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A Relative View of Global Poverty: What the International Poverty Line is not Telling Us

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A relative view of global poverty: what the international poverty line is not telling us

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Abstract

The international poverty line is a widely accepted standard for defining the extreme poor in the world. However, the current method of using the international poverty line to measure poverty in all countries implies a more stringent standard of assessing poverty in low-income settings. The line reflects the standards of absolute poverty in the poorest countries, which is an idea originating from 1990 when the World Bank set the dollar-a-day line. With economic growth over the years, the concept of relative poverty has become more relevant. In more recent times, it would be an improvement to start shifting the focus of the international poverty line from the *poorest countries* to the *poorest people* in every country. This paper shows that global and regional poverty profiles change substantially when poverty is estimated with alternative poverty lines that incorporate a relative notion of poverty. In particular, with the international poverty line of $2.15, the share of the global poor in 2019 living in Sub-Saharan Africa alone is 60%. However, under the assumptions of weakly relative poverty, this share decreases to 24%. In a nutshell, new evidence suggests that the well-known fact that global poverty is mostly concentrated in Sub-Saharan Africa is exaggerated.

Keywords: international poverty line; global poverty; Sub-Saharan Africa
JEL codes: I32; D63

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1 Introduction

In 1990, the World Bank set the dollar-a-day line to define who was poor in the developing world. This line reflected the standards of absolute poverty in some of the poorest countries in the world at the time. It was based on the idea that a minimum level of consumption expenditure was needed for subsistence in the developing world. The data available then supported the fact that an individual needed at least $1.00 (1985 PPP) in poor countries to cover their basic needs, including food, shelter, and clothing (World Bank, 1990).

The dollar-a-day line has been updated each time new PPP data were released. When the 2005 PPPs were released, the dollar-a-day line was updated to $1.25 (Ravallion, Chen, & Sangraula, 2009). The primary goal of the World Bank and the United Nations to end (extreme) poverty in the world by 2030 has been set with respect to this updated line. In 2015, the World Bank poverty line became known as the international poverty line (Word Bank, 2015; World Bank, 2017) and has been updated again in 2022 from $1.90 in 2011 prices to $2.15 in 2017 prices as the typical national poverty line of low-income countries (Jolliffe, Mahler, Lakner, Atamanov, & Tetteh Baah, 2022). Aside the change in name, the World Bank poverty line has seen at least two more developments over the years: (1) in terms of its significance, it is now used to measure not only absolute poverty but also extreme poverty[1] (Chen & Ravallion, 2010; Ferreira et al., 2016), and (2) in terms of its scope, it is now used to measure poverty in all countries, and not only developing countries as before (Deaton, 2006; Chen & Ravallion, 2010; Ferreira et al., 2016).

The current method of applying the international poverty line to income/consumption distributions of *all* countries can belie an equal assessment of poverty across countries. Consider an individual living on $3.00 *a day* in the United States in 2017; this is also the average cost of *a meal* for people who were food secure in the United States in 2017 (Feeding America, 2019). By the international poverty line of $2.15, this individual will be excluded from the global count of the extreme poor in spite of the fact that they are living in extreme poverty.[2] Thus, the international poverty line implies a more lenient standard for assessing poverty in high-income settings, such as the United States. Equivalently, the international poverty line implies a more stringent standard for assessing poverty in low-income settings, often in Sub-Saharan Africa. (In 2019, 80% of the world's population living in low-income countries were in Sub-Saharan Africa.)

[1] At the national level, extreme poverty is the proportion of the population whose total consumption expenditure is less than a food poverty line, whereas absolute poverty is the proportion of the population whose total consumption expenditure is less than an absolute poverty line (Khandker & Haughton, 2009). (The food poverty line and a non-food allowance yield the absolute poverty line.) For global poverty monitoring, the World Bank defines extreme poverty as living below the international poverty line. Since the international poverty line is constructed based on absolute national poverty lines, this paper considers extreme poverty and absolute poverty as similar concepts in the context of global poverty.

[2] The *US Census Bureau* reports that 12.3% of the US population were living below the absolute national poverty line in 2017 (Fontenot, Semega, & Kollar, 2018), whereas only 1.25% were living below the international poverty line (World Bank, 2022b).

In its leading role of monitoring global poverty, the World Bank has defined other poverty lines in addition to the international poverty line for a fairer assessment of poverty in the world. First, there are higher lines of $3.65 (2017 PPP) and $6.85 (2017 PPP) defined as the median values of the national poverty lines of lower- and upper-middle-income countries, respectively (Jolliffe et al., 2022). According to the World Bank (2022b), it is more reasonable to use these lines to measure absolute poverty in middle-income countries. Though absolute poverty lines, the international poverty line and higher lines reflect the idea of relative poverty, the fact that the concept of poverty varies by income (Ravallion, 2010; Ravallion & Chen, 2011). Second, the World Bank has a complementary measure of poverty based on a societal poverty line that combines elements of both absolute and relative poverty—that is to say, weakly relative poverty. The societal poverty line is defined as max(international poverty line, $1.15 + 50% of median consumption or income), expressed in 2017 PPP dollars, and is country-year-specific (Jolliffe et al., 2022). (Section 2 has more details on the derivation of this line.)

The international poverty line is constructed in the same spirit of the dollar-a-day line set in 1990 to reflect the standards of absolute poverty in the poorest countries in the world (Ferreira et al., 2016; Jolliffe et al., 2022). However, with economic growth over the past decades, and with many countries graduating from low-income to middle-income countries, the concept of relative poverty is becoming more relevant.[3] Globalization has resulted in a growing share of rich people in some developing countries (Freund, 2016) and a growing share of poor people in rich countries (ILO, 2017). When thinking about global poverty in recent times, we might want to start shifting the focus from the *poorest countries* to the *poorest people* in every country. That would be an improvement on the idea from 30 years ago to set a poverty line that would reflect the standards of the poorest countries. To the extent that the societal poverty line is more aligned with national poverty lines than the international poverty line and other absolute poverty lines (see Section 5), the societal poverty line might be considered as a more relevant metric for measuring global poverty.

This paper synthesizes the existing work on the international poverty line and other official lines of the World Bank to highlight the changes in global and regional poverty profiles when a (weakly) relative notion of poverty is assumed. The results suggest that the current method of applying the international poverty line to all countries has implications that are non-trivial for global poverty estimates and the perceptions held about the regional distribution of poverty. Of all three absolute poverty lines ($2.15, $3.65, and $6.85) and the societal poverty line, the international poverty line has the most traction for monitoring global poverty. The headline numbers of global poverty are based on the international poverty line, and this line is often cited in research and policy work. For example, *Our World in Data* publishes global poverty estimates primarily based on the international poverty line. With this line, the global poverty rate is a single-digit number in 2019, as is the regional poverty rate for any region except Sub-

[3] In 1990, a majority (58%) of the world's population was living in low-income countries and in 2019 a minority (9%) was living in low-income countries. These are updated estimates from Fantom and Serajuddin (2016).

Saharan Africa.[4] By this standard, about 60% of the global poor live in Sub-Saharan Africa alone. However, when one uses the societal poverty line, which assumes a weakly relative notion of poverty, this share decreases substantially to 24%.

The rest of the paper is organized as follows. Section 2 discusses the rationale behind the international poverty line and the other poverty lines, as well as their methodological foundations. Section 3 discusses the data and method used in estimating global poverty. Section 4 presents the results, and Section 5 investigates the robustness of the main results. Section 6 concludes.

2 The official poverty lines of the World Bank

2.1 A brief history of the international poverty line

Since 1990 when the dollar-a-day line was set, the World Bank has determined its poverty line based on a sample of PPP-adjusted national poverty lines of some of the poorest countries in the world. A summary measure (mean or median) of PPP-adjusted national poverty lines of selected poor countries is usually taken as the international poverty line. Table 1 summarizes how the line has evolved with each release of new PPP data. A guiding principle has persisted, that the line should reflect the definitions of poverty in the poorest countries. However, there have been improvements in terms of data and methodology with each update of the line. For example, the number of countries that form the basis of the international poverty line has increased from 8 with the 1985 round of the International Comparison Program (ICP) to 28 with the 2017 round (see more on the sampling methodology in the next sub-section). The updates in the line reflect improvements in PPP data, as well as survey data and national poverty lines often produced by national statistical offices. Another guiding principle of the international poverty line, which has been quite prominent in recent updates, is the need to minimize any possible changes to the real value of the line. The amount of $1.90 (2011 PPP) holds constant the real value of $1.25 (2005 PPP) (Ferreira et al., 2016) and the amount of $2.15 (2017 PPP) holds constant the real value of the $1.90 (2011 PPP) (Jolliffe et al., 2022). These recent updates essentially incorporate new price data into the derivation of the line and reflect nominal increases in the value of the line.

2.2 Derivation of the international poverty line and higher lines

The sampling of countries whose poverty lines underpin the international poverty line is an important part of the brief history discussed above but has been moved here to better illustrate how the current international poverty line has been derived together with higher absolute lines. When the 2005 PPPs were adopted for poverty measurement, Ravallion et al. (2009) identified this set of countries by plotting national poverty lines against household final consumption

[4]The global extreme poverty rate in 2019 is 8%. Extreme poverty differs by region: East Asia Pacific (1%), Europe Central Asia (2%), Latin America Caribbean (4%), Middle East North Africa (8%), South Asia (9%), and Sub-Saharan Africa (35%).

Table 1: History of the international poverty line

Source	World Bank (1990)	Chen and Ravallion (2001)	Ravallion et al. (2009)	Ferreira et al. (2016)	Jolliffe et al. (2022)
ICP Data (PPPs)	1985	1993	2005	2011	2017
Method	Inspection (rounded)	Median	Mean	Mean (rounded)	Median
Poverty line	$1.00	$1.08	$1.25	$1.90	$2.15
Countries used in sample	Bangladesh, Indonesia, Kenya, Morocco, Nepal, Pakistan, Philippines, Tanzania	Bangladesh, China, India, Indonesia, Nepal, Pakistan, Tanzania, Thailand, Tunisia, Zambia	Chad, Ethiopia, The Gambia, Ghana, Guinea-Bissau, Malawi, Mali, Mozambique, Nepal, Niger, Rwanda, Sierra Leone, Tajikistan, Tanzania, Uganda	Same as before (15 countries)	28 low-income countries

Source: Adapted from Ferreira et al. (2016)

expenditure per capita and identifying a cluster of countries whose lines were too low and uncorrelated with consumption expenditure per capita. The *mean* value of a reference group of 15 poor countries resulted in the international poverty line of $1.25 (2005 PPP) and, subsequently, $1.90 (2011 PPP) (see Table 1). In contrast to Ravallion et al. (2009), Jolliffe and Prydz (2016) found that national poverty lines (in logs) and household final consumption expenditure per capita (in logs) are positively correlated along all levels of income. Deaton (2010) also argued that the set of 15 countries was not representative of the poorest countries in the world. Jolliffe and Prydz (2016) therefore expanded the reference group of poorest countries to 33 low-income countries.[5] Interestingly, the authors found that the *median* value of the national poverty lines of these countries also results in approximately $1.90 (2011 PPP).

Jolliffe and Prydz (2016) were inspired by the fact that the cost of basic needs is increasing in income and proposed higher poverty lines—$3.20 (2011 PPP) and $5.50 (2011 PPP)—derived as the median values of the national poverty lines of lower- and upper-middle-income countries, respectively. These lines were officially adopted by the World Bank in 2018 as lines more relevant for the measurement of poverty in middle-income countries. In practice, these lines are

[5]The full sample consisted of 126 harmonized national poverty lines, one per country for circa 2011, the PPP base year. See Jolliffe and Prydz (2016) for more details on their methodology and its strengths (e.g., the use of harmonized national poverty lines from a more recent sample, compared to data mostly from the 1990s underlying the derivation of the $1.25 line.)

applied to all countries when reporting global or regional poverty estimates. It is possible to make statements such as "85% of Africans live on less than $5.50 per day" (Castaneda, Jolliffe, Fujs, Lakner, & Prydz, 2019) and "with the 2017 PPPs, about 321 million more people in the world would be considered poor in 2017 by the standards of upper-middle-income countries" (Jolliffe et al., 2022).

When the 2017 PPPs were released, Jolliffe and Prydz' (2016) approach was now adopted to derive the international poverty line and the higher lines in a consistent manner. The international poverty line has been updated to $2.15 (2017 PPP), and the higher lines $3.65 (2017 PPP) and $6.85 (2017 PPP), respectively. Though not an official line of the Bank, the median value of the poverty lines of high-income countries is $24.35. See Jolliffe et al. (2022) for more details.

Equation 1 below specifies the international poverty line of $2.15, which is used for any country i and year t.

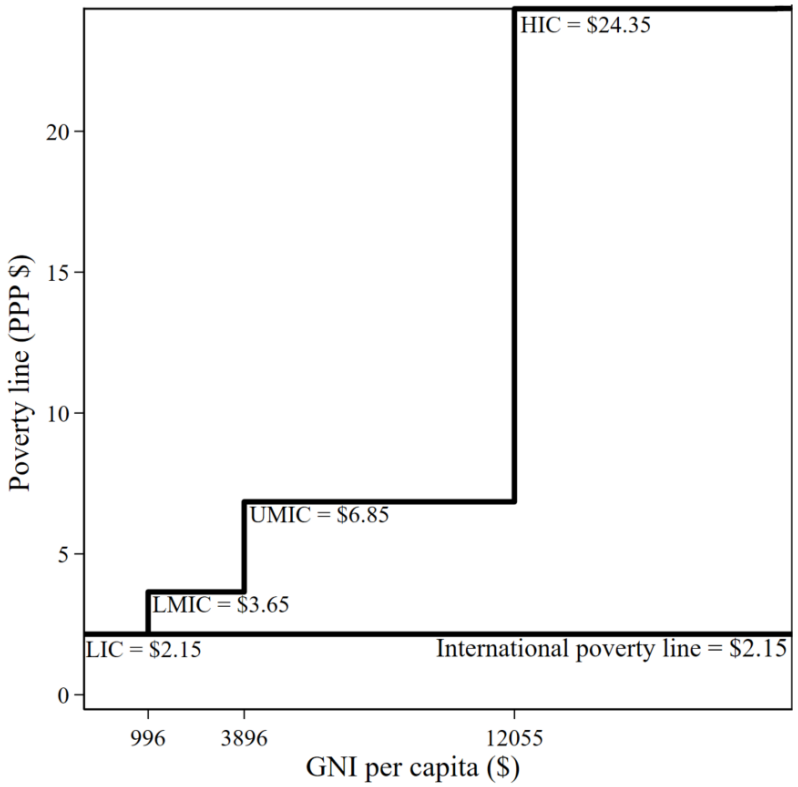
$$z_1 = 2.15 \quad \forall\, i, t \tag{1}$$

$$z_2 = \begin{cases} 2.15, & \text{if} \quad y_{it} < {Y_t}^1 \\ 3.65, & \text{if} \quad {Y_t}^1 \leq y_{it} < {Y_t}^2 \\ 6.85, & \text{if} \quad {Y_t}^2 \leq y_{it} \leq {Y_t}^3 \\ 24.35, & \text{if} \quad y_{it} > {Y_t}^3 \end{cases} \tag{2}$$

This paper proposes to use all the poverty lines discussed above to create a single, income-group-specific poverty line as an alternative to the international poverty line when measuring global poverty. Equation 2 specifies the income-group-specific poverty line, which varies by country-year. For analytical purposes, the World Bank categorizes countries using data on gross national income (GNI) per capita, denoted by y, expressed in current US dollars.[6] Depending on the level of income, countries are classified into four groups: low-income, lower-middle-income, upper-middle-income, and high-income countries. The income thresholds, denoted by ${Y}^1$, ${Y}^2$, and ${Y}^3$, are fixed in real terms, but are updated every year since 1989 to reflect new relative prices across countries (Fantom & Serajuddin, 2016). For example, using 2017 data, the income thresholds are $996, $3,896, and $12,055 for ${Y}^1$, ${Y}^2$, and ${Y}^3$, respectively (see Equation 2 above). Figure 1 illustrates the income-group-specific poverty line for the year 2017 as a step-wise poverty line function that varies by income group and super-imposes the international poverty line.

[6] A three-year moving average of market exchange rates is used to convert domestic currencies into the US dollar. This approach is called the Atlas Method, and it is used to smooth out price volatilities. See more details in Fantom and Serajuddin (2016).

Figure 1: International poverty line vs. income-group-specific poverty line



Notes: This figure illustrates the income-group-specific poverty line using data for 2017. Low-income countries (LIC) are countries whose gross national income per capita is below $996 and are assigned a poverty line of $2.15. Lower-middle-income countries are countries whose gross national income per capita falls between $996 and $3,896 and are assigned a poverty line of $3.65. Upper-middle-income countries are countries whose gross national income per capita falls between $3,896 and $12,055 and are assigned a poverty line of $6.85. High-income countries (HIC) are countries whose gross national income per capita is above $12,055 and are assigned a poverty line of $24.35.

The income-group-specific poverty line approach sets a standard for countries with respect to their income status and represents a fairer poverty assessment of countries. This approach has been used to estimate the impact of the COVID-19 pandemic on global poverty (World Bank, 2022b). However, there is a drawback to this approach, in that a few countries change income status overnight, which is not consistent with the reality on the ground. The next sub-section discusses the societal poverty line approach of measuring global poverty, which addresses this issue.

2.3 Derivation of the societal poverty line

Jolliffe and Prydz (2021) take the relative notion of poverty seriously, arguing that the cost of basic needs increases as an economy grows. This is not necessarily because the same bundle of basic needs costs higher in a richer country (the PPP exchange rates should account for this), but rather because within a country the bundle of basic needs varies with economic growth. Basic needs would include food, clothing, and shelter in the earliest phase of development, and, in addition, education and healthcare later in the development process. In more advanced settings, access to internet connectivity and owning a car are more likely to be considered basic

needs. All this reflects increasing costs of social participation as an economy grows. In most rich countries, where the most basic needs are usually less of a concern, poverty is explicitly defined in relative terms (e.g., 60% of the median disposable income in the OECD is a *strongly relative* poverty line).

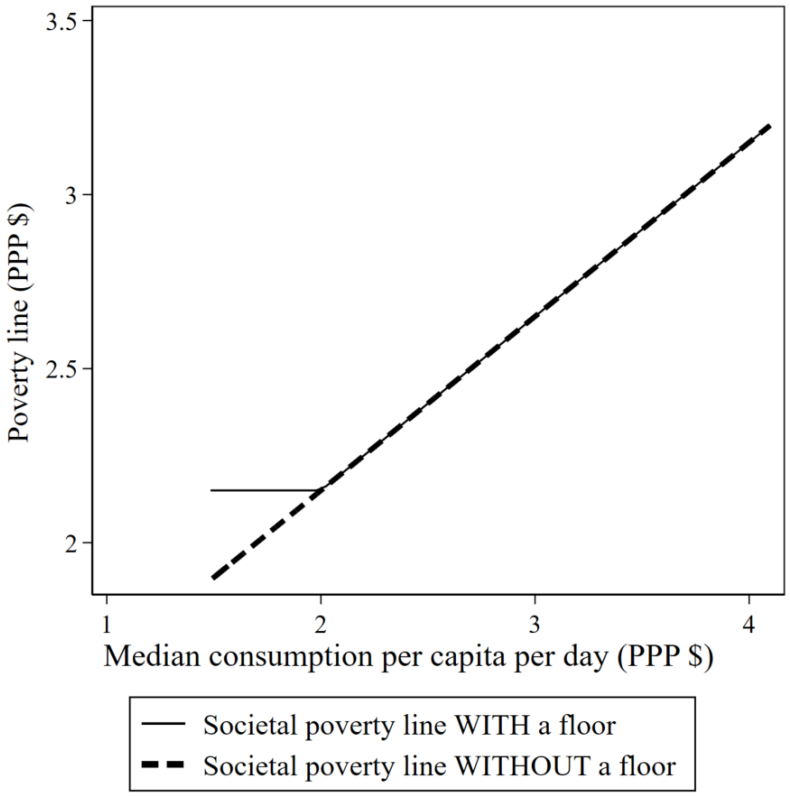
For a relative view of global poverty, one could simply aggregate the number of poor people across countries based on national poverty lines. This approach would make an international poverty line redundant, but Deaton (2006, p. 12) notes that "there are a few people who take a strong enough relativist view of [global] poverty". Aggregating national poverty estimates across countries is not advisable because poverty is usually defined as an absolute concept (i.e., the cost of basic needs) in poor countries and a relative concept (i.e., the cost of social participation) in rich countries. As detailed below, more recent research suggests that there would be some value in finding a middle ground (Ravallion & Chen, 2011; Jolliffe & Prydz, 2016; World Bank, 2017; Jolliffe & Prydz, 2021). In fact, new research shows evidence of relative poverty lines even among poor countries: the cost of basic needs, which is represented by PPP-adjusted national poverty lines, varies across poor countries and over time, depending on income status or mean consumption (Jolliffe & Prydz, 2016; Jolliffe & Prydz, 2021).

With this background, a *weakly relative* poverty line may be defined that combines elements of both absolute and relative poverty (Ravallion & Chen, 2011). By definition, an absolute poverty line is fixed at some minimum level of expenditure that sustains subsistence. Unlike an absolute poverty line, a relative poverty line is a function of income. Jolliffe and Prydz (2021) propose a societal poverty line that fulfills the theoretical requirements of a weakly relative poverty line and in response to Atkinson's recommendation that the World Bank should have such a supplementary poverty line (World Bank, 2017). Basically, Jolliffe and Prydz (2021) run a regression of national poverty line (PPP-adjusted) on median consumption/income per capita (PPP-adjusted). They define the societal poverty line using the parameter estimates—a constant term of 1 and a slope coefficient of 0.5. With the 2011 PPPs, they define the societal poverty line as: max($1.90, $1.00 + 50% of median income/consumption). Jolliffe and Prydz (2021) include a third parameter, which is the international poverty line of $1.90 as a floor of the societal poverty line. Essentially, if $1.00 + 50% of the median is less than the international poverty line, the societal poverty line becomes the international poverty line. They argue that if an individual is living in extreme poverty, they must also be unable to participate fully in the society, and hence must also be living in societal poverty.

Jolliffe et al. (2022) follow the same approach to update the societal poverty line with the 2017 PPPs. The new societal poverty line is specified in Equation 3. Figure 2 shows an example of the societal poverty line in 2017 PPPs for Ghana, 1990-2019. By construction, the societal poverty line varies as median consumption/income varies from year to year. Until 2000, when $1.15 + 50% of median consumption of the Ghanaian population was less than the international poverty line of $2.15, the societal poverty line for Ghana would be $2.15.

$$z_3 = \max(2.15, 1.15 + 0.5y_{it}) \tag{3}$$

Figure 2: The societal poverty line for Ghana, 1990-2019



Notes: This chart is based on consumption distributions derived from six surveys conducted in Ghana between 1988 and 2017. The societal poverty line relies on median consumption values on a yearly basis. Annual distributions have been extrapolated/interpolated from the six survey data sets, using growth rates in GDP per capita. See the technical details on how annual distributions are created from less frequent survey data in the Poverty and Inequality Platform (PIP) Methodology Handbook (World Bank, 2022a). There is a kink in the societal poverty line function at $2.15, which is the international poverty line.

The World Bank has officially adopted the societal poverty line (with a floor) for measuring global poverty. This paper investigates how global and regional poverty profiles will change if the international poverty line is not super-imposed as a floor of the societal poverty line (i.e., the dashed line in Figure 2). There are good reasons to do this. Let us consider Mozambique, for example. Mozambique is among the poorest 10 countries by GDP per capita and is among the list of low-income countries whose national poverty lines form the basis of the new international poverty line. Mozambique has a national poverty line of $1.50 (2017 PPP) from its latest survey conducted in 2014. The societal poverty line currently used for assessing societal poverty in Mozambique is 2.15 for all years, as $1.15 + 50% of median consumption is less than $2.15 in all years. In essence, by imposing the international poverty line as a floor of the societal poverty line, international poverty rates are higher than national poverty rates typically for the poorest countries. The idea that living below the international poverty line indicates a condition of extreme poverty is hard to justify particularly in very low-income settings. Largely

agrarian, these societies usually do not live by the high standards of high-income countries and may not necessarily be poor in their own conditions and circumstances, at least in terms of food and shelter. By contrast, living on even $5.00 a day may put an individual living in a high-income setting in the condition of extreme poverty. Thus, it would be fairer to assess poverty across countries based on countries' own conditions and circumstances. This paper argues that the societal poverty line without a floor is more likely to satisfy this property. Besides, we would have a societal poverty line that is data-driven, regression-based, and parameterized as $1.15 + 50% of median consumption/income for all countries. Equation 4 specifies this variant of the societal poverty line without a floor.

$$z_4 = 1.15 + 0.5y_{it} \tag{4}$$

3 Data and method for estimating global poverty

This paper uses the same data the World Bank uses in estimating global poverty for comparability of results. The paper also follows the same methods used in estimating global poverty, except that it uses four competing poverty lines to measure global poverty. These include the default of the international poverty line of $2.15, income-group-specific poverty line, societal poverty line with a floor, and societal poverty line without a floor. See Equations 1, 2, 3, and 4 in Section 2 above.

The global poverty estimates are based on nationally representative income and consumption survey data from across 169 countries covering over 97% of the world's population. The surveys are conducted once in every few years, especially in developing countries. To estimate poverty for every year, the survey distributions are shifted using growth rates from GDP per capita and household final consumption expenditure (HFCE) per capita, which are more readily available on an annual basis. Country-level poverty estimates are aggregated to produce regional and global poverty estimates. Countries without any survey data take the average of the region to which they belong. The regional and global poverty estimates are population-weighted averages of the country-level poverty estimates.

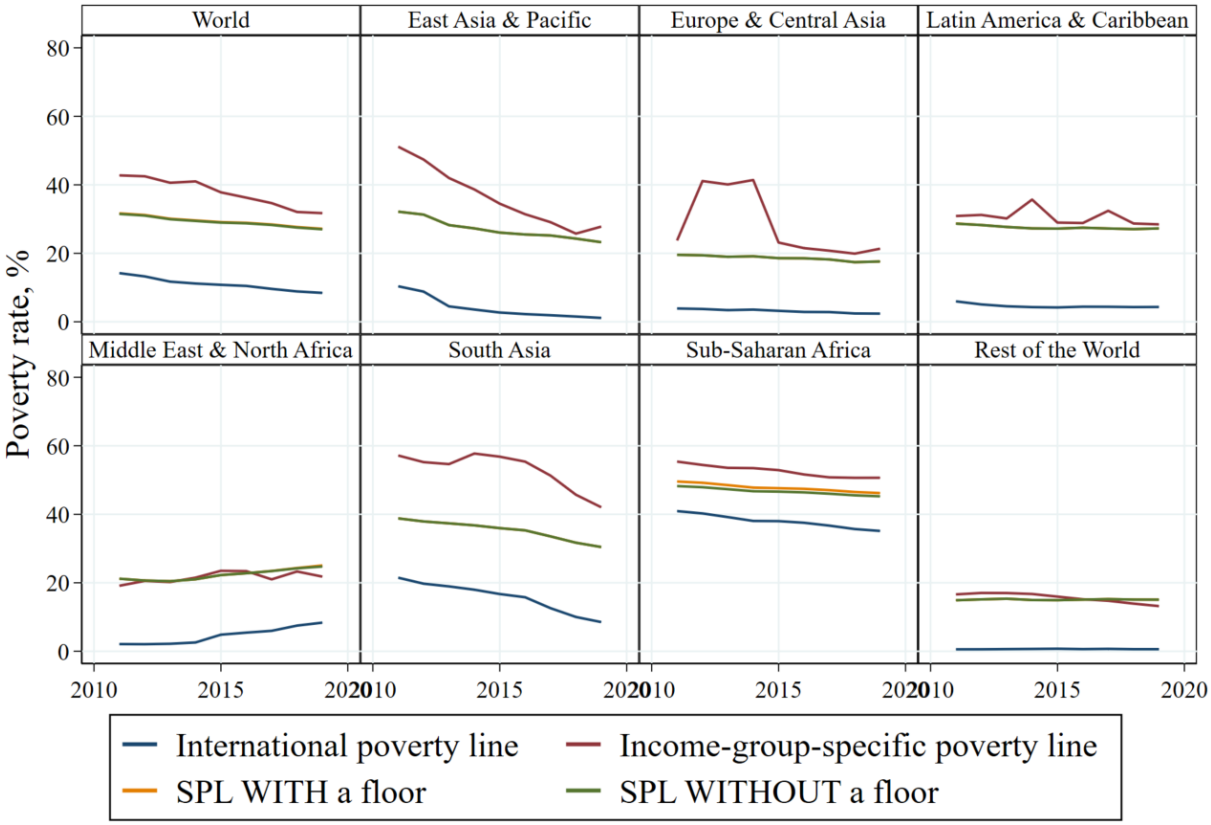
More details on the data and methodology used in estimating global poverty can be found in the Poverty and Inequality Platform (PIP) Methodology Handbook (World Bank, 2022a).

4 Results

4.1 Poverty in the world and disaggregated by region

Depending on the poverty line used, global and regional poverty profiles differ substantially. Figure 3 shows global and regional trends in poverty for the period 2010-2019. The most recent decade is selected because the relative notion of global poverty is more relevant for the most recent decade.

Figure 3: Global and regional poverty trends, 2010-2019



Notes: SPL refers to the societal poverty line. Rest of the World refers to rich countries across different geographical regions that are not considered as a part of the developing world. These include United States, Canada, United Arab Emirates, Germany, Switzerland, France, Japan, among others. All poverty estimates are estimated using the 2017 PPPs.

Table 2: Global and regional poverty levels in 2019

Region	International poverty line	Income-group-specific poverty line	Societal poverty line WITH a floor	Societal poverty line WITHOUT a floor
	(1)	(2)	(3)	(4)
World	8	32	27	27
East Asia & Pacific	1	28	23	23
Europe & Central Asia	2	21	18	18
Latin America & Caribbean	4	28	27	27
Middle East & North Africa	8	22	25	25
South Asia	9	42	30	30
Sub-Saharan Africa	35	51	46	45
Rest of the World	1	13	15	15

Notes: All poverty estimates are in percentages (%). Rest of the World refers to rich countries across different geographical regions that are not considered as a part of the developing world. These include United States, Canada, United Arab Emirates, Germany, Switzerland, France, Japan, among others. Poverty is estimated using the 2017 PPPs.

Table 2 shows poverty levels in 2019 for the world and all regions (see the Appendix for maps with country-level poverty estimates). Across all regions the proportion of poor people is the lowest with the international poverty line and highest with the income-group-specific poverty line. One may consider them as more optimistic and more pessimistic estimates of poverty, respectively. In 2019, global poverty is as low as 8% with the international poverty line or as high as 32% with the income-group-specific poverty line. Depending on one how optimistic or pessimistic one is about the level of global poverty, one may be more leaning toward 8% or 32%. That is to say, about 1 out of 10 people vs. 1 out of 3 people in the world would be considered poor. A more realistic estimate of global poverty would plausibly lie within the interval of these two estimates. It turns out that with the societal poverty line, the global poverty rate of 27% comes quite closer to the more pessimistic poverty estimate. The rough poverty trend with the income-group-specific poverty line, particularly in Europe and Central Asia and Latin America and the Caribbean, is indicative of the fact that countries change income status overnight.

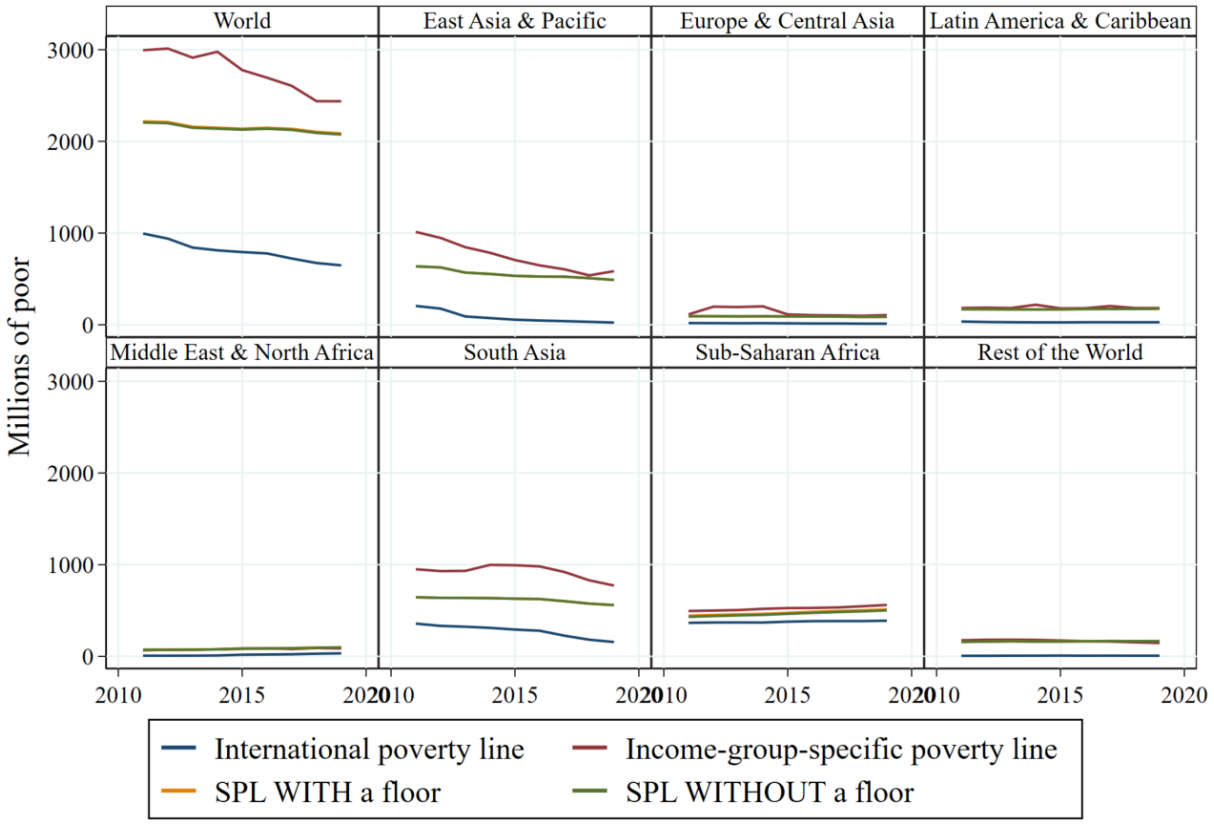
The societal poverty line smooths the poverty trends and addresses this issue. An interesting pattern observed with the societal poverty line is that global or regional poverty is almost indistinguishable with or without a floor, except for Sub-Saharan Africa. Thus, having two types of societal poverty lines is only relevant for Sub-Saharan Africa (see Figure 3). This is the region with the highest share (50%) of people living in low-income countries in 2019. Further, poverty is relatively high in East Asia and the Pacific, Europe and Central Asia, and the rich world ("Rest of the World") when using the societal poverty line.

With the international poverty line poverty is a single digit in the world and in all the regions, except Sub-Saharan Africa where poverty is as high as 35%. With the other lines that reflect a relative notion of poverty, Sub-Saharan Africa still has the highest levels of poverty, though not too high compared to other regions, such as South Asia and the Middle East and North Africa. Figure 2 shows that poverty has been increasing in the Middle East and North Africa.

4.2 Millions of poor in the world and disaggregated by region

Global poverty estimates may also be presented in terms of millions of poor. Figure 4 shows the trends in millions of poor for the world and by region under all four poverty lines. These estimates largely mimic much of the estimates of global and regional poverty trends already presented in the previous sub-section. The number of people estimated to be poor has been falling or fairly stable since 2010, except for Sub-Saharan Africa where the number has been increasing, regardless of the line being used. With rapid population growth, the proportion of people living in poverty has been falling in the region, yet the number of poor in Sub-Saharan Africa has been increasing. Table 3 shows the data points for 2019. About 648 million people in the world lived under the international poverty line. This number more than triples when moving to the alternative lines that invoke the relative notion of poverty. Sub-Saharan Africa has the highest millions of poor with the international poverty line, while South Asia has the highest millions of poor with the other lines.

Figure 4: Global and regional trends in millions of poor, 2010-2019



Notes: SPL refers to the societal poverty line. Rest of the World refers to rich countries across different geographical regions that are not considered as a part of the developing world. These include United States, Canada, United Arab Emirates, Germany, Switzerland, France, Japan, among others. All poverty estimates are estimated using the 2017 PPPs.

Table 3: Global and regional estimates of millions of poor in 2019

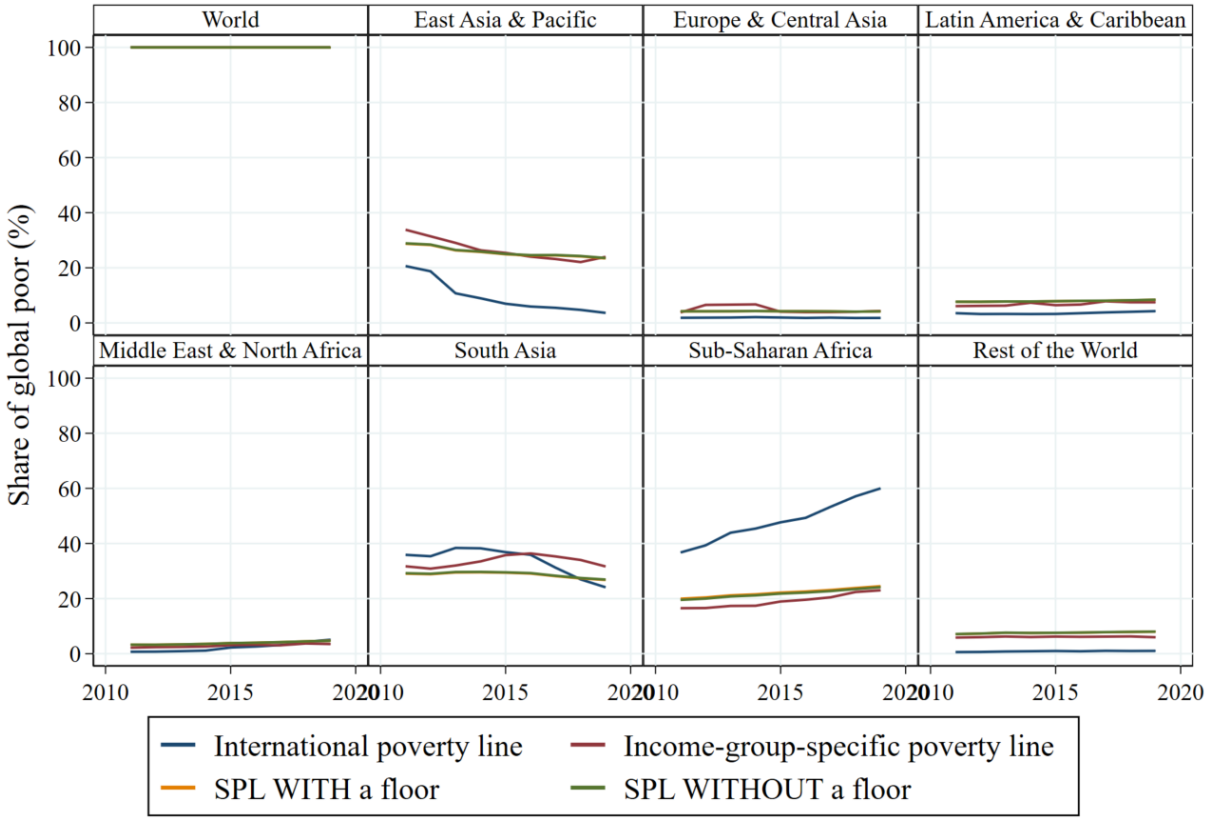
Region	International poverty line	Income-group-specific poverty line	Societal poverty line WITH a floor	Societal poverty line WITHOUT a floor
	(1)	(2)	(3)	(4)
World	648	2437	2087	2075
East Asia & Pacific	24	585	489	489
Europe & Central Asia	12	106	87	87
Latin America & Caribbean	28	183	175	175
Middle East & North Africa	33	86	99	98
South Asia	156	772	559	559
Sub-Saharan Africa	389	561	511	501
Rest of the World	7	146	167	167

Notes: Rest of the World refers to rich countries across different geographical regions that are not considered as a part of the developing world. These include United States, Canada, United Arab Emirates, Germany, Switzerland, France, Japan, among others. Poverty is estimated using the 2017 PPPs.

4.3 Share of the global poor by region

From a policy perspective, it is important to monitor regions' shares of the global poor. It shows where global poverty is concentrated and where it might be prudent to invest resources to fight poverty. Figure 5 shows the regional shares of the global poor for the period 2010-2019. The dynamics of global poverty have been driven by only three regions, namely East Asia and the Pacific, South Asia, and Sub-Saharan Africa. More generally, global poverty has been moving away from East Asia and the Pacific and South Asia to Sub-Saharan Africa. A closer look at the data reveals more interesting patterns. At the international poverty line, global poverty has moved quite rapidly to Sub-Saharan Africa. However, when one uses a fairer standard to assess poverty across countries, it turns out that this finding is exaggerated. The share of global poor in Sub-Saharan Africa when using the (weakly) relative poverty lines is not only lower but is increasing only slightly over time.

Figure 5: Share of the global poor by region, 2010-2019



Notes: SPL refers to the societal poverty line. Rest of the World refers to rich countries across different geographical regions that are not considered as a part of the developing world. These include United States, Canada, United Arab Emirates, Germany, Switzerland, France, Japan, among others. All poverty estimates are estimated using the 2017 PPPs.

Table 4 presents the regional shares of the global poor in 2019. With the international poverty line, 60% of the global poor lived in Sub-Saharan Africa, but this share reduces significantly to about 24% with the societal poverty line. Conversely, only 4% of the global poor at the international poverty line lived in East Asia and the Pacific in 2019, but this share increases substantially to about 24% when moving to the lines that incorporate the notion of relative

poverty. With the weakly relative poverty lines, global poverty is mostly concentrated in South Asia (27%), slightly above Sub-Saharan Africa (about 25%) and East Asia and the Pacific (about 24%).

Table 4: Share of the global poor by region in 2019

Region	International poverty line	Income-group-specific poverty line	Societal poverty line WITH a floor	Societal poverty line WITHOUT a floor
	(1)	(2)	(3)	(4)
World	100	100	100	100
East Asia & Pacific	4	24	23	24
Europe & Central Asia	2	4	4	4
Latin America & Caribbean	4	7	8	8
Middle East & North Africa	5	4	5	5
South Asia	24	32	27	27
Sub-Saharan Africa	60	23	25	24
Rest of the World	1	6	8	8

Notes: All estimates are in percentages (%). Rest of the World refers to rich countries across different geographical regions that are not considered as a part of the developing world. These include United States, Canada, United Arab Emirates, Germany, Switzerland, France, Japan, among others. Poverty is estimated using the 2017 PPPs.

5 Robustness checks

5.1 International poverty series vs. national poverty series

The international poverty line is applied to income or consumption distributions from all countries to arrive at international poverty rates, which are aggregated across all countries and regions. This approach potentially introduces a bias in the global poverty estimates (World Bank, 2017). To get a sense of this bias, the seemingly unrelated regressions model in Equation 5 investigates how each of the competing poverty series correlates with national poverty series.

$$NPR_{it} = \alpha_j + \beta_j P_{jit} + \epsilon_{jit} \tag{5}$$

NPR_{it} represents the reported national poverty rate for country i in year t. Equation 5 is a system of equations denoted by $j \in \{1, 2, 3, 4\}$ estimated separately. Equation 5 varies the four competing poverty series, defined by the (1) international poverty line, (2) income-group-specific poverty line, (3) societal poverty line with a floor, and (4) societal poverty line without a floor. Given the data, the following error structure holds true: (1) $E[\epsilon_{jit}] = 0$; (2) $E[\epsilon_{jit}, \epsilon_{jit}] = \sigma$; and (3) $E[\epsilon_{jit}, \epsilon_{kit}] \neq 0$, with $j, k = \{1, 2, 3, 4\}$ and $j \neq k$. The error terms are correlated across all four equations. The parameter of interest is β, which measures how much national poverty rate changes on average if international poverty rate (by any of the competing poverty series) changes by 1 percentage point. The objective is to assess the strength of association between the national poverty series and each of the four competing poverty series.

Table 5: Correlation between national poverty series and competing poverty series

Category	International poverty line	Income-group-specific poverty line	Societal poverty line WITH a floor	Societal poverty line WITHOUT a floor
	(1)	(2)	(3)	(4)
Constant (α)	18.45	16.76	4.4	3.96
Coefficient (β)	0.66	0.21	0.82	0.84
R-Squared	0.43	0.11	0.57	0.57
N	777	777	777	777
Test of equality of coefficients (β): p-values				
Equal with (1)		0	0	0
Equal with (2)			0	0
Equal with (3)				0.0001

Notes: This table provides the results of regressing national poverty rate (%) on each of the competing poverty series (i.e., four separate regressions). The competing poverty series are derived by applying the corresponding poverty lines on survey distributions at the country-level. All parameter estimates are statistically significant at the 1% level. The table also includes test results of the null hypotheses of equality of each pair of the parameter estimates of interest (β's). Chi-squared tests are done due to the assumptions of seemingly unrelated regressions (i.e., correlation of errors across equations). There are two sources of the national poverty rates—the World Development Indicators (WDI), July 2022 version (World Bank, 2022d) and OECD.Stat, December 2020 version (OECD, 2020). The series downloaded from WDI is *Poverty headcount ratio at national poverty lines (% of population), including noncomparable values (SI.POV.NAHC.NC)*. The series downloaded from the OECD is *PVT6A: Poverty rate after taxes and transfers, Poverty line 60% (i.e., share of population living on below 60% of median disposable income)*. This analysis consists of 777 country-year observations spanning the period 2010-2019.

Table 5 shows that if poverty measured by the international poverty line increases by 1 percentage point, national poverty rate changes moderately by 0.66 percentage points on average. As expected, the correlation is weaker (0.21) with the use of the income-group-specific poverty line, whereas the correlation is stronger (>0.80) with the use of the societal poverty line. All these estimates are statistically different from each other. These results suggest that using the societal poverty line as an international poverty line would be more consistent with national poverty lines and likely minimize the bias introduced into global poverty estimates. Of all the poverty numbers presented in Section 4 above, one would want to have more faith in the numbers resulting from the societal poverty line, particularly the one without a floor.

5.2 Consistency of competing poverty series with related indicators

This paper exploits the well-established link in the literature between poverty and (quality) education across countries to verify the main results of this paper (Tilak, 2002; Restuccia & Vandenbroucke, 2014; World Bank, 2018). Equation 6 is a used to investigate this relationship.

$$SCH_{it} = \alpha_j + \beta_j P_{jit} + \epsilon_{jit} \tag{6}$$

SCH_{it} represents (learning-adjusted) years of schooling for country i in year t. Equation 6 is similar to Equation 5, except that (learning-adjusted) years of schooling is substituted for reported national poverty rate. Equation 6 satisfies the same identification conditions as Equation 5. The parameter of interest here is also β, which measures how (much) years of schooling is expected to change if poverty rate (by any of the competing poverty series) changes by 1 percentage point. The strength of association between educational attainment and poverty is compared across the four competing poverty series.

Table 6: Correlation between competing poverty series and related indicators

Category	International poverty line	Income-group-specific poverty line	Societal poverty line WITH a floor	Societal poverty line WITHOUT a floor
	(1)	(2)	(3)	(4)
(a) Years of schooling				
Constant (α)	9.632	11.761	14.374	14.506
Coefficient (β)	-0.15	-0.089	-0.217	-0.222
R-Squared	0.377	0.454	0.643	0.655
N	797	797	797	797
Test of equality of coefficients (β): p-values				
Equal with (1)		0	0	0
Equal with (2)			0	0
Equal with (3)				0.0085
(b) Learning-adjusted years of schooling				
Constant (α)	9.584	11.444	13.911	14.033
Coefficient (β)	-0.179	-0.092	-0.209	-0.214
R-Squared	0.529	0.55	0.746	0.76
N	217	217	217	217
Test of equality of coefficients (β): p-values				
Equal with (1)		0.0012	0.0427	0.0394
Equal with (2)			0	0
Equal with (3)				0.1396

Notes: This table provides the results of regressing (learning-adjusted) years of schooling on each of the competing poverty series. The competing poverty series are derived by applying the corresponding poverty lines on survey distributions at the country-level. All parameter estimates are statistically significant at the 1% level. The table also includes test results of the null hypotheses of equality of each pair of the parameter estimates of interest (β's). Chi-squared tests are done due to the assumptions of seemingly unrelated regressions (i.e., correlation of errors across equations). Panel (a) provides the results for actual years of schooling, while panel (b) learning-adjusted years of schooling. Data on actual/mean years of schooling have been taken from the underlying data of the Human Development Index (HDI) (UNDP, 2022). Data on learning-adjusted years of schooling are from the TCdata360 Initiative (World Bank, 2022c). Learning-adjusted years of schooling is computed as the product of (a) mean years of schooling and (b) the ratio of most recent Harmonized Test Score to 625, where 625 corresponds to advancement attainment in the Trends in International Mathematics and Science Study (TIMSS) test (Filmer, Rogers, Angrist, & Sabarwal, 2020). The analysis covers country-year observations spanning the period 2010-2019. All regressions are population weighted.

As expected, Table 6 shows that the number of years of schooling is negatively correlated with poverty in all cases. Further, the strength of correlation between years of schooling and competing poverty series buttresses the point of this paper, that the societal poverty line is likely to yield more reliable estimates of global and regional poverty estimates than the international poverty line. For example, in panel (a), years of schooling is expected to decrease by 0.15 years if poverty increases by 1 percentage point, when using the international poverty line to measure poverty. The reduction in years of schooling is 0.22 when using the societal poverty line to measure poverty. Greater reduction suggests greater correlation between years of schooling and poverty.

Table 6 has two series on educational attainment, namely actual years of schooling and learning-adjusted years of schooling. This is distinction is important, as the former does not control for differences in the quality of schooling across countries. Let us consider Nigeria and India—the countries that drive the regional poverty estimates in Sub-Saharan Africa and South Asia, respectively. With the international poverty line, 31% of the population in Nigeria is estimated to be poor in 2018, whereas 11% of the population in India is estimated to be poor. It turns out that in terms of mean years of schooling, for the same period, both Nigeria and India are the same (6.5 years for both Nigeria and India). Given the known association between poverty and educational achievements across countries, it may be surprising that Nigeria is much poorer than India. The data on learning-adjusted years of schooling suggests otherwise, that Nigeria has lower years of schooling than India (5.04 adjusted years for Nigeria vs. 6.92 adjusted years for India). Table 6, panel (b) also shows the poverty series resulting from the societal poverty line have a greater correlation with years of schooling than the series resulting from the international poverty line.

6 Conclusion

This paper adds to the strand of literature arguing for a relative assessment of poverty across countries. Prydz and Jolliffe (2019) already ask in a blog whether the international poverty line is a relevant standard for measuring poverty in rich countries. The authors argue that as countries get richer, the cost of basic needs increases even in PPP terms, so that applying the international poverty line to all countries results in an "unequal treatment" of countries. This paper lends itself to this issue, and highlights what the use of the international poverty line for all countries means for Sub-Saharan Africa—which is home to 80% of the world's population living in low-income countries. In a nutshell, the results suggest that extreme poverty in Sub-Saharan Africa is exaggerated relative to the other regions of the world.

In addition, there are at least three reasons to reconsider the pre-eminence of the international poverty line and focus a bit more on the society poverty line for the measurement of global poverty. First, the societal poverty line incorporates the notion of relative poverty, thus a measure of inequality, into global poverty assessments. The use of the median in defining the

societal poverty line is attractive for policy work, particularly in a time when there is heightened interest in changes in inequality in the world. The societal poverty line is a measure that combines in one shot a poverty and inequality measure and correlates quite well with other important indicators of well-being, such as (learning-adjusted) years of schooling.

Second, it is an approach that weakens the criticism leveled against the World Bank, that it has set an international poverty line that is meager, so that it can report low poverty estimates (Allen, 2017; Sumner, Ortiz-Juarez, & Hoy, 2022; Mahrt, Herforth, Robinson, Arndt, & Headey, 2022). The Bank faces a dilemma in presenting poverty data. If it publishes poverty numbers that are considered too low, observers might say the Bank is presenting "good" poverty numbers to show that it is being successful in reducing poverty around the world. On the other hand, if it publishes poverty numbers that are considered too high, some observers might also say the Bank is doing that to remain in business. As this paper shows, estimates of global poverty resulting from the societal poverty line lie between too optimistic and too pessimistic estimates of global poverty.

Third, it provides a compromise on the long-standing issue about whether or not it makes sense to use purchasing power parities (PPPs), and hence an international poverty line, to measure global poverty (Reddy & Pogge, 2010; Allen, 2017). PPPs are expected to equilibrate the relative prices of goods and services across countries. The use of PPPs for measuring global poverty suggests that poverty is a price question, when in fact it is more directly a cost question. The bundle of goods and services that would be required in a tropical region to achieve a minimum standard of living would be different in a temperate region (e.g., winter jackets would be needed in a temperate region). With the same prices, the cost of basic needs would differ in this example. For the international comparability of the items priced by the International Comparison Program (ICP), there is an indicator in the estimation of PPPs in more recent ICP rounds that shows the importance of each item in the countries from where the data are collected. Thus, the PPP data from more recent rounds somewhat address the cost-price issue. Nevertheless, there are still difficult methodological issues in the ICP approach—such as the lack of comparability of housing across countries—that some scholars prefer an alternative approach to measuring global poverty. For example, Klasen et al. (2016) suggest a long-run solution that national poverty lines consistently determined for global poverty monitoring may be used to estimate the number of poor people in each country, and the poor population may be aggregated across countries and regions. For now, using the societal poverty line to measure global poverty still incorporates PPP data and has the added advantage that it is country-year-specific and more aligned with national poverty lines.

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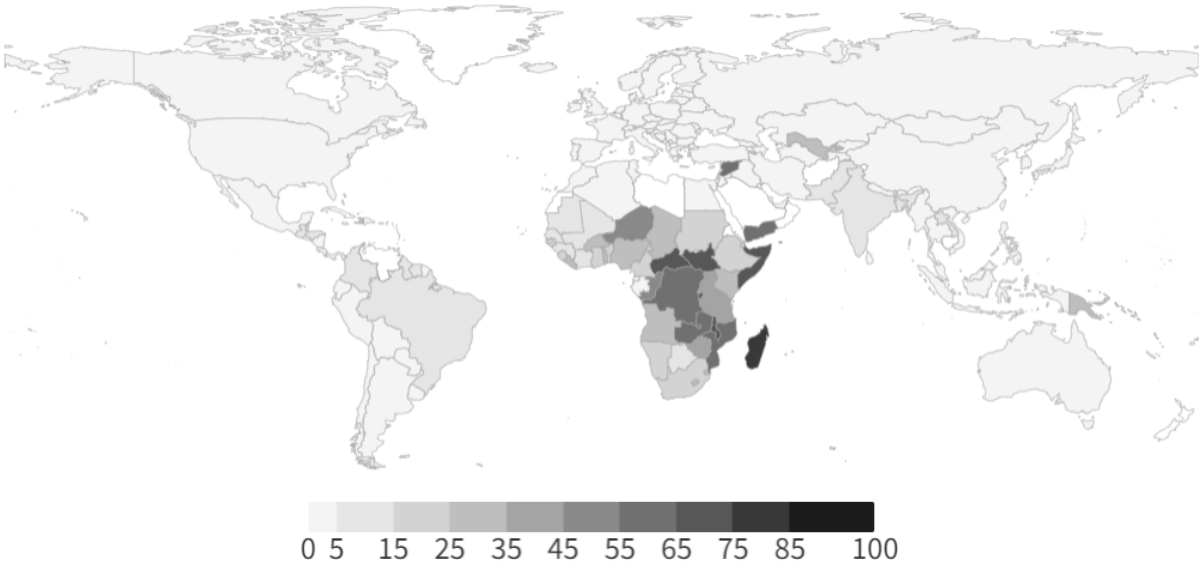
Appendix

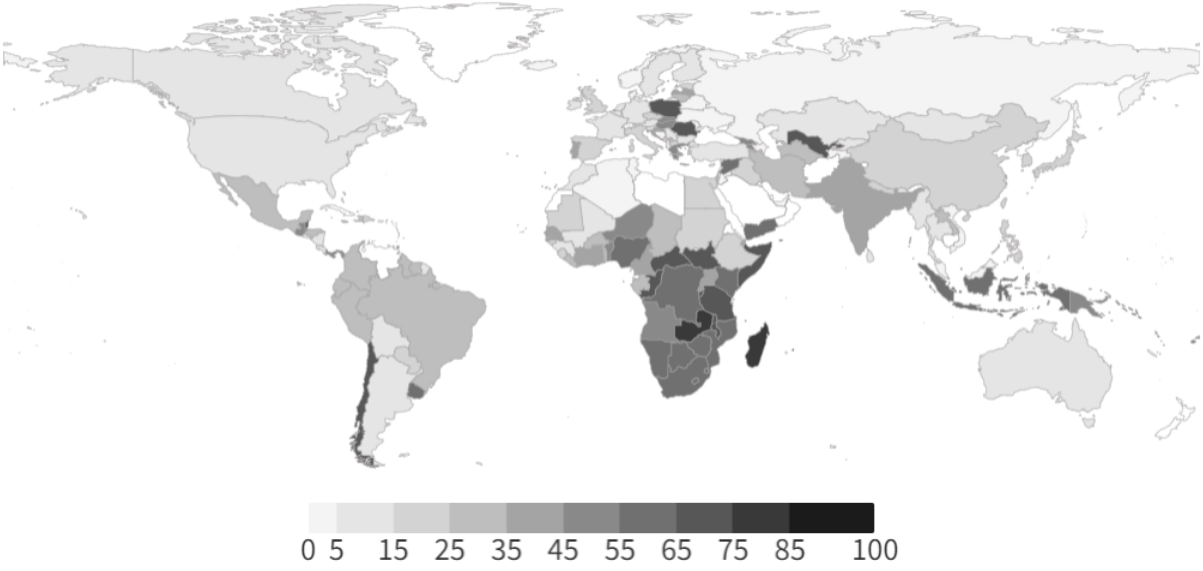
A. Poverty estimates for 2019 by country

Fig. A1: Percent of population living below the international poverty line



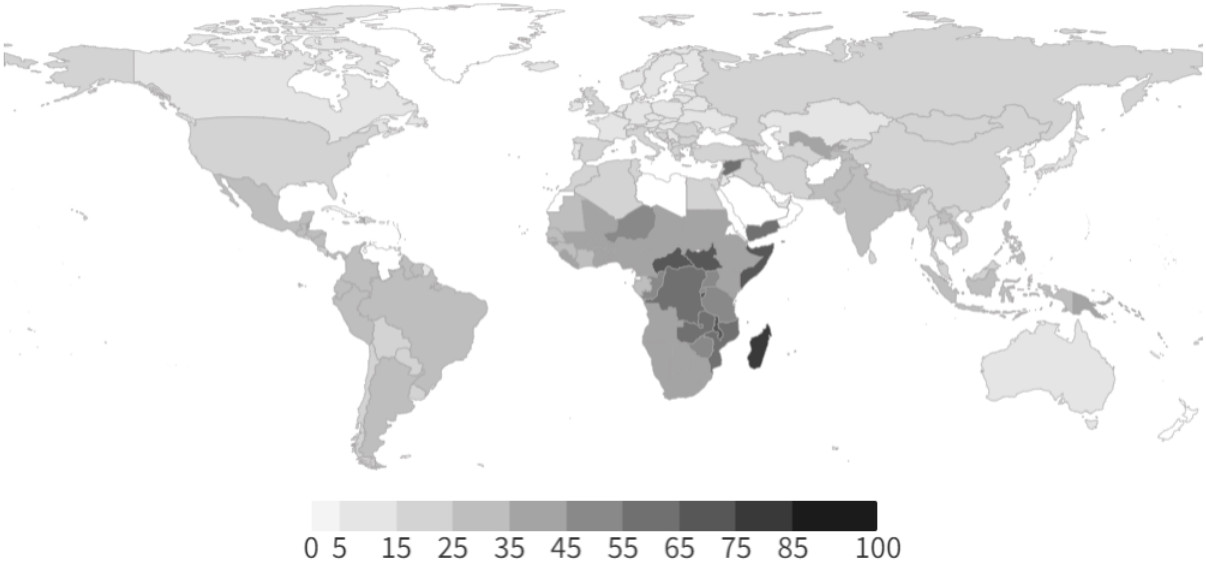
Note: Countries without survey data are marked with color white.

Fig. A2: Percent of population living below the income-group-specific poverty line



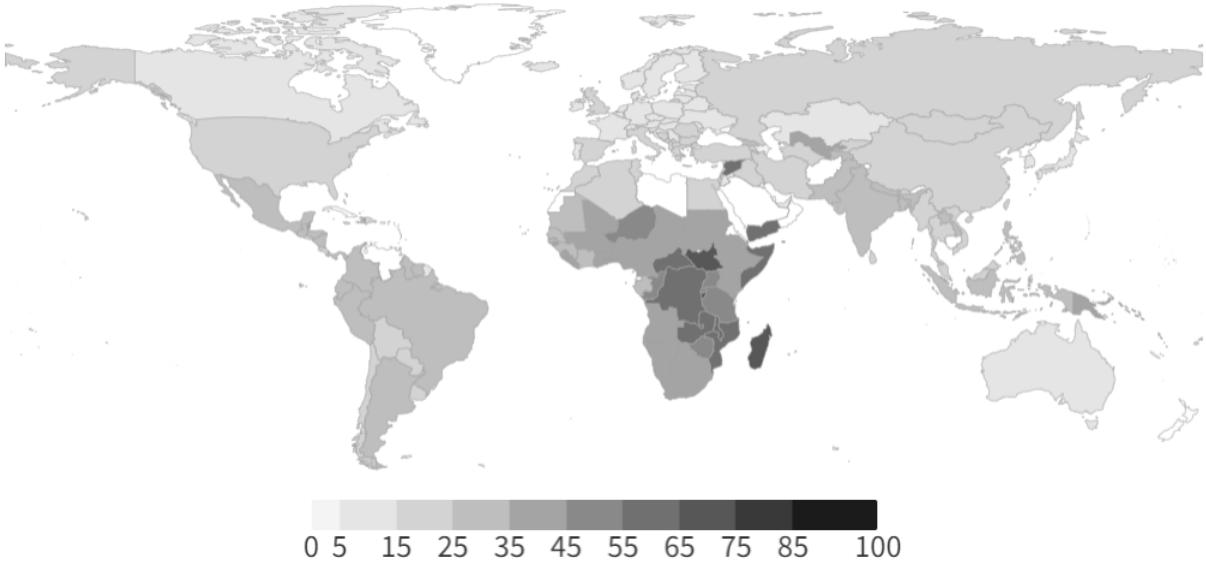
Note: Countries without survey data are marked with color white.

Fig. A3: Percent of population living below the societal poverty line WITH a floor



Note: Countries without survey data are marked with color white.

Fig. A4: Percent of population living below the societal poverty line WITHOUT a floor



Note: Countries without survey data are marked with color white.