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Abstract

Global poverty is a fundamental indicator in monitoring the world's social progress. We review the main issues arising in such measurement since its origin in the World Bank's publications. Comparison with the parallel process of measuring poverty in the European Union provides further insights on the measurement in supranational entities.
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Keywords: global poverty, income, consumption, poverty line, household-level comparable data, cosmopolitanism.
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1. Introduction

In his Presidential address to the American Economic Association on the subject of measuring global poverty, Deaton (2010, p. 7) noted that one candidate measure for a global total would use national numbers from national poverty counts and simply 'add them up over all countries'. 'The importance of national ownership and the incorporation of context-specific measures of poverty' (Greenstein et al., 2014, p. 132) provide a rationale for adopting this procedure in any global count. One could go even further and suggest that 'global poverty and inequality measures are arguably of limited interest' (Deaton, 2010, p. 6), as national governments bear the principal burden of combating poverty and there is no supranational authority in charge of redistributing resources between countries. On the other hand, the resources mobilized by multilateral institutions and nongovernmental organisations to boost development and alleviate poverty are considerable, and call for a global monitoring where poverty and inequality measures feature prominently. As Deaton recognised, global measures 'have a central place in a cosmopolitan vision of the world' (2010, p. 6). The first Sustainable Development Goal is to end poverty in all its forms everywhere, its first target being the eradication of extreme poverty by 2030 as measured by the number of people living on less than $1.25 a day – the World Bank's well-established standard before its last revision. This global poverty count requires a framework for measurement that is common across countries. The implementation of such a framework is the subject of this chapter.

As with measurement in any individual country, we can approach the task in different ways. We restrict attention to unidimensional measurement with a monetary indicator of living standards, although we shall return to multidimensional poverty in the conclusions. The unidimensional measurement of global poverty implies calculating a weighted average of national poverty levels, that is calculating the statistic $P = \sum_i w_i p(y_i; z_i)$, where *i* refers to a world's country, *p* is a poverty index, *y* is the monetary variable used to define the poverty status, *z* is the threshold below which a person is classified as poor, and *w* is the weight assigned to country *i*. For simplicity's sake, the expression assumes that *P* is decomposable by population subgroups, i.e. by countries.

The choice of *p*, *y* and *z* is common to any poverty measurement exercise. Thus, the poverty index may be the headcount rate, the poverty gap or any of the several indices discussed in the literature, *y* might be income or consumption, which may in turn be defined differently (e.g., including imputed rents on owner-occupied dwellings or otherwise), and *z* may be an absolute or a relative threshold or some combination of the two. What is distinctive

in the measurement at the global level is the weighting vector *w*, but also the way in which *z* can be set in a coordinated way across the world. In addition, global measurement requires attention to the comparability of the available data, not only over time as for national measurement but also across countries.

The measurement of global poverty goes back to an exercise started by the World Bank in the late 1970s. More or less at the same time, European countries began to develop poverty statistics as an essential part of the then Community's agenda for social inclusion (CEE, 1981; Jenkins, 2020). Both exercises aim at measuring poverty in a supranational entity – the world and the European Union (EU), respectively – but have followed parallel paths, which have rarely crossed. Comparing the two approaches provides useful insights.

In the next section, we describe the World Bank's approach. Then we discuss where to set the poverty threshold *z*, how to choose the monetary measure of welfare *y*, the data needs, and lastly the weighting function *w*. Due to space constraints, we do not deal with two important issues, the equivalence scale and the poverty measure *p*, which are examined in other chapters. Finally, we draw some conclusions.

2. The World Bank measurement

The World Bank's measurement dates to calculations used in the first *World Development Report* in 1978 (World Bank, 1978) that were based on use of India's national poverty line. The procedure was later developed by Ravallion and colleagues into the form used in the 1990 report, the then 'dollar a day' poverty line that with some modification is still used today. The current line of $1.90 per person per day dates from calculations made in 2015 (Ferreira et al. 2016). The procedure to arrive at this poverty threshold, *z*, is based on averaging the national poverty lines – 15 in the 2015 exercise – in the poorest countries for which lines are available and using Purchasing Power Parity (PPP) exchange rates to translate national currencies into a common currency of 'international' dollars (at 2011 prices). On this basis, some 689 million people were considered poor in 2017, or 9.2 percent of the world's population (World Bank, 2020, Table 1A.2). This represented a large reduction from a poverty rate measured on the same basis in 1990 of 36 percent or a total of 1.9 billion people, a reduction driven in particular by falls in South and East Asia.

The figures that have resulted from the World Bank's measurement have changed over time with revisions to the set of national poverty lines on which it is based and the (rare) updates to the PPP exchange rates. The impact of the latter has been the subject of considerable

debate (e.g., Deaton, 2010; Ravallion, 2020), and settling this issue was one of the primary tasks assigned by the World Bank to the Commission on Global Poverty (CGP) which it established in 2015 under the chairmanship of Tony Atkinson (World Bank, 2017). One of the recommendations of the CGP, accepted by the Bank (World Bank, 2016), was to carry on using the same PPPs (which refer to 2011) and to adjust the 'International Poverty Line' (IPL) of PPP$1.90 over time in each country using the national consumer price index until 2030, the UN's target date for eliminating poverty on this basis.

Typically, the World Bank's estimates excluded high-income countries, as they were assumed to have no-one beneath the IPL, defined by the Bank as 'extreme' poverty. Following the advice of the CGP (World Bank, 2017, p. 47), the Bank now includes these countries in its global poverty count and provides estimates for them in its public use database PovcalNet. Unsurprisingly, the proportion of people living in extreme poverty in high-income countries is tiny, 0.6 percent (see 'Rest of the World' in World Bank, 2020, Table 1A.2), and is such not to affect the global count given population sizes. Although the geographical distribution of extreme poverty is not disturbed, attention is thereby drawn to those 6.5 million and more individuals in the rich world who have resources insufficient even by the minimum standard applied by the World Bank in the poorest countries.

This recommendation of the CGP has far-reaching implications, despite its modest impact on global estimates. First, including rich countries means recognising that they have no special status from the rest of the world: all countries must have a place in the global count. Second, it helps to bring out a pitfall in the measurement of poverty in high-income countries such as the exclusion from the total count of those who do not live in registered households, such as the homeless and those living in institutions, the illegal immigrants and the refugees (see Chapter 40 on the last of these groups). Atkinson (2019, p. 131) deals extensively with 'the missing', in rich and poor countries alike, noting: 'As the total living below the International Poverty Line falls over time, the missing population will become proportionately more significant. Moreover, a number of the groups – such as refugees, the homeless and those living in war zones – have a particular claim on our compassion'. The issue will only gain in importance when the migrations that are expected to be caused by climate change eventually materialise. Third, including high-income countries raises the question of whether the IPL makes sense in advanced economies. Critiques of the World Bank's approach have long stressed that the line is too low to cover the purchasing of basic necessities in many countries, including the United States, the base country (e.g., Reddy and Pogge, 2010). This criticism is

partly accounted for by the World Bank's recent use of two lines set at higher levels (PPP$3.20 and PPP$5.50) as well as by the adoption of the 'societal' poverty line discussed below.

3. The poverty threshold: absolute vs. relative, national vs. worldwide

The World Bank's IPL is an example of an absolute line, lines that can be seen as the outcome of a basic needs approach to assessing poverty. As described, the World Bank derives the IPL taking the average of the national poverty lines in a small set of very poor countries, adjusted with PPP indices. This is not the only way to derive an absolute line. For instance, Allen (2017) computes a line for each country in national currency through linear programming to arrive at the cheapest basket of food that provides a given nutritional input, common to all countries, supplemented by adding the cost of a few non-food necessities (see also Moatsos, 2016). This recognises national specificities in the composition of the food basket and avoids the use of PPPs, but identifies food diets that are unpalatable and hardly acceptable, even for the very poor. Ravallion (2020) provides a critique, while noting that trends over time in poverty reduction with Allen's method and the Bank's are similar.

At the other extreme is a relative line, which is a natural way to proceed when the focus is on individuals not in isolation but living in a society. This is the approach followed from the outset in European exercises. In the final report of the First Programme of Pilot Schemes and Studies to Combat Poverty (CEE, 1981), the poverty line was set for a single person at 50 percent of the mean (equivalent) disposable income in each nation, as in Townsend (1962). The at-risk-of-poverty indicator currently in use in the EU is a direct descendant of such a measure, from which it departs only in setting the line at 60 percent of the median, preferred because it is more stable and less sensitive to outliers than the mean.

A second distinctive feature of the World Bank's approach is that IPL is a worldwide poverty standard, adjusted only for cost-of-living differences. This approach aims at treating all world inhabitants homogeneously and, by definition, allows no room for cross-country differences in the socially acceptable minimum living standard. The proposal by Greenstein et al. (2014) goes in the opposite direction of fully embodying such national differences in the global measurement of poverty. The European approach retains the idea of a common standard but adjusts it for a country's income level, as the poverty line is set at the national median rather than at the EU-wide median. Using the EU-wide common standard would change considerably the level and composition of European poverty (Brandolini, 2007). As Atkinson noted, when the poverty line is set as a fraction of the national median, 'the impact of growth

on poverty in the Community [depends] solely on what happens within each country', whereas it would be affected 'by the relative growth rates of different member countries' (1995, p. 71) if the line was proportionate to the EU-wide median. Ultimately, the question is deciding the relevant 'reference group' in deriving a relative poverty threshold.

The World Bank and the European approaches are starkly different: an absolute global standard vis-à-vis a relative national standard. In many ways, this divergence reflects the different level of development of the countries considered. Atkinson and Bourguignon (2001) went beyond this traditional distinction for the poverty threshold and proposed a unified framework by introducing the idea of what has come to be known as a 'societal' poverty line. The societal line is an absolute one at lower levels of development but then moves up as national income rises, something rationalised using Sen's capability approach. (Ravallion, 2020 provides a fuller theoretical framework.) How to construct such a line is now an important new research area (e.g., Ravallion and Chen, 2011, 2019; Atkinson, 2019; Jolliffe and Prydz, 2021; but see also the 'hybrid' threshold proposed by Foster 1998 for the US, while Decerf, 2017 considers the appropriate poverty index when the line has both absolute and relative elements).

The World Bank's biennial flagship report *Poverty and Shared Prosperity* includes estimates of global poverty based on a societal poverty line (SPL) following another of the recommendations of the CGP report. Formally, the line is defined by the Bank as $SPL = \max(\text{PPP\$1.90}, \text{PPP\$1.00} + 0.5 \times \text{median})$, where median is the daily median level of consumption (or income) per capita in the household survey used to estimate the extent of a country's poverty. In other words, the SPL is the same as the IPL, that is PPP$1.90, in countries at lower levels of development and then moves up. The global poor in 2017 assessed using the SPL are estimated to have totalled 2.1 billion people with a poverty rate of 27.6 percent, which may be compared with the figures noted earlier of 689 million people and a rate of 9.2 percent when using the IPL (World Bank, 2020, Tables 1A.2, 1C.1). The World Bank regions 'Europe and Central Asia' and 'Rest of the world', which includes North America and most of the EU, each contributed just under 1 percent of global poverty in 2017 according to the IPL but with the SPL their shares rise to 4.0 and 8.1 percent. Over time, global societal poverty has declined more slowly than the global total when poverty is assessed with the IPL as national medians have increased with economic growth.

4. The focal variable: income vs. consumption – and its measurement

The choice of the monetary variable *y* capturing living standards is not straightforward, although in practice it largely reduces to choosing between consumption and income. China's National Bureau of Statistics has used a criterion of both low income *and* low expenditure to identify rural households in poverty (Atkinson, 2019, p. 59) but in general a choice has to be made, whether the aim is to arrive at a national or global total (bar imputation of one measure from the other e.g., Moses et al., 2021). The World Bank's preferred measure is consumption, arguing that this best captures the living standards that individuals achieve while income reflects only opportunity or a command over resources. Of course, the argument can be turned around in favour of income depending on which aspect of welfare one considers more important.

Practical considerations of data availability may often influence what measure of living standards is used. While clearly wishing to use consumption, the World Bank has to rely on income data for many Latin American and Caribbean countries for its estimates of global poverty. Figures for most high-income countries are also based on income. Conversely, the European approach has consistently favoured income, but has turned to expenditure when such variable was unavailable or inaccurate (e.g., O'Higgins and Jenkins, 1990).

Whether income or consumption is taken, a string of additional issues relating to the exact definition of *y* need to be resolved. Consumption of a good – its use – is typically proxied by the expenditure required to purchase the good, or it may be ignored entirely if expenditure is only very infrequent as with many durable goods. Amendola and Vecchi (2014) note that official poverty measurement in the US, Canada, Australia and the UK ignores durables and that the same is true in 41 out of 95 poverty assessments carried out by the World Bank between 1996 and 2014 (covering 61 countries) in which the definition of the welfare aggregate was clear. On the other hand, Deaton and Zaidi (2002) recommend, in the guidelines they drafted for the World Bank, calculating an annual rental equivalent for any durable good by using appropriate real interest rates and depreciation-values (see also the draft updated version of the guidelines by Mancini and Vecchi, 2021). Detailed indications on how to define household income are provided in the final report of the Expert Group on Household Income Statistics – The Canberra Group (2001).

In sum, the choice of which components to include in consumption or income is no less important than the conceptual choice between either variable. The value of owner-occupied housing is a typical problem: is the imputed rent – the use that the household can be deemed to

make of the property – in or out of the calculations of either consumption or income? If included, how is it estimated? Both Deaton and Zaidi (2002) and the Expert Group on Household Income Statistics – The Canberra Group (2001) recommend its inclusion, while warning about difficulties in practical implementation. The main message for producers and users alike is to pay close attention to footnotes. Atkinson (2019) provides a valuable 'Checklist' as a guide to poverty estimates, whether at the global or national level.

5. The need for fit-for-purpose data

Atkinson's Checklist goes well beyond the definitional issues discussed above. For example, who is being counted, people or households? How is inequality within households addressed and what about the differences between them in their needs? What are the survey response rates? How comparable are data across countries and across time? Even more importantly, do data even exist?

Progress on the data has been significant in the last decades. Much has been achieved by investing in new sources. To bridge data gaps and help countries produce better data, the World Bank launched in the early 1980s the Living Standards Measurement Survey (LSMS), which to date has supported more than one hundred low and middle-income countries in improving the availability and quality of household survey data. (As of June 2021, the LSMS website contains 'only' 137 studies for 37 countries, which is a small subset of the surveys actually supported by the LSMS team over the years.) Serious deficiencies in available national data were identified in the first European exercises and eventually led to the development of harmonised data collections such as, currently, the EU Statistics on Income and Living Conditions (EU-SILC).

Nevertheless, the issue of existence of data is still relevant at the global level. It is easily overlooked when presented with estimates that appear to relate to the whole world, but as the World Bank notes clearly on the PovcalNet website: 'Since many countries do not have household surveys every year, it is often necessary to extrapolate or interpolate the welfare aggregate(s)'. The 2020 edition of *Poverty and Shared Prosperity* highlights the improvement in the coverage of Africa due to new data for Nigeria and the marked decline for South Asia due to the absence of recent data for India: 'These estimates illustrate how the ability to monitor global poverty depends on the availability of data for populous countries, especially countries with large populations of extreme poor' (World Bank, 2020, p. 51).

With around 1.4 billion people each, India and China together make up over a third of the world's population and the availability and quality of data from these countries have a major impact on estimates of global poverty. Atkinson (2019, p. 171) reports that the World Bank figure for the fall in rural poverty in China between 2012 and 2013 was 62.9 million people, over half of the global reduction in poverty between these two years. He also notes that figures supplied by China's National Bureau of Statistics showed a far smaller fall of only 16.5 million people, illustrating the need for comparison of international organisations' estimates with those of national authorities, a process of cross-checking that can provide legitimacy to both exercises. (The experience of China is also discussed by Chen and Ravallion, 2021, who like Atkinson point to the introduction of a new nationwide household survey in 2013.)

The comparability of the data used for global counts of monetary poverty is also critical, and often hard to judge. Aspects of survey design and questionnaires vary substantially, although harmonisation has greatly improved over time thanks to the efforts of statistical offices and initiatives such as the World Bank's LSMS or the Eurostat's EU-SILC. However, in many cases the World Bank's global counts have to use surveys that national authorities have conducted for their own purposes. By contrast, the UNDP's estimates of multidimensional poverty (see our concluding section below) are able to draw largely on two survey programmes that each appear to have a high degree of comparability across countries (Atkinson, 2019, Table 4.1).

6. The weighting function: cosmopolitanism vs. limited sympathy

Global poverty measurement, like any other count aggregating multiple nations, calls for assigning a weight to each country. Both the World Bank and Eurostat take weights in the statistic P to be equal to the population size. This implies weighting each poor person equally, around the world or within the EU. Atkinson (2019) describes this as a 'cosmopolitan' approach to estimating global poverty and one that is entirely suitable for an international organisation such as the World Bank. However, he considers alternatives. They include the extreme position of an 'isolationist' approach in which poverty outside one's own country is ignored, and a 'limited sympathy' approach in which full weight is given to the poor within national borders and a weight less than 1 but greater than 0 to the poor in other countries.

The case of 'limited sympathy' has received virtually no attention in the literature on global poverty. It raises ethical as well as measurement questions. In particular, it would imply that the global poverty count is nationally specific and varies with the country where the

calculation is made: ‘the magnitude of world poverty as seen from India will be different from that seen from the US; the two world poverty counts may even be moving in opposite directions’ (Atkinson, 2019, pp. 13-4). A reason to consider this approach is the fact that opinions differ: ‘we have to recognise that sympathy may, in today’s world, be less than complete, and that this needs to be reflected in the measures employed’ (Atkinson, 2019, p. 14). This recognition is echoed in the current debate on the impact of globalisation on inequalities between and within countries: ‘Whether one thinks the last quarter century has been good or bad for equity depends critically on whether one takes a national or global perspective’ (Rodrik, 2017, p. 1).

In the end, whether national borders should feature in the measurement of global poverty is a normative choice, grounded in some conception of global distributive justice (Brandolini and Carta, 2016). Counting the poor across countries requires an ethical judgement on how each of them contributes to the total count and, as well known since Atkinson’s (1970) landmark article on inequality measurement, such judgement needs to be made explicit.

7. Conclusions

Measuring poverty in the whole world is not much different from conducting the same exercise in a single country. The debate on whether to choose an absolute or relative standard is crucially influenced by economic progress, and the appeal of relative standards gains momentum as countries become richer. Indeed, a key challenge for measurement at the global level is to arrive at a poverty standard that is suitable for countries at vastly different levels of development, reflected in the recent interest in ‘societal’ poverty lines.

The growing consensus that human well-being cannot be adequately measured by income alone is stimulating the multidimensional measurement of poverty, at the national and global level. As to the latter, since 2010 the UNDP’s *Human Development Report* has published estimates of non-monetary multidimensional poverty (e.g., UNDP, 2020). Following the CGP advice, the World Bank now includes estimates of multidimensional poverty in its reports alongside its longstanding monetary measures. (The approach adopted by the Bank differs from that of the UNDP and recommended by the CGP as a monetary measure of poverty is included as one of the dimensions.) We have not delved into multidimensional approaches as they are discussed in other chapters, but this is undeniably a very active research field.

One important difference between national and supranational exercises pertains to the weights to assign to citizens of, or residents in, differing countries. While this aspect has received no attention so far, it is evidently determined by underlying ethical views of distributive justice.

The availability of appropriate high-quality data is also common to all exercises, although issues of cross-country comparability amplify difficulties for global counts. Progress has been astonishing since 'the meagreness of reliable information' led Kuznets to conclude that his celebrated paper on growth and inequality was 'perhaps 5 per cent empirical information and 95 per cent speculation, some of it possibly tainted by wishful thinking' (1955, p. 26). Yet, there is no doubt that investing in better data and statistical capability is a priority to improve the measurement of poverty, both within nations and for the whole world.

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