty towards a more relative approach.[6] However, as argued by Alcock (2006) "...the bald distinction between absolute and relative poverty is in practice an over-simplification (...) What we require for life will in practice differ depending on place and time" (p. 66). "Thus absolute definitions of poverty necessarily involve relative judgements to apply them to any particular society; and relative definitions require some absolute core in order to distinguish them from broader inequalities. (...) If we wish to retain poverty as a basis for analysis, measurement and ultimately political action (…) therefore, we need to avoid the disadvantages of both, or rather capitalise on their advantages" (p. 68).

[5] For example, except for two exceptions, no country collects information on anthropometric measures regularly in the surveys.

[6] Absolute poverty is sometimes claimed to be an objective definition of poverty, and it is typically contrasted with relative poverty, which explicitly recognizes that some element of judgement is involved in determining poverty levels (Alcock, 2006, pp. 64–65).

3. Description of the MPI-LA

3.1 The MPI-LA structure: The Alkire-Foster M_0 measure

The proposed MPI-LA has the structure of one of the measures of the AF multidimensional poverty measures (2011), the M_0 measure, or the adjusted headcount ratio. Here we briefly describe it following Alkire, Foster, et al. (2015) and Alkire and Santos (2014).

Let $x_{ij} \in \mathbb{R}_+$ be the achievement of each person $i = 1, \dots, n$ in each indicator $j = 1, \dots, d$, and let z_j be the deprivation cutoff of indicator j. A person is deprived in this indicator if her achievement is below the deprivation cutoff. Formally, deprivation is defined as $g_{ij}^0 = 1$ when $x_{ij} < z_j$ and $g_{ij}^0 = 0$ otherwise. Then, the deprivation of each person is weighted by the indicator's weight, given by w_j, such that $\sum_j w_j = 1$. From this, a deprivation score is computed for each person, defined as the weighted sum of deprivations $c_i = \sum_{j=1}^{d} w_j g_{ij}^0$. Then, with this score the poor are identified using a second cutoff, the poverty cutoff, denoted by *k*, which represents the proportion of minimum deprivation a person must experience in order to be identified as poor. That is, someone is poor when $c_i \geq k$.

The deprivations of those not identified as poor are then ignored; technically, they are censored. Formally, censored deprivations are defined as $g_{ij}^0(k) = g_{ij}^0$ when $c_i \geq k$ and $g_{ij}^0(k) = 0$ otherwise. Analogously, the censored deprivation score is defined as $c_i(k) = \sum_{j=1}^{d} w_j g_{ij}^0(k)$.

Once the multidimensionally poor have been identified, the M_0 measure combines two fundamental sub-indices: the **proportion** of people who are multidimensionally poor (also called poverty incidence) and their poverty **intensity**, given by the average (weighted) deprivations among the poor. Formally, the proportion of poor people is given by $H = q/n$, where q is the number of people identified as poor. Poverty intensity is given by $A = \sum_{i=1}^{n} c_i(k)/q$. MPI, as M_0, is the product of these two sub-indices:

$$IPM = M_0 = H \times A = \frac{1}{n} \sum_{i=1}^{n} \sum_{j=1}^{d} w_j g_{ij}^0(k)$$

By adjusting the incidence of multidimensional poverty by the intensity, M_0 satisfies **dimensional monotonicity** (Alkire and Foster, 2011a): if a poor person becomes deprived in an additional indicator, M_0 will increase.

Because of its additive structure, the M_0 measure allows two types of decompositions which are useful for informing policy. First, M_0 can be decomposed into population subgroups. This is because the M_0 of the overall society can be obtained as the population-weighted sum of subgroup poverty levels (subgroups need to be mutually exclusive and collectively exhaustive of the population). Then, the

subgroup percentage contribution to overall poverty can be computed as the subgroup M_0 weighted by its population share, over the overall M_0. Second, after identification, M_0 can be **broken down by indicator**. The overall M_0 can be expressed as the weighted sum of the proportion of the total population who have been identified as poor and are deprived in each indicator (weights refer to the *relative* weight of each indicator). These proportions are the so-called *censored headcount ratios*. This enables analysis of the contribution of deprivations in each indicator to overall poverty. The percentage contribution of an indicator to overall poverty is computed as the censored headcount ratio multiplied by its relative weight, divided by the overall M_0 measure.

Last, but not least, the M_0 measure is robust to the use of ordinal variables, as it dichotomizes individuals' achievements into 'deprived' and 'non-deprived'. This means that poverty values are not changed under changes of the variables' scales.

3.2 Data sources

The data used in this paper corresponds to the household surveys periodically performed in the countries of the region. Details of the name and survey years used are presented in Table 1. The different surveys have been harmonized by ECLAC in order to make the different variables as comparable across countries as possible.[7]

Table 1: Survey Data Used

Country	Survey	Initial Year	Final Year
Argentina	Encuesta Permanente de Hogares	2005	2012
Bolivia	Encuesta Continua de Hogares	2003	2011
Brazil	Pesquisa Nac. Por Amostra de Domicilios	2005	2012
Chile	Encuesta de Caracterización Socioeconómica Nacional	2003	2011
Colombia	Gran Encuesta Integrada de Hogares	2008	2012
Costa Rica	Encuesta de Hogares de Propósitos Múltiples/ Encuesta Nacional de Hogares	2005	2012
Ecuador	Encuesta de Empleo, Desempleo y Subempleo	2005	2012
El Salvador	Encuesta de Hogares de Propósitos Múltiples	2004	2012
Guatemala	Encuesta Nacional de Condiciones de Vida	2000	2006
Honduras	Encuesta Permanente de Hogares de Propósitos Múltiples	2006	2010
Mexico	Encuesta Nacional de Ingresos y Gastos de los Hogares	2004	2012
Nicaragua	Encuesta Nac. de Hogares sobre Medicion de Niveles de Vida	2005	2009
Paraguay	Encuesta Permanente de Hogares	2005	2011
Peru	Encuesta Nacional de Hogares, Condiciones de Vida y Pobreza	2003	2012

[7] In particular, the data on incomes has been corrected to account for the non-response rate for wage earners, the self-employed and retired people. In order to mitigate probable underreporting biases, survey incomes are adjusted in order to match an estimate of the household income and expenditure accounts from the System of National Accounts. For the measurement of monetary poverty, ECLAC calculates monetary poverty lines that aim for regional comparability, using the cost of basic needs method.

Rep. Dom.	Encuesta Nacional de Fuerza de Trabajo	2006	2012
Uruguay	Encuesta Continua de Hogares	2005	2012
Venezuela	Encuesta de Hogares por Muestreo	2005	2012

3.3 Selected dimensions, indicators and cutoffs

The poverty index proposed here intends to maximize the available information in the current household surveys periodically performed in the region. It is composed of 13 indicators grouped into five dimensions, which are detailed in Table 2 and explained in what follows. It must be noted that this structure is justified on normative judgements detailed below and informed by a priori empirical exploration of the data, comprising the implementation of factor analysis, correlation and redundancy analysis, and robustness analysis, all of which is presented in Section 4.

One prior clarification is that all indicators are defined at the household level, assuming equal sharing and externalities within the household. In other words, the unit of identification of the poor is the household and all household members are considered poor if their household has been identified as such. While ideally one would like to be able to develop an individual-based poverty measure, this is a limitation imposed by the data and not exclusive to multidimensional measures (see for example Deaton 1997 for income poverty measures design). For a discussion on issues in indicator design to match the unit of identification see Alkire, Foster et al. (2015, ch. 7).

Table 2: MPI-AL: Dimensions, Deprivation Indicators and Weights

Dimensions	Deprivation Indicators: People Who Live In…	Weights (%)
Housing		**22,2**
Housing materials [a]	Households with dirt floor or precarious roof or wall materials (waste, cardboard, tin, cane, palm, straw, other materials).	7,4
People per room [b]	Households with three or more people per room, in urban and rural areas (overcrowding).	7,4
Housing tenure [c]	Households which live in i) an illegally occupied house or ii) in a ceded or borrowed house	7,4
Basic Services		**22,2**
Improved Water Source[d]	Urban areas: Households with some of the following water sources: - piped to yard/plot; - unprotected well or without mechanic pump; - cart with small tank; - bottled water; - river, spring, dam, lake, ponds, stream, rainwater, other. Rural areas: Households with some of the following water sources: - unprotected well or without mechanic pump; - cart with small tank; - bottled water; - river, spring, dam, lake, ponds, stream, rainwater, other.	7,4
Improved Sanitation [d]	Urban areas: Households with some of the following:	7,4

	- toilet or latrine not connected to piped sewer system or septic tank; - shared toilet facility; - no toilet facility (bush/field). Rural areas: Households with some of the following: - no toilet facility (bush/field); - shared toilet facility;- toilet or latrine flushed without treatment to surface, river or sea.	
Energy [e]	Households with no access to electricity or which use wood, coal or dung as cooking fuel.	7,4
Living Standard		**22,2**
Monetary Resources	Households with insufficient per capita income to cover food and non-food needs.	14,8
Durable Goods [f]	Households which do not own any of the following items: car, refrigerator or washing machine.	7,4
Education		**22,2**
Children's School Attendance	Households where there is at least one child or adolescent (6 to 17 years) not attending school.	7,4
Schooling Gap	Households where there is at least one child or adolescent (6 to 17 years) who is over two years delayed with respect to his/her schooling grade for age.	7,4
Adult Schooling Achievement	Households where no member 20 years or older has achieved a minimum schooling level, defined as: - complete lower secondary school for people between 20 and 59 years, and - complete primary school for people of 60 years or more.	7,4
Employment and Social Protection		**11,1**
Employment	Households with at least one member between 15 and 65 years old being one of the following: - unemployed; - employed without a pay; or - a discouraged worker.	7,4
Social Protection [g]	Households experiencing the three following characteristics: - no member has some form of contributory health insurance; - no member is contributing to a social security system; and - no member is receiving a pension or retirement income.	3,7

[a] There was no available information on the following items for the following countries: walls for Argentina (2005, 2012), floor for Brazil (2005, 2012), roof for Colombia (2008, 2012) and Ecuador (2005), housing materials for Uruguay (2005).
[b] Given that in the case of Brazil, Costa Rica, Honduras and Mexico, the number of rooms does not exclude kitchen and/or toilets, we corrected the number of rooms in the house using Kaztman's (2011) suggestion of subtracting one from the total number of rooms.
[c] Households living in houses given in usufruct were not considered as deprived.
[d] In the case of the Dominican Republic (2006 and 2012), we applied the same deprivation definition for urban areas to rural ones because the survey question does not allow us to differentiate between the two.
[e] There is no information on access to electricity for Argentina (2005 and 2012), the Dominican Republic (2006) and Uruguay (2005); and there is no information on cooking fuel for Chile (2003 and 2011), Honduras (2006) and Venezuela (2005 and 2012).
[f] There is no information on durable goods for Argentina (2005 and 2012) and Bolivia (2003). There is no information on car ownership for Brazil (2005) and Chile (2003), thus it has been replaced by ownership of a stove and ownership of a water boiler correspondingly. There is no information on washing machines for Costa Rica (2012) and Honduras (2010 and 2006), and it has been replaced by a TV with plasma or LCD screen for Costa Rica and a heater for Honduras.
[g] There is no information on health insurance for Brazil (2005 and 2012) and Venezuela (2005 and 2012). The indicator on social protection has not been included for Nicaragua (2009) because of lack of information on both sub-indicators (social security system and health insurance)

As explained in Section 2, this MPI-LA builds upon the tradition of poverty measurement in the region, as well as upon the recent developments in poverty measurement. Thus, the first building block is composed of a set of core deprivation indicators typically included in the UBN method in the region. These indicators comprise some of the housing characteristics (housing materials of floor, walls and roof, and overcrowding), basic services (water, sanitation) and two of the education indicators (adult schooling achievement and children's school attendance). All of them are relatively well-established indicators of poverty in the Latin American context as well as globally, as they are either MDG indicators or closely related to them. Furthermore, they are widely available in household surveys across Latin American countries.

However, given that many Latin American countries have significantly reduced the most extreme deprivations – especially the more developed ones (ECLAC, 2013) – an MPI restricted to the traditional UBN indicators does not seem to offer a comprehensive identification criterion of the poor in the current regional context. Thus, we have enriched the poverty measure in three ways. First, we have updated some of the deprivation cutoffs of the traditional UBN indicators to the current (higher) standards in the region. Second, we have integrated an income deprivation indicator. Third, we have incorporated some additional non-monetary indicators of poverty. We justify each of these procedures in turn.

Higher deprivation cutoffs for traditional UBN indicators

We have upgraded the deprivation cutoff of the overcrowding indicator from more than three people per room to three or more people per room, a criterion used in the overcrowding indicator complementary to the MDG's indicators.[8] This is an intermediate criterion between the one that is being used in countries such as Chile and Mexico (2.5 or more people per room) and the historical one still being used in other countries.[9] We have also upgraded the deprivation cutoff for access to safe drinking water and improved sanitation. Following the UBN tradition, the cutoff discriminates between urban and rural areas. In urban areas, it is required to have pipe in the dwelling or to the yard plot, or a protected well with pump water in order to be non-deprived (whereas, previously, piped water outside

[8] http://mdgs.un.org/unsd/mdg/Host.aspx?Content=Indicators/OfficialList.htm).

[9] For the case of Chile, see Ministerio de Desarrollo Social http://www.ministeriodesarrollosocial.gob.cl/casen/definiciones/vivienda.html; for México, see Sistema Estatal de Información e Indicadores de Suelo y Vivienda https://www.coveg.gob.mx/seiisv/modulos/secciones/indicadores/indicadores/Indicador%2014.pdf.

the yard was considered non-deprived).[10] In rural areas, in addition to the non-deprived categories of urban areas, access to a public tap is also considered to be non-deprived. In terms of sanitation, the most important change is that both in urban and rural areas, following the international norm (UN, 2003) households sharing their sanitation facility with other households are now considered to be deprived. In any case, it must be noted that survey information on water sources and sanitation facilities in the region is still very heterogeneous, making cross-country comparisons limited.[11]

We have also increased the deprivation cutoff of the indicator of children's school attendance. Traditionally, households were considered deprived if there was at least one child between 6 and 14 years of age who was not attending school. Yet, considering the changes in the legislation in several countries, which have extended mandatory schooling up to secondary school, we consider households to be deprived if there was at least one child or adolescent between 6 and 17 years of age who is not attending school. Note that households without children are considered non-deprived in this indicator.

Finally, the adult schooling indicator usually required completion of primary school. Yet nowadays, the number of years of education necessary to improve the probability of accessing a decent job and income and being integrated into society widely exceeds the completion of primary school in the region (Villatoro, 2007). Thus, we require lower secondary school completion for people between 20 and 59 years of age, and we leave the primary school completion requirement for people of 60 years or more.

Including income alongside non-monetary indicators

It has recently been proposed that non-monetary indicators should be integrated with the income poverty indicator into a multidimensional index (see empirical implementations in Callan, Nolan and Whelan 1993 and Nolan and Whelan 1996 for the Irish case; Bradshaw and Finch 2003, and Alkire, Apablaza and Jung, 2014 for the British case; Santos et al. 2010 and ECLAC 2013 for Latin American countries; also see Alcock 2006 and Nolan and Whelan 2011 for further conceptual discussion). Such integration in the Latin American case is justified not only because there is a trend in reducing the core non-monetary indicators but primarily because there is abundant empirical evidence regarding the mismatches between monetary and non-monetary measures in identifying the poor.[12,13]

[10] Most surveys do not collect information on whether wells are protected or not. However, several surveys discriminate whether the well has a pump, allowing its use in the deprivation cutoff in line with the international norm.

[11] Additionally, countries have adopted the international norm (UN, 2003) with respect to safe water and improved sanitation with differences (Taccari and Stockins, 2013), which translates into often very significant differences in reported estimates of access to safe water and improved sanitation (see Cecchini and Azócar 2007 for further details).

[12] The cited references provide empirical evidence on such mismatches. Further evidence includes Ruggeri Laderchi (1997) with data from Chile, Peru and India; Stewart et al. (2007) with data from India; and Whelan, Layte and Maitre (2004) for

Thus, we scrutinized two arguments frequently offered to justify the practice of keeping the monetary poverty and UBN measures separate. The first argument is that each of these measures captures different aspects of poverty. The UBN measure would mainly capture deprivation in access to public goods and income poverty would capture insufficient resources to satisfy needs through the market. However, this distinction does not actually hold in the current Latin American context. Of the typical non-monetary deprivations used in the UBN measure, in most countries, only water and sanitation are provided by the state, and, in any case, these services are not free. Electricity and gas, education and housing are actually primarily provided via markets. Also, even when UBN poverty might reflect a more *structural* type of poverty while income poverty might reflect a more *transient* type of poverty, such a distinction is a descriptive characterization rather than a fundamental difference in the state of being poor. Furthermore, the results of factor analysis performed over the 34 observations and presented in Section 4 do not suggest such a differentiation into types of poverty reflected by monetary and non-monetary indicators.

The second argument is that because income is a fungible resource, it can be used to satisfy a variety of needs, including those considered in the non-monetary indicators. Thus, income would be at risk of being redundant.[14] However, it is worth noting what we understand by redundancy in the context of joint distribution measures. Redundancy occurs when the level and trend of two indicators match - the measures walk in lock-step - for example because they are equivalently affected by the same policy instrument. The fact that two deprivations tend to occur simultaneously in one period does not necessarily indicate redundancy. On the contrary, accounting for the joint distribution of deprivations is at the core of multidimensional poverty measurement. There would be redundancy if the *same* deprivation was captured with different indicators; in that case there would be an efficiency loss in identifying the poor (or an unnecessary reduction in parsimony of the multidimensional index). An imperfect technical solution to distinguish which part of the co-occurrence of deprivations is actual redundancy and which part is association of different deprivations, is to observe levels, trends, and apparent redundancy over several periods. The important point is that not every time two indicators appear to be redundant should one be dropped; normative reasons as well as the information they can

nine European countries. Also in Chile's 2013 poverty measures released in January 2015, 20.4 per cent of the population are income poor, and 14.4 per cent are multidimensionally poor, but only 5.5 per cent are poor by both measures (Ministerio de Desarrollo Social 2015: 57).

[13] In this respect, the national measures of Mexico and Chile include income and take a 'consistent poverty' approach (Callan et al., 1993; Nolan and Whelan, 1996, Nolan and Whelan, 2011), close to the bi-dimensional method, by which the multidimensionally poor are those who are income poor *and* deprived in non-monetary indicators. The Colombian measure is closer to the global MPI, keeping income poverty as a separate measure, although selecting indicators and deprivation cutoffs in line with the country's public policy.

[14] Clearly, there is also risk of redundancy among non-monetary indicators.

provide for public policy can be good reasons to keep both. In our case, the income deprivation indicator offers valuable information for public policy design, such as conditional cash transfer programs. Moreover, as will be seen in Section 4.2, redundancy analysis does not suggest as high co-occurrence between monetary and non-monetary deprivations as many would think *a priori*. Furthermore, the analysis of matches and mismatches between multidimensional and income poverty presented in Section 5.4 also supports including income.

Thus, both arguments most commonly given to keep the income poverty measure and the UBN measure separate are actually weak and not empirically verified. On the contrary, combining income with the non-monetary indicators in the multidimensional poverty measure has several advantages.

First, the factor analysis results presented in Section 4.1 indicate that income deprivation seems to be a strong indicator of poverty of countries in the region, although insufficient as a standalone measure. Thus, it does not seem appropriate to ignore the information provided by this indicator.

Second, in the regional, limited data context, income can act as a surrogate for some missing dimensions, even if imperfectly. In particular, fundamental dimensions of wellbeing such as nutrition and health could not be incorporated in this MPI-LA due to data constraints. Income can also complement the information provided in the included non-monetary indicators, especially when such indicators are limited or likely to have measurement error. For example, having access to water or electricity does not guarantee the satisfaction of associated needs – bills need to be paid. At the same time, and looking to the reverse argument, income itself is also subject to measurement error, thus combining it with non-monetary indicators should also contribute to a better identification of the poor.

Third, combining income with non-monetary indicators in the MPI-LA can exploit the properties of the AF methodology better than a contingency table, which is traditionally used in the region. By keeping the monetary and non-monetary measures separate, poverty intensity could only consider the non-monetary indicators and one would not have an estimate of the contribution of income deprivation to overall poverty *vis a vis* the contribution of the non-monetary indicators. Estimates of the crossing of the MPI-LA with monetary poverty presented in Section 5.4 suggest that combining both types of indicators improves the identification of the poor.

As a final comment, it must be noted that we used the total poverty line (including food and non-food items) as the deprivation cutoff of the income indicator rather than the indigence line.[15] The reasons are linked to the ones given above for including the income indicator. First, conceptually, the total poverty line provides a more complete basis for identifying the poor than the indigence line, which only considers food items. Second, empirically, the proportion of indigent people in each country is relatively low[16], resulting in a limited scope when using the indigence line. Third, while there is a higher observed co-occurrence between the non-monetary and the monetary indicators when the total poverty line is used as compared to the indigence line, these are low enough so as to justify its use (see Section 4.3).

Including new non-monetary indicators

Finally, we have incorporated some additional non-monetary indicators of poverty. These were of two types. On the one hand, based on the available data, we included three deprivation indicators of arguably basic needs that complement the usual UBN indicators. These are an indicator of insecure housing tenure (within the housing dimension), energy deprivation (within the basic services dimension) and deprivation of durable goods (within the living standard dimension). There are several reasons that support these additions.

First, a secure housing tenure arrangement, which protects against forced eviction and other threats, has been recognized as a component of the right to an adequate living standard (UN, 2013). A household is considered to be deprived if it lives in an illegally occupied house or in a ceded or borrowed house, understanding that none of these situations guarantees protection from eviction. Households living in houses given in usufruct are not considered deprived, as they are legally protected against eviction.

Second, the indicator on energy deprivation is such that a household is considered to be deprived in energy if it has no access to electricity or uses dung, wood or coal as cooking fuel (or both), which are harmful to health (UN, 2003; Duflo et al., 2008; Nussbaumer et al., 2011). Access to clean cooking fuel is an MDG indicator (UN, 2003) whereas access to electricity allows people to be independent during the night time and enables a wide range of work and leisure activities (Alkire and Santos, 2010). We use a combined indicator of energy rather than the two separately for three reasons: (a) deprivation rates in electricity alone are low in several countries (the average is 10%, varying from 1% to 31%), (b)

[15] Note that the exploratory measure presented in ECLAC (2013) used the indigence line under the premise that using the total poverty line could lead to a "double counting" of certain deprivations. Further statistical and conceptual analysis performed here suggested that this is not the case.

[16] Considering the 34 observations, the proportion of people under the indigence line varies from 1% to 49% and it is on (simple) average 17%, whereas the proportion of people under the total poverty line varies from 4% to 71%, and it is on (simple) average 38%.

information on electricity is missing in nine observations, and thus, including this indicator separately would require a re-adjustment of the weights in the cases of missing data which would reduce the scope of comparability, and (c) conceptually, energy deprivation involves both kinds of deprivations.

Third, the inclusion of an indicator of durable goods can be understood as a proxy of a permanent living standard, complementing the income indicator as "…income on its own will not capture comprehensively the command over resources and living standards of different households…" (Atkinson et al. 2002, pp. 122–23). A household is considered deprived if it does not own any of the following: car, refrigerator, or washing machine.

On the other hand, a novelty of this MPI-LA is that we incorporated a set of indicators that aim to reflect precarious linkages with institutions. This implies broadening the criteria of poverty identification, introducing a somehow greater level of relativity. Thus, alongside the more extreme deprivations, which have typically been part of the absolute measures of poverty, we are also including deprivations that reflect relative disadvantage. In the Latin American region, these include living in socially segregated urban areas, access to poor quality services (education, health, transport, housing, among others), and a lack of connection to social networks and institutional frameworks that would facilitate coping with shocks and accessing opportunities of upward mobility (Kaztman, 2001).

Considering what is available across the surveys, we have included an indicator of deprivation in employment based on its intrinsic importance and its implications for social integration and not for its relationship with monetary poverty. As argued by Atkinson et al. (2002) "...although unemployment is generally regarded to be one of the principal causes of poverty, comparative international research has demonstrated that there is no linear relation between unemployment in a country (including long-term unemployment) and the poverty rate" (p. 136). "Labor market participation is an important means of social integration: in an individualized society, lack of work holds a danger of social exclusion and detachment from the prevailing life-style and culture in society" (p. 137). In fact, the International Labor Organization has claimed labor to be a source of dignity, security, family stability and social peace.[17] We considered households to be deprived in employment when there is at least one member who is (i) unemployed, (ii) employed without a pay, or (iii) discouraged worker.[18]

[17] See http://www.ilo.org/global/about-the-ilo/decent-work-agenda/lang--es/index.htm.

[18] It should be noted that we also explored considering as deprived people who are not looking for jobs due to having to look after children or elderly members of the household, given that many of the used surveys provide this kind of information. However, we decided not to take the employment deprivation definition that far for two reasons. First, the survey instrument does not allow us to discriminate whether this situation is actually enforced or rather a matter of choice. Second,

In turn, access to social protection is a fundamental human right and part of ILO's decent work agenda. Empirically, deprivation in social protection has a high incidence in Latin America; labour market segmentation translates into the poor accessing precarious jobs with non-existent or deficient social protection (Kaztman, 2010). We consider deprived households those where no member has some form of contributory health insurance or retirement (either based on mandatory or voluntary contributions) and no elderly member is receiving some pension or retirement income.

We have also included an indicator of schooling gap.[19] Given that there has been a significant increase in the coverage of primary and secondary school in the region (ECOSOC, 2011)[20], focus is progressively shifting from schooling coverage to educational quality, where variability is highly associated with the socio-economic intake of schools.[21] Although imperfect, the schooling gap indicator offers a proxy for the quality of education children receive.[22] In fact, there is evidence that entering school after the compulsory age, as well as repetition of grades, is likely to be a sign of deprivation – leading to drop-outs and underperformance (UNESCO, 2012; ECOSOC, 2011).

3.4 Limitations of the MPI-LA and improvements in data collection

The proposed MPI-LA has several limitations due to data constraints, namely, limited cross-country comparability, missing indicators in some countries, and variability in the survey response categories for some of the included indicators. All of these limitations could be overcome with improved data collection.

First, estimates are not fully comparable because not all surveys with the information on the MPI-LA indicators were collected for the same years (see Table 1). While some countries have well-established

---

empirically, deprivation rates reached very high levels (75% for example) in some countries, and thus the indicator would have had a disproportionate contribution to overall poverty of unclear validity given the data constraints.

[19] This indicator has also been included in official multidimensional poverty measures of Mexico (CONEVAL, 2010) and Colombia (Angulo, Díaz y Pardo Pinzón, 2013). In this study we have used "two years delayed" for the indicator because a threshold of one year could be misleading given the different school calendars, effective age of entrance to school and time of the year in which each survey is conducted.

[20] ECOSOC (2011) report on progress towards Education for All indicates that, on average, the region has been highly successful in this area. However, the average net enrolment rate for primary education remained virtually constant from 2000 (93.5%) to 2008 (95.3%). In terms of secondary education, a third of the region's countries have reached 80% access or above education among the youngest age group or more and the country average rose more than 7 percentage points between 2000 and 2008. However, secondary education completion rates indicate that much work is still needed to promote this level of education.

[21] While global gaps in access to school may be narrowing, gaps in school quality remain enormous (UNESCO, 2010, p.104). Also, within the Latin American region, it has been stated that inequity is to be also seen in terms of the poor access to quality social services such as health or education (ECOSOC, 2011, p.43)

[22] Admittedly, children may be delayed in school progression due to incapacity of the school system to appropriately accompany them throughout their schooling. Also, children may be apparently not delayed and yet lacking the corresponding skills if the school system promotes their progression regardless of their actual achievements.

regular survey programs, that in most cases produce results with a periodicity of a year or less than a year, there are still many countries where surveys depend on the availability of resources and are collected with a low frequency. Advancing in establishing regular survey programs would improve the availability of useful information for public policy and also enhance the comparability across countries.

Second, there are dimensions that we have liked to include and could not due to data limitations. Specifically, health is a missing dimension in this index. We were only able to include access to (a contributory) health insurance, which does not reveal the effective use of health services or health outcomes. Except for only a very few cases, there are no indicators of health *functionings* in Latin American surveys, such as anthropometric indicators, infant mortality, chronic illnesses, or inability to perform daily activities autonomously. Given the importance of health for wellbeing, improving data collection in this dimension should constitute a priority. This does not mean including an extensive health module but rather selecting a few key indicators. In light of this, the Multidimensional Poverty Peer Network and the Oxford Poverty and Human Development Initiative have proposed a set of short survey modules in view of the development agenda post-2015.[23]

Third, indicators on dimensions included in this MPI can also be improved for the sake of both comprehensiveness and cross-country comparability. For example, it would be important to make advances in collecting an indicator on fundamental cognitive skills which is appropriate to the age of the respondent. There are relatively simple ways to do so that are proposed in Grosh and Glewwe (2000) and there are questions in this line in the survey modules proposed by the MPPN. Similarly, following the ILO's definition of decent work, it would be important to improve the collection of data related to employment formality and quality. Collecting information on these types of education, health and employment indicators would entail counting with measures of effective functionings and thus improving the assessment of wellbeing.

Even the data collection on income information should be further homogenized and refined to capture more accurately households' resources. Improvements include the treatment of income from secondary education, in-kind income, the distinction between net and gross income, and public transfers. Even data on housing and basic services requires further harmonization. The survey response categories of water source and sanitation facilities still need to be made comparable and more in line with the MDG's standards. In some cases, especially in the provision of electricity, water and gas, an indicator of continuity in the provision of the service would be of importance. Similarly, collecting information on

[23] See http://www.ophi.org.uk/wp-content/uploads/MPPN_SDG-Pov_QuexPost2015_Sept-14a.pdf?0a8fd7.

ownership of the same durable goods across countries would improve proxying permanent living standards.

Although perhaps of secondary importance, promoting the inclusion of questions on socially perceived necessities in the European style (see Mack and Lansley 1985 for the pioneer study, and Nolan and Whelan 2011 for an updated discussion) would contribute to validate regional as well as national poverty measures.

In sum, although there have been significant improvements in terms of data collection in the region, there are still many ways in which survey data collection could be improved – not necessarily in a costly way and with potential important benefits for public policy design.[24] This would allow overcoming many of the current limitations of the proposed MPI-LA as a tool for public policy monitoring.

3.5 Weighting structure and the poverty cutoff

Table 2 presents the weighting structure. The housing, basic services, living standard and education dimensions are equally weighted with 22.22%, whereas the social protection dimension receives half of this weight, 11.11%. In turn, weights within dimensions are equally distributed in the case of the housing, basic services and education dimensions, and unequal within the living standard and the social protection dimensions, with income and employment receiving twice the weight of durable goods and social protection within the corresponding dimensions. As a result, all deprivations receive the same weight (7.4%) except for social protection (3.4%) and income (14.8%).

The rationale for weighting the employment and social protection dimension with half the weight of the other four dimensions is twofold. On the one hand, the deprivations contained in this dimension go a step beyond the traditional conception of poverty in the region. Second, the effective weighting of a dimension is a result of the explicit weight and the deprivation cutoffs used. Given that deprivation rates in employment and social protection tend to be high under the cutoffs used, assigning the same weight as the other dimensions resulted in a disproportionate contribution of deprivations in this dimension to overall poverty. This second argument also applies to weighting the social protection indicator with half the weight of the employment one. The rationale for weighting the income indicator with twice the weight as the durable goods one within the living standard dimension is that income is a synthetic

[24] Several countries have implemented such improvements, either as national initiatives or with the support of international programs, such as the MECOVI Program (Programa para el Mejoramiento de las Encuestas y la Medicion de las Condiciones de Vida en America Latina y el Caribe).

indicator, presumably summarizing several deprivations, serving – as stated above – as a surrogate for deprivations which could not be included.

It must be noted that whenever an indicator is missing in a country, weights are equally distributed among the observed indicators. This is the case in Nicaragua 2009, which lacks social protection and thus the employment indicator receives the full 11.11% weight; Argentina 2005 and 2012 and Bolivia 2011, which lack the durable goods indicator, and thus income receives the full 22.22% weight; and Uruguay in 2005, which lacks the housing material indicators and thus overcrowding and tenure receive an 11.11% weight each.

While we favor the described weighting structure, we have tested whether the poverty ordering of observations is significantly altered when alternative weighting structures are used. We have found, as detailed in Section 4.3, that this is not the case. Thus, the MPI-LA is robust to the weights used.

In terms of the poverty cutoff, the preferred k value is 25%, i.e. a quarter of the total weighted indicators. This means that in order to be identified as poor a person must experience deprivations in the equivalent of a full dimension of housing, services, education or living standard, plus some other indicator, or, alternatively, they must be deprived in income and two additional indicators. In other words, with this cutoff, the poor are truly *multidimensionally* poor as deprivation in any full dimension is not enough. However, as with weights, we computed the MPI-LA (as well as many other alternative specifications) for a range of k values, from 10% (just above a union criterion) to 100% (intersection criterion).[25] As presented in Section 4.3, we found the MPI-LA to be highly robust to a restricted plausible range of poverty cutoffs, from 10% to 70%.[26]

4. Comprehensiveness, Parsimony and Robustness of the MPI-LA

In constructing a multidimensional poverty index, especially one aiming at becoming a tool for regional monitoring of poverty reduction, one intends it to comply with three desirable characteristics: comprehensiveness, parsimony, and robustness. We evaluate each in turn.

[25] A union criterion to identify the poor requires a person to experience any deprivation in order to be considered poor, whereas an intersection criterion requires the person to experience *all* deprivations.

[26] Poverty cutoffs above 70%, similar to an intersection criterion, produce very low poverty estimates in most countries and are considered to be overly demanding for identifying the poor.

4.1 Comprehensiveness

By ***comprehensiveness*** we mean that the index should *capture* poverty in the region, including, as much as possible, the deprivations that are widely recognized as constituent elements of poverty. Of course, comprehensiveness is restricted by data availability. Thus, while no poverty measure will ever capture *all* the relevant deprivations, at least we intend to include those that – being available – are relevant. Ideally, this would rely on a survey on socially perceived necessities in the spirit of Mack and Lansley (1985). Given that we do not count with such type of surveys in the region, we need to rely on other forms of validation of the dimensions and indicators included. In the first place, we build upon a thorough review provided in Santos (2014) and also considered by ECLAC (2013) of the rich experience in the Latin American region in multidimensional poverty measurement, as well as of the European tradition. We also draw from the literature on global poverty. The dimensions and indicators contained in the proposed MPI-LA have been previously used and are normatively justified as relevant for poverty either regionally or by the international literature. In the second place, we have performed an exploratory factor analysis (EFA) in order to verify the empirical relevance of the indicators as indicators of poverty, complementing the normative arguments.[27]

Assuming a bivariate normal distribution, Table 3 presents a summary of the exploratory factor analysis results using tetrachoric correlations, given that all our indicators are dichotomous.[28] It reports a simple average across observations of the factor loadings of each indicator over the two main factors. This is done for each initial and final year (around 2005 and 2012 correspondingly) separately, as well as for the pooled observations. We can extract three main conclusions from the results.

First, 10 out of the 13 indicators used have average factor loadings of 0.55 or more over the first factor, and one – children's school attendance – has an average loading just below 0.50. These data comply with the rule of thumb that a factor with five or more strongly loading items (.50 or better) are desirable and indicate a solid factor (Costello and Osborne, 2005). Thus, these results support the assumption that – in general – the selected indicators account for an underlying phenomenon: poverty.

Second, the two indicators with low average factor loadings are housing tenure and employment, both with an average load around 0.23. However, this has not been a reason to exclude them from the MPI.

[27] We implemented EFA rather than Principal Components Analysis (PCA) because EFA aims to reveal any latent variables that cause the observed variables to co-vary, whereas PCA is computed without regard to any underlying structure caused by latent variables (Costello and Osborne, 2005).

[28] Familiar factor analysis procedures (common factor analysis and principal components analysis) produce valid results only if the data are truly continuous and multivariate normal. Clearly, this is not the case of dichotomous variables. We used the *factormat* command in Stata. With this, the EFA is performed using the matrix of tetrachoric correlations as the input, rather than the raw variables.

We consider the normative arguments presented in the previous section strong enough so as to retain them. "Statistical techniques are helpful for informing such selection, yet cannot constitute the only element. Value judgements (...) are a fundamental prior element" (Alkire, Foster, et al., 2015). Yet this evidence suggests that that both indicators can be improved. Data collection on housing tenure could be refined in order to better identify precarious tenure regimes.[29] In terms of employment, it would be important to advance towards an indicator of employment quality.

Third, the income deprivation indicator has a high average loading on factor 1 – between 0.67 and 0.69. Thus leaving the monetary indicator outside the MPI would imply ignoring important information for poverty measurement in the Latin American context. This is in line with the normative arguments that income can act as a surrogate for all the other non-considered dimensions due to data restrictions and that, even when merely a means, having purchasing power provides the household with some freedom to choose the bundle of goods (Santos et al., 2010).

A final remark is that the EFA results do not suggest different groups of indicators, such as UBN vs. income, loading on different factors. Thus the sometimes argued position that UBN indicators account for a different kind of poverty than income poverty does not seem to hold.

In sum, considering well-established normative arguments provided by the literature combined with empirical analysis, the proposed MPI-LA seems to be comprehensive given the current data limitations.

Table 3: Exploratory Factor Analysis Results – Averages

	2005		2012		2005 and 2012	
	Factor 1	**Factor 2**	**Factor 1**	**Factor 2**	**Factor 1**	**Factor 2**
Housing Materials	0.74	-0.16	0.70	-0.14	0.72	-0.15
Overcrowding	0.66	0.20	0.62	0.16	0.64	0.18
Tenure	0.25	0.04	0.22	0.00	0.24	0.02
Drinkable Water	0.61	-0.12	0.56	-0.08	0.58	-0.10
Sanitation	0.58	0.00	0.59	-0.09	0.58	-0.05
Energy	0.78	-0.22	0.75	-0.18	0.76	-0.20
Adult Schooling	0.75	0.00	0.72	-0.01	0.74	-0.01
Children's School Attendance	0.47	0.18	0.41	0.21	0.44	0.19
Schooling Gap	0.73	-0.14	0.70	-0.14	0.72	-0.14
Employment	0.23	0.19	0.23	0.23	0.23	0.21
Social Protection	0.65	0.07	0.67	0.09	0.66	0.08
Income	0.69	0.28	0.67	0.25	0.68	0.27
Durable Goods	0.80	-0.11	0.75	-0.10	0.77	-0.10
	Variance /c. Factor1=5,1 (59%) Factor2=1 (12%)		Variance/c. Factor1=4,7 (56%) Factor2=1 (12%)		Explained Variance /c. Factor1=4,9 (57%) Factor2=1 (12%)	

/a. Correlations between the common factor, F, and the input variables.

[29] UN HABITAT (2011) offers some valuable guideline principles.

/b. Simple average of all observations, including 2005 and 2012.
/c. Factor common variance. It is estimated as a simple average.
Notes: In EFA, the percentage of explained variance of each factor is computed as the corresponding eigenvalue divided by sum of all eigenvalues.

4.2 Parsimony

By parsimony we mean that, while capturing poverty as well as possible, the MPI-LA is also kept as simple as possible, avoiding potential redundancy between indicators. Clearly, there is a delicate tension between comprehensiveness and parsimony (Santos and Santos, 2014). As explained above, the fact that two deprivations tend to occur together does not necessarily mean that they account for the *same* deprivation. Thus, evaluating potential redundancy is far from a mechanical matter, and one needs to carefully scrutinize the numbers and consider not only empirical but also normative arguments.

In order to explore potential redundancies between the indicators we computed two measures, as suggested by Alkire, Foster, et al. (2015, ch. 7).[30] One of them is the Cramer V correlation coefficient between all pairs of deprivation indicators. Given two deprivation indicators, j and j', this coefficient uses the information contained in a cross tabulation, such that

$$\text{Cramer's V} = \frac{\left(\mathbb{p}_{00}^{jj'} \times \mathbb{p}_{11}^{jj'}\right) - \left(\mathbb{p}_{10}^{jj'} \times \mathbb{p}_{01}^{jj'}\right)}{[\mathbb{p}_{+1}^{j'} \times \mathbb{p}_{1+}^{j} \times \mathbb{p}_{+0}^{j'} \times \mathbb{p}_{0+}^{j}]^{1/2}},$$

where $\mathbb{p}_{00}^{jj'}$ is the proportion of people non-deprived in both j and j', $\mathbb{p}_{11}^{jj'}$ is the proportion of the people deprived in both j and j', $\mathbb{p}_{10}^{jj'}$ is the proportion of people deprived in j but not in j', and $\mathbb{p}_{01}^{jj'}$ is the proportion of people deprived in j' but not in j. $\mathbb{p}_{+1}^{j'}$ and $\mathbb{p}_{1+}^{j}$ are the proportions of people deprived in j' and j correspondingly, whereas $\mathbb{p}_{+0}^{j'}$ and $\mathbb{p}_{0+}^{j}$ are the proportions of people non-deprived in j' and j correspondingly.

The other measure has been proposed by Alkire and Ballon (2012) as a measure of redundancy, based on Simpson (1943). This measure shows the matches between deprivations as a proportion of the minimum of the marginal deprivation rates. Using the same notation as above, the measure of Redundancy R^o is defined as

$$R^o = \mathbb{p}_{11}^{jj'} / \min\left(\mathbb{p}_{+1}^{j'}, \mathbb{p}_{1+}^{j}\right), \qquad 0 \leq R^o \leq 1.$$

[30] The notation used here borrows from the cited source.

That is, the measure of redundancy displays the number of observations that have the same deprivation status in both variables, which reflects the joint distribution, as a proportion of the minimum of the two uncensored or censored headcount ratios.[31] In this paper we use the uncensored headcount ratios. R^o offers complementary information to correlation because it accounts for the overall level of deprivation in the indicator with the lowest deprivation.

Table 4 presents a summary of the results of the two measures detailed above. It reports the simple average across the 34 observations alongside the minimum and maximum values of the Cramer V and R measures between indicators within each dimension and between each indicator and income. It can be observed that – on average – both the correlation and the redundancy measures are low between indicators within each dimension. Results of the average Cramer V indicate that correlation is higher between housing materials and overcrowding, water and sanitation, and sanitation and energy, but the average coefficient is never above 0.24. In turn, the R^o measure suggests higher potential redundancy within the education dimension and the employment and social protection dimension. Yet, even for the pairs of indicators in those dimensions, the average R^o coeficient is 0.67 at most, indicating that one in three persons (living in a household) deprived in one of the indicators (say, adult schooling) is not deprived (the household is not deprived) in the other (say, children's school attendance). In addition, the range is high with only 22% of persons deprived in adult schooling being deprived in school attendance in some countries. Thus, dropping one of the two indicators within the dimension would increase the probability of missidentifying the poor in each country.

The correlation and redundancy results for income paired with each of the other indicators offer similar conclusions. The Cramer V between monetary and non-monetary deprivations is below 0.25 in most cases. The lowest average correlations are with tenure (0.08), followed by children's school attendance (0.15) and schooling gap (0.16), whereas the highest average correlations are with durable goods (0.26) and social protection (0.34). Also, while the average R^o coeficients between income and the non-monetary deprivation indicators are higher than between the non-monetary indicators within each dimension, the highest are 0.75 (between income and social protection) and 0.67 (between income and durable goods). Even these apparently high redundancy values are not really so, as they indicate that one in four people deprived in, say, income, are not deprived in social protection. Furthermore, again the range is large, with less than half of those deprived in income being deprived in social protection in

[31] By using the minimum of the uncensored or censored headcounts in the denominator it is ensured that the maximum value of R^o is 100%.

some contexts. Thus, as argued above, dropping one of the two indicators, would negatively affect the capacity of the MPI-LA to identify the poor in each country.

It must be noted however that the estimation of these measures did lead us to collapse the access to health care indicator and the social security one into a combined union indicator of social protection. The redundancy measure between these two indicators was above 0.90.

Table 4: Cramer V and R^0 Coefficient

		Cramer V (Correlation Measure)			Coefficient R (Redundancy Measure)		
		Mean	Min	Max	Mean	Min	Max
Within Housing Dimension	**Housing Materials and Overcrowding**	**0.24**	0.02	0.55	**0.47**	0.09	0.85
	Housing Materials and Tenure	**0.04**	-0.07	0.19	**0.25**	0.08	0.54
	Overcrowding and Tenure	**0.10**	0.02	0.19	**0.35**	0.12	0.73
Within Basic Services	**Drinkable Water and Sanitation**	**0.22**	-0.30	0.61	**0.53**	0.11	0.99
	Drinkable Water and Energy	**0.24**	-0.01	0.54	**0.51**	0.07	0.90
	Sanitation and Energy	**0.16**	-0.33	0.45	**0.49**	0.15	0.99
Within Education	**Adult Schooling and Children's School Attendance**	**0.18**	0.02	0.29	**0.64**	0.16	0.93
	Adult Schooling and Schooling Gap	**0.15**	0.05	0.29	**0.67**	0.22	0.95
	Children's School Attendance and Schooling Gap	**0.10**	-0.09	0.20	**0.27**	0.04	0.60
Within Employment and Social Prot.	**Employment and Social Protection**	**0.11**	0.06	0.23	**0.62**	0.22	0.93
Income with	**HOUSING**						
	Housing Materials	**0.19**	0.02	0.45	**0.63**	0.16	0.93
	Overcrowding	**0.25**	0.08	0.43	**0.65**	0.34	0.86
	Tenure	**0.08**	-0.03	0.28	**0.50**	0.15	0.83
	BASIC SERVICES						
	Drinkable Water	**0.14**	0.03	0.26	**0.56**	0.18	0.89
	Sanitation	**0.19**	0.03	0.33	**0.59**	0.31	0.89
	Energy	**0.22**	0.03	0.47	**0.61**	0.10	0.92
	EDUCATION						
	Adult Schooling	**0.30**	0.11	0.42	**0.64**	0.21	0.94
	Children's School	**0.14**	0.03	0.24	**0.57**	0.11	0.87
	Schooling Gap	**0.15**	0.04	0.25	**0.64**	0.11	0.90
	EMPLOYMENT AND SOC. PROTECTION						
	Employment	**0.15**	0.06	0.25	**0.52**	0.30	0.83
	Social Protection	**0.33**	0.10	0.49	**0.75**	0.46	0.94
	LIVING STANDARD						
	Durable Goods	**0.25**	0.05	0.47	**0.67**	0.32	0.90

Note: The average, minimum and maximum values for each measure were computed considering all observations (countries and years) in which the involved indicators were non-missing.

4.3 Robustness

Finally, when deciding on a particular index it is fundamental to have a sense of the robustness of the index to changes in the parameters, especially if the index will constitute an instrument for informing public policy. As in any poverty measure, there are a number of decisions involved in the construction of the MPI. Within the AF method specifically, these are the selection of indicators and their corresponding cutoffs, the selection of (explicit) weights and the selection of the poverty cutoff k.

We estimated a total of 58 alternative specifications of the MPI-LA, varying one parameter at a time (with respect to the proposed measure) as well as several at the same time, and all of them were estimated for the full range of k poverty cutoffs (from 10 to 100%). Following Alkire and Santos (2014), we evaluated the robustness of the MPI-LA comparing every possible pair of countries under each possible specification. Whenever a country A is poorer than a country B under a particular specification of the MPI, the pair is said to be robust if such relationship holds under an alternative specification of the MPI. The country ranking is considered to be robust when there is a high proportion of robust pairwise comparisons.[32] We also computed Spearman and Kendall ranking correlation coefficients, which are related instruments of analysis to the pairwise comparisons (see Alkire, Foster, et al. 2015).

The 58 alternative specifications involve essentially six types of variations. First, we explored alternative groupings of the indicators into dimensions. We initially departed from a list of 15 indicators and five dimensions, namely, housing (using housing material, overcrowding and household tenure), basic services (using water, sanitation, cooking fuel and electricity), education (using adult schooling achievement, children's school attendance and children's schooling gap), employment and social protection (using employment, access to health care and access to social security – either contributing to a retirement benefit or perceiving such retirement), and living standard (using income and durable goods). However, the fifteen indicators were grouped in multiple alternative ways. For example we tried grouping the housing indicators (dwelling materials, overcrowding and tenure) alongside the basic services indicators into an overarching 'housing conditions' dimension, adding up to four dimensions rather than five. Similarly, we tried including durable goods into the 'housing conditions' dimension. We also tried specifications with only three dimensions. In one case these were (1) living standard, (2) education, and (3) employment and protection, with the living standard dimension including housing conditions, basic services, durable goods and income. In another case the three dimensions were (1)

[32] While there is no established benchmark for such proportion, we consider proportions over 80% to be highly robust.

housing and basic services, (2) institutional affiliation – comprising the education, employment and social protection indicators – and (3) living standard – comprising income and durable goods.

Second, we explored combining the following pairs of indicators into a single one: children's school attendance with schooling gap, cooking fuel with electricity, and access to health care with access to social protection. In the three cases, the combined indicator was defined such that a household was deprived if it registered deprivation in at least one of the two composing indicators. Third, we also considered excluding certain indicators from the MPI, namely household tenure, electricity and cooking fuel. Thus, all in all, there are specifications with 11 to 15 indicators, grouped into three to five dimensions. As we primarily follow an equal weighting approach across and within dimensions, alternative numbers of indicators grouped in different ways entail alternative weighting structures. Thus, for example, the explicit weight assigned to income ranged from a minimum of 3.7% (in the specification in which income is grouped alongside the shelter and basic services indicators into a 'living standard' dimension), to a maximum of 25% (in the specification in which income is the only indicator in one of four dimensions). The weights of the other indicators also vary greatly.

Fourth, aside from the changes in explicit weights derived from the different number and groupings of indicators when using an equal weighting across and within dimensions, we also tried alternative weighting structures using non-equal weighting structures. Specifically, we tried equal weighting across dimensions but unequal weighting within the living standard dimension, with the income indicator receiving twice the weight of the durable goods indicator. We also tried unequal weighting across dimensions. Specifically, when using five dimensions, we tried weighting housing, basic services and education with 20% each, employment and social protection with 15%, and living standard with 25%. We also tried weighting housing, basic services, education and living standard with 22% each, and employment and social protection with 12%. Another experimented structure was weighting housing, basic services and education with 22.5% each, employment and social protection with 15%, and living standard with 17.5%. Clearly, we also tried the proposed weighting structure of weighting housing, basic services, education and living standard with 22.22% each, and employment and social protection with half of this weight, 11.11%. When using unequal weighting across dimensions we tried both equal and unequal weighting within the living standard and the employment and social protection dimensions, giving income twice the weight of durable goods and employment twice the weight of the social protection and health insurance indicator. A final weighting specification involved using 13 indicators (the ones used in the proposed MPI-LA) and giving equal weights across indicators, regardless of any conceptual dimension they might belong to, except for the social protection indicator which received half the weight of the rest (4% vs. 8% for all others).

Fifth, we estimated most of the different specifications with the income indicator using the total poverty line and – alternatively – the indigence line. Sixth, we tried four alternative definitions of the employment indicator: (1) defining as deprived every person in a household in which the household head is deprived in employment; (2) defining as deprived every person in a household in which more than half of its members are deprived in employment, (3) defining as deprived every person in a household in which half or more of its members are deprived in employment, and (4) defining as deprived every person in a household in which at least one of its members is deprived in employment.

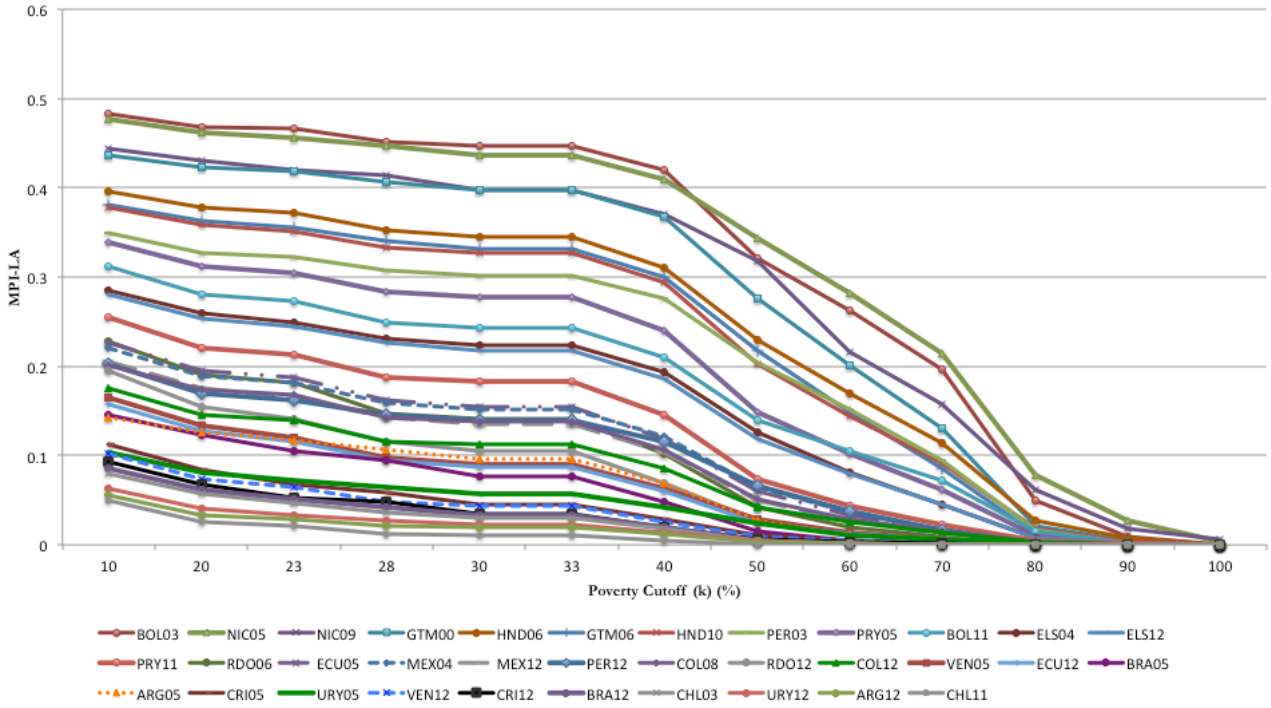
Let us first consider the results of the robustness of the proposed MPI-LA to changes in the poverty cutoff k only. Note that a poverty cutoff of 10% implies being deprived in at least both employment and social protection indicators; in the durable goods indicator or any indicator of housing, services or education – plus one of employment or social protection; or in income alone. At the other extreme, a poverty cutoff of 70% demands being deprived at least in any three of the four dimensions that weight 22.22% plus in the employment and social protection dimension – admittedly a highly demanding cutoff. At the poverty cutoff of 80% poverty estimates decrease dramatically in all countries to 10% or less, and in most cases to 5% or less. Such a cutoff implies almost an intersection criterion. This makes the country ranking less discriminating, and thus it is not sensible to test for robustness at this cutoff and over. So, considering poverty cutoffs between 10% and 70%, we find that 93% of all possible pairwise comparisons are robust. When we restrict the k values to a more relevant range of 20% to 40%, the proportion of robust pairwise comparisons increases to 98%.[33] It may also be noted that the Spearman and Kendall correlation coefficients between the country rankings obtained with the different k values are high. The Kendall Tau b correlation coefficient for k varying between 10% and 70% ranges from 0.88 to 0.99, and the Spearman ranges from 0.98 to 0.99.[34] The robustness of the MPI-LA to changes in the poverty cutoff can be seen in Figure 1, which presents the values of M_0 for all of the 34 observations at the different k values.[35]

[33] Given that we have 34 observations (17 countries at two points in time), there are 561 possible country pairwise comparisons.

[34] Kendall Tau b correlation coefficient corrects for tied ranks.

[35] The graph presents more k values around the selected poverty cutoff of 23%.

Figure 1: MPI-LA Estimates for Different *k* Values.



Note: The initials account for the country names as follows: ARG: Argentina; BOL: Bolivia; BRA: Brazil; CHL: Chile; COL: Colombia; CRI: Costa Rica; ECU: Ecuador; GTM: Guatemala; HND: Honduras; MEX: Mexico; NIC: Nicaragua; PER: Peru; PRY: Paraguay; RDO: Dominican Republic; URY: Uruguay; VEN: Venezuela. The numbers account for the year of observation.

Second, we tested the robustness of the MPI-LA to the 58 specifications detailed above, which vary several parameters simultaneously. Specifically, 14 of the 58 specifications were estimated for the 34 observations. They varied in the way indicators were grouped into dimensions, combining certain indicators and using alternative weighting structures. Considering seven values of k (10% to 70%), we have a total of 98 variants. We found that 85% of all possible pairwise comparisons were robust to those 98 variants. Kendall correlation coefficient between pairs of rankings went from a minimum of 0.83 to a maximum of 1; Spearman varied from 0.95 to 1. When we restricted the possibilities to a smaller range of k values, 20%, 30% and 40%, the proportion of robust pairwise comparisons increased to 91% and the minimum values of the Kendall and Spearman correlation coefficients increased to 0.89 and 0.97, correspondingly.

The same 14 structures were also estimated for the 34 observations varying the income poverty line (total vs. indigence). Considering seven values of k (10% to 70%), we have 196 variants. We found that 84% of all possible pairwise comparisons between observations were robust to the 196 alternative specifications. When we restricted the possibilities to a smaller range of k values, 20%, 30% and 40%, the proportion of robust pairwise comparisons increased to 90%. In both cases the Kendall and Spearman correlation coefficients had a minimum value of 0.83 and 0.95, correspondingly.

Additionally, we estimated 29 specifications (varying in the way indicators were grouped into dimensions, combining certain indicators and using alternative weighting structures) only for observations with no missing indicators.[36] Considering k values from 10% to 70% (203 alternative variants), we found that 81% of all possible pairwise comparisons are robust. The Kendall correlation coefficient between pairs of rankings went from a minimum of 0.79 to a maximum of 1; Spearman varied from 0.92 to 1. When we restricted the possibilities to a smaller range of k values, 20%, 30% and 40%, the proportion of robust pairwise comparisons increased to 88% and the minimum values of the Kendall and Spearman rank correlation coefficients increased to 0.83 and 0.94, correspondingly.

In sum, the MPI-LA is highly robust in terms of the poverty orderings across countries and years not only to the k poverty cutoff but also to simultaneous changes in the number and grouping of the considered indicators, the weighting structure, the income deprivation cutoff, and the definition of the employment indicator. This analysis indicates that although there are several normative decisions involved in the construction of the proposed MPI-LA: (1) many alternative options were considered and estimated and (2) such particular selections of dimensions, indicators, deprivation cutoffs, weights, and poverty cutoffs do not critically affect the poverty ranking obtained. Thus, the MPI-LA seems to be a solid instrument for informing policy.

5. Results

Full estimation results are presented as Supplementary Data. Table S.1 presents the multidimensional poverty index or adjusted headcount ratio MPI-LA and its two composing sub-indices: incidence (the unadjusted headcount ratio, H) and intensity, A. For each, the upper and lower bound estimates, as well as the standard errors, are presented – all obtained via bootstrap.[37] It also presents the censored headcount ratios of each composing indicator, as well as their corresponding contributions, for each country at both points in time. Tables S.2 and S.3 present the MPI, H and A, censored headcount ratios and contributions for urban and rural areas, correspondingly, for each country at both points in time.

[36] These observations are Bolivia 2011, Brazil 2005 and 2012, Colombia 2008 and 2012, Costa Rica 2005 and 2012, Ecuador 2005 and 2012, El Salvador 2004 and 2012, Guatemala 2000 and 2006, Honduras 2010, Mexico 2012, Nicaragua 2005, Peru 2003 and 2012, Paraguay 2005 and 2011, Dominican Republic 2012 and Uruguay 2012.

[37] For each country we performed 1000 replications, and used these estimates to create the bootstrap 95% confidence intervals and standard errors. It is worth noting that the bootstrap could not consider the complex survey design because the strata and cluster variables are in general not provided in the datasets.

5.1 Aggregate MPI-LA estimates: incidence and intensity

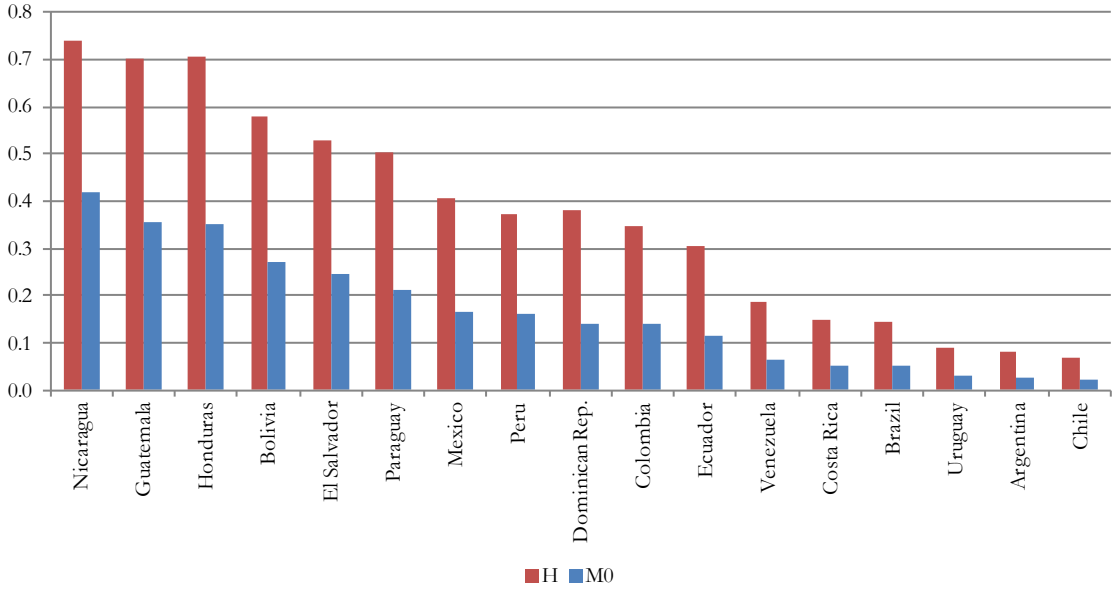
Figure 2 presents the unadjusted headcount ratio – or poverty incidence H – and the adjusted headcount ratio M_0 in the specified MPI-LA for the 17 countries in the final year of observation, around 2012. It can be noted that poverty incidence exceeds 70% in three Central American countries – Guatemala, Honduras and Nicaragua – and is between 50% and 58% in three additional countries – Bolivia, El Salvador and Paraguay. Five countries – Colombia, the Dominican Republic, Ecuador, Mexico and Peru – have headcount ratios between 30 and 40%, followed by Brazil, Costa Rica and Venezuela with incidences between 14 and 19%. Finally, the incidence is below 10% in the three southern cone countries, Argentina, Chile and Uruguay.[38] Bootstrapped confidence intervals suggest that the estimates for each country are highly reliable with very small standard errors (see Table S.1).

Thus, there is great variability in the incidence of poverty across countries in the region: while in the Southern cone only one in ten people are multidimensionally poor, in Central America the proportion is seven in ten. The regional incidence of multidimensional poverty, obtained as a population-weighted average of country-incidences, is 28%, suggesting that around 159.224 million people are multidimensionally poor using 2012 population estimates.[39] This incidence is 1.86 times higher than the regional incidence of acute poverty estimated in 2010 using the global MPI (Alkire and Santos, 2014). It is also worth noting that the 28% figure is largely influenced by the case of Brazil, which is by far the largest country in the region and the fourth least poor according to the MPI-LA. In fact, when we exclude Brazil, the average headcount ratio is 35%.

[38] Results presented here for the year 2012 in Argentina were computed using ECLAC poverty line which is updated on the basis of official levels of inflation. Considering that inflation is under-estimated for that year, we performed an alternative estimation that uses a poverty line updated according to the average inflation from several provinces. This yields an augmented income poverty cutoff that is approximately twice the original poverty line. Using this augmented and arguably more accurate income poverty cutoff, we find M_0 to be 0.055 (*vs.* 0.028 obtained with the original PL), H to be 15% (*vs.* 8% obtained with the original PL), and A 37% (*vs.* 35% obtained with the original PL). Clearly, these different estimates affect the conclusion on poverty reduction in Argentina.

[39] Population estimates correspond to Centro Latinoamericano y Caribeño de Demografía (CELADE) available at http://interwp.cepal.org/sisgen/ConsultaIntegrada.asp?idIndicador=1&idioma=e.

Figure 2: Multidimensional Unadjusted and Adjusted Headcount Ratios ca. 2012

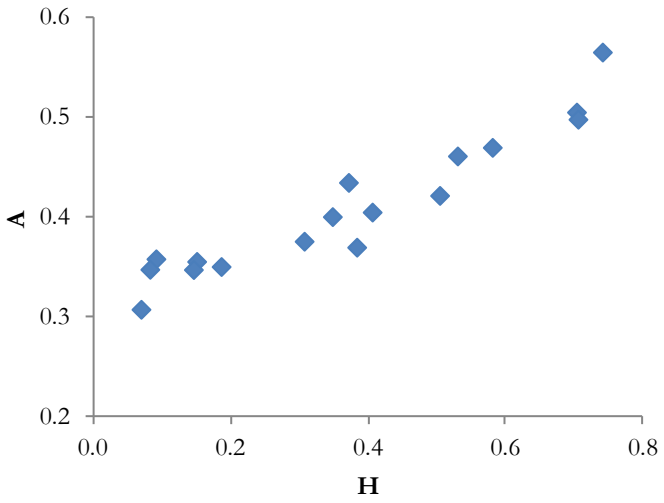


In terms of intensity, in line with international empirical evidence (Alkire and Santos, 2010, 2014), the average proportion of deprivations suffered by the poor population (A) in Latin America is larger in countries with higher poverty rates, as depicted in Figure 3. In countries with the highest poverty rates, the average percentage of deprivations exceeds 45%, which means that – on average – the poor are deprived in over two full dimensions (or its equivalent), whereas in countries with the lowest headcount ratios the percentage is below 36%, the equivalent of 1.6 dimensions.[40]

As a consequence, the adjusted headcount ratio (M_0), which is obtained as the product of H and A, shows larger differences between countries than H. Even though the ranking of countries is practically the same as with incidence, the difference between the highest and the lowest M_0 is 16 times, while the ratio of their headcount indices is eight times.

[40] Note that, by definition, the minimum A value is 25%, as this is the poverty cutoff k.

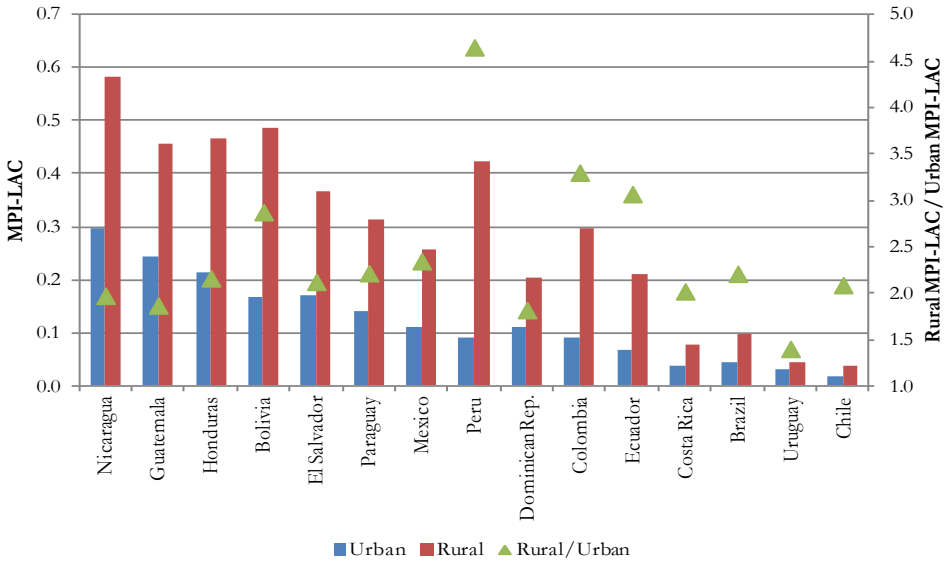
Figure 3: Incidence (H) vs. Intensity (A)



5.2 Poverty in rural vs. urban areas

Figure 4 shows that multidimensional poverty is more severe in rural areas, another result in line with global multidimensional poverty evidence (Alkire and Santos, 2014) as well as with multidimensional poverty evidence in the region (Santos et al. 2010; ECLAC, 2013). The ratio between rural and urban MPI-LA averages 2.4 times, with Uruguay being the only case where the ratio is close to 1.0 and Peru the only case where the ratio exceeds 4.0 times. In the 13 remaining countries, the ratio varies between 1.8 and 3.3 times. Higher multidimensional poverty in rural areas is a consequence of both higher incidence and higher intensity: a person living in a rural area is not only much more likely to be poor, but, also, the poor experience on average a higher number of deprivations.

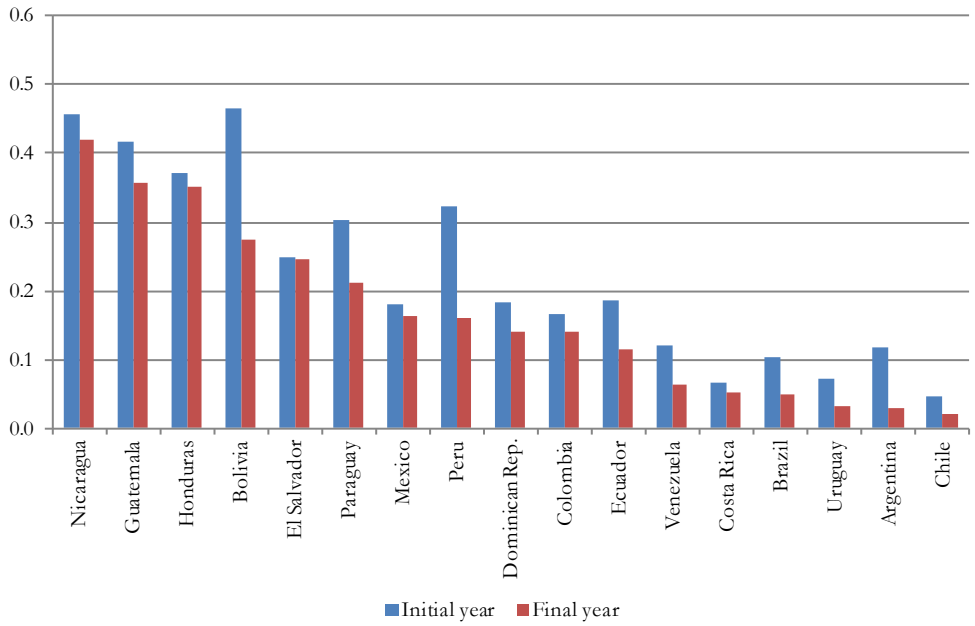
Figure 4: MPI-LA in urban vs. rural areas ca. 2012



5.3 Changes in poverty over time

All but one country in the region (El Salvador) experienced statistically significant reductions in their multidimensional poverty levels between the two observed points in time (the first around 2005 and the final around 2012), which can be observed in Figure 5. Hypothesis tests were performed using standard errors obtained with the bootstrap method.

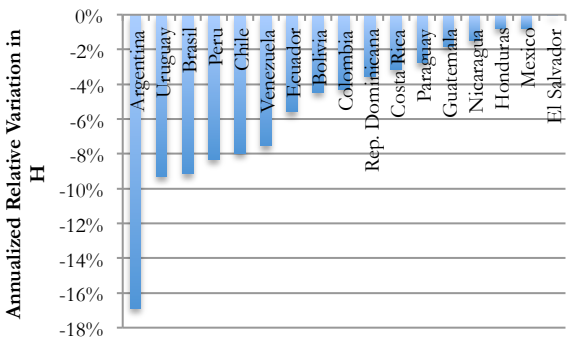
Figure 5: MPI-LA ca.2005 – ca.2012



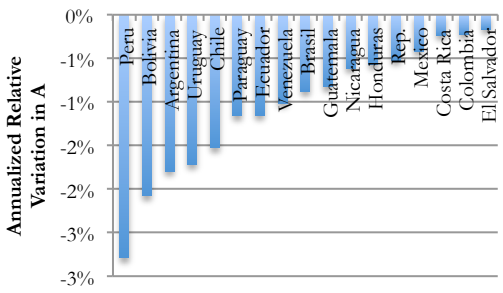
It is also worth noting that the reduction in MPI-LA that each country experienced was a consequence of statistically significant reductions in both incidence and intensity, which are depicted in Figure 6, Panel A and B correspondingly. In this respect it is worth emphasizing the important reductions in intensity verified by Peru and Bolivia.

Figure 6: Annualized Relative Reductions in Poverty Incidence and Intensity

Panel A: Incidence

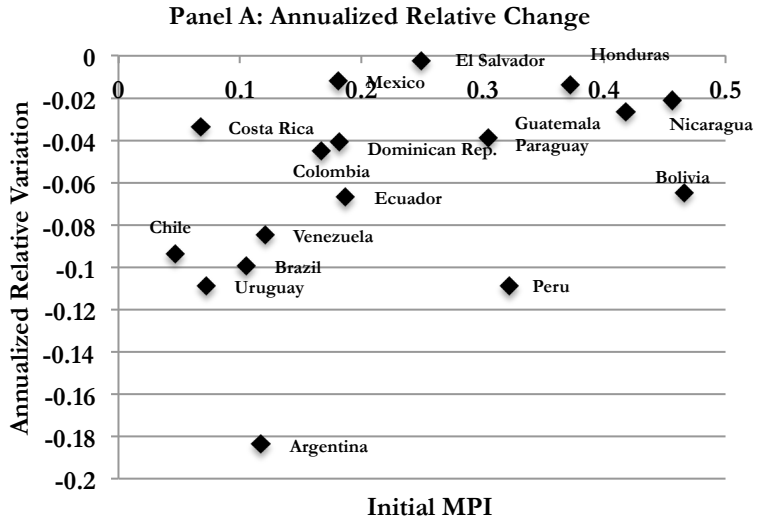


Panel B: Intensity

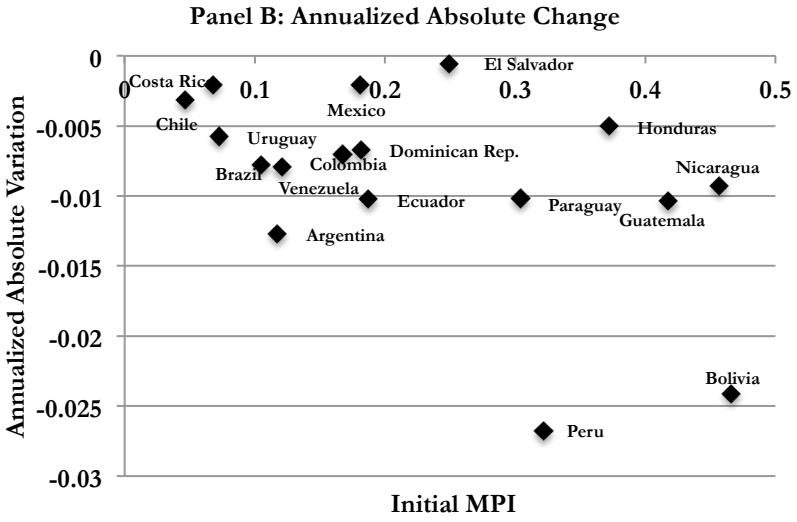


In Figure 7 we depict annualized relative (Panel A) and absolute (Panel B) reductions in the MPI-LA against initial MPI levels. It can be seen that there is a negative correlation between relative annual reduction and initial poverty, that is, less poor countries were the ones achieving higher relative reductions. The largest is found in Argentina (-18% per year)[41], followed by Uruguay (-11%), Brazil (-10%) and Chile (-9%), countries where poverty was halved during that period. On the other hand, the smallest changes are found in Honduras, Mexico and Nicaragua, where poverty fell less than 2% per year. An opposite though less strong pattern is found in terms of the absolute change. In any case, performances are disparate even among countries with similar initial poverty levels, as the different rates of poverty reduction show in – for example – the cases of Colombia, the Dominican Republic, Ecuador and Mexico.

Figure 7: Relative and absolute annualized reductions in the MPI-LA vs. initial MPI-LA level

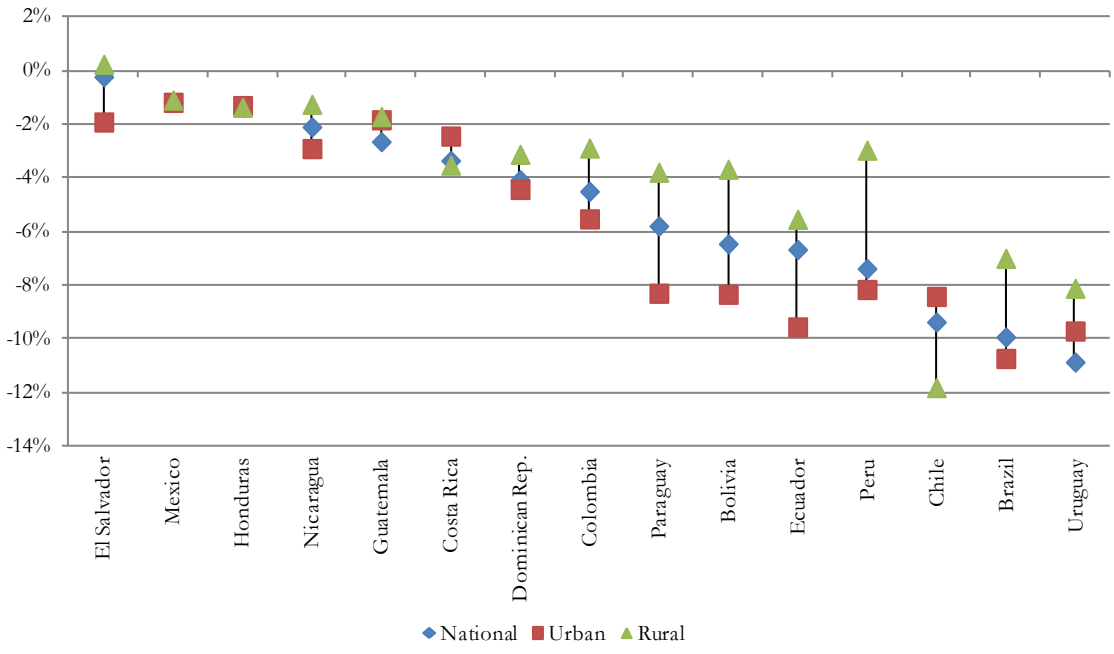


[41] With the alternative estimates for Argentina in 2012, the annualized rate of poverty reduction is much lower and similar to that of Uruguay at 11%.



Also, the reduction in multidimensional poverty was more evident in urban areas, as can be seen in Figure 8. Among the seven countries with the largest decreases in poverty at the national level (of 6% or more per year), six of them had a greater reduction of poverty in urban areas than in rural areas. In Bolivia, Peru and Paraguay the reduction in urban areas more than doubled (in relative terms) that of rural areas. Chile stands out as an exception, as it had a greater reduction of poverty in rural areas.

Figure 8: Changes in the MPI-LA by area of residence, ca.2005–ca.2012 (annualized relative change)



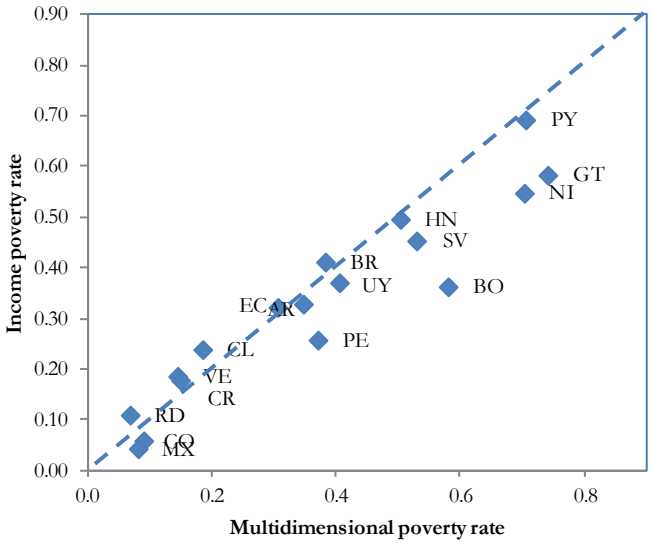
5.4 Multidimensional vs. income poverty

Comparing our results with income poverty figures (using ECLAC poverty lines) reveals that both measures are closely correlated – as Panel A of Figure 9 shows. Countries with the lowest income

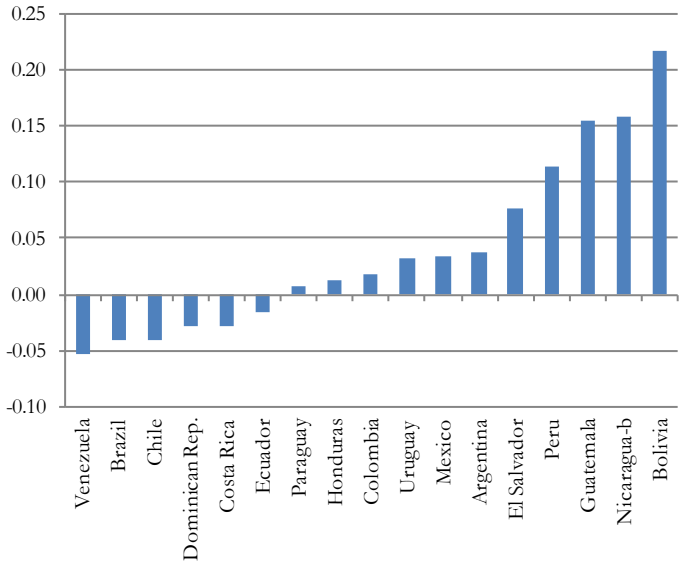
poverty rates are the same countries with the lowest multidimensional poverty rates and vice versa, even though their relative position may differ. This was expected as income is included in the MPI. However, there are differences in the headcount ratios of income poverty and the MPI poor, as can be seen in Panel B of Figure 9. The MPI headcount ratios fall below the income poverty rates in six countries, while the contrary happens in 11 countries. In most cases the difference between both measures is of less than 5 percentage points. Nevertheless, in Bolivia, Guatemala and Nicaragua the multidimensional index is more than 15 percentage points above the monetary poverty rate, while in Peru the difference is 11 percentage points.

Figure 9: Multidimensional vs. income poverty headcount ratios, ca. 2012

Panel A: Multidimensional vs. monetary poverty



Panel B: Difference between multidimensional and income headcount ratio (percentage points)



In any case, the similarity of poverty rates should not be understood as if both methods are identifying the same population as poor. We compared the income poverty estimates with the multidimensional estimate, computing for each country and year the proportion of people who are both income and MPI poor, the proportion of people who are non-poor by both methods, and the proportion of the mismatches. We label the proportion of those who are income poor but MPI non-poor as "*inclusion discrepancy*", in the sense that these people would be counted as poor if the income method was used. We label the proportion of those who are income non-poor but MPI poor as "*exclusion discrepancy*", in the sense that these people would *not* be counted as poor if the income method was used

This exercise is similar in spirit to the bidimensional method, although with the obvious difference that the MPI *includes* income. In fact, by construction, when income is included as an indicator in an AF measure, there is a systematic relationship between the deprivation cutoff k used and each type of discrepancy one would incur if income was used as the sole indicator to identify the poor. If one thought

that the poor are those who experience any deprivation (i.e. under a union criterion) and used income poverty to proxy their identification, the inclusion discrepancy would be zero and the exclusion discrepancy would be the maximum (and equal to multidimensional poverty rate minus the income poverty rate), whereas the opposite happens under an intersection criterion (with the inclusion discrepancy being maximum and equal to the income poverty rate minus the multidimensional poverty rate) (Santos, 2013). Given that we use an intermediate cutoff of k=25%, both discrepancies will tend to be of some intermediate size.[42]

We find that exclusion discrepancy ranges from a maximum of 23% in Bolivia in 2011 to a minimum of 1% in Chile in 2011; the simple average across countries is 9%. Inclusion discrepancy ranges from a maximum of 11% in the case of the Dominican Republic to virtually zero in the case of Argentina; the simple average being 5%. Table 5 presents the contingency table of both identification methodologies for the cases of Bolivia and the Dominican Republic. When the proportion of the population in each of the mismatches is seen as a proportion of the poor, the discrepancies look quite higher. For example, in the case of Bolivia, it means that almost 40% of the multidimensionally poor are not income poor (23/58), and in the case of the Dominican Republic it means that 27% of the income poor are not multidimensionally poor (11/41).

Table 5: Matches and mismatches between income poverty and the MPI-LA

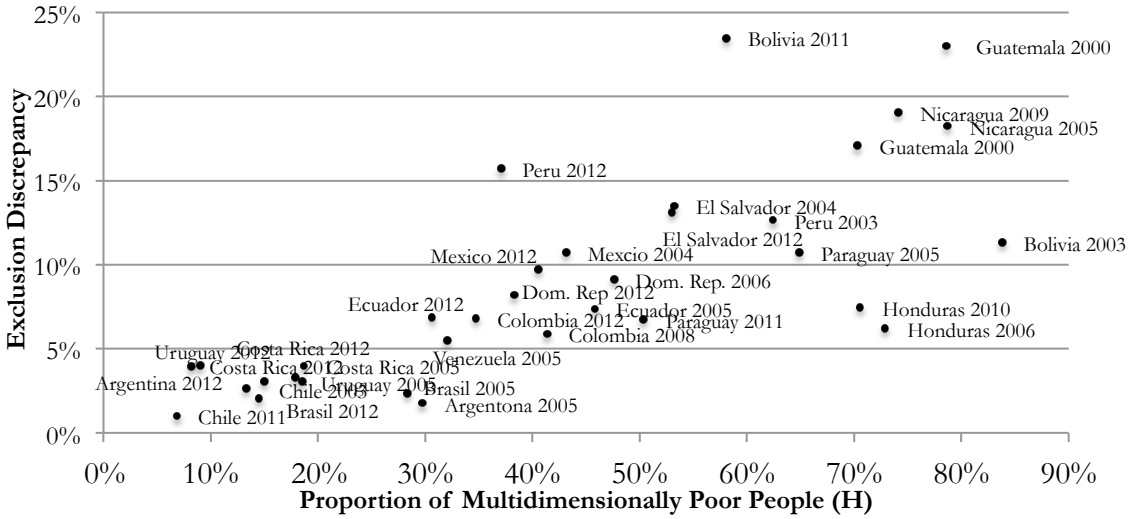
	Bolivia 2011			**Dom. Rep. 2012**		
	Multidimensionally			Multidimensionally		
Income	Poor	Non-Poor	Total	Poor	Non-Poor	Total
Poor	35%	**2%**	37%	30%	**11%**	41%
Non-Poor	**23%**	40%	63%	**8%**	51%	59%
Total	58%	42%	100%	38%	62%	100%

We also find, in line with evidence elsewhere (Santos, 2013), that the higher the incidence of multidimensional poverty, the higher the exclusion discrepancy and the lower the inclusion discrepancy tend to be. This is shown in Figure 10[43]. There it can be seen that not only Bolivia, but also Mexico, Peru, El Salvador, Guatemala and Nicaragua have exclusion discrepancies above 10%, whereas Chile, Mexico, Colombia, Brazil, Ecuador and Venezuela have inclusion discrepancies above 6%. In sum, while the size of the mismatches between the income and the MPI poor is not massive, evidence suggests that the MPI is useful to identify population that suffers from multiple deprivations and may be considered poor even if their incomes are not below the poverty line. This reinforces the relevance of this instrument for public policy challenges.

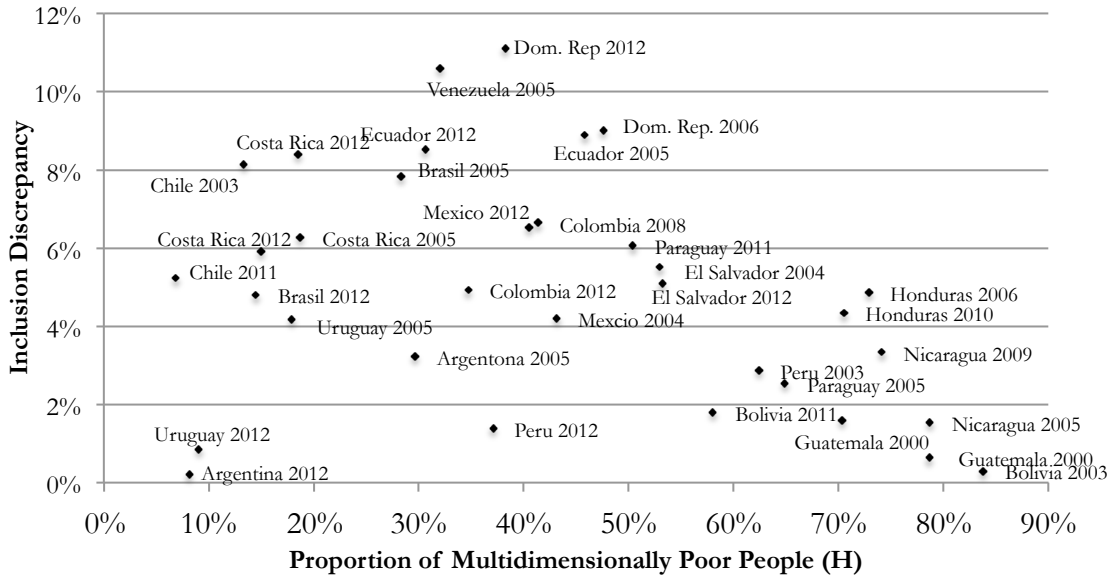
[42] However, we computed both types of discrepancies for a range of deprivation cutoffs k, from 10% to 100%. Results are available upon request.

[43] The same relationship is verified when the discrepancies are graphed against income poverty incidence.

Figure 10: Exclusion and inclusion discrepancies vs. MPI-LA
Panel A: Exclusion Discrepancy



Panel B: Inclusion Discrepancy



5.5 Composition of poverty

In this section we briefly analyse the composition of poverty in the region. Figure 11 presents the relative contributions of each dimension, whereas Figure 12 breaks down poverty into the relative contributions by indicators. To have a sense of absolute deprivation levels in each indicator, Table S.1 in the Supplementary Data presents the censored headcount ratios.

Among the five dimensions considered by the index, the dimension of living standard stands out as the largest contributor. On average it represents a third of total deprivations. Within this dimension, most of

the contribution is made by the indicator of income deprivation, with the indicator of durable goods representing less than 12% of total poverty in all countries.

In terms of absolute levels of deprivation, it may be worth noting that in the final year of observation, Honduras had 63% of people in poor households with less than the poverty line income; in El Salvador, Paraguay, Guatemala and Nicaragua this was between 40 and 50%; in Peru, Ecuador, Colombia, Dominican Rep., Mexico and Bolivia, this was between 20 and 40%, in Venezuela, Brazil and Costa Rica between 10 and 15% and in Chile, Uruguay and Argentina it was 6% or lower. The proportion of people in poor households lacking durable goods was around 60% in Nicaragua and Guatemala, around 40% in Bolivia and Honduras and around 30% in El Salvador and Peru. It was between 10 and 15% in the Dominican Republic, Colombia, Ecuador and Mexico, and 6.5% or lower in the rest of the countries.

On average, the contribution of the remaining four dimensions is similar, although education tends to have a larger contribution than housing and basic services in most countries. Within education, years of schooling is the indicator that contributes the most, usually representing half or more of the dimension.

In terms of absolute levels of deprivation within the housing dimension, one can see in Table S.1 that in El Salvador, Honduras, Bolivia, Peru, Guatemala and Nicaragua, each in its final year of observation, had between 20 and 40% of people in poor households with precarious wall materials whereas the same countries, except Peru, also had above 20% of people in poor and overcrowded households. Deprivation in housing tenure is at lower levels in general. Only Nicaragua in 2009 had a censored headcount ratio of 35% for housing tenure; the rest of the countries had censored headcount ratios of housing tenure below 14%, and most were below 10%.

Regarding basic services, deprivations in energy and in sanitation show the highest levels. The proportion of households that are poor and deprived in sanitation was 55% in Nicaragua in 2009 and 37% in Bolivia in 2011. Guatemala, El Salvador, Paraguay, Mexico and Honduras had between 20 and 30% of people in poor households with deprived sanitation, whereas this was 10% or lower in the rest of the countries. Deprivation in energy was also highest in Nicaragua 2009, with 59% of people poor and deprived in this indicator; it was 55% in Honduras and 35% in Paraguay. In Peru, El Salvador, Bolivia and Guatemala it was –in their corresponding final years of observation– between 20-25%, between 10 and 17% in Dominican Rep., Colombia and Mexico, and below 7% in the rest of the countries. Water showed the lowest levels of deprivation, with Bolivia exhibiting the highest censored headcount ratio of 23%. The rest of the countries were below 20%, and six of them below 10%.

Within the education dimension, adult schooling is the indicator with substantially higher censored headcount ratios: in Guatemala, Honduras and Nicaragua there were between 50 and 64% of people in poor households deprived in schooling; this was 39% in El Salvador, 20% to 30% in Mexico, Bolivia,

Paraguay, Colombia, Dominican Rep. and Ecuador, 10-20% in Peru, Costa Rica, Venezuela and Brazil, and 8% or lower, in Chile, Argentina and Uruguay. Children's school attendance exhibited in the final year of observation higher levels of deprivation in Bolivia, Guatemala, Nicaragua and Honduras with 26 to 31% of people in poor households where at least a child is not attending school. In the rest of the countries the censored headcount ratios were below 12%. Also, comparing countries in their final year of observation, schooling gap's censored headcount ratios were higher – between 13 and 20% – in Nicaragua, Guatemala and Honduras; in the rest of the countries this was 6.4% or lower. However, this relatively low level of deprivation in the schooling gap indicator should not lead to the conclusion that education quality is not an issue in the region given that, as argued above, schooling is a very imperfect proxy of schooling quality.

Employment exhibited censored headcount ratios between 20 and 30% in the final year of observation in Nicaragua, Honduras, Bolivia and Guatemala, between 10 and 20% in Peru, Ecuador, El Salvador, Paraguay, Dominican Rep., Colombia and Mexico, and 6.5% or lower in the other six countries. Social protection exhibited higher censored headcount ratios. In Honduras, Guatemala and Bolivia, in their final years of observation, there were 65%, 56% and 53% of people who were poor and deprived in social protection correspondingly. This was 47% in Paraguay, 45% in El Salvador, between 30 and 35% in Mexico, Peru, Colombia and Dominican Rep., 24% in Ecuador, 15% in Venezuela and below 10% in the other five countries (Nicaragua had this indicator missing).

The contribution of the different dimensions to overall poverty differs according to the level of poverty of each country. In poorer countries, it is to be expected that deprivations in housing and basic services have a greater importance than in less poor countries, while the opposite may be expected from deprivations in employment and social protection. In fact, as it can be seen in Figure 13, results show that the contribution of the employment and social protection dimensions decreases with the MPI. A similar trend is shown by the living standard dimension, with a decreasing contribution in poorer countries, even though there is larger spreading around the trend (for example Bolivia and Uruguay are two notable exceptions). On the other hand, the dimensions of basic services and housing show the opposite pattern, contributing more to multidimensional poverty in countries with higher poverty levels. The education dimension does not show a clear correlation pattern with the level of poverty.

Figure 11: Contribution of each dimension to the MPI-LA, ca. 2012

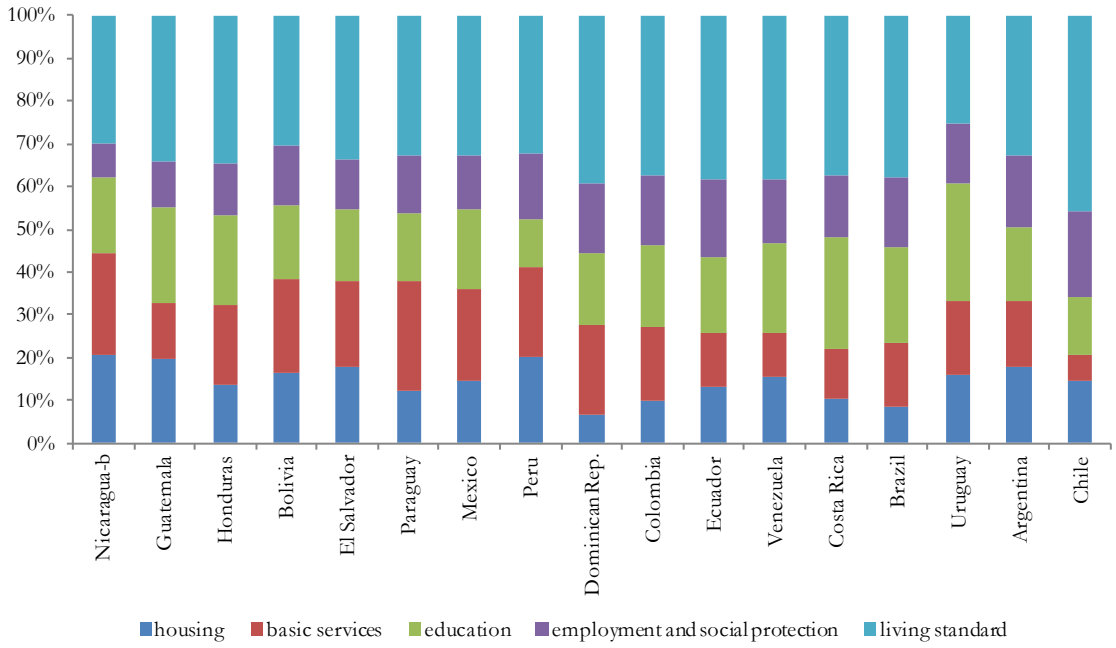


Figure 12: Contribution of each indicator to the MPI-LA, ca. 2012

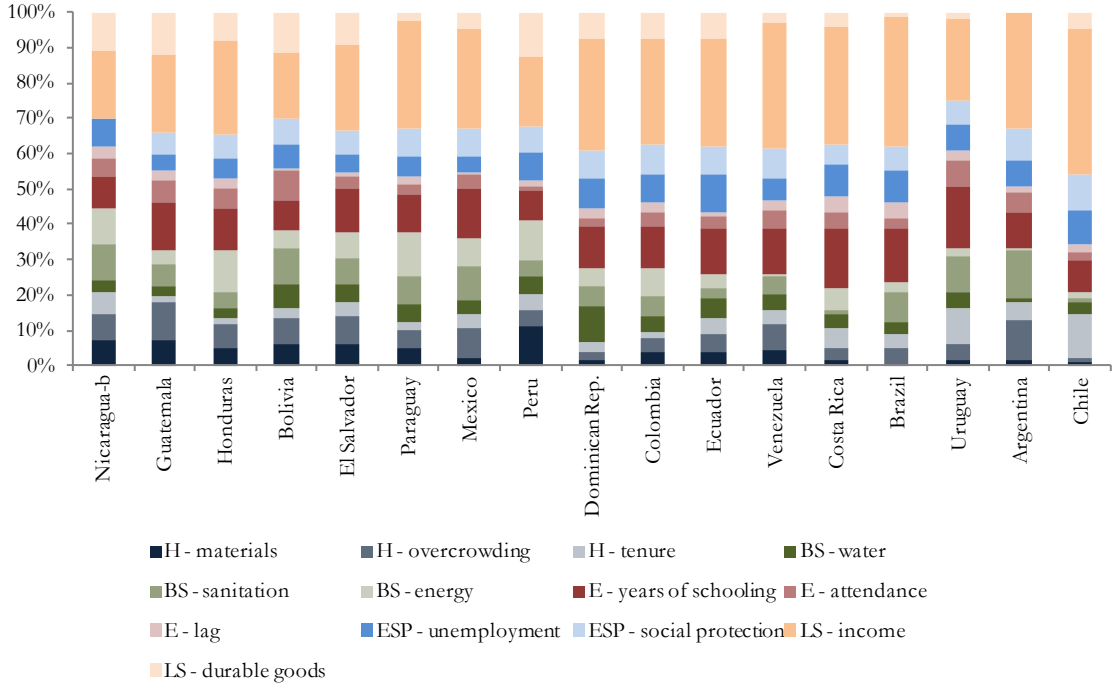
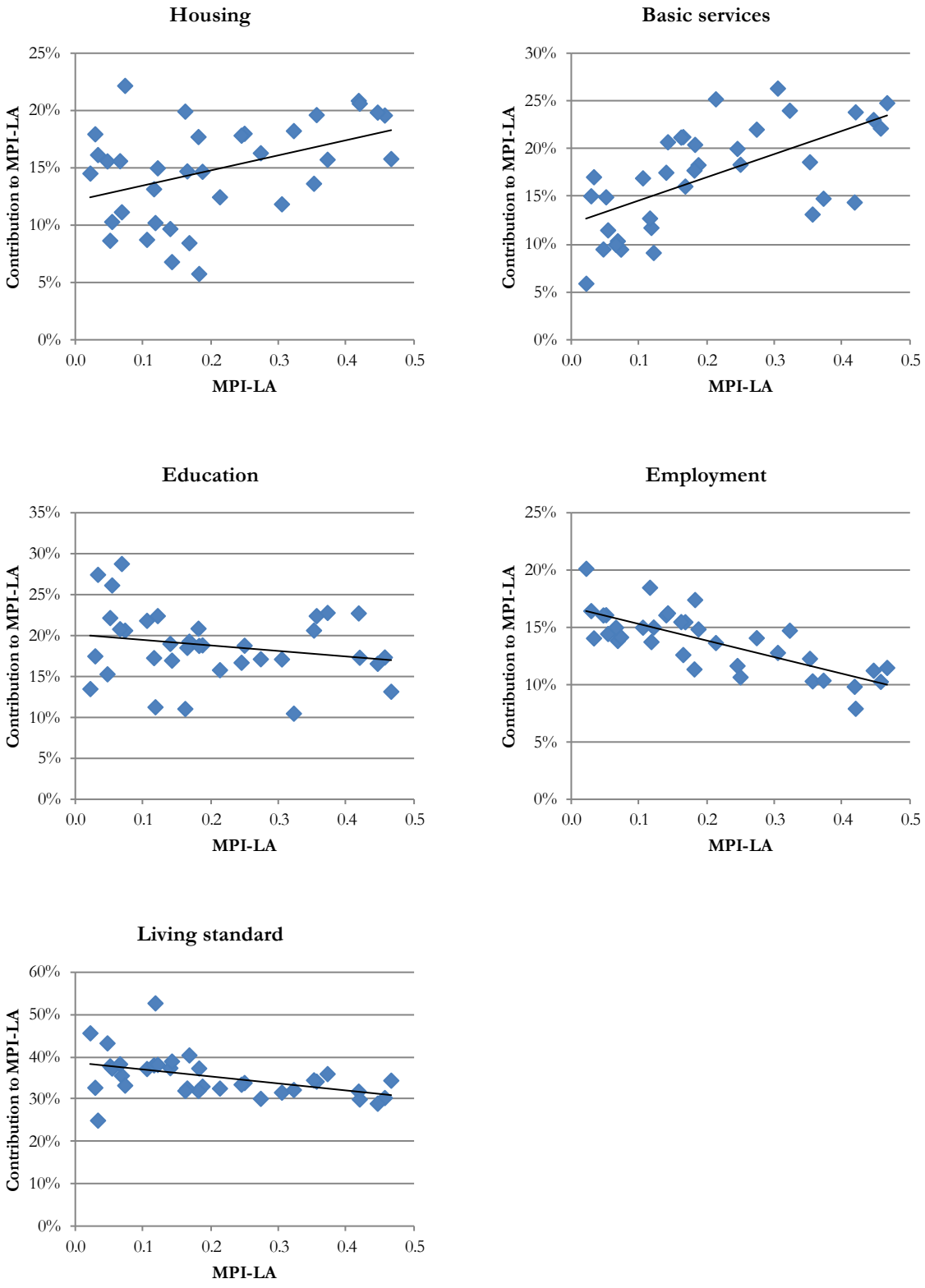
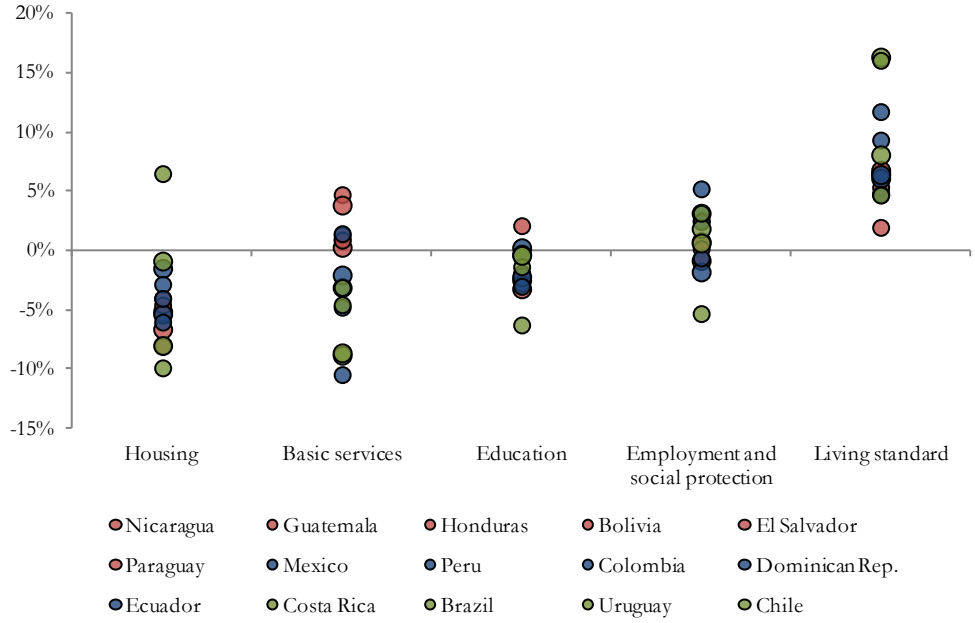


Figure 13: Contribution of each dimension vs. MPI-LA, ca. 2005 and ca. 2012



The contribution of each dimension to total poverty is different in urban and rural areas as depicted in Figure 14. One emerging pattern is that in all 15 countries with data for both areas, the living standard dimension has a larger weight in urban areas than in rural areas. On the contrary, housing has a larger contribution in rural areas in all countries but Brazil. Depending on the country, the contribution of basic services, education and employment and social protection may be larger or smaller in rural areas.

Figure 14: Differences in the contribution of each dimension between urban and rural areas, ca. 2012

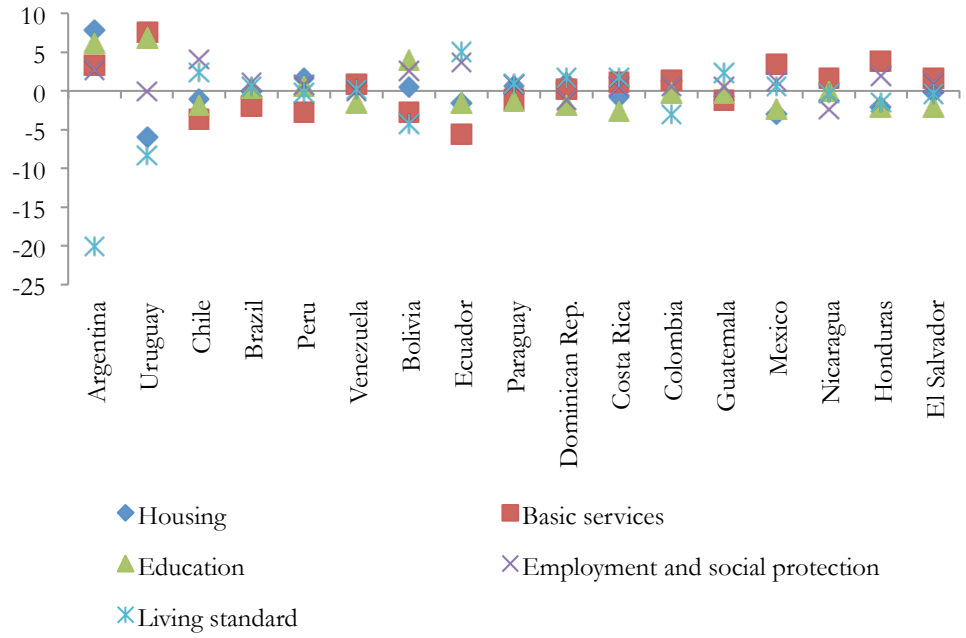


In Figure 15 it can be seen that, compared to 2005, the contribution of the different dimensions to the MPI in 2012 shows many similarities, with the (simple) average contribution of each dimension being almost identical in both years. Nevertheless, there are some changes that merit attention. In Argentina the contribution of the living standard dimension fell 20 percentage points; this was compensated for by an increase in the other dimensions.[44] In Uruguay, the living standard dimension's contribution decreased 8 percentage points and was compensated for by an increase in the contribution of basic services of the same size; similarly, the contribution of deprivations in housing decreased against an increase in education. Bolivia exhibited a reduction in the contribution of living standards against an increase of similar size in the contribution of education – a reduction in the contribution of basic services vs. an increase in the contribution of employment and social protection. Finally, Ecuador showed a decrease in the contribution of basic services (6 percentage points) against an increase in the

[44] This result is influenced by an artificially low official poverty line.

one of living standards and showed a decrease in the contribution of housing and education (2 percentage points each) against an increase in the contribution of employment and social protection.

Figure 15: Changes in the contribution of each dimension between ca. 2005 and ca. 2012 a/ (in percentage points)



a/ Countries sorted in descending order by (absolute value of) relative change in M_0 between initial and final year.

6. Concluding Remarks

In this paper we have proposed a Multidimensional Poverty Index for the Latin American region. It is composed of thirteen indicators grouped into five dimensions: housing, comprising housing materials, rooms per person and housing tenure; basic services, comprising water, sanitation and energy; education, comprising adult school achievement, children's school attendance and schooling gap; employment and social protection; and living standards, comprising income and durable goods. Employment and social protection have weights of 11.11%, with employment being weighted as twice social security, and the other four have weights of 22.22%, with equal weighting within dimensions except for the case of living standard, in which income is weighted as twice durable goods. We consider someone to be multidimensionally poor if she is deprived in 25% or more of the weighted indicators, meaning that a person is required to be deprived at least in the equivalent of a full dimension of the four with equal weights, *plus* something else.

We estimated poverty for 17 countries at two points in time, one around 2005 and the other around 2012. There is great variability of poverty across countries in the region. Considering the final year of observation for each country, we find poverty to be highest in three Central American countries:

Guatemala, Honduras and Nicaragua, and lowest in three Southern cone countries: Uruguay, Argentina and Chile. Overall, we estimate that about 28% of people in the region are multidimensionally poor, which means 159.224 million people using 2012 population estimates, although this estimate is highly influenced by Brazil, the fourth least poor country.

An encouraging result, which is in line with estimates through other methods, is that we find a statistically significant reduction in poverty between these two points in all countries except for El Salvador, with significant reductions of both incidence and intensity. Annual relative reductions were bigger in less poor countries, but there were important reductions in absolute levels in poorer countries. However, important disparities between rural and urban areas of each country remain, these being particularly big in Peru, Chile, Ecuador, Bolivia and Paraguay.

Among the components of multidimensional poverty, living standards, led by income deprivation, emerge as a significant contributor to overall poverty, accounting – on average – for 30% of total poverty. The contribution of the remaining four dimensions is fairly similar, although there are variations across countries. The relative contribution of deprivations in employment and social protection as well as in living standards tend to be higher in less poor countries, whereas the relative contribution of deprivations in housing and basic services tends to be higher in poorer countries. In line with this, the living standard dimension has a larger contribution in urban areas than in rural areas whereas the opposite holds for the housing dimension.

When the MPI-LA is compared with income poverty, we find the proportion of MPI poor people who would not be identified as poor if only income was used to vary between 1% and 23%, with the higher percentages being found in poorer countries. We also find the proportion of people who are not MPI poor but income deprived to vary between zero and 11%, with the higher percentages being found in less poor countries. Thus, the MPI-LA seems to constitute a more accurate instrument to identify the poor.

It is also worth noting that the proposed MPI-LA seems to capture relatively well the state of poverty – within the given data constraints – as suggested by exploratory factor analysis. It also seems to comply with some degree of parsimony, as suggested by statistical analysis using correlation and redundancy measures. Finally, it is highly robust to changes in weighting structures, the poverty cutoff and the indicators used, as well as to the monetary deprivation cutoff. It certainly has limitations, which can be gradually overcome by improvements in data collection, more regular periodicity of data collection across countries, better harmonised survey instruments, and the inclusion of some functionings indicators such as nutrition, employment quality and cognitive skills.

References

Abramovich, V. (2006). The rights-based approach in development policies and strategies. *CEPAL Review* No. 88. Santiago de Chile, Comisión Económica para América Latina y el Caribe (CEPAL).

Alcock, P. (2006). *Understanding Poverty*. Third Edition. Basingstoke: Palgrave Macmillan.

Alkire, S. and Ballon, P. (2012). Understanding association across deprivation indicators in multidimensional poverty. Paper presented at the Research Workshop on Dynamic Comparisons between Multidimensional Poverty and Monetary Poverty. OPHI, University of Oxford.

Alkire, S. and Foster, J. (2007). Counting and multidimensional poverty measurement. *OPHI Working Paper* 7. University of Oxford.

Alkire, S. and Foster, J. (2011). Counting and multidimensional poverty measurement. *Journal of Public Economics*, 95, 476–487.

Alkire, S. and Santos, M. E. (2010). Acute multidimensional poverty: A new index for developing countries. *OPHI Working Paper* 38. University of Oxford.

Alkire, S. and Santos, M. E. (2014). Measuring acute poverty in the developing world: Robustness and scope of the Multidimensional Poverty Index. *World Development,* 52, 71–91.

Alkire, S., Apablaza, M., and Jung, E. (2014). "Multidimensional Poverty Measurement for EU-SILC Countries". *OPHI Research in Progress 36d.*

Alkire, S., Foster, J. E., Seth, S., Santos, M. E., Roche, J. M. and Ballon, P. (2015). *Multidimensional poverty measurement and analysis.* Oxford University Press.

Angulo, R., Díaz, B. Y. and Pardo Pinzón, R. (2013). A counting multidimensional poverty index in public policy context: The case of Colombia. *OPHI Working Paper* 62. University of Oxford.

Atkinson, A., Cantillon, B., Marlier, E. and Nolan, B. (2002). *Social indicators. The EU and social inclusion.* Oxford: Oxford University Press.

Beccaria, L. and Minujín, A. (1985). Métodos alternativos para medir la evolución del tamaño de la pobreza, *Documentos de Trabajo* 6. Buenos Aires: Instituto Nacional de Estadística y Censos (INDEC).

Boltvinik, J. (1992). El método de medición integrada de la pobreza. Una propuesta para su desarrollo, *Comercio Exterior,* 42(4).

Boltvinik, J. (1995). La Pobreza en Mexico. II. Magnitud. *Salud Publica Mex* , 37(4): 298–309

Boltvinik, J. (1996). Evolucion y Magnitud de la Pobreza en Mexico. *Estudios Demograficos y Urbanos* 11, 2(32).

Bradshaw, J. and Finch, N. (2003). Overlaps in dimensions of poverty, *Journal of Social Policy*, 32: 513–25.

Callan, T., Nolan, B., and Whelan, C.T. (1993). Resources, deprivation and the measurement of poverty. *Journal of Social Policy,* 22(2): 141–72.

Cecchini, S. and Azocar, I. (2007). Indicadores de los objetivos de desarrollo del Milenio en America Latina y el Caribe: una comparación entre datos nacionales e internacionales. Serie Estudios Estadisticos y Prospectivos No 53. Comisión Económica para América Latina y el Caribe (CEPAL).

CONEVAL (Consejo Nacional de Evaluación de la Política de Desarrollo Social de México) (2010). *Informe de pobreza multidimensional en México 2008*.

Costello, A. B. and Osborne J. W. (2005). Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. *Practical Assessment, Research and Evaluation*, 10 (7).

Deaton, A. (1997). *The analysis of household surveys. A microeconometric approach to development policy*. Baltimore: John Hopkins University Press.

Duflo, E., Greenstone, M. and Rema, H. (2008). Indoor air pollution, health and economic well-being. *Survey and Perspectives Integrating Environment and Society*, 1: 1–9.

ECLAC (2013). *Social Panorama of Latin America, 2013* (LC/G.2580-P), Santiago de Chile.

ECOSOC (2011). Progress towards education for all in Latin America and the Caribbean. Regional Preparatory Meeting 2011. United Nations Economic and Social Council. Annual Ministerial Review. Regional Bureau of Education for Latin America and the Caribbean OREALC/UNESCO Santiago.

Grosh, M. and Glewwe, P. (2000) *Designing household surveys questionnaires for developing countries. Lessons from 15 years of the living standard measurement study. Volume 1.* Washington, DC: World Bank.

Kaztman, R. (2001). Seduced and abandoned: the social isolation of the urban poor, *CEPAL Review* 75: 163–180. Santiago de Chile, Comisión Económica para América Latina y el Caribe (CEPAL).

Kaztman, R. (2010). La dimensión espacial de la cohesión social en América Latina, *La cohesión social en América Latina. Una revisión de conceptos, marcos de referencia e indicadores* (LC/G.2420), Santiago de Chile, Comisión Económica para América Latina y el Caribe (CEPAL).

Kaztman, R. (1989). La Heterogeneidad de la Pobreza. El Caso de Montevideo, *Revista de la Cepal* 37, 141–152. Santiago de Chile, Comisión Económica para América Latina y el Caribe (CEPAL).

Kaztman, R. (2011). Infancia en América Latina: Privaciones habitacionales y desarrollo de capital humano*, Documentos de Proyecto* (LC/W.431), Santiago de Chile, Comisión Económica para América Latina y el Caribe (CEPAL)/Fondo de las Naciones Unidas para la Infancia (UNICEF).

Mack, J. and Lansley, S. (1985) *Poor Britain*. London: Allen and Unwin.

Ministerio de Desarrollo Social de Chile (2015). CASEN 2013. Situacion de la Pobreza en Chile. Presentacion de la nueva metodologia de mediciond ela pobreza y sintesis de los principales resultados. http://observatorio.ministeriodesarrollosocial.gob.cl/documentos/Casen2013_Situacion_Pobreza_Chile.pdf

Naciones Unidas (2013). *Informe de la Relatora Especial sobre una vivienda adecuada como elemento integrante del derecho a un nivel de vida adecuado y sobre el derecho de no discriminación a este respecto* (A/HRC/25/54) http://www.politicaspublicas.net/panel/images/stories/docs/2014-principios-rectores-seguridad-tenencia-a-hrc-25-54.pdf.

Narayan, D., Chambers, R., Shah, M. K., and P. Petesch. (2000). *Voices of the poor: Crying out for change*. Washington, DC: World Bank.

Nolan, B. and Whelan, C. (1996). *Resources, deprivation and poverty*. Oxford: Oxford University Press.

Nolan, B. and Whelan, C. (2011). *Poverty and deprivation in Europe.* Oxford: Oxford University Press.

Nussbaumer, P., Brazilian, M., Modi, V. and Yumkella, K. K. (2011). Measuring energy poverty: Focusing on what matters. *OPHI Working Paper* 42. University of Oxford.

Roche, J. M. and Santos, M. E. (2013) In search of a multidimensional poverty index for Latin America, presented at 10th Arnoldshain Seminar, 29 June – 2 July, Gottingen, Alemania and at the 2013 ECINEQ Meeting, 2–-24 July, 2013, Bari, Italy.

Ruggeri Laderchi, C. (1997). Poverty and its many dimensions: The role of income as an indicator. *Oxford Development Studies*, 25 (3): 345–360.

Santos, M. E. (2013). Tracking poverty reduction in Bhutan: Income deprivation alongside deprivation in other sources of happiness. *Social Indicators Research* 112(2): 259–290.

Santos, M. E. (2014). Measuring multidimensional poverty in Latin America: Previous experience and the way forward. *OPHI Working Paper* 66. University of Oxford.

Santos, M. E. and Santos, G. (2014). Composite indices of development. *In* B. Currie-Alder, R. Kanbur, D. Malone, and R. Medhora, eds. *International Development: Ideas, Experience and Prospects* Oxford: Oxford University Press, Chapter 5.

Santos, M. E., Lugo, M. A., Lopez-Calva, L. F., Cruces, G. and Battiston, G. (2010). Refining the basic needs approach: A multidimensional analysis of poverty in Latin America. *Research on Economic Inequality Vol. 18: Studies in Applied Welfare Analysis: Papers from the Third ECINEQ Meeting,* pp. 1–29. Bingley: Emerald.

Sen, A. (1985). Well-being, agency and freedom: the Dewey Lectures 1984. *The Journal of Philosophy*, 82(4).

Simpson, G. G. (1943). Mammals and the nature of continents. *American Journal of Science,* 241(1): 1–31.

Stewart, F., Saith, R., Franco, S., and Harriss-White, B. (2007). Alternative realities? Different concepts of poverty, their empirical consequences and policy implications: Overview and conclusions. *In* F. Stewart, R. Saith and B. Harriss-White, eds. *Defining Poverty in a Developing World*. Basingstok: Palgrave Macmillan.

Taccari, D. and Stocking, P. (2013). Tipologias de discrepancias y medidas de conciliación estadística de los indicadores ODM. Serie Estudios Estadisticos 81. Comisión Económica para América Latina y el Caribe (CEPAL).

Townsend, P. (1979). *Poverty in the United Kingdom: A survey of household resources and standards of living, 1967-1969*. Harmondsworth: Penguin Books.

UN (2003). *Indicators for monitoring the Millennium Development Goals*. New York: United Nations.

UN (2014). *The Millennium Development Goals report*. New York: United Nations.

UN HABITAT (2011). *Monitoring security of tenure in cities. People, land and policies*. United Nations Human Settlements Programme.

UNDP (2013). *A million voices: The world we want. A sustainable future with dignity for all*. New York: UNDP.

UNDP (2010). *The real wealth of nations: Pathways to human development. Human Development Report 2010*. New York: UNDP.

UNESCO (2010). *2010 EFA global monitoring report. Reaching the marginalized*. Oxford: Oxford University Press.

UNESCO (2012). 2012 EFA Global Monitoring Report. Youth and Skills: Putting Education to Work. Paris. UNESCO.

UNESCO (2012). EFA Monitoring Report: Youth and Skills. Putting Education to Work.

Villatoro, P. (2007). "Hacia la ampliación del segundo Objetivo del Milenio: una propuesta para América Latina y el Caribe", s*erie Políticas Sociales,* Nº 132 (LC/L.2712-P), Santiago de Chile, Comisión Económica para América Latina y el Caribe (CEPAL).

Whelan, C., Layte, R and Maître, B. (2004). Understanding the mismatch between income poverty and deprivation: A dynamic comparative analysis, *European Sociological Review,* 20(4): 287–302.