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Conciliating Absolute and Relative Poverty: Income Poverty Measurement with Two Poverty Lines

There are two different approaches to income poverty measurement: the absolute and the relative approach. An individual is deemed absolutely poor if her income is insufficient to cover her subsistence needs. This is for instance the approach underlying the $1.9 a day extreme poverty line of the World Bank (Ferreira et al., 2016). In turn, an individual is deemed relatively poor if her income is so much smaller than the income standard in her society that she is at risk of social exclusion. The relative poverty threshold depends on the income standard of the society considered. For instance, most OECD countries use a relative threshold that corresponds to a given fraction of mean or median income.

Unsurprisingly, the main critic raised against any of these two approaches is to ignore either subsistence or social exclusion. On the one hand, any absolute poverty threshold becomes less and less relevant for the identification of the socially excluded as the income standard grows over time. On the other hand, relative poverty measures often ignore the increase in individual resources that results from growth. Importantly, if a country's growth is such that the income of its poorest citizens becomes sufficient to cover their subsistence needs, then poverty has arguably been reduced, even if these individuals are still socially excluded. Relative measures do not acknowledge such poverty reduction.

Many policymakers, such as the World Bank, aim at reducing both absolute and relative poverty (World Bank, 2015). For such policymakers, using two separate poverty measures, one absolute and one relative, is not a solution. The reason is that two measures would often yield opposing poverty evaluations, in which case no conclusion can be drawn. Such opposing evaluations typically happen when the income of poor individuals grow, but not as fast as their society's income standard.

The research efforts aimed at combining absolute and relative poverty mostly focus on the design of new poverty lines (Ravallion and Chen, 2011; Jolliffe and Prydz, 2017). This strand of research has proposed poverty lines whose threshold does depend on the income standard, but is less sensitive to income standard than the threshold of a relative line. A prominent application is the Societal poverty line (World Bank, 2018). These new lines have the potential to better identify the poor, but they cannot resolve on their own the important issue identified above, namely that poverty measures should decrease when poor individuals become able to cover their subsistence needs. This issue is not so much a problem of whom should be

identified as poor, but rather a problem of how poor individuals are compared across societies with different income standards. These inter-personal comparisons primarily rely on the index with which a poverty measure is constructed. Indeed, a poverty measure is defined with two components: a poverty line and an index. Poverty indices, like the head-count ratio or the poverty-gap ratio, aggregate the poverty contributions of all poor individuals in a distribution. The properties of poverty indices have been extensively studied under the assumption that the poverty line is absolute (Zheng, 1997). Unfortunately, when combined with a poverty line whose threshold depends on the income standard, these indices provide highly counterintuitive comparisons (Decerf, 2017).

I illustrate these counterintuitive comparisons when comparing poverty using the head-count ratio combined with the Societal poverty line of the World Bank. According to this measure, Colombia has in 2015 the same societal poverty as Bangladesh (29%). Even if income is more unequally distributed in Colombia than in Bangladesh, this judgment is arguably debatable given that only 5% of individuals are extremely poor in Colombia, while it is 15% in Bangladesh. This debatable comparison is due to the head-count ratio. When using this index, an extremely poor individual earning less than $1.9 a day in Bangladesh contributes the same to poverty as a Colombian whose income is just below the societal poverty threshold in Colombia, i.e. $5.5 a day.

I study poverty indices based on two poverty lines: one absolute line and one relative line. First, I derive an axiomatic result showing that indices based on two lines should be such that the poverty contribution of an absolutely poor individual is always larger than the poverty contribution of an individual who is only relatively poor, regardless of the income standard in their respective societies. Importantly, mainstream poverty indices violate this property and therefore yield the counterintuitive comparisons illustrated above. Second, I study a Foster-Greer-Thorbecke parametric family of indices satisfying this property. Only one member of this family, the extended head-count ratio (EHC), satisfies classical robustness and monotonicity properties. This new index is equal to the fraction of absolutely poor individuals plus the fraction of individuals who are only relatively poor multiplied by an endogenous weight. Letting y denote an income distribution, HCA denote the fraction of absolutely poor individuals and HCR denote the fraction of individuals who are only relatively poor, we have

$$EHC(y) = HCA(y) + w(y) \; HCR(y)$$

where the endogenous weight $w(y)$ evolves linearly with the average income among individuals who are only relatively poor. The closer this average income is to the relative (absolute) threshold, the closer the weight is to zero (one).

Using World Bank data, I contrast the poverty comparisons obtained from the extended head-count ratio with those obtained from the extreme head-count and the societal head-count. When comparing Bangladesh and Colombia in 2019, the Societal measure HCA+ HCR takes the same value for both (29%), even if the extreme measure HCA is three times larger in Bangladesh (15% instead of 5%). In contrast, the EHC is much larger in Bangladesh (22%) than in Colombia (16%), reflecting the larger severity of extreme poverty status. These countries endogeneous weights are 0.49 and 0.47, respectively. The distribution of poverty in the developing world and its evolution over time is investigated. Over the period 1990-2015, the EHC in the developed world is reduced by about 60%, from an initial value equal to 49% in 1990 to a value equal to 20% in 2015.