Sharing Prosperity Globally and Domestically: Benchmark Incomes and Potential Trade-offs

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Abstract

In recent decades, relative inequality declined at a global level whilst increasing domestically in many countries. This was driven largely by economic transformation in once poor countries, particularly China and India. The changes in those countries' income distributions simultaneously reduced global inequality while increasing domestic inequality. Such a phenomenon is suggestive of potentially important trade-offs for international policy makers. Should overseas development assistance be used to grow or subsidise those on incomes that are low by global standards, even if this increases domestic inequality? Should instead international resources be used to reduce domestic inequality wherever it is severe, even if this means exacerbating global inequality? Inequality measures are typically associated with a benchmark income, above which adding increments of income increases inequality, and below which it decreases inequality. Using data from the World Income Inequality Database, we present the most comprehensive empirical study to date of where in the income distribution benchmark incomes lie in practice, and how they evolved during 1975-2015. With estimates for 149 countries in 2015, we provides the first estimates of global benchmark incomes, how the global benchmark percentile has changed over time, and how it compares to domestic benchmark income percentiles. In so doing, we illuminate when income growth or subsidies are likely to be equalising, with respect to both domestic and global income distributions, and where there are trade-offs between the two. We also shed light on where there are important, purely domestic, trade-offs, between reducing domestic inequality and reducing poverty.

Keywords: Benchmark incomes; global inequality; global poverty; inequality; poverty; shared prosperity

JEL Classifications: D31; D63; O15

1. Introduction

In recent years there has been considerable interest in the global distribution of income, among all the citizens of the world, ignoring national borders. Such studies typically involve constructing a distribution of income of all the citizens of the world, using national accounts and/or survey data. Inequality, and other distributional concepts such as polarization, are subsequently measured based on this global interpersonal distribution of income. There is some consensus that since the mid-1970s, global inequality has been decreasing in relative terms (Bourguignon 2017; Milanovic 2012; Niño-Zarazúa et al. 2017; Jorda and Niño-Zarazúa 2019; Lakner and Milanovic 2016); but increasing in absolute terms (Bosmans et al. 2014; Niño-Zarazúa et al. 2017).

The fall in relative global inequality has occurred despite the fact that relative inequality grew in many countries over this period. In large part, the reason for the fall in global inequality has been attributed to long sustained high levels of economic growth in heavily populated, previously poor countries, notably China and India (Niño-Zarazúa et al. 2017). There is no doubt that the changes that took place in these countries' income distributions following the 1970s contributed to a very substantial fall in global inequality, as their economies grew and converged with middle income countries. In so doing, India and China became much richer countries, and hundreds of millions of people were lifted out of absolute poverty. At the same time, it is equally clear that those same changes in India's and China's income distributions resulted in very substantial increases in domestic inequality – in both relative and absolute terms (Niño-Zarazúa et al. 2017). Thus, with respect to relative measures of inequality, such as the Gini coefficient, China's growth in recent decades has been equalising globally, but disequalising domestically. Such a phenomenon is suggestive of potentially important trade-offs for international policy makers. For example, should overseas development assistance be used to grow or subsidise those on incomes that are relatively low by global standards even if it is likely to increase domestic inequality, with all the potential adverse impacts domestic inequality may bring? Or should instead international resources be used to reduce domestic inequality wherever it is severe, even if this means exacerbating global inequality and the corresponding gaps between countries? We think these questions deserve greater consideration. We do

not, however, attempt to answer them here. Instead, the purpose of this study is to inform such debates by conducting an extensive empirical investigation of when income growth or subsidies are likely to be equalising, with respect to both domestic and global income distributions, and where there are trade-offs between the two. We also aim to illuminate where there are important, purely domestic, trade-offs, between reducing domestic inequality and reducing poverty.

Our approach is rooted in, and brings together, two strands of literature: the literature on global income inequality noted above, and the literature on inequality benchmark incomes. Nearly all widely used inequality measures are associated with a benchmark income or position, above which adding increments of income increases inequality, and below which it decreases inequality.[1] Benchmark incomes can be interpreted as social reference levels for inequality, analogous to poverty lines, above which increases to incomes increase inequality, and below which they decrease inequality (Roope, 2021). They can be interpreted as signifying the richest person in society for whom it is just and fair to subsidize their income (Corvalan 2014, Lambert 2014). In one of the first empirical studies to estimate where benchmark incomes lie in practice, Roope (2021) found that, in a study of ten countries, benchmark incomes for all countries lay far above official poverty lines with, on average, half of the income distribution lying above the official poverty line but below the benchmark income implied by the Gini coefficient. In this study, we employ a similar approach but, using more recent data, extend the analysis both to a far wider range of countries, and to the global income distribution as a whole. For all countries, we locate the percentile of the income distribution above which income growth/subsidies would increase inequality and below which they would decrease inequality. We do the same for the global income distribution. For each country, we consider where the domestic benchmark income lies compared to the global benchmark income. This enables us to identify the range of incomes in which income growth/subsidies would: a) reduce both domestic and global inequality; b) reduce domestic inequality but increase global inequality; c) reduce global inequality but increase domestic inequality; d) increase

[1] As shown by Roope (2019), any inequality measure which embodies social preferences that satisfy a strong version of the Pigou-Dalton transfer property, must have a benchmark income. In essence, this means that a benchmark income exists for any inequality measure that always registers a fall in inequality when income is transferred from a richer individual to a less well-off individual.

both domestic and global inequality. At the same time, we also compare where each country's domestic benchmark income lies in comparison to the national poverty line, illuminating the range of incomes in which income growth/subsidies would: e) reduce both poverty and (domestic) inequality; f) reduce (domestic) inequality but not poverty; g) fail to reduce poverty and increase inequality.

The rest of this paper is structured as follows. In Section 2 we outline the inequality measures used in the study and their associated benchmark incomes. In Section 3 we describe the data used in the study, and the methods used to construct both domestic and global income distributions, upon which the various inequality benchmark income estimates are based. Our results are presented in Section 4, and we offer a concluding discussion in Section 5.

2. Inequality measures and benchmark incomes

We employ the same measures and notation used in Roope (2021); thus, this section closely follows that study. For a society of $n \geq 2$ individuals let $\mathbf{x} = (x_1, \cdots, x_n) \in \mathbb{R}_+^n$ denote the distribution of incomes. An inequality measure is a function that assigns to each income profile a nonnegative number, so that $I: \bigcup_{n\in\mathbb{N}} \mathbb{R}_+^n \longrightarrow \mathbb{R}_+$. The mean of income profile $\mathbf{x} \in \mathbb{R}_+^n$ is given by $\mu = \frac{1}{n} \cdot \sum_{i=1}^n x_i$, and the median income by m. Let $\varepsilon > 0$ denote an incremental increase in individual l's income.

As in Roope (2021), we use five inequality measures with contrasting normative properties. These measures, the benchmark incomes corresponding to them and some limiting values, are displayed in Table 1.

Table 1. Inequality measures and corresponding benchmark incomes

	Formula	Benchmark Income
Gini coefficient	$I_G(\mathbf{x}) = 1 - \frac{1}{n}\left[\frac{\sum_{k=1}^n 2\left(n-k+\frac{1}{2}\right)x_k}{\sum_{i=1}^n x_i}\right]$	$B_{\mathbf{x}} = \frac{\sum_{k=1}^n k x_k}{\sum_{i=1}^n x_i}$ $\lim n \to \infty \frac{B_{\mathbf{x}}}{n} = \frac{1}{2}(I_G(\mathbf{x}) + 1)$

Mean log deviation	$I_{MLD}(\mathbf{x}) = \frac{1}{n}\sum_{i=1}^{n} \ln\left(\frac{\mu}{x_i}\right)$	$B_{\mathbf{x},\varepsilon} = \frac{\varepsilon}{\left(1+\frac{\varepsilon}{n\mu}\right)^n - 1}$ $\lim \varepsilon \to 0\ B_{\mathbf{x},\varepsilon} = \mu$
Absolute Gini	$I_{AG}(\mathbf{x}) = \mu \cdot I_G(\mathbf{x})$	$B_{\mathbf{x}} = m$
Variance	$I_V(\mathbf{x}) = \frac{1}{n}\sum_{i=1}^{n}(x_i - \mu)^2$	$B_{\mathbf{x},\varepsilon} = \mu + \frac{1}{2}\left(\frac{n-1}{n}\right)\varepsilon$ $\lim \varepsilon \to 0\ B_{\mathbf{x},\varepsilon} = \mu$
Krtscha	$I_K(\mathbf{x}) = \frac{1}{n\mu}\sum_{i=1}^{n}(x_i - \mu)^2.$	$B_{\mathbf{x},\varepsilon} = \mu + \frac{\sigma_{\mathbf{x}}^2}{2\mu} - \frac{\varepsilon(n-1)}{2n}$ $\lim \varepsilon \to 0\ B_{\mathbf{x},\varepsilon} = \mu + \frac{\sigma_{\mathbf{x}}^2}{2\mu}$

NOTE: For proofs of these results, see Hoffmann (2001); Lambert and Lanza (2006); Corvalan (2014); Roope (2019).

The measures include two 'relative' measures, $I_G(\cdot)$ and $I_{MLD}(\cdot)$, two 'absolute' measures, $I_{AG}(\cdot)$ and $I_V(\cdot)$; and a 'centrist' measure, $I_K(\cdot)$.[2] In the context of a growing economy, 'relative' measures have widely been regarded as "rightest" and 'absolute' measures "leftist" (Kolm, 1976). However, this taxonomy can be misleading, especially with respect to benchmark incomes. In fact, while the relative versus absolute measures typically rank countries very differently with respect to inequality, Roope (2021) found that ordering countries according to the measures' benchmark percentiles provided very similar rankings. Moreover, the benchmark percentiles implied by absolute measures are not necessarily lower than those implied by relative measures. Indeed, it is clear from Table 1 that the (relative) Mean Log Deviation (MLD)

[2] 'Relative' inequality measures are those which are invariant under equiproportional increases in all incomes. By contrast, 'absolute' inequality measures are those which register no change when the same absolute amount of income is added to all incomes. 'Centrist' inequality measures (sometimes also referred to as 'intermediate' or 'compromise' measures) register an increase in inequality if all incomes increase equiproportionally, and a decrease if the same absolute amount of income is added to all incomes.

and (absolute) Variance imply identical benchmark incomes. An attractive property of the Gini coefficient, one not shared by any of the other measures in Table 1, is that it is perfectly correlated with its benchmark income percentile (Roope, 2021). Thus, the Gini coefficient's benchmark percentiles are consistent with the measure itself, in the sense that higher inequality necessarily means a higher benchmark income, and, in large samples, this relationship is linear. For these reasons and for tractability, we focus our benchmark income analysis mainly on the Gini coefficient, but provide analogous results for all other measures in Supplementary materials.

3. Constructing global and domestic income distributions

Data

We used data from UNU-WIDER's World Income Inequality Database (WIID) to construct synthetic domestic and global income distributions at five year intervals from 1960-2015, however the analyses in this study focuses mainly on the most recent 2015 data.

We employed the harmonised WIID dataset, which comprises 1342 observations (country-years) and 63 variables. Observations of insufficient quality were excluded from our analysis if they lacked either a reported Gini coefficient or data on GDP per capita (2011). This left us with 1229 country-year observations. In four cases, there were duplicate country-year estimates. We kept the observations in which the survey year was closest to the reference year, and the one preceding the reference year when its posterior counterpart was also available. This left us with 1225 observations. Of these, 1069 contained data on decile shares, while the remaining 156 contained data on quintile shares.

For each country-year, we created scaled up synthetic income distributions (N = 10,000) based on the decile/quintile shares, the reported Gini coefficient, and the GDP per capita (2011). All computations are performed with R version 3.6.1 (R Core Team, 2018), using the packages GB2 (Graf and Nedyalkova, 2015) to obtain the scaled up synthetic samples and GB2group (Jordá, Sarabia, and Jäntti, 2019) to first obtain the required parameters from grouped data. (See the syntheticSamples.R script in Supplementary materials for further details.) The correlation between the average

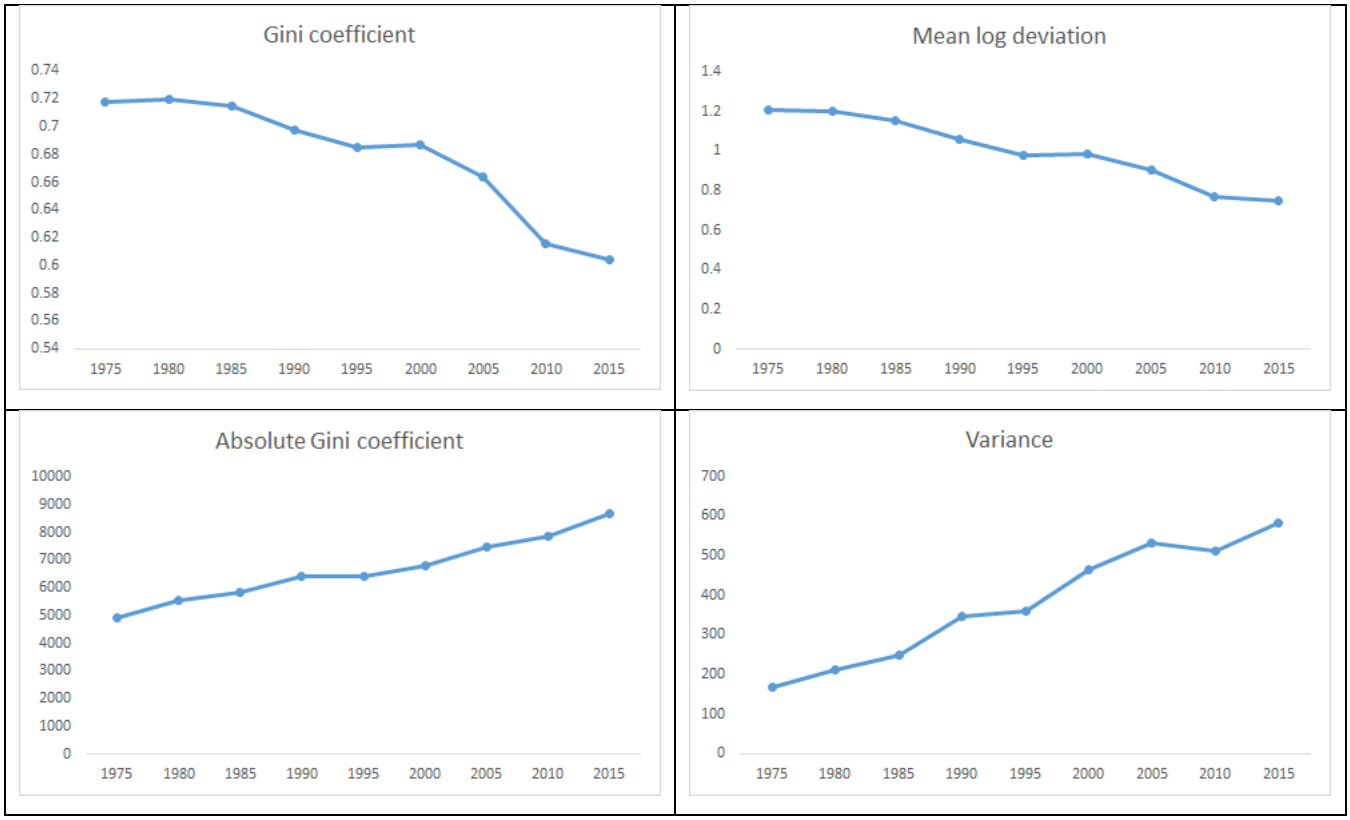
income of the resulting synthetic samples and the variable GDP per capita (2011) was almost perfect (r = 0.9999814) and the correlation between the Gini coefficient of the resulting synthetic samples and the reported Gini was also very high (r = 0.8841875).

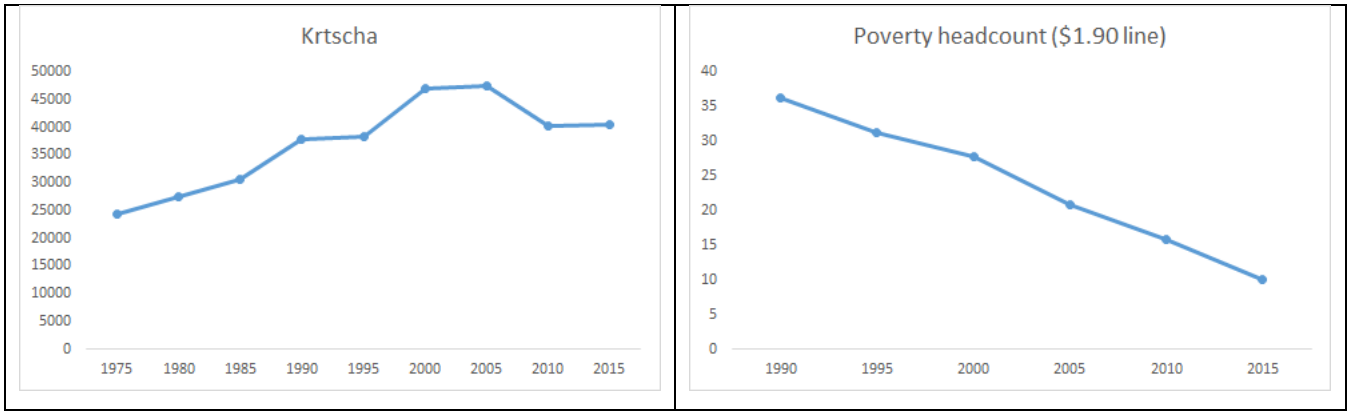
The global-year synthetic income distributions were estimated using the country-year parameters estimated in the syntheticSamples.R script and taking into account their populations (For details, see the paraWorldSams.R script in Supplementary materials). We obtained a total of 12 world-year synthetic samples (N = 10,000).

4. Results

Consistent with an increasing body of literature, Figure 1 indicates that global inequality has been falling in relative terms (Gini and MLD), but increasing in absolute terms (Absolute Gini and Variance). Meanwhile, the proportion of those globally living below the US$1.90 poverty line has been decreasing.

Figure 1. Trends in global inequality and poverty 1975-2015





While relative inequality has been falling at a global level, there has been considerable heterogeneity across countries, with inequality rising in some countries and falling in others (see Figure S1, Supplementary Materials, for trends in all countries included in the study.)

Next, we present the paper's central results on inequality benchmark percentiles, focusing on the most recent data (2015). We begin by presenting what are, to the best of our knowledge, the first estimates of benchmark incomes and percentiles of the global income distribution, together with the inequality measures which imply them (Table 2). We first briefly note that, consistent with previous studies, global inequality increased during 1975-2015 according to our two relative measures (Gini and MLD) but increased according to our two absolute measures (Absolute Gini and Variance). According to the intermediate Krtscha measure, inequality increased from 1975 to 2005 but subsequently decreased. According to the Gini coefficient, the global benchmark percentile fell from the 85th percentile in 1975 to the 80th percentile in 2015. As the Gini coefficient is perfectly correlated with its implied percentiles, this decline is a direct implication of the declining Gini coefficient. The result means that, in 2015 for example, increasing incomes of those below the global 80th percentile would decrease global inequality, while increasing incomes above this would increase global inequality. For the other inequality measures, benchmark incomes and percentiles are not perfectly correlated with the corresponding measures (Roope 2019, 2021) and this is apparent from Table 2. For example, while inequality decreased steadily according to the MLD and increased steadily according to the Variance, these measures imply the same benchmark incomes (Roope 2019, 2021). At a global level

Table 2. Benchmark incomes and percentiles of the global income distribution

	Inequality measures					Benchmark incomes					Benchmark percentiles					Poverty percentile (US$ 1.90)
Year	I_G	I_{MLD}	I_{AG}	I_V	I_K	B_G	B_{MLD}	B_{AG}	B_V	B_K	p_G	p_{MLD}	p_{AG}	p_V	p_K	$p_{1.90}$
1975	0.72	1.21	4929	167	24348	16,328	6,864	1,379	6,864	19,038	85.9	74.3	50.0	74.3	88.3	-
1980	0.72	1.20	5563	212	27501	18,643	7,727	1,471	7,727	21,477	86.0	74.7	50.0	74.7	88.1	-
1985	0.72	1.15	5842	250	30568	18,542	8,167	1,802	8,167	23,451	85.8	75.6	50.0	75.6	89.2	-
1990	0.70	1.06	6427	348	37753	18,481	9,218	2,380	9,218	28,094	84.9	75.0	50.0	75.0	90.9	36.3
1995	0.68	0.98	6409	359	38373	16,847	9,360	2,803	9,360	28,546	84.2	76.2	50.0	76.2	91.2	31.2
2000	0.69	0.98	6796	465	46949	15,913	9,899	3,280	9,899	33,373	84.3	77.3	50.0	77.3	92.8	27.7
2005	0.66	0.91	7455	532	47396	17,190	11,229	4,127	11,229	34,926	83.2	76.1	50.0	76.1	92.4	20.8
2010	0.62	0.77	7847	514	40299	17,000	12,748	6,119	12,748	32,897	80.8	74.2	50.0	74.2	91.2	15.9
2015	0.60	0.75	8693	583	40544	20,732	14,390	6,849	14,390	34,662	80.2	71.0	50.0	71.0	90.2	10.1

NOTES: i) Benchmark incomes are in 2011 US$ adjusted for purchasing power parity; ii) Poverty percentile is, by construction, equal to poverty headcount rate at US$ 1.90 line.

the benchmark percentiles corresponding to these measures increased from the 74th to 77th percentile during 1975 to 2000, then decreased to the 71st percentile by 2015. Benchmark percentiles implied by the Krtscha measure are generally very high (Roope 2019, 2021) and were found to rise from the 88th to 92nd percentile during 1975-2000 before falling to the 90th percentile in 2015 (Table 2). As guaranteed by definition (Roope 2019), benchmark percentiles for the Absolute Gini lie in the 50th percentile.

Supplementary Tables S1-S7 provide, for all inequality measures, the percentiles of the domestic income distribution in which the domestic and global benchmark incomes lie, and how these compare to domestic poverty lines. Based on these results, Figures 2-8 display for all countries, by World Bank region, the percentiles of the income distribution in which the domestic and global benchmark incomes implied by the Gini coefficient lie, alongside domestic poverty lines.

Some striking trends are apparent from Figures 2-8. In the generally poor regions of South Asia (Fig 7) and Sub-Saharan Africa (Fig 8), in almost all countries the global benchmark percentile lies substantially above the domestic benchmark percentile (an average of 22 percentage points in South Asia and 18 percentage points in Sub-Saharan Africa). In South Asia for instance, the average domestic benchmark income lies in the 72nd percentile, while the global benchmark income lies, on average, in the 94th percentile. This means that in an average South Asian country, increasing incomes below the 72nd percentile would reduce domestic inequality, while increasing incomes below the 94th percentile would reduce global inequality. Increasing incomes above the 72nd but below the 94th percentile would increase domestic inequality but reduce global inequality. Only increases above the 94th percentile would increase global inequality.

The situation in predominantly high-income regions is dramatically different. In North America,[3] domestic benchmark percentiles lie far above the global benchmark percentile. In the United States for instance, the domestic benchmark income lies in

[3] Canada and the US only for the purposes of this study; Central American countries are included in World Bank Latin America & Caribbean group.

the 74th percentile, while the global benchmark income lies in the 28th percentile. Thus, only increasing the incomes of those in the bottom 28% of the US distribution would help reduce global inequality. Increases above the 28th percentile would increase global inequality yet, as long as they are below the 74th percentile, they would reduce domestic inequality.

In some of the world's richest countries, such as Luxembourg and Norway, the global benchmark income lies virtually at the bottom of the domestic distribution in the first percentile, thus except perhaps for the very poorest on the margins of society, any increases in income would tend to increase global inequality. Conversely, in the very poorest countries such as Burundi and the Democratic Republic of Congo, the global benchmark income lies almost at the very top of the distribution. Thus, except for the richest elites, any increases in income would tend to decrease global inequality.

Another striking pattern from Figures 2-8 is that, for all countries with a domestic poverty line, the domestic benchmark incomes lies far higher up the income distribution, the gap in percentiles typically comprising around half the income distribution.

Figure 2. Global versus domestic benchmark percentiles in East Asia & Pacific in 2015

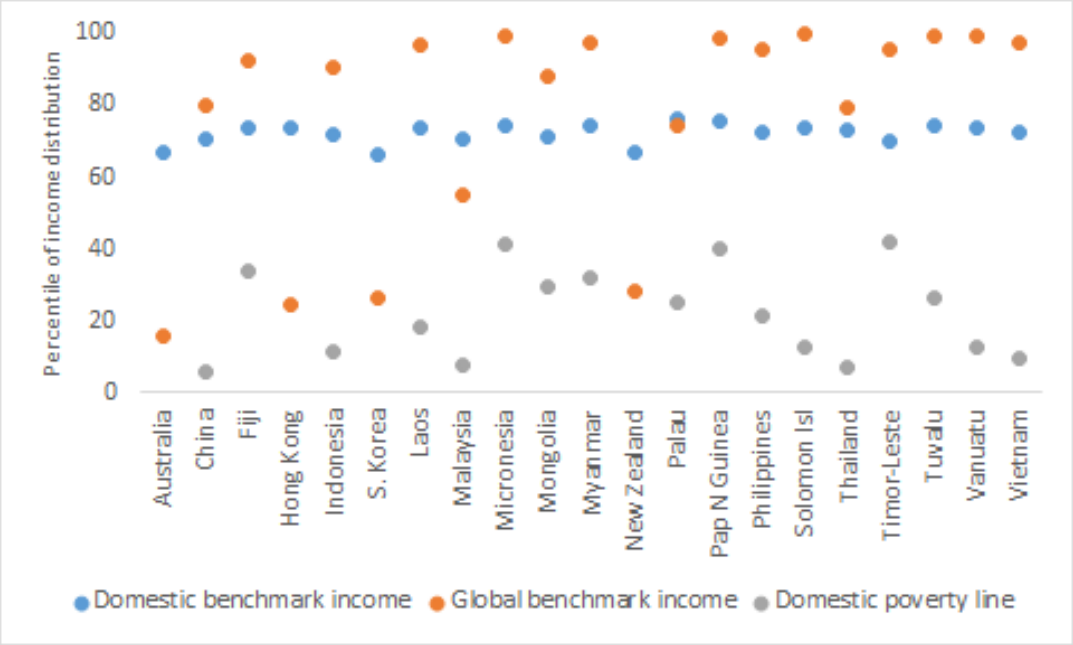


Figure 3. Global versus domestic benchmark percentiles in Europe & Central Asia in 2015

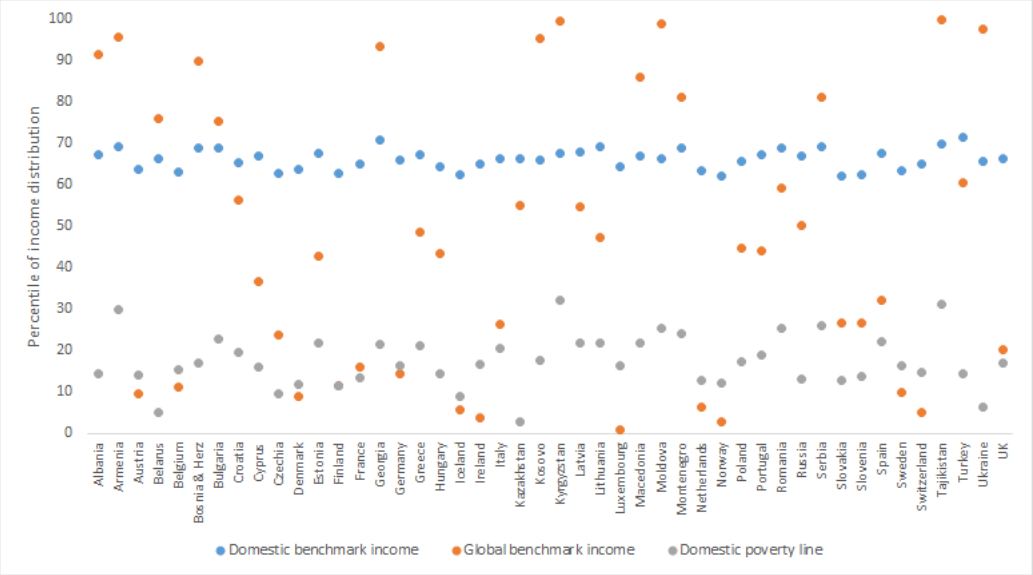


Figure 4. Global versus domestic benchmark percentiles in Latin America & Caribbean in 2015

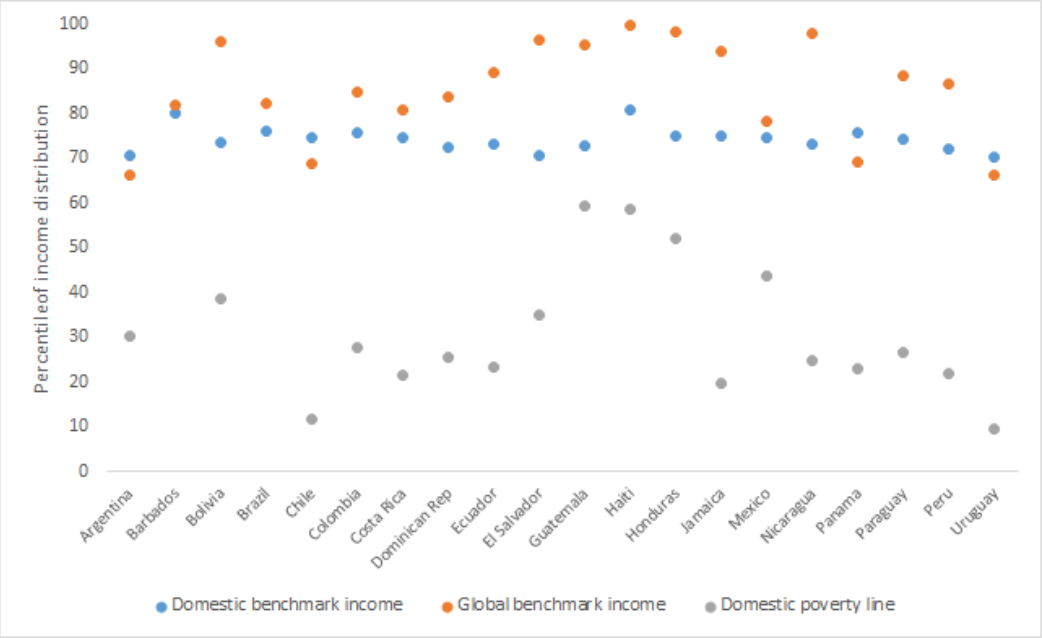


Figure 5. Global versus domestic benchmark percentiles in the Middle East & North Africa in 2015

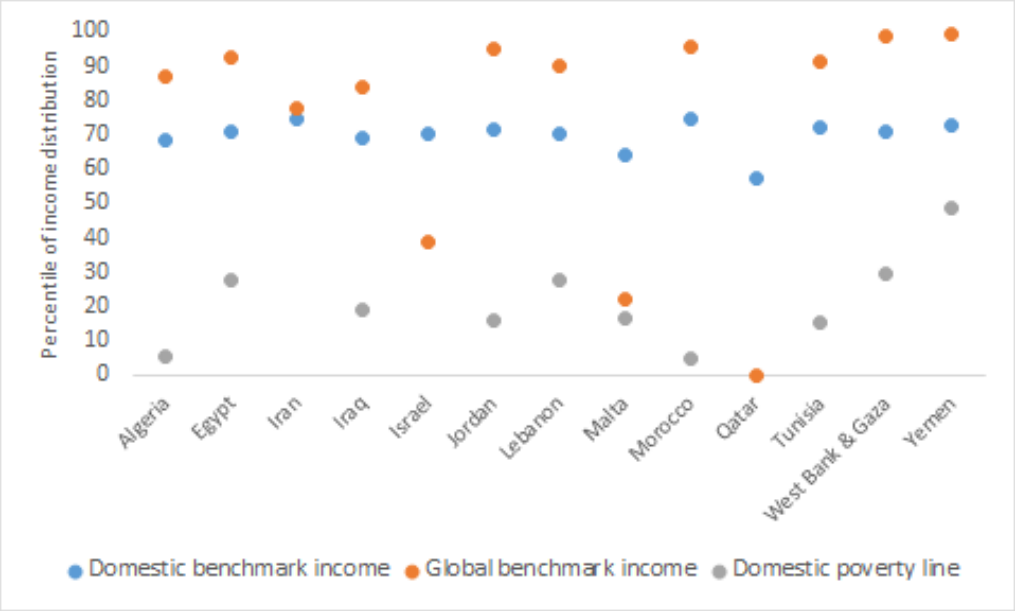


Figure 6. Global versus domestic benchmark percentiles in North America 2015

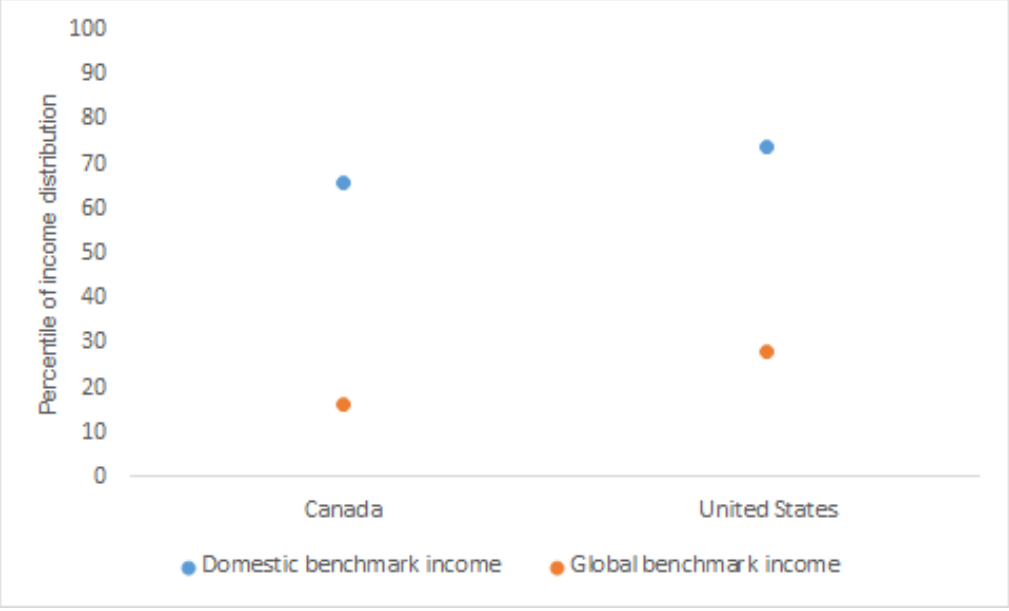


Figure 7. Global versus domestic benchmark percentiles in South Asia in 2015

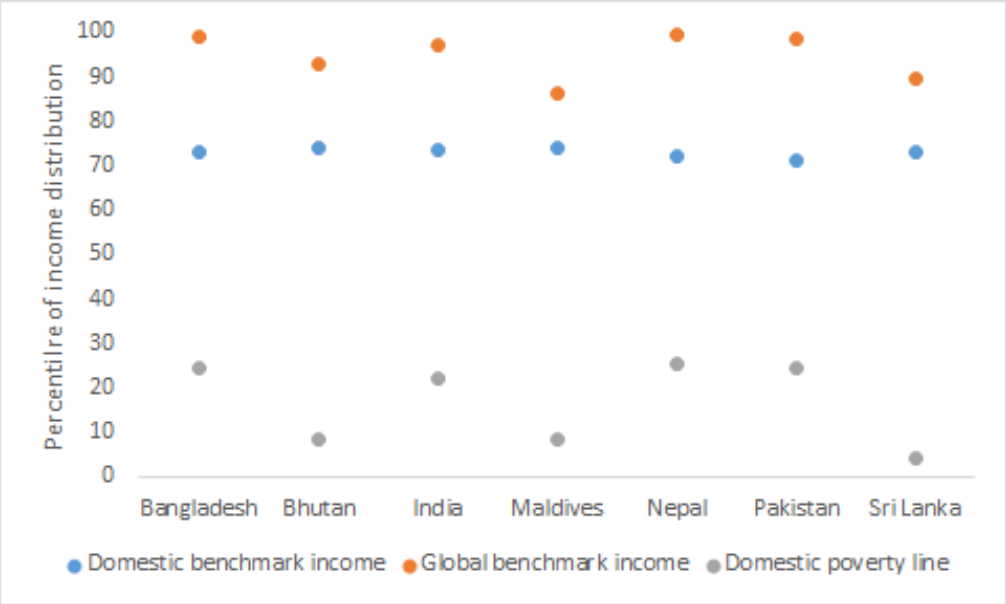
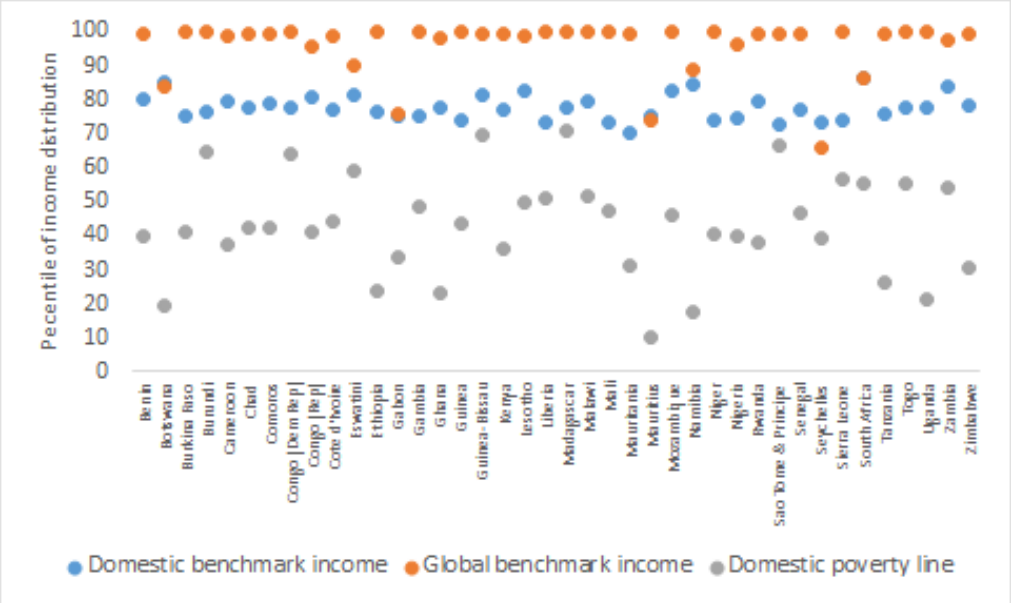


Figure 8. Global versus domestic benchmark percentiles in Sub-Saharan Africa 2015



5. Discussion

This paper constitutes by far the most comprehensive empirical study to date of where benchmark incomes and percentiles lie in practice, and how they have evolved over the last four decades. As well as estimates for 149 countries in 2015, it provides the

first estimates of global benchmark incomes, how the global benchmark percentile has changed over time, and how it compares to domestic benchmark income percentiles. For all countries, the paper provides not only the domestic and global benchmark percentiles, but where these lie in comparison to domestic poverty lines. Despite declines, in 2015 the global benchmark income percentile lay in the 80th percentile according to the Gini coefficient. This underscores just how unequal the world remains; increasing the incomes of the bottom 80% globally would reduce global income inequality.

Our results illuminate potentially important trade-offs for international policy makers. In low-income countries, domestic benchmark incomes typically lie far below the global benchmark income. In India, for example, for all its growth in recent decades, the global benchmark income according to the Gini coefficient is still in the 97th percentile, while its domestic benchmark lies in the 73rd percentile. In such a country, where domestic inequality is already a major concern, is it desirable that overseas development assistance be used to grow or subsidise those between the 73rd and 97th percentile, whose incomes are relatively low by global standards, even though this would have no impact on domestic poverty and would increase domestic inequality?

Similarly, what are the implications of the fact that benchmark incomes in high-income countries lie so far above the global benchmark income? During the last decade, increasing domestic inequality and polarization in many countries, in multiple domains, has been attributed as giving rise to populist policies and figures that potentially threaten democracy (Guriev, 2018; Pástor and Veronesi, 2021). This has led to increased discussion both in academia and popular discourse about the importance of reducing gaps in living standards between ‘elites’ and those who feel ‘left behind,’ particularly in high-income countries with comparatively high inequality levels, such as the US and the UK (Jennings et al., 2021). As Lakner and Milanovic (2016)’s much discussed ‘elephant graph’ illustrated, between 1988 and 2008, the 80th percentile of the global income distribution had grown barely at all, and less than any other section, constituting the lowest point of a trough between the 80th and 85th percentile. In large part, this area of the global income distribution includes low-income individuals in high-income countries such as the US, and the lack of opportunities and income growth in populations such as the so-called Rust Belt in the US is widely regarded as a major

source of dissatisfaction with globalization and traditional mainstream politics (McQuarrie, 2017). Though we use different data, it is interesting to note that this section of the global income distribution corresponds almost exactly with our global benchmark percentile estimates. Income increases in these populations are likely to have very limited impact on global inequality levels, but would certainly reduce domestic inequality in countries such as the US.

The benchmark income approach can be used to target areas of the income distribution for subsidies or growth promoting investment. It can be used to identify the richest sections of the distribution for which it might be deemed fair to subsidise income financed by taxation (Corvalan, 2014), and the poorest sections for which it is just and fair not to subsidise income (Roope, 2021). Compared to poverty lines and other reference income levels that can be criticised as being arbitrary, a major advantage of the benchmark approach is that benchmark incomes arise naturally, fully determined by the inequality measure of choice. Once a particular inequality measure is decided upon, unlike poverty lines, there can be no disagreement over the level of the benchmark income, reducing the scope for political manipulation. Comfortingly, it is also the case that, while different inequality measures – especially relative versus absolute – often disagree substantially about trends in inequality, the benchmark incomes implied by different types of inequality measures generate broadly similar conclusions about both the location of benchmark incomes and their trends over time.

Nevertheless, despite the typically arbitrary nature of poverty lines, they remain valuable. Benchmark incomes arise naturally through social preferences that are concerned with inequality, but not necessarily with poverty. Yet there are good reasons for society to have a concern for both poverty and inequality. Consistent with Roope (2021), but for a much larger range of countries, this study finds that there is a vast gap in all countries between domestic benchmark incomes and poverty lines. Focusing on everyone below benchmark incomes should not come at the price of failing to give special focus to those near the very bottom of the distribution. Indeed, though increases to any incomes below benchmark incomes reduce inequality, increases to incomes far below benchmark incomes reduce inequality the most (Roope, 2019). The large gap between poverty lines and benchmark incomes also underscores the often overlooked fact that economic growth will not necessarily reduce poverty, even if it

causes inequality to fall (Roope, 2021). All of this emphasises the importance of considering the full impacts that policies are likely to have across the income distribution, e.g. via growth incidence curves, rather than overly relying on summary statistics such as the Gini coefficient or poverty measures alone. Awareness of the percentiles in which both poverty lines and benchmark incomes lie can help to focus consideration of what shape of growth incidence curve is desirable and feasible. We hope that the benchmark percentiles provided in this study will be useful to both national and international policy makers.

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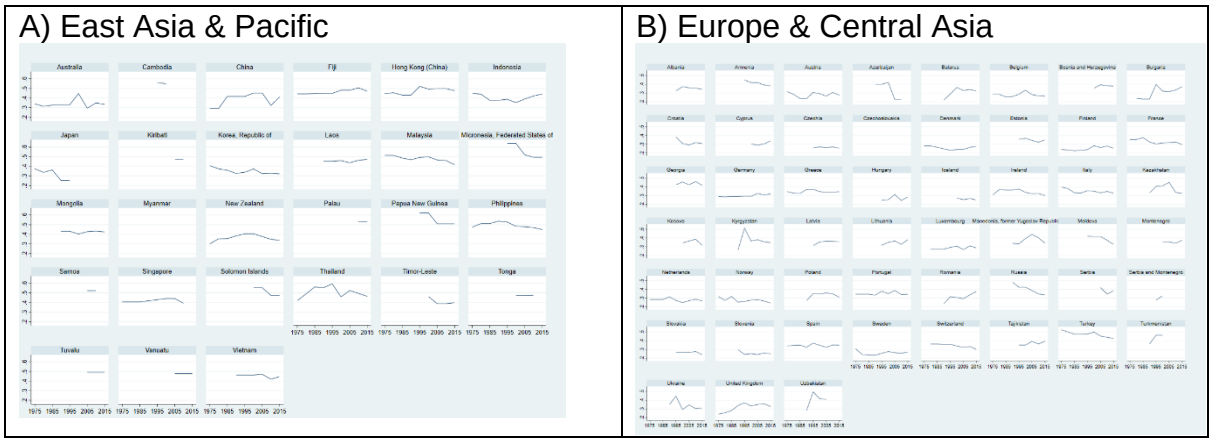
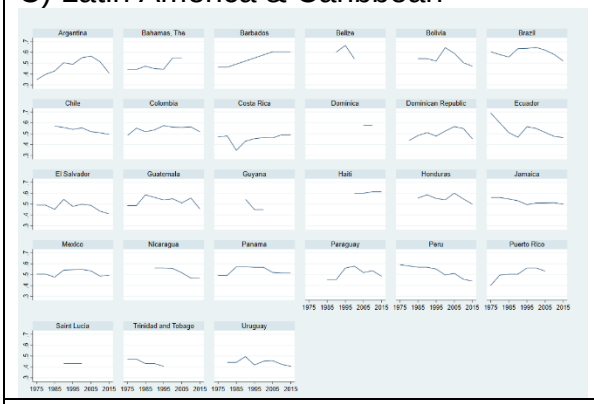
Supplementary Materials

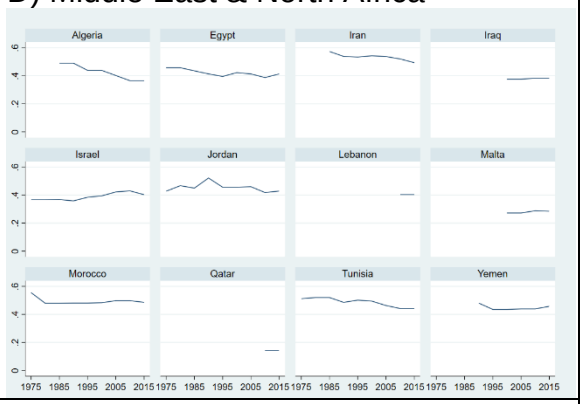
Figure S1. Trends in Gini coefficient by country and region



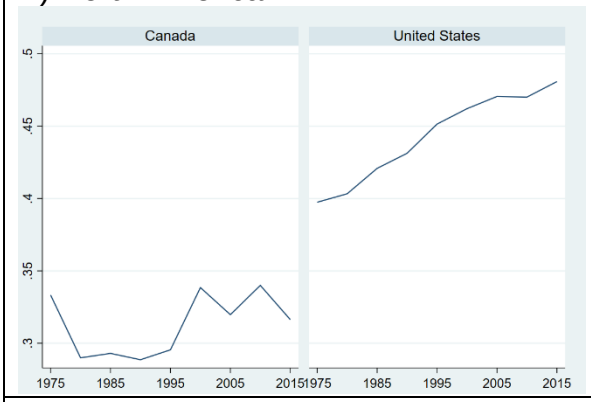
C) Latin America & Caribbean



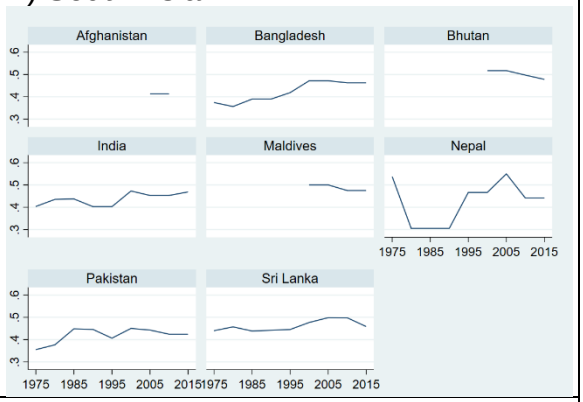
D) Middle East & North Africa



E) North America



F) South Asia



G) Sub-Saharan Africa

Table S1. Global and Domestic benchmark income percentiles in East Asia & Pacific in 2015

	Domestic benchmark percentiles					Percentiles in domestic distribution where global benchmark income lies					Domestic poverty line percentile
Country	p_G	p_{MLD}	p_{AG}	p_V	p_K	p_G	p_{MLD}	p_{AG}	p_V	p_K	
Australia	66.7	63.1	50.0	63.1	78.2	16.1	5.8	0.6	5.8	44.9	-
China	70.6	60.7	50.0	60.7	74.1	79.9	63.2	30.7	63.2	94.6	5.7
Fiji	73.6	69.9	50.0	69.9	89.1	92.4	85.5	57.4	85.5	97.3	34
Hong Kong	73.9	67.9	50.0	67.9	91.8	24.8	15.7	5.8	15.7	44.4	-
Indonesia	72.1	68.7	50.0	68.7	87.6	90.3	81.0	46.0	81.0	96.6	11.2
Korea, Republic of	66.1	59.6	50.0	59.6	73.7	26.5	12.8	2.4	12.8	59.7	-
Laos	73.5	70.2	50.0	70.2	90.8	96.9	93.6	76.7	93.6	99.1	18.3
Malaysia	70.7	66.8	50.0	66.8	83.0	55.2	35.5	7.3	35.5	79.5	7.6
Micronesia, Federated States of	74.6	68.0	50.0	68.0	85.7	99.3	98.2	90.1	98.2	99.9	41.2
Mongolia	71.3	66.5	50.0	66.5	84.0	88.3	76.5	39.1	76.5	96.3	29.6
Myanmar	74.3	71.8	50.0	71.8	94.6	97.5	95.1	82.2	95.1	99.1	32.1
New Zealand	66.9	62.4	50.0	62.4	76.3	28.0	12.2	1.0	12.2	60.6	-
Palau	76.5	68.8	50.0	68.8	85.8	74.4	61.3	34.5	61.3	87.7	24.9
Papua New Guinea	75.5	68.4	50.0	68.4	87.1	98.6	96.6	85.9	96.6	99.7	39.9
Philippines	72.5	69.8	50.0	69.8	88.1	95.5	91.0	68.9	91.0	98.6	21.6
Solomon Islands	73.6	69.1	50.0	69.1	88.3	99.7	99.3	96.1	99.3	99.9	12.7
Thailand	73.2	68.5	50.0	68.5	85.7	79.3	65.0	30.5	65.0	91.6	7.2
Timor-Leste	69.9	66.5	50.0	66.5	83.2	95.5	89.6	58.9	89.6	98.9	41.8
Tuvalu	74.6	69.9	50.0	69.9	89.0	99.0	97.5	89.4	97.5	99.7	26.3
Vanuatu	73.9	68.8	50.0	68.8	87.9	99.5	98.7	93.1	98.7	99.9	12.7
Vietnam	72.4	66.8	50.0	66.8	85.1	97.4	93.9	74.8	93.9	99.4	9.8

Table S2. Global and Domestic benchmark income percentiles in Europe & Central Asia in 2015

	Domestic benchmark percentiles					Percentiles in domestic distribution where global benchmark income lies					Domestic poverty line percentile
Country	p_G	p_{MLD}	p_{AG}	p_V	p_K	p_G	p_{MLD}	p_{AG}	p_V	p_K	
Albania	67.2	63.7	50.0	63.7	78.8	91.3	78.6	31.6	78.6	98.1	14.3
Armenia	69.0	68.3	50.0	68.3	89.2	95.5	90.1	54.7	90.1	98.6	29.8
Austria	63.8	60.2	50.0	60.2	74.5	9.6	3.3	0.4	3.3	37.3	14.1
Belarus	66.1	64.1	50.0	64.1	80.8	75.9	48.8	8.4	48.8	93.6	5.1
Belgium	63.2	57.9	50.0	57.9	68.7	11.2	3.3	0.3	3.3	41.3	15.5
Bosnia and Herzegovina	69.0	64.9	50.0	64.9	81.7	89.6	77.1	34.1	77.1	97.2	16.9
Bulgaria	68.7	64.2	50.0	64.2	83.5	75.4	52.2	15.1	52.2	92.6	22.9
Croatia	65.4	57.8	50.0	57.8	70.5	56.3	31.8	6.8	31.8	88.3	19.5
Cyprus	67.0	65.7	50.0	65.7	82.2	36.6	15.0	0.9	15.0	72.4	16.1
Czechia	62.7	62.0	50.0	62.0	75.4	23.7	6.0	0.3	6.0	72.6	9.7
Denmark	63.8	60.8	50.0	60.8	76.6	9.0	3.3	0.4	3.3	33.5	11.9
Estonia	67.5	61.3	50.0	61.3	74.6	42.7	23.8	4.0	23.8	74.1	21.7
Finland	62.7	59.6	50.0	59.6	71.0	11.5	2.8	0.2	2.8	47.4	11.6
France	64.8	64.5	50.0	64.5	80.5	16.2	4.7	0.4	4.7	55.9	13.6
Georgia	70.9	66.8	50.0	66.8	85.2	93.3	85.2	50.6	85.2	98.1	21.6
Germany	66.0	62.3	50.0	62.3	77.3	14.6	4.9	0.5	4.9	43.3	16.5
Greece	67.3	59.9	50.0	59.9	76.9	48.5	27.6	7.5	27.6	82.2	21.2
Hungary	64.2	60.6	50.0	60.6	73.9	43.3	18.7	1.8	18.7	82.9	14.5
Iceland	62.5	63.2	50.0	63.2	77.4	5.8	1.5	0.1	1.5	34.7	8.8
Ireland	65.0	61.0	50.0	61.0	73.0	3.9	0.9	0.0	0.9	22.0	16.8
Italy	66.3	58.7	50.0	58.7	74.7	26.3	13.8	3.3	13.8	58.7	20.6
Kazakhstan	66.3	65.2	50.0	65.2	80.8	55.1	27.7	2.0	27.7	85.1	2.7
Kosovo	65.9	62.8	50.0	62.8	77.6	95.3	87.1	40.2	87.1	99.1	17.6
Kyrgyzstan	67.4	68.0	50.0	68.0	86.8	99.6	99.0	93.8	99.0	99.9	32.1
Latvia	67.9	61.5	50.0	61.5	76.5	54.5	32.9	7.7	32.9	83.2	21.8
Lithuania	69.2	64.5	50.0	64.5	82.0	47.1	27.1	5.7	27.1	77.2	21.9
Luxembourg	64.3	60.5	50.0	60.5	73.2	0.8	0.3	0.0	0.3	4.8	16.5
Macedonia,	67.0	57.9	50.0	57.9	71.3	85.9	65.6	24.0	65.6	97.7	21.9
Moldova	66.3	64.7	50.0	64.7	80.7	98.8	96.4	75.8	96.4	99.7	25.4
Montenegro	68.8	66.9	50.0	66.9	84.8	81.1	61.8	17.7	61.8	93.9	24
Netherlands	63.4	61.5	50.0	61.5	75.5	6.5	1.7	0.2	1.7	32.6	12.7
Norway	62.1	57.5	50.0	57.5	71.1	2.8	0.9	0.2	0.9	11.9	12.2
Poland	65.5	61.0	50.0	61.0	75.5	44.6	21.6	3.0	21.6	81.3	17.3
Portugal	67.2	62.6	50.0	62.6	79.3	43.9	23.0	4.2	23.0	78.4	19
Romania	68.8	59.7	50.0	59.7	80.3	59.0	37.4	13.8	37.4	87.9	25.3
Russia	66.8	62.9	50.0	62.9	79.5	50.2	26.3	4.5	26.3	83.0	13.3
Serbia	69.2	59.5	50.0	59.5	78.8	81.2	58.7	23.7	58.7	95.3	25.9
Slovakia	61.9	55.4	50.0	55.4	66.6	26.6	10.4	1.3	10.4	75.5	12.7
Slovenia	62.4	57.5	50.0	57.5	69.1	26.7	9.5	0.9	9.5	73.8	13.9
Spain	67.4	59.0	50.0	59.0	73.8	32.1	18.0	4.8	18.0	63.1	22.3
Sweden	63.5	57.1	50.0	57.1	69.0	9.9	3.7	0.5	3.7	33.6	16.2
Switzerland	65.0	62.7	50.0	62.7	78.4	5.0	1.6	0.2	1.6	22.6	14.7
Tajikistan	69.7	66.3	50.0	66.3	84.8	99.7	99.3	95.2	99.3	99.9	31.3
Turkey	71.3	68.0	50.0	68.0	87.4	60.4	40.2	9.8	40.2	83.6	14.3
Ukraine	65.5	63.8	50.0	63.8	79.8	97.6	93.2	56.0	93.2	99.5	6.4
United Kingdom	66.3	62.3	50.0	62.3	77.6	20.3	8.1	0.9	8.1	53.0	17

Table S3. Global and Domestic benchmark income percentiles in Latin America & Caribbean in 2015

	Domestic benchmark percentiles					Percentiles in domestic distribution where global benchmark income lies					Domestic poverty line percentile
Country	p_G	p_{MLD}	p_{AG}	p_V	p_K	p_G	p_{MLD}	p_{AG}	p_V	p_K	
Argentina	70.5	63.2	50.0	63.2	77.3	66.4	47.7	17.5	47.7	86.6	30.3
Barbados	80.2	76.3	50.0	76.3	98.7	82.1	71.1	41.2	71.1	91.4	NA
Bolivia	73.6	67.2	50.0	67.2	88.1	96.2	91.9	69.2	91.9	98.9	38.6
Brazil	76.0	71.4	50.0	71.4	94.4	82.1	69.5	36.5	69.5	92.3	NA
Chile	74.7	72.4	50.0	72.4	95.1	68.7	50.5	16.2	50.5	85.8	11.7
Colombia	75.8	71.3	50.0	71.3	93.3	84.8	73.8	41.7	73.8	93.6	27.8
Costa Rica	74.4	69.6	50.0	69.6	87.4	80.8	68.2	35.3	68.2	91.9	21.7
Dominican Republic	72.6	68.9	50.0	68.9	87.6	83.5	70.1	33.1	70.1	93.6	25.6
Ecuador	73.2	68.4	50.0	68.4	87.4	89.0	79.2	45.8	79.2	96.1	23.3
El Salvador	70.5	68.0	50.0	68.0	86.7	96.3	91.8	65.9	91.8	99.0	34.9
Guatemala	72.7	71.9	50.0	71.9	94.5	95.5	91.3	68.0	91.3	98.4	59.3
Haiti	80.7	73.9	50.0	73.9	96.2	99.6	99.1	96.3	99.1	99.8	58.5
Honduras	75.0	68.6	50.0	68.6	86.8	98.3	95.9	83.6	95.9	99.6	52.2
Jamaica	75.0	70.1	50.0	70.1	93.8	93.9	88.2	61.3	88.2	97.7	19.9
Mexico	74.7	72.6	50.0	72.6	95.3	78.2	62.9	25.4	62.9	90.7	43.6
Nicaragua	73.3	71.4	50.0	71.4	94.1	97.9	95.7	83.5	95.7	99.3	24.9
Panama	75.7	70.2	50.0	70.2	92.2	69.1	53.3	23.8	53.3	85.6	23
Paraguay	74.2	69.4	50.0	69.4	90.4	88.5	78.6	45.8	78.6	95.7	26.6
Peru	72.0	66.7	50.0	66.7	86.5	86.7	73.8	36.5	73.8	95.6	21.8
Uruguay	70.3	64.9	50.0	64.9	81.0	66.2	46.1	14.4	46.1	86.9	9.7

Table S4. Global and Domestic benchmark income percentiles in Middle East & North Africa in 2015

	Domestic benchmark percentiles					Percentiles in domestic distribution where global benchmark income lies					Domestic poverty line percentile
Country	p_G	p_{MLD}	p_{AG}	p_V	p_K	p_G	p_{MLD}	p_{AG}	p_V	p_K	
Algeria	68.3	68.5	50.0	68.5	89.2	87.0	70.5	19.2	70.5	95.8	5.5
Egypt	70.7	73.8	50.0	73.8	95.0	92.7	85.7	42.5	85.7	97.1	27.8
Iran	74.7	70.6	50.0	70.6	92.3	77.9	62.9	28.6	62.9	90.7	NA
Iraq	69.2	68.5	50.0	68.5	90.1	84.1	64.4	18.1	64.4	94.6	18.9
Israel	70.2	61.7	50.0	61.7	77.5	38.8	24.0	7.6	24.0	65.4	NA
Jordan	71.4	72.1	50.0	72.1	94.6	94.7	89.6	57.6	89.6	98.1	15.7
Lebanon	70.2	68.7	50.0	68.7	91.3	89.9	78.3	29.8	78.3	96.4	27.4
Malta	64.2	60.4	50.0	60.4	72.2	22.1	6.8	0.4	6.8	59.9	16.5
Morocco	74.3	74.3	50.0	74.3	97.1	95.4	91.6	70.3	91.6	98.2	4.8
Qatar	57.1	56.8	50.0	56.8	65.4	0.0	0.0	0.0	0.0	0.1	NA
Tunisia	72.1	69.2	50.0	69.2	92.9	91.0	81.4	39.6	81.4	96.6	15.2
West Bank and Gaza	71.0	67.3	50.0	67.3	90.2	98.7	97.0	85.4	97.0	99.6	29.2
Yemen	72.9	72.8	50.0	72.8	95.8	99.1	98.3	93.2	98.3	99.7	48.6

Table S5. Global and Domestic benchmark income percentiles in North America in 2015

	Domestic benchmark percentiles					Percentiles in domestic distribution where global benchmark income lies					Domestic poverty line percentile
Country	p_G	p_{MLD}	p_{AG}	p_V	p_K	p_G	p_{MLD}	p_{AG}	p_V	p_K	
Canada	65.8	59.0	50.0	59.0	73.0	16.4	7.4	1.4	7.4	42.2	NA
United States	74.0	64.6	50.0	64.6	81.5	28.3	19.1	7.7	19.1	46.0	NA

Table S6. Global and Domestic benchmark income percentiles in South Asia in 2015

	Domestic benchmark percentiles					Percentiles in domestic distribution where global benchmark income lies					Domestic poverty line percentile
Country	p_G	p_{MLD}	p_{AG}	p_V	p_K	p_G	p_{MLD}	p_{AG}	p_V	p_K	
Bangladesh	73.1	70.1	50.0	70.1	88.8	99.2	98.1	91.0	98.1	99.7	24.3
Bhutan	73.9	68.9	50.0	68.9	86.6	92.7	85.7	58.9	85.7	97.5	8.2
India	73.4	73.1	50.0	73.1	95.8	97.0	94.2	79.3	94.2	98.9	21.9
Maldives	73.8	70.0	50.0	70.0	92.4	86.2	74.5	38.1	74.5	94.7	8.2
Nepal	72.1	69.6	50.0	69.6	90.2	99.6	99.1	95.3	99.1	99.9	25.2
Pakistan	71.2	70.8	50.0	70.8	92.5	98.5	96.7	86.2	96.7	99.5	24.3
Sri Lanka	72.9	69.6	50.0	69.6	92.1	89.6	79.8	42.4	79.8	96.2	4.1

Table S7. Global and Domestic benchmark income percentiles in Sub-Saharan Africa in 2015

	Domestic benchmark percentiles					Percentiles in domestic distribution where global benchmark income lies					Domestic poverty line percentile
Country	p_G	p_{MLD}	p_{AG}	p_V	p_K	p_G	p_{MLD}	p_{AG}	p_V	p_K	
Benin	79.9	74.7	50.0	74.7	98.5	99.4	98.8	95.9	98.8	99.7	40.1
Botswana	85.4	79.3	50.0	79.3	98.4	83.8	76.8	57.0	76.8	90.8	19.3
Burkina Faso	75.1	72.6	50.0	72.6	93.4	99.7	99.5	97.4	99.5	99.9	41.4
Burundi	76.3	72.4	50.0	72.4	93.6	100.0	99.9	99.5	99.9	100.0	64.9
Cameroon	79.3	72.4	50.0	72.4	92.2	98.5	96.7	89.1	96.7	99.5	37.5
Chad	77.8	71.4	50.0	71.4	92.2	99.5	98.9	95.1	98.9	99.9	42.3
Comoros	78.7	71.7	50.0	71.7	91.3	99.2	98.2	92.7	98.2	99.7	42.4
Congo, Democratic Republic of the	77.4	71.6	50.0	71.6	90.9	100.0	99.9	99.3	99.9	100.0	63.9
Congo, Republic of the	80.4	74.4	50.0	74.4	96.1	95.4	92.2	78.5	92.2	98.2	40.9
Cote d'Ivoire	77.2	71.8	50.0	71.8	92.4	98.7	97.2	89.9	97.2	99.6	44.4
Eswatini	81.6	75.3	50.0	75.3	94.9	90.0	84.3	65.7	84.3	95.1	58.9
Ethiopia	76.5	72.6	50.0	72.6	94.5	99.7	99.5	97.5	99.5	99.9	23.5
Gabon	75.4	68.7	50.0	68.7	85.7	75.6	61.7	32.7	61.7	88.8	33.4
Gambia, The	75.0	71.0	50.0	71.0	92.2	99.8	99.6	97.9	99.6	99.9	48.6
Ghana	77.5	71.2	50.0	71.2	89.9	98.2	96.0	86.2	96.0	99.5	23.4
Guinea	73.8	69.1	50.0	69.1	88.8	99.8	99.5	96.9	99.5	99.9	43.7
Guinea-Bissau	81.6	77.7	50.0	77.7	98.7	99.5	99.1	97.0	99.1	99.8	69.3
Kenya	77.0	71.8	50.0	71.8	91.3	99.1	97.9	91.9	97.9	99.7	36.1
Lesotho	82.3	74.7	50.0	74.7	94.1	98.4	96.8	90.3	96.8	99.5	49.7
Liberia	73.6	68.9	50.0	68.9	87.7	99.9	99.9	98.9	99.9	100.0	50.9
Madagascar	77.9	73.0	50.0	73.0	93.5	99.7	99.5	97.6	99.5	99.9	70.7
Malawi	79.3	75.4	50.0	75.4	97.6	99.7	99.5	98.3	99.5	99.9	51.5
Mali	73.5	68.7	50.0	68.7	85.8	99.9	99.6	96.5	99.6	100.0	47.2
Mauritania	70.5	67.9	50.0	67.9	91.0	99.2	98.1	90.8	98.1	99.7	31
Mauritius	75.0	71.5	50.0	71.5	93.5	74.2	58.1	24.3	58.1	88.5	10.3
Mozambique	82.8	79.1	50.0	79.1	99.2	99.6	99.3	97.9	99.3	99.8	46.1
Namibia	84.7	77.9	50.0	77.9	97.1	88.8	83.4	66.9	83.4	93.9	17.4
Niger	74.1	69.7	50.0	69.7	88.0	100.0	99.9	99.5	99.9	100.0	40.8
Nigeria	74.6	70.5	50.0	70.5	90.4	96.5	93.1	76.6	93.1	98.9	40.1
Rwanda	79.4	76.7	50.0	76.7	98.5	99.5	99.0	96.4	99.0	99.7	38.2
Sao Tome and Principe	72.4	67.7	50.0	67.7	84.6	99.6	98.8	92.5	98.8	99.9	66.7
Senegal	76.8	71.4	50.0	71.4	91.4	99.0	97.7	91.0	97.7	99.7	46.7
Seychelles	73.6	75.8	50.0	75.8	97.4	65.6	39.5	9.3	39.5	85.7	39.3
Sierra Leone	74.1	69.8	50.0	69.8	87.9	99.9	99.8	98.5	99.8	100.0	56.8
South Africa	86.4	78.5	50.0	78.5	97.0	86.3	80.7	64.6	80.7	92.2	55.5
Tanzania	76.0	72.7	50.0	72.7	94.3	99.2	98.4	93.5	98.4	99.7	26.4
Togo	77.6	70.7	50.0	70.7	88.9	99.9	99.6	97.3	99.6	100.0	55.1
Uganda	77.3	73.2	50.0	73.2	94.2	99.6	99.2	96.4	99.2	99.9	21.4
Zambia	83.7	76.5	50.0	76.5	95.6	97.2	95.1	87.3	95.1	98.8	54.4
Zimbabwe	78.1	73.0	50.0	73.0	93.0	99.1	98.2	93.0	98.2	99.7	30.4