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The three eras of global inequality, 1820-2020 with the focus on the past thirty years

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ABSTRACT

The paper reestimates global inequality between 1820 and 1980, reappraises the results up to 2013, and presents new inequality estimates for 2018. It shows that historically, global inequality has followed three eras: the first, from 1820 until 1950, characterized by rising between country income differences and increasing within-country inequalities; the second, from 1950 to the last decade of the 20th century, with very high global and between-country inequality; and the current one of decreasing inequality thanks to the rise of Asian incomes, and especially so Chinese. The present era has seen the emergence of the global "median" class, reduced population-weighted gaps between nations, and the greatest reshuffling in income positions between the West and China since the Industrial Revolution. Whether global inequality will continue on its downward trend depends now much more on changes in India and large African countries than on China.

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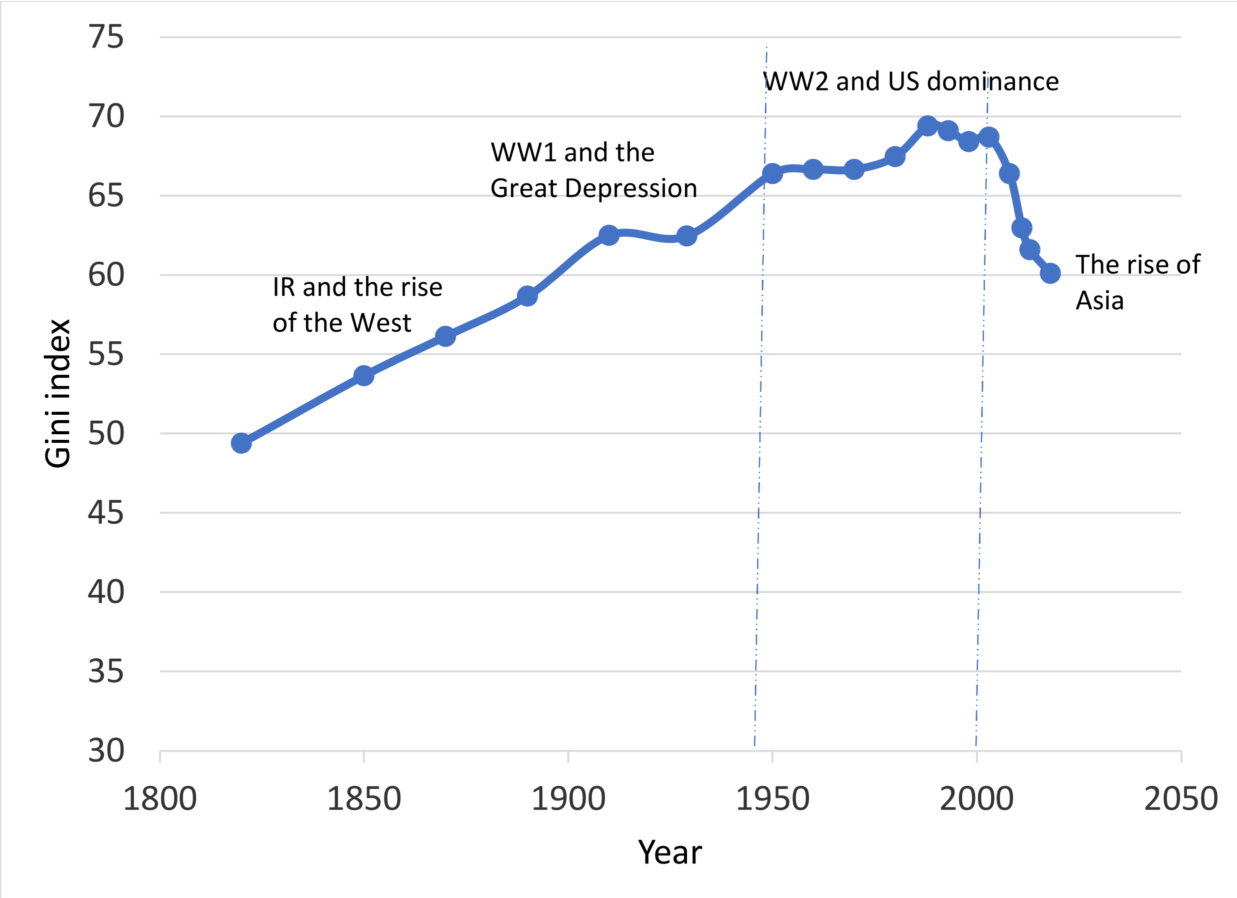
1. The three eras defined: a bird's eye view of history

Studying empirically global inequality—defined as inequality in real incomes between citizens of the world—helps us understand better the big changes that have occurred over the past two centuries. Figure 1 shows the level of global inequality, measured by the Gini coefficient, from 1820 to 2018. Even if the quality of the data, especially for within-national inequalities, is much weaker in the past than for the most recent period, the extent of the overall change leaves very little doubt as to the dominant trends. They sharply delineate the three great eras of global development.

The first era covers the period 1820-1950, and is characterized by the consistently rising global inequality. Around the time of the Industrial Revolution, global inequality was estimated at 50 Gini points.[2] Compared to the inequality levels that were recorded since this was a rather modest inequality for the world as a whole. It is approximately equal to the level of inequality that we find in very unequal *countries* like Brazil or Colombia today. Throughout the nineteenth century, however, global inequality constantly grew reaching 62 Gini points on the eve of World War I. In the inter-war period, inequality slightly decreased, only to further go up mostly due to the effects of World War II that, in income terms, benefited the already rich countries like the United States and further impoverished China and India.

[2] As discussed in Annex I, the underlying data for the years 1820-1980 come from the seminal work of François Bourguignon and Christian Morrisson (2002). Their numbers are revised and updated by using the more recent estimates of GDPs per capita and population from the Maddison project (2017 version). The latter data are based on 2011 international prices rather than on 1990 prices used by Bourguignon and Morrisson. This makes the 1820-1980 results comparable to those of the later years where I also use 2011 PPPs. The within-national inequalities for 1820-1980 are from Bourguignon and Morrisson (2002). The data for the period after 1980 are from the nationally representative household surveys, including between 111 and 136 countries and covering in all but two cases more than 90 percent of the world GDP and world population. They are based on the work by Lakner and Milanovic (2016), Milanovic (2021) and some more recent unpublished compilations and calculations.

Figure 1. Estimated global income inequality 1820-2018



Note: 1820-1980 based on the revised Bourguignon and Morrison (2002) data series; 1988-2008 based on Lakner and Milanovic (2016); 2018-13 based on Milanovic (2021); 2018, unpublished results. For fuller explanation see Annex I.

The second era extends over the second half of the twentieth century. It is a period of very high global inequality maintained at a level between 67 and 70 Gini points.

The third era begins around the turn of the century and extends until 2018, the last year for which we have the data. Global inequality is decreasing throughout that period, going down from 70 Gini points to 60 Gini points. The decrease, having occurred over less than 20 years, is very sharp. It is shown in Figure 1 by the strong downward slope of the line—the slope which is steeper than the upward rising slope during the nineteenth century.

When we look at the two components of global inequality, namely (i) the between-country inequality which represents inequality between (population-weighted) mean country incomes (called Concept 2 inequality), [3] and (ii) the within-country inequality, which is a population-weighted summation of all national inequalities, the previous picture sharpens (Figure 2). (We use the Theil (0) index or mean log deviation here because it is, unlike Gini, exactly decomposable. The overall picture does not change though, as can be seen from Tables A1 and A2 in Annex I.)

The between-country component was rising throughout the nineteenth century, plateauing over most of the twentieth century, and beginning its decline at the close of the twentieth century, continuing to 2018-20. Its movement is similar, but more dramatic than the movement of global inequality. The between-inequality is, in effect, the main driving force behind the changes in global inequality, and thus in the recent period behind its decline.

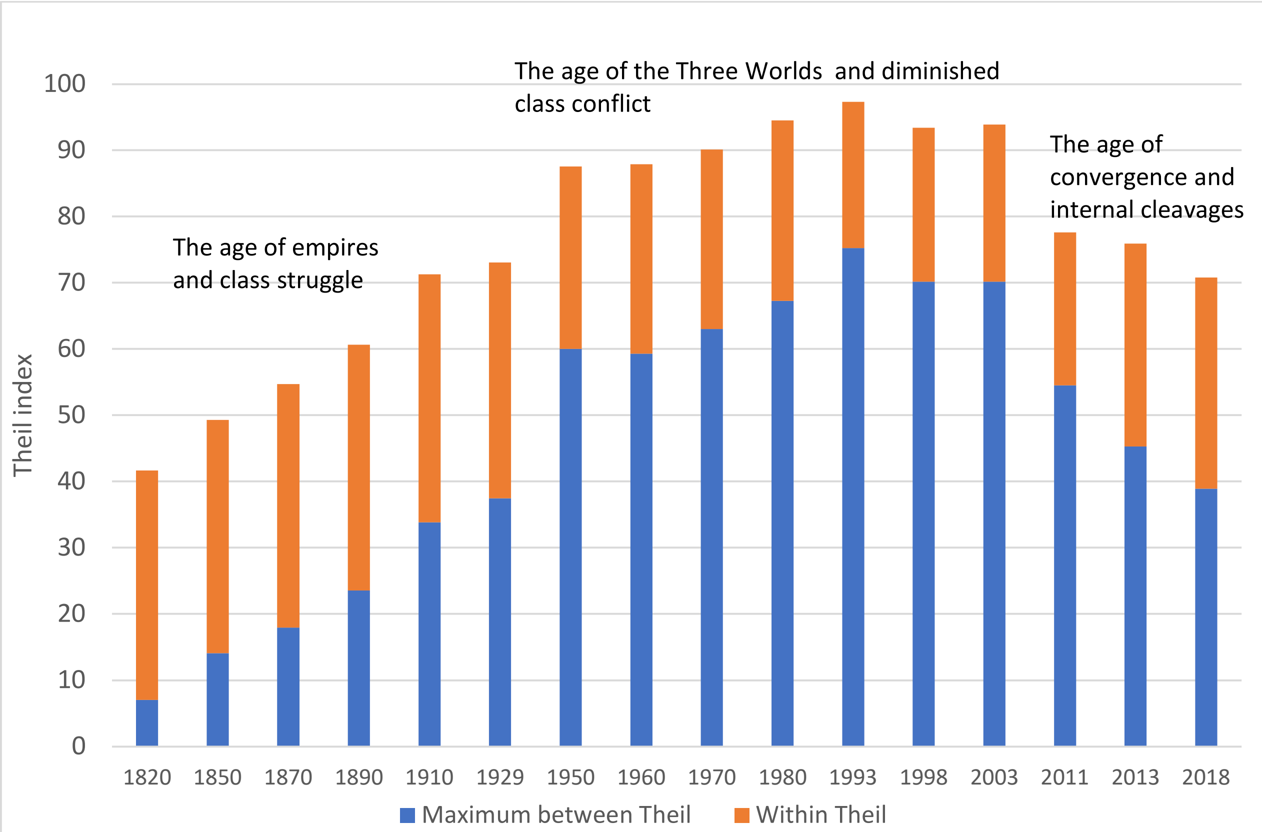
The three eras represent three different periods of international development. The first era is characterized by income divergence between, on the one hand, the industrializing countries of North-Western Europe, North America, and Japan, and on the other hand China, India and Africa with stagnant or even declining per capita incomes. This is the period that is in economic history known as the Great Divergence. It lasted throughout the nineteenth century. The great economic divergence had its corollaries in the great divergence in political and military power between the rising states and those that stagnated or declined. It coincided with European conquest of most of Africa, colonization of India, and semi-colonization of China. As Braudel (1979, p. 535) writes, "History of the world between about 1400 and…1950 is one of an ancient parity [between the West and Asia] collapsing under the weight of multisectoral distortions…Compared with this predominant trend, everything else is secondary."

[3] For the ease of exposition, it is useful to differentiate between Concept 1 international inequality which is the (unweighted) inequality in country mean incomes (often studied under the topic of country convergence or divergence), Concept 2 international inequality which is inequality in population-weighted country mean incomes, and Concept 3 or global inequality which is inequality between world citizens. In the latter two inequalities, the units of observation are individuals; the difference is that in Concept 2 inequality individuals enter the calculation with the mean income of their country, and in Concept 3 with their actual incomes. Concept 2 inequality is thus a component of Concept 3 inequality.

The between-country inequality remained at approximately the same—very high—level between 1950 and the turn of the twenty-first century. The increasing number of countries adds to the between country inequality compared to what it was before, but that "bias" –if one can indeed speak of the bias in this case—is not a dominant factor in what we observe. The second half of the twentieth century is the era of the Three Worlds, relatively well delineated in terms of their income levels and geographical spread: the First World of advanced capitalist countries, the Second World of less rich Eastern European socialist countries and the USSR, and the Third World of poorer, and in many cases emerging from colonization, countries of Asia and Africa. To the latter are often added Latin America countries, even if they were, on average, richer and were politically independent since the early nineteenth century.

The third era is, as we have seen, the era of the rapidly declining between country inequality on the heals of the rising Asian mean incomes.

Figure 2. Decomposition of global income inequality 1820-2018



Note: 1820-1980 based on revised Bourguignon and Morrison (2002) data series; 1993-2008 based on Lakner and Milanovic (2016); 2008-13 based on Milanovic (2021); 2018, unpublished results. For more details, see Annex I.

When we look at the second component, the within national inequality, we notice its increase throughout the nineteenth century. The data are shown in Table A2, Annex I. [4] Although our data on within-national inequality in the nineteenth century shown here and coming from the estimates contained in Bourguignon and Morrisson, are not fully reliable, and in some cases are probably not better than guesses, the independently obtained information on within-national inequalities in some key countries like the United Kingdom, France,

[4] The residual inequality in the Gini index (see Table A2, Annex I) is decreasing, but this is due to the fact that the residual inequality in Gini includes both the proper effect of the within-inequality and the term reflecting overlap between the distributions. As the overlap term has gone down, due to the divergence in mean country incomes, the residual inequality has decreased. The decrease in the overlap component can be interpreted as the rising difference in incomes between citizens of different countries (see Yitzhaki 1994, and Milanovic and Yitzhaki 2002) which is, of course, consistent with the observed mean country income divergence.

Germany, the United States leaves little doubt as to the presumption of generally rising within-national inequalities during the period, at least in the economically advancing part of the world.[5]

Putting the two nineteenth-century developments together, namely, the divergence between incomes of nations, and often the divergence in individual or class incomes within nations, means that the increase in global inequality was driven by both forces of divergence.

Things changed during most of the twentieth century. The level of global inequality was, as we have seen, extremely high but there was no clear upward or downward trend. Between-national inequalities had remained high, thus ushering the “tripartite” world. Within-national inequalities shrank in large countries, such as the United States, Japan, Germany, UK and France, due to much more progressive policies regarding taxation and social transfers. Similarly, inequality in countries that experienced communist revolutions (among which, most importantly the Soviet Union and China) decreased as well. The second era was thus characterized by a combination of very high levels of between-country inequality and diminished national inequalities.

It is with the rise of China that begins the third era of global inequality. The rise of China was important because it was very swift, dramatic in terms of the acceleration in its rate of growth, and involved a large number of people varying between 1/4 and 1/5 of the world population. Furthermore, the starting point of China in terms of its mean income was very low which also contributed, when China began to grow, to a fast reduction in the between-country inequality. The convergence in incomes did not involve only China but at the same time, or a bit later. extended to the rest of Asia, and especially to India which both by the size of its population and relative poverty came to play the role similar to the one that previously belonged to China (see more in Annex II). However, as of approximately 2018, China’s attainment of a relatively high income level means that its growth is no longer contributing as

[5] For the UK, see Lindert (1988), Milanovic, Lindert and Williamson (2011), Allen (2016 and 2019), Alvaredo, Atkinson and Morelli (2016); for the US, Lindert and Williamson (2020); for Germany, Bartels, Kersting, and Wolf (2021); for France, Piketty (2001).

much to the reduction in global inequality, and may soon even add to it.[6] This point is discussed below.

The third era was therefore in some ways a mirror image of the first: the rise of one part of the world and the relative, although not real, income decline of another. But in terms of its effect on global inequality, it was the reverse of the first era. In the nineteenth century, the rise of the West meant growing between-country inequalities whereas in the more recent period, the rise of Asia meant a catch-up of incomes and hence a declining global inequality. The first period was one of divergence, the current one is one of convergence.

In terms of within-national inequalities, the third era is characterized by the rising inequalities in many large countries including the United States, China, Russia, India and even the welfare states of continental Europe.[7] Only Latin America has bucked the trend.[8] Summarizing the features of the third era, we could say that it is a period of the rise of Asia and thus of the global (population-weighted) income convergence, but also a period of widening domestic cleavages within nations. Unlike in the nineteenth century, the between- and within- forces work against each other, but the former (mean income convergence) is much stronger. This explains the swift decrease in global inequality.

The preponderant role of between-country inequality in explaining the decrease of global inequality in the past seventy years, can also be seen from a comparison of global inequality calculated using household surveys (as discussed so far) and the between-inequality component where mean incomes from household surveys are replaced by GDPs per capita (see Figure 3). The advantage of GDPs per capita is that they are available annually and we can

[6] In 2018, China's mean per capita income from household surveys was 7,000 international dollars, which was slightly below the world average of 7,600 international dollars. When using GDP per capita (again in PPP terms), China's level of $17,450 in 2020 was higher than the world average GDP per capita of $15,500. According to the World Bank classification, China is ranked as an upper middle-income country.

[7] The post-1980s increase in within-national inequalities is extensively documented. For the changes in OECD countries see OECD reports (2011, 2015); for the change in China, Xie and Zhou (2014) and Zhuang and Shi (2016); for the change in India, Subramanian and Jayaraj (2014); for "transition" economies, see Milanovic (2008).

[8] See Gasparini et al. (2011), and Gasparini and Cruces (2013).

follow the evolution of Concept 2 inequality without interruption.[9] (The disadvantages of using GDP per capita as a measure of individual income or welfare are well known, see e.g. Anand and Segal (2008) but our objective here is just to illustrate the importance of country convergence.) The movements of the two lines in Figure 3 are very similar implying that mean country incomes (here proxied by GDPs pe capita) drive the decrease in global inequality. The greater speed with which Concept 2 measure goes down is partly due to the fact that the convergence in terms of GDPs per capita is stronger than in terms of household mean per capita incomes (Milanovic, 2005), and partly due to the fact that within-national inequalities have tended to increase after 1980, thus offsetting to some extent the decrease in Concept 2 inequality.

It is noticeable though that after 2018, Concept 2 inequality no longer decreases. In 2020, due to the economic impact of covid (e.g. strong negative growth of India, and of many countries in Africa: 41 had negative real per capita growth in 2020), it registered even a small increase.[10] One cannot exclude the future reversal of the decline in Concept 2, and thus in global inequality as well, as recently argued by Deaton (2021), World Bank (2022), and Kanbur et al. (2022).

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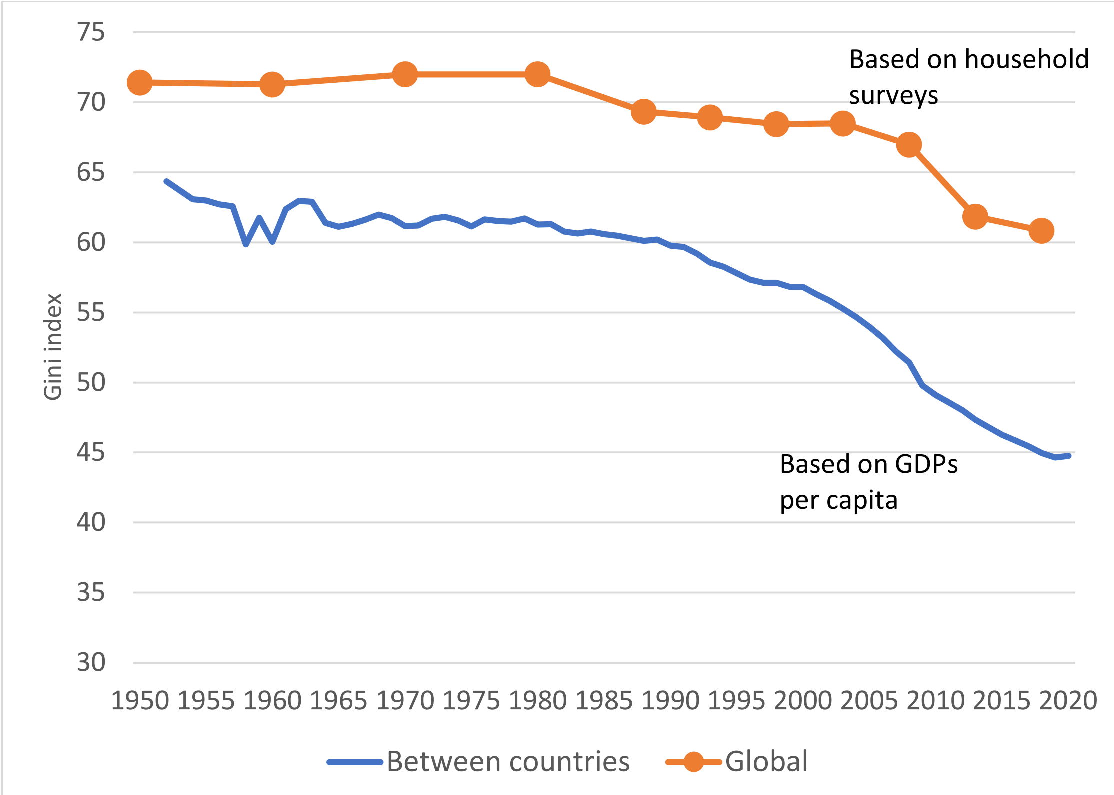
[9] It is worth underlining that the use of GDP per capita for the estimation of the between-component does not yield the same values as the use of mean incomes from household surveys, which is in our context a preferred measure. The two however move very closely.

[10] The population-weighted per capita growth for the continent was -3%. Calculated from the World Bank World Development Indicators.

Figure 3. Global inequality and inequality between countries (population-weighted), 1950-2018/20



2. The past thirty years in the world: the greatest reshuffle of individual income positions since the Industrial Revolution

2.1. The emergence of the global median class

The changes that have occurred after approximately 1980 have profoundly affected the global distribution of incomes, not only when measured by composite indexes like Gini or Theil as we have done so far, but even when we look at the shape of the global income distribution. Danny Quah in the 1990s (see Quah, 1996) described the global income distribution as twin-peaked: the first, high, peak was that of very poor people, most of them from poor Asian countries; there was another, much smaller peak at relatively high incomes and most people there were from the developed Western economies. The middle of the global income distribution was rather empty. This is the shape that we can observe on the global income distribution curve for 1988, shown in Figure 4. The first peak occurs at around $PPP 600 per capita per year, the second peak at around $PPP 12,000. It is noticeable that (what one might call) the global middle class is absent.

The situation is markedly different in 2011. Not only has the overall curve shifted to the right implying a general increase in incomes, but the rightward shift was accompanied by the thickening in the middle of income distribution. There was simultaneously a significant change in income levels and in their distribution. The twin peaks have been replaced by a single peak, or the mode of global income distribution, at around $PPP 1,200 per capita annually. The distribution however has remained skewed to the right, i.e. it has remained strongly asymmetric (even in log terms).

The rightward movement has continued and even accelerated after 2011, so that by 2018 the global income distribution has acquired an almost log-normal shape that is characteristic of income distributions of individual countries.[11] The evolution toward a symmetrical distribution can be also observed if we look at the measures of skewness: in 1988, it was 0.78; in 2011, 0.36; and in 2018, only 0.14.[12] (Skewness of 0 would imply a perfect bell-shaped distribution in log incomes.) The new mode of the distribution is around $PPP 2,300 per capita annually, and within the range between the median and +/- one standard deviation (all in log terms) are concentrated about two-thirds of the world population. [13]

It should be noted however that the global median, and what may be called "the global median class", is much poorer than what is conventionally considered the middle class in advanced Western economies. The global median in 2018 is about $PPP 3,600 per capita,

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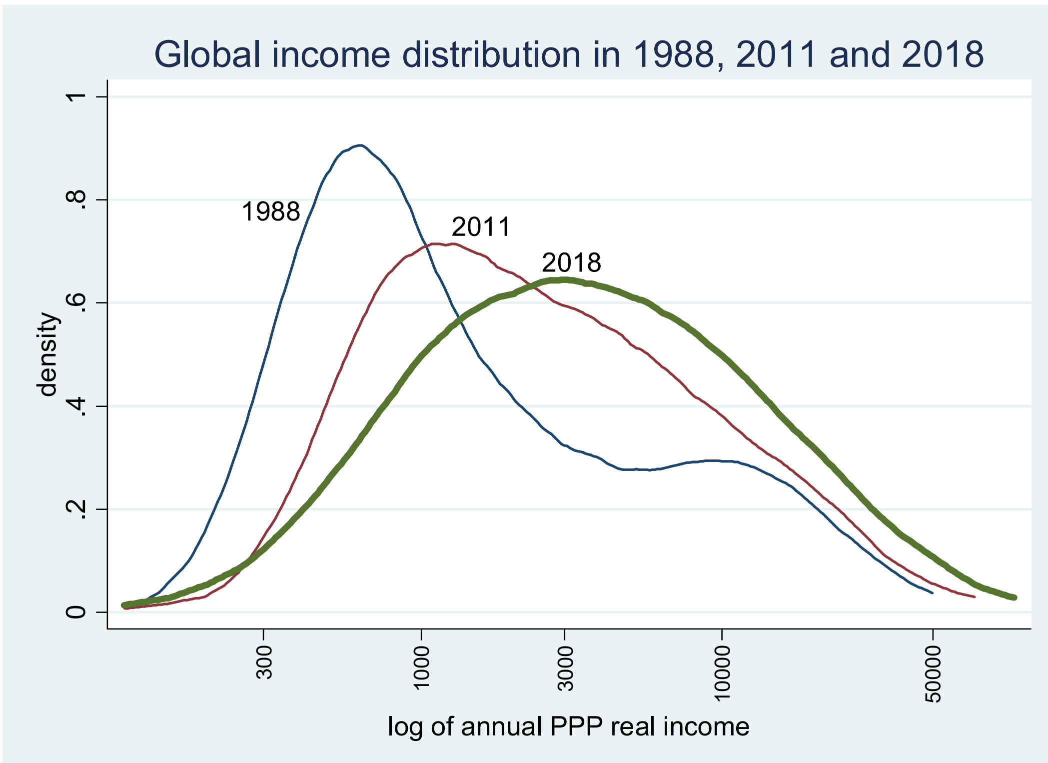
[11] The log-normal shape is consistent with very different levels of inequality. Both Gini and Theil are linked to the log-normal distribution through a single parameter, s, the standard deviation of log of incomes. The formula for Gini is $2N\left(\frac{s}{\sqrt{2}}\right)-1$ and the formula for Theil is $\frac{s^2}{2}$. The empirical *s* in 2018 is 0.51, and replacing it in the Gini formula gives the value of 0.64. The empirical Gini is 0.6, the difference being due to the fact that the empirical distribution does not follow perfectly the theoretical log-normal distribution.

[12] The measure of skewness shown here is the standard one given in Stata: it is equal to $\frac{m_3}{s^3}$ where $m_3 = \frac{\sum(y-\bar{y})^3}{n}$ is the third moment of the distribution and s is the standard deviation. y is log of income.

[13] In absolute dollar terms, the range is rather wide: from $PPP 1,078 to $PPP 11,720. So one should be careful in interpreting it. It may be perhaps more useful to note that about one-half of the world population has incomes that are between about $PPP 1,600 and $PPP 8,600.

whereas the global median for the countries of Western Europe, North America and Oceania (WENAO) is more than five times higher ($PPP 18,500). The person having the advanced countries' median income is placed between 90th and 91st global percentile. While a person with such income may be considered "middle class" in the Western sense of the term, it is obvious that globally speaking such a person is very highly placed, and may rather be considered a part of the global upper class.

Figure 4. Global income distribution in 1988, 2011 and 2018



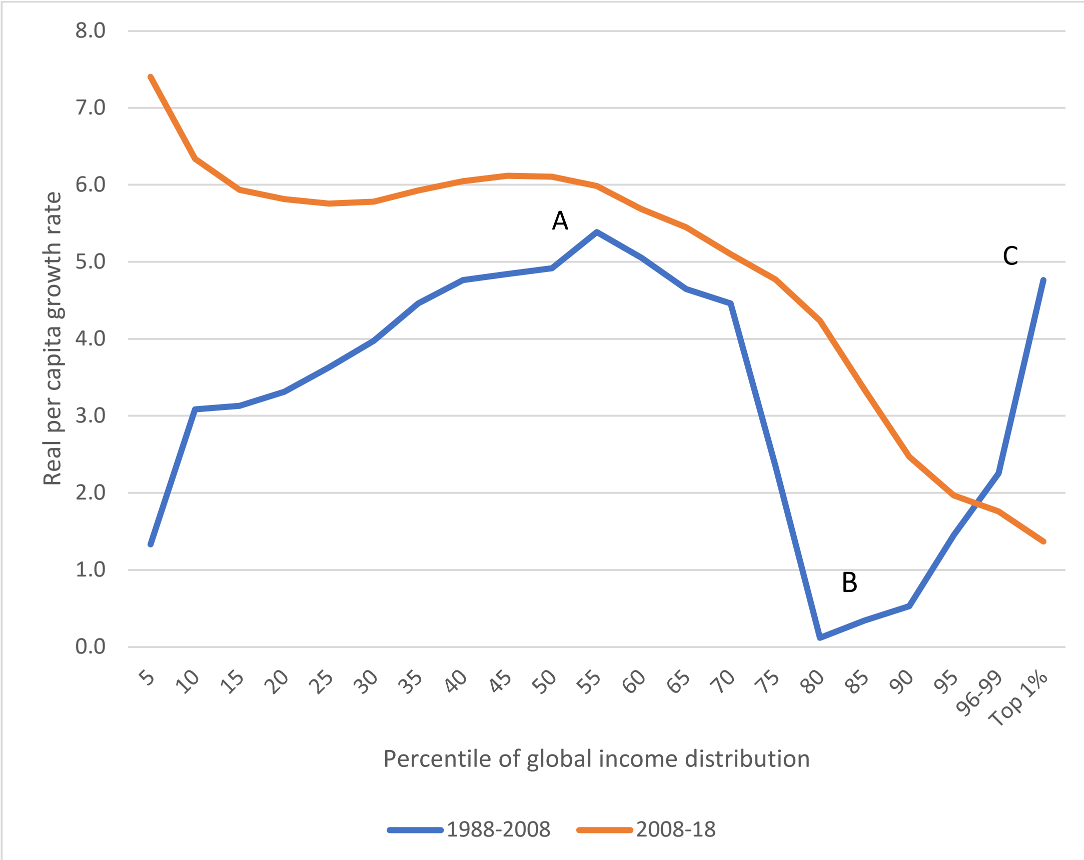
Note: See Annex I. Both the coverage of the world population and of the world GDP is above 90 percent. All incomes are expressed in 2011 international dollars.

2.2 Global growth incidence curves 1988-2018: "winners" and "losers"

The thirty-year period that we consider here was not however uniform. During the years of "high globalization" from around the fall of the Berlin Wall to the global financial crisis, the changes took a particular shape that is associated with the so-called "elephant curve" (Lakner and Milanovic, 2016). The distinctive feature of the global growth incidence curve for the period 1988-2008, shown in Figure 5, was that it highlighted relatively high real growth among the middle of income distribution (point A), where were located mostly Asian populations, and among the global top five percent (point C), and, on the other hand, a very sluggish, or almost zero real growth (point B), among the populations around the 80th and 90th percentile who were mostly from the middle or lower-middle classes from the advanced economies.[14] The causes and the effects of this particular pattern of growth have been much discussed, including in an entire book by Anthea Roberts and Nicolas Lamp (2021) that provides a variety of political and economic interpretations of these developments. One can focus on either international causes of this development, underscored by the gap between points A and B, and argue that a particular type of globalization characterized by outsourcing and free movement of capital was its main cause. Alternatively one may focus on the "domestic" part of the development, namely the gap between points B and C, and see the slowdown in income growth of advanced countries' middle classes as caused by the domestic forces of lower taxation of high incomes, skill-based technological change, or unusually high returns to capital. The results are, of course, consistent with both of these main explanations, and it is quite likely that both international and domestic factors played a role.

[14] For the additional discussion of the groups that populated the stagnant part of the global income distribution, see Lakner and Milanovic, "A rebuttal to the Resolution Foundation 'elephant graph' discussion - or 'elephants are tough animals...'" (October 2016), available at https://blogs.worldbank.org/developmenttalk/rebuttal-elephant-graph-discussion-or-elephants-are-tough-animals

Figure 5. Global incidence curves for 1988-2008 and 2008-2018



Note: The fractiles are anonymous (that is, the global fractiles in 2018 are composed of country/percentiles that "fall" into that fractile in 2018 and which are normally different from the country/percentiles that were in that global fractile in 2008). For the distinction between anonymous and quasi non-anonymous growth in this context, see Lakner and Milanovic (2016).

This particular pattern of growth however has not continued in the next ten-year period that runs from the end of the Global Financial Crisis to the outbreak of covid-19. What the most recent growth incidence curve shows is a marked deceleration in real income growth for the global top one percent. It does not show much of an improvement for the people around the 80-90th global percentile either. Very much in accord with the "elephant chart", it illustrates the continued strong growth in the middle. Moreover, growth rates appear to have been particularly high among the poorest percentiles which gives to the global growth incidence curve a very clear downward shape characteristic of pro-poor growth. The results for the earlier five-year period 2008-13 are discussed in Milanovic (2021) and look very similar to what is reported here. The next five year period simply continued in the same vein.[15]

However when we try to ”dissect” the change and to look at “winners” and “losers” it is important to point out that the very fact that growth rates along the global income distribution differ means that there is a significant “churning” within the distribution. In other words, while it made sense to approximate the middle of the global income distribution with the Asian populations (and especially with the Chinese) in 1988, their very growth has moved many of them toward higher percentiles. Thus the middle of the global income distribution in 2018 is not composed of the same country/percentiles that populated it in 1988.

It is therefore of particular importance to look at who were the most important “winners” in the period 2008-18, that is who populated the lower global percentiles, running approximately from the first to the fourth global ventile (i.e. the bottom 20% of the global income distribution). As can be seen, their average growth was between 6 and 8 percent per capita annually. The story of what we observe at the bottom of the global income distribution between 2008 and 2018 is complicated (because of the churning and the fact that the sample is not balanced, i.e., not exactly the same countries are included in 2008 and 2018): it revolves around three key developments.

a. Changes on the bottom

The first was the rise of China whose lower part of rural income distribution has “vacated” the global bottom quintile in large numbers. While in 2008, some 226 million of the rural Chinese were in the global bottom quintile that number has fallen to only 53 million in 2018. China has thus left “open” some 170 million “slots” in the bottom quintile (or approximately 15% of the total number of the slots in that quintile). This was due to the very high growth rates among the poor Chinese rural deciles. Incomes of all (but the lowest) Chinese

[15] For an alternative global incidence curve for the period 2008-18 that uses Indian consumption (instead of income) data, see Annex II.

rural deciles more than doubled between 2008 and 2018, with the average annual growth rates being around 10 percent per capita.[16]

The vacant slots were filled by other countries' populations who in 2008 were above the bottom quintile level but because of Chinese growth were pushed back. This is the second development. Among countries whose populations were thus "relegated" to the bottom quintile, India is the most important. In 2008, rural and urban India had 356 million people in the bottom quintile; in 2018, the number increased to 537 million meaning that around 40% of the slots in the bottom quintile are now taken by Indians. (Similar increase happened with Pakistan. In 2008, only 33 million Pakistani citizens were in the global bottom quintile; in 2018, the number more than doubled to 67 million.) India thus filled all the slots left open by the increased incomes of the Chinese rural population. About 170 million Chinese "migrated" out of the bottom quintile, and 181 million Indians "fell" into it (537-356). The bottom quintile has thus become much more "Indian" than before, not necessarily because of low income growth among the Indian poor but because it fell short of Chinese growth.[17] It is also worth pointing out to two large middle-income countries with very high inequality whose poor were in increasing numbers pushed into the bottom quintile because of Chinese growth. They are Brazil whose number of people in the bottom global quintile increased from 19 million in 2008 to 21 million in 2018, and South Africa with the increase from 10 million to 17 million.

The third development is straightforward: relatively high growth in countries that had in both 2008 and 2018 a high number of people in the global bottom quintile. Table 1 singles out eight countries with a large participation in bottom quintile in both 2008 and 2018. They have about the same number of people in the bottom quintile in both years (330 million) and account for just over ¼ of total population in the bottom quintile in both years. The average

[16] The income of the lowest rural decile still increased significantly (by 80 percent over ten years) even if it failed to more than double as other rural deciles did. The source for Chinese calculations are micro data from the China Household Income Project (CHIP) from 2007 and 2018. They are also included in Luxembourg Income Study.

[17] Indian urban incomes have risen across all deciles between 2008 and 2018, while rural incomes have risen only from the fourth decile onward. There was thus a deterioration or stagnation of income among the rural poor in India while simultaneously the Chinese rural poor have registered more than doubling of real incomes.

annual growth among these groups was a relatively high 5.1 percent per person. The table also shows (the last column) the percentage of countries' overall population that is in the global bottom quintile in 2018. Here the numbers vary from those of very poor African counties like Tanzania and Uganda where about 70 percent of the population is in the bottom quintile, to Bangladesh, Kenya, and rural Indonesia with about one-half of the population, to urban Indonesia and the Philippines with about one-quarter.

Table 1. Population sizes and average incomes of groups that were in the bottom global quintile in 2008 and 2018

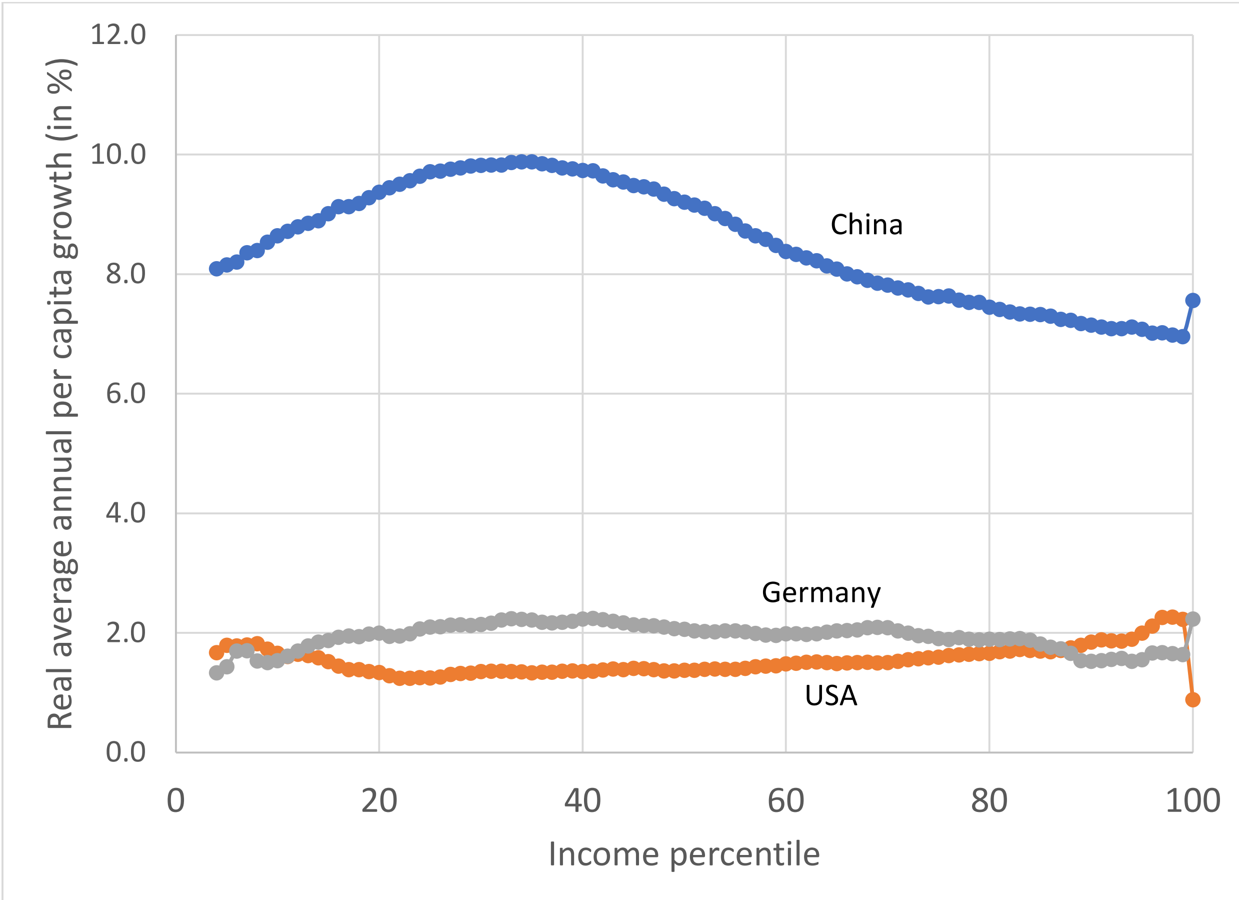
	Country's population in global bottom quintile (in million)		Income per capita per year of the population in the bottom quintile (in international dollars)		Average annual growth rate 2008-18	Note: % of county's population in the bottom global quintile (2018)
	2008	2018	2008	2018		
Indonesia-rural	34.2	23.6	612	931	4.3	51
Indonesia-urban	24.2	15.0	550	968	5.8	23
Nigeria	105.5	78.3	418	890	7.9	35
Bangladesh	72.7	80.7	586	861	3.9	50
Philippines	18.0	32.0	634	955	4.2	25
Tanzania	33.8	39.4	426	664	4.5	72
Uganda	15.7	30.0	500	681	3.1	69
Kenya	26.9	30.8	460	770	5.3	56
Total	*331*	*330*	*467*	*767*	*5.1*	--

In conclusion, the recorded high income growth of the bottom quintile between 2008 and 2018 was thus due to three very different developments: the big rise in Chinese rural incomes that "expelled" most of the Chinese rural population out of the bottom quintile, the "fall" into the bottom quintile of people who were before above it (mostly of the Indian rural poor), and the fast growth among many poor groups in poor countries—but whose rate of growth was not sufficiently high to allow them to "escape" from the global bottom quintile.

b. China vs. the West

The best way to appreciate the difference in the growth experience between China and the rich countries which is the single most important development during 2008-18 is to look at the real growth rates of disposable (post-tax and post-transfer) income across their distributions. They are shown in Figure 6. China's average annual per capita rate of growth was over 10 percent for almost the entire income distribution. The growth was broadly-speaking pro-poor as indicated by the very high growth (10 percent per annum) for the lower middle classes. There is also an interesting uptick for the top 1 percent. On the other hand, American and German average growth rates over the same period were—across the distribution—about 2 percent per capita annually. In the case of the United States, an even lower growth, due to the effects of the financial crisis, is noticeable for the top 1 percent. These diverse rates of growth had a strong effect on the shape of the global income distribution. We have noticed in Figure 5 that the growth rate at the global top in the period 2008-18 was fairly low (1.3 percent p.a.), in marked contrast with the period before the Global Financial Crisis. When one takes into account that: (i) 10 to 11 percent of the US population and 4-5 of the German population belong to the global top one percent, (ii) between the two of them, they account for two-thirds of all people in the global top 1 percent, and (iii) their rates of growth were around or below 2 percent per annum, the low growth rate of the global top 1 percent becomes more understandable. In other words, the low growth of the global top was due to the low growth of upper parts of national income distributions in rich countries, whose citizens overwhelmingly populate the global top.

Figure 6. Growth rates across income distributions for China, US and Germany, 2007/08 to 2018



Note: Real average annual per capita growth rate. Calculated from LIS data for US and Germany for 2008 and 2018, and LIS data for China 2018 and CHIP for China 2007. Nominal amounts deflated by countries' Consumer Price Indices.

c. The great reshuffle in the middle

When we translate the rise of Asian economies and China in particular in terms of individual income levels, we observe what is probably the greatest reshuffle of individual incomes since the Industrial Revolution. The China effect, which is the most important part of the global positional reshuffling, is present, even if unequally, in almost all parts of the global income distribution. We have seen that it explains to some extent the significant increase of the lowest incomes and we look next at its effect on the middle of the global income distribution.

Figure 7 (upper panel) shows the positions of Chinese urban deciles and Italian deciles in 1988 and 2018. The upward movement of the Chinese urban deciles that amounted to between 24 and 29 global percentiles (meaning that people in a given Chinese urban decile leapfrogged over one-fourth or more of the world population, or got ahead over approximately 1.5 billion people)[18] is not a surprise. But obviously as the Chinese deciles have gone up in the global distribution, other countries' deciles, if relatively close to the upward-moving Chinese deciles, had to go down. This is illustrated on the example of Italy. The bottom Italian decile has slipped by 20 percentiles, the second and the third by respectively six and two. The other deciles were not affected as they tend to be above the part of the global distribution where the Chinese influence has been the strongest. The changes observed in the case of Italy are not unique to that country. The German bottom decile has slipped from the 81st global percentile in 1993 to 75th percentile in 2018 (Figure 7, bottom panel).[19] The second lowest decile has, like in Italy, lost in its relative position. In France (not shown here), the bottom three deciles have lost out, with the lowest one again losing the most, going down from the 73rd global percentile in 1988 to 69th in 2018. In the United States, the bottom decile has lost 7 percentiles, and the positional loss has spread to the bottom 40 percent of the population.

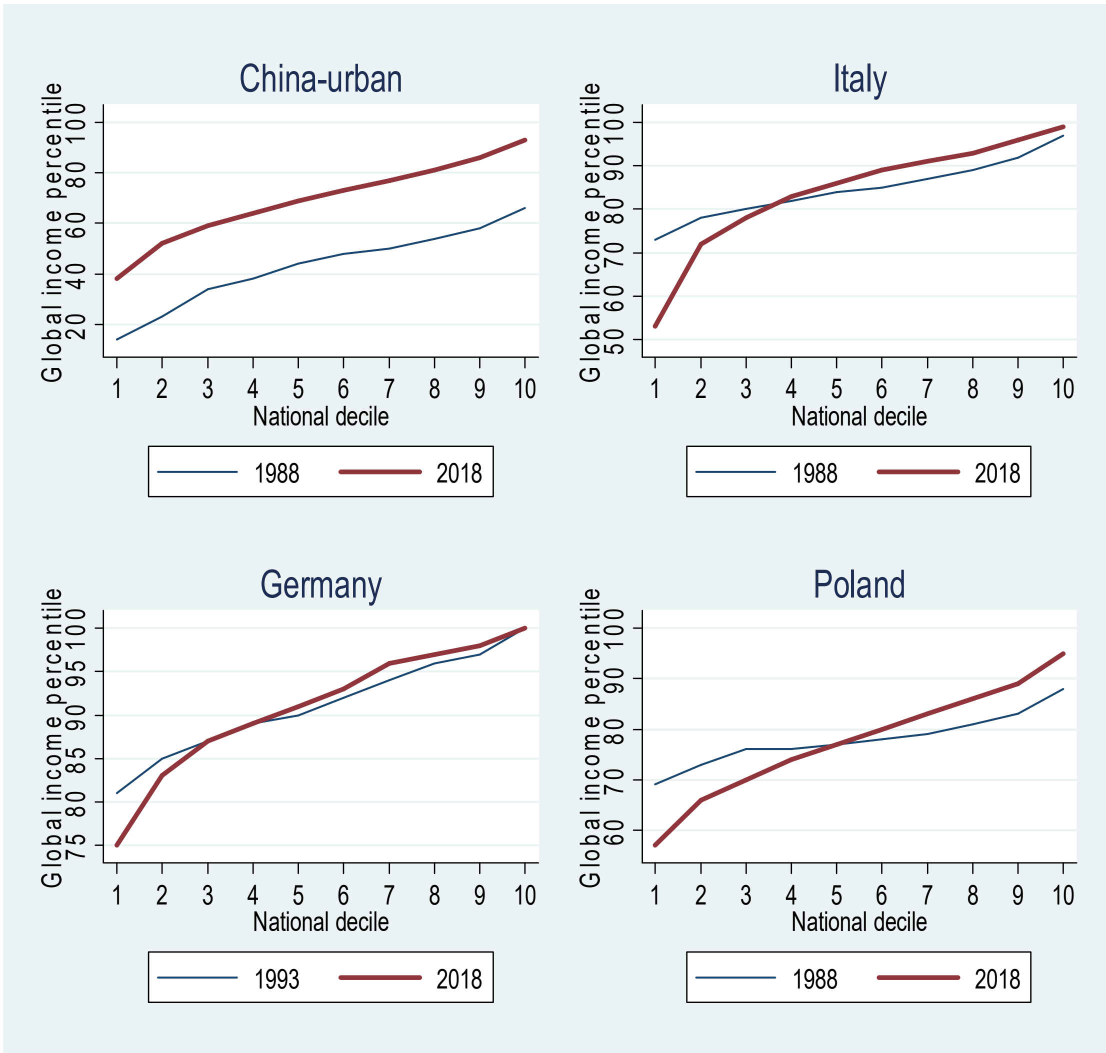
The positional losses covered in some cases the entire countries' income distributions. Countries that in 1988 were richer than China (but not as rich as the US, Italy etc.) and were by 2018 within the "reach" of Chinese upward movement had all their deciles register positional losses. This was for example the case of Croatia and Serbia. The lowest deciles in the two countries dropped by between 20 and 30 global percentiles. The loss, even if less dramatic, extended throughout their entire distributions and affected even the top income deciles Poland that had a remarkably good economic performance over the 30 year period considered here was affected negatively too (see Figure 7, bottom panel). Its bottom 40 percent of population lost out, even if the top's position improved: the Polish top decile moved from the 88th global percentile to the 95th. Very unequal middle income countries such as Brazil showed

[18] One should keep in mind that the overall world population was 5.1 billion in 1988 and 7.6 billion in 2018.

[19] I use 1993 data because the 1988 data cover only the former West Germany.

a different type of change. There, the losses were the largest for the middle income deciles. The rich remained outside of China's "reach".

Figure 7. Positions of country/deciles in global income distribution in 1988 and 2018



Note: The graph shows the global income position of each national income decile (running from the poorest, 1, to the richest, 10) in 1988 and 2018. The data for Germany are for 1993 and 2018.

d. Relative constancy on the top

Unlike the middle of the global income distribution, the composition of the top has remained more stable. To assess this we look at the composition of country/percentiles that were in the global top 5 percent (top ventile) in 2008 and 2018. The global top 5 percent contains between 320 and 330 million people in both years and is more representative of the globally affluent that the more rarified global top 1. The latter, by definition, includes only the very rich and their incomes are more likely to be affected by the underestimation of the returns to capital (see Yonzan et al, 2022). Thus, the top 5 percent are a more relevant group and their incomes are more accurately measured.

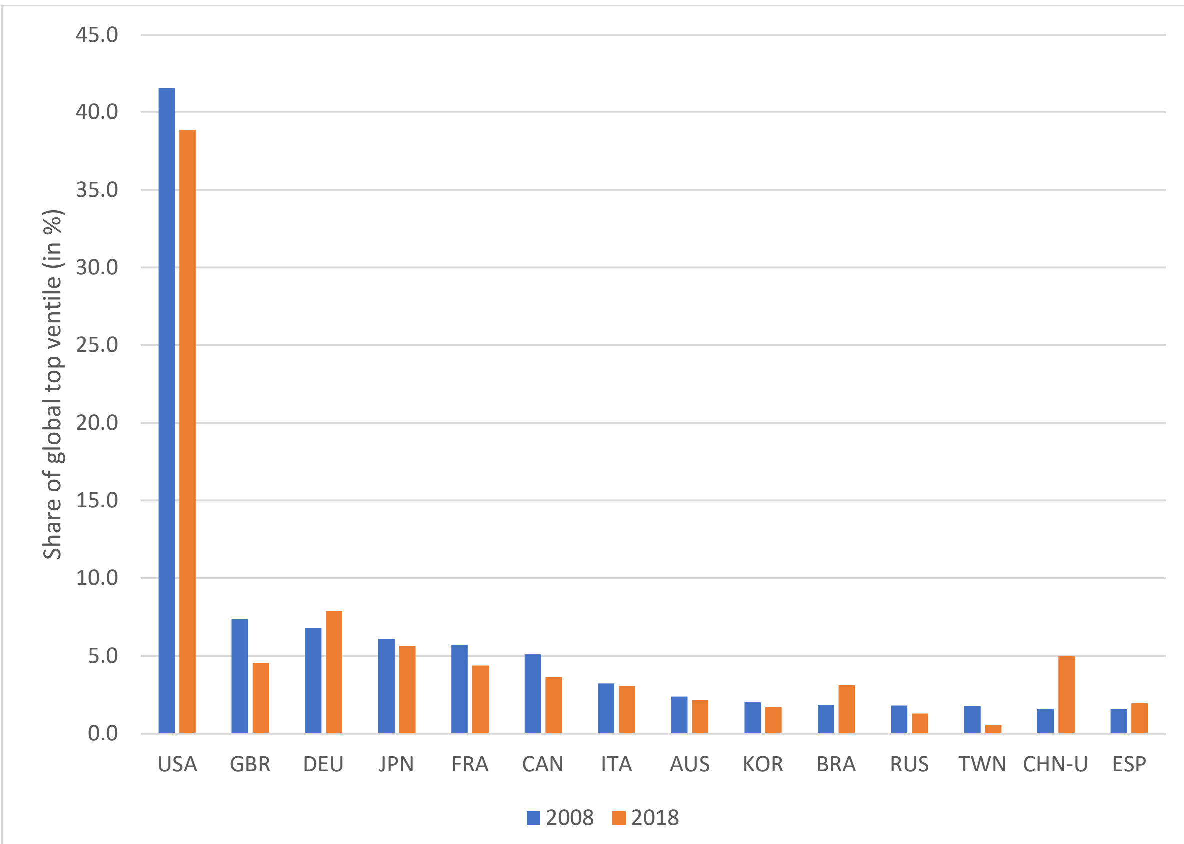
When we take twelve countries with the largest absolute participations in the global top ventile in 2008 (they are given in the first twelve positions, going from left to right, in Figure 8), we note that there are only two newcomers in 2018 and, consequently, two dropouts. Ten out of twelve countries are the same with approximately the same number of people in both years. The United States is by far the most important: in both years, about 40% of the globally affluent are US citizens. The United Kingdom, Japan and Germany come next, with their positions slightly shifting between the two years, each participating by between 5 and 8 percent among the globally affluent. The newcomers among the top twelve countries are the urban Chinese whose participation has increased from 1.6 percent to 5 percent, and the Spanish citizens, going up from 1.6 to 1.9 percent. The two countries that have dropped out are Russia and Taiwan.

We note a strong persistence in terms of both countries and the number of their citizens who are part of the globally affluent. WENAO (Western Europe, North America and Oceania) plus Japan have about 250 million of their citizens amongst the globally affluent.[20] They account for 87 percent of the group in 2008, and 78 percent in 2018. Thus the global West's role has remained preponderant.

[20] This includes all WENAO citizens, i.e., not only from among the WENAO countries that are among the top twelve countries by the number of people being part of the global top ventile.

Among Asian countries (exclusive of Japan), the Chinese urban population is the most important. The shares of the Indian and Indonesian urban populations in the top global ventile have also risen between 2008 and 2018: in the case of India from 1.3 to 1.5 percent; in the case of Indonesia, from 0.3 to 0.5 percent. Overall, the importance of the non-Japanese parts of Asia among the globally affluent has increased but—with the exception of the urban Chinese—their numbers are still modest. The same is true for the other parts of the world (Africa, Latin America, and Eastern Europe) which, with the exceptions of Brazil and Russia, never had a significant participation among the globally affluent.

Figure 8. The composition of the global top 5 percent in 2008 and 2018 (in percent)



Note: Each bar shows the share of that country in the global top ventile. For example, about 40% of the population in the global top ventile comes from the United States.

3. The present and the future: the period of big external shocks

The time when this paper is being written is unlike any recent period. It is characterized by three large external shocks that are still enduring, and whose consequences are impossible to forecast with any certainty. The first was the shock of covid that began in the late 2019, and has been going on for the three past years (these lines are written in October of 2022). It has had important effects on countries' growth rates (for example, making India's per capita growth rate in 2020 almost minus 10 percent) and thus on the Concept 2 inequality. However, it is too early to say how these effects will play out over the medium term: many of the GDP declines were almost immediately (in the next years) reversed by similarly-sized increases.

The second important exogenous shock was the deterioration of the US-Chinese relations which, given that these are the two largest economies in the world accounting together for almost 45% of the global GDP, will also have an impact on global inequality. Again, here too it is impossible to foretell whether the medium- to long-term impact of the "decoupling" would be to slow down Chinese, and even American, economy or not; or to change the evolution of their domestic inequalities.

The third shock was that of the Russia-Ukraine war that so far has not only seriously weakened both economies (e.g. with Ukraine's economy expected to contact by almost a third in 2022) but has affected the rest of the world through economic sanctions, apparent creation of politically-motivated economic blocs, and higher prices of energy and food. It is obvious that if the war continues the effects will cascade and will affect global inequality not only through the differentials in countries' growth rates, but also through changes in real within-national distributions. For example, the higher relative prices of food and energy will disproportionately affect poorer households in all countries because the share of expenditures they make on such goods is much higher than that of the richer households.

Leaving these exogeneous shocks aside (because their effects are, as mentioned, impossible to forecast), we can at least pinpoint to two longer-term developments that do not depend directly on the effects of the shocks. They are the changing roles of China and Africa in the global income distribution.

As we have seen, China's role in shaping the global income distribution was without a doubt determinant since the early 1980s. But the very fact that China has through its advance shaped the distribution means also that China's relative position has shifted markedly upwards. Hence its growth cannot any longer be global inequality-reducing as much it was in the past. While in 1988, Chinese urban deciles covered the range between the 14th and 66th global percentile, thirty years later, they range from the 34th to the 93rd percentile. The median-income urban Chines has advanced from around the 45th global percentile in 1988 to about 70th global percentile in 2018.[21] This has also meant that the inequality-reducing role of China has been reduced as China has grown richer, and that at the present, Chinese growth may be broadly neutral as far as global inequality is concerned, even if, as explained in the footnote below, the situation is a bit more complicated. [22]

Figure 9 shows the annual (marginal) China effect on Concept 2 international inequality, measured by GDPs per capita, from 1952 to 2020 (see Note to Figure 9 for the way the marginal effect is calculated). The years when Chinese growth has contributed to the reduction of Concept 2 inequality are those when the graph is below the horizontal axis (line of 0), and the opposite for the years when China's growth has added to global inequality. The latter has

[21] Chinese rural deciles covered in 1988 the range from the first (globally poorest [sic]) percentile to the 56th; in 2018, they ranged from the 7th to the 81st global percentile. The median-income rural person advanced from the 15th to the 43rd global percentile.

[22] In global inequality studies, we obviously deal with individual incomes, not with countries'. Thus, the increase of income of a poor Chinese (or even of a poor American) may be inequality-reducing, while higher income of a rich Chinese might increase global inequality. The exact formula (Milanovic, 1994) for the individual infinitesimal income increase that raises Gini in general is

$$dG = \frac{dm_i}{Y}\langle 1 - G - \frac{2(n-i+1)}{n+1}\rangle$$

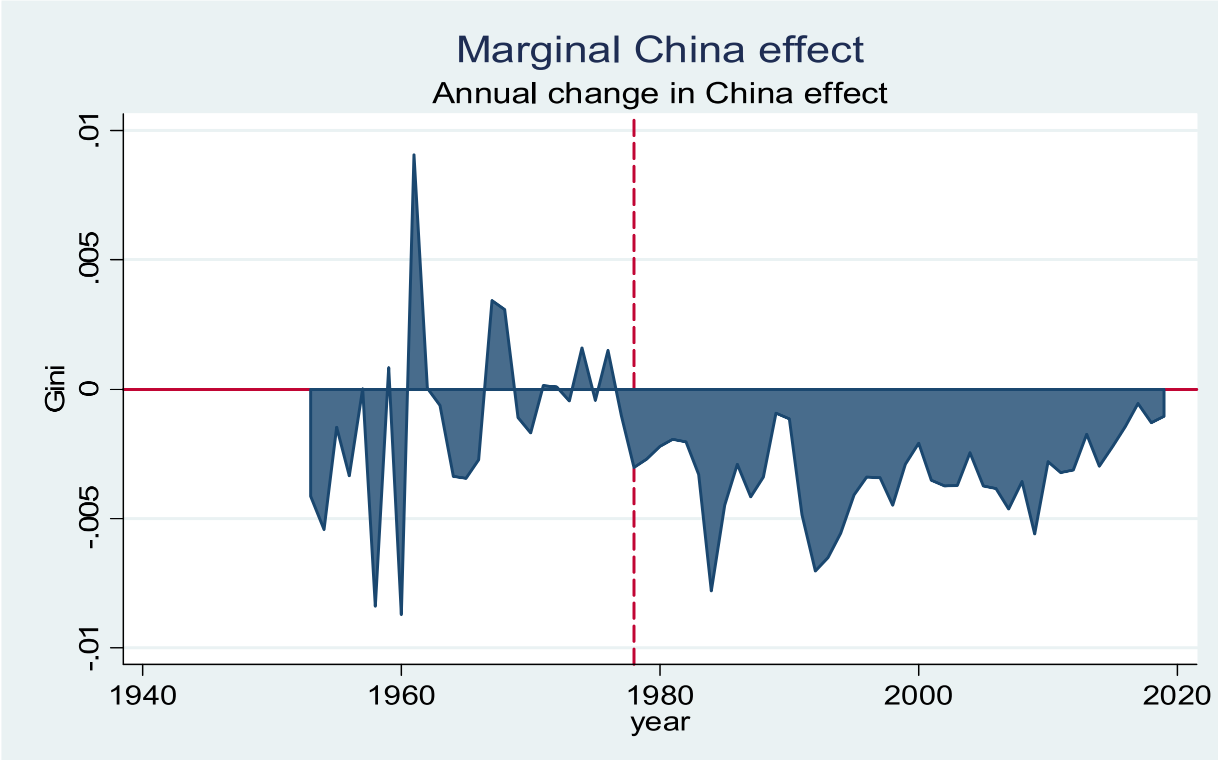
where G=Gini coefficient, dm_i = change in income the *i*-th individual (when individuals are ranked from the poorest, 1, to the richest, *n*=100) and *Y*=total income of the community (in this case, the world). For Gini to go up, the expression must obviously be positive; thus we require dG>0. Note that the expression depends on what is the initial Gini: the higher the initial Gini, the more "difficult" it is to contribute to its further increase. We can treat *i*'s as percentiles running from 1 to *n*. With the current global Gini of 60, dG>0 only for *i*>81, that is, if incomes of people above the 81st percentile go up (everything else being the same). This could of course also be interpreted that for the Gini to go up the rate of growth among people above the 81st global percentile must be greater than the rate of growth among those poorer than them. The key question then becomes: how may Chinese are above this point? The answer is that in 2018, one-quarter of the urban Chinese was above this point and only 4 percent of the rural Chinese. Consequently, China can still contribute to the reduction in global inequality, but only if that growth comes from the lower part of urban distribution or from (all but the top 4 percent of) the rural distribution.

happened in the years when China's growth was strongly negative, and China was poor, as during the Great Leap Forward in 1961, and, to a lesser extent, during the Cultural Revolution that lasted the decade from 1966 to 1976. [23]

After the reforms in 1978, as China's growth picked up, the very opposite occurred: China was the most important engine of global inequality reduction. Figure 9 shows it by the line lying below 0. Closer to the present however that effect weakens. It weakens because China is now sufficiently rich that its high growth no longer has the inequality-reducing effect that it had in the past. It is important to underline that this has nothing to do with the slowdown of Chinese growth as such but with the changed position of the Chinese population in the global distribution of income. In other words, the engine of global inequality reduction that China was from 1978 until approximately 2020, is no longer as powerful as before.

[23] China's bad performance added almost 1 Gini point to between-country inequality.

Figure 9. The effect of Chinese GDP per capita growth on Concept 2 inequality, 1952-2020



Note: The graph shows the marginal (yearly) change in Concept 2 inequality due to the addition of China (to all other countries). We can distinguish three periods. In the 1952-1978 period, adding Chine *increases* international inequality because China is poor. The China effect does not change much from one year to another as China grows more or less at the same rate as the world. In 1978-2000, adding China also *increases* international inequality because China is poor. But that effect diminishes as China gets richer. So incrementally (from year to year) China's superior performance helps reduce global inequality. After 2000, the addition of China *reduces* global inequality but that incremental (marginal) effect becomes substantially weaker from one year to the next. Around 2017-18, China's incremental/marginal effect becomes close to zero although international inequality with China included is still lower than international inequality without China. China's growth from that point has an almost neutral effect on Concept 2 inequality. Calculated from GDPs per capita obtained from the World Bank's World Development Indicators.

The end of the benign (pro-equality) China effect highlights in turn the key roles that will be played by India and by the populous African countries in the future. In order for the population-weighted convergence to continue India and large African countries need to grow faster than the world, and especially faster than the rich OECD countries.[24] The question has

[24] The importance of populous countries growing fast is obvious because only they can make a serious dent in global inequality.

been asked before, can Africa's growth in the rest of the twenty-first century replicate recent Asian (and Chinese) growth experience? This matters not only because Africa is relatively poor, but because Africa is the only continent whose population is expected to grow in this century and perhaps even in the next.

We obviously cannot answer with any certainty the question regarding the likelihood of Africa's future fast growth, but if we can look at the past and Africa's post-1950 record, and use that as a possible guide regarding the future, we cannot be too optimistic. Table 2 shows that only six African countries have succeeded in registering five or more years of consecutive per capita growth of at least 5 percent. This rate of growth can be seen as a reasonable objective which, if maintained over at least a decade, will allow to achieve perceptible convergence. But it was an objectives that, as the data show, was unattainable for almost all African countries. In addition, the exceptional episodes listed here involved mostly very small countries (in terms of population) and countries whose growth largely depended on one export commodity (oil in the case of Gabon and Equatorial Guinea, and cocoa in the case of Cote d'Ivoire). It is only Ethiopia, herself rebounding for the disastrous effects of the civil war and secession of Eritrea, that was a populous country (with more than 100 million people) exhibiting high growth for a long period (13 consecutive years).

Table 2. African countries with high growth (defined as 5% per capita per year for at least five consecutive years); period 1950-2020

Country	Period	Number of years
Botswana	1969-83	15
Cote d'Ivoire	2013-17	5
Cape Verde	1994-98	5
Ethiopia	2005-17	13
Gabon	1962-66	5
Gabon	1970-76	7
Equatorial Guinea	1993-2005	13

Note: Calculated from the World Bank World Development Indicators.

This simple exercise suggests that for large African countries (ranked by the size of their populations in 2022: Nigeria, Ethiopia, Egypt, Congo, Tanzania, South Africa) to take over the role of China in this century and the next, one needs to envisage an entirely different growth record. At first sight, this seems very difficult to see particularly when we realize that 5 percent per capita annually implies an overall growth rate of 7 to 8 percent (given that the population will be rising at about 2 percent per annum). Moreover, it needs to be achieved under the conditions where an exceedingly young population means that many would be outside of the working age. The rate of income growth per person of working age would need to be even greater than 5 percent, and of course to perdure for a sizeable period.

On a positive note however, one needs to recall that the Asian success was not seen before it took place and that many prominent economists (most famously Gunnar Myrdal in his *The Asian Dilemma: An Inquiry into the Poverty of Nations* published in 1968) were overwhelmed by the bleak prospects for Asian growth, given the apparent overpopulation of the countries and their slow technological development. Not only that these forebodings did not materialize, but Asia (and this does not apply to China only) became a continent with the exceptionally high rates of growth. These errors of prediction should give us pause when we look at the difficulties of Africa's growth in the next fifty or more years, and perhaps too easily dismiss possibilities of a sharp break with the past.

4. Conclusions

Studying global inequality in incomes over the past two centuries is in effect studying global economic, and to some extent, political and military, history of the world. The numbers are dry—but behind these numbers, and determining these numbers, are big historical changes: the rise and decline of different parts of the world. Before the Industrial Revolution global income inequality, as far as we know, was relatively low. There were poor and rich people in various countries and empires, but there were no systematic differences in income levels between different parts of the world. This is, of course, what we believe today, based on the empirical data that begin with 1820. But this is known only by extension, not through direct estimation of inequality of the world in say, 1700. Thus while this conclusion seems reasonable much more remains to be done in studying inequality between and within countries in the decades and centuries before the Industrial Revolution

The Industrial Revolution represented a fundamental break: it launched some countries, principally Western Europe and North America, to a much higher growth path, and left others more or less at the same level at which they were before. Thus the gap between nations widened, and together with it also the gap between the "haves" and the "have-nots" within nations. Throughout the nineteenth century and up to the World War I global inequality increased, driven by both of these forces. After World War II, it stabilized, albeit at an unprecedently high level. Within-national inequalities then decreased, but this was insufficient to make much of a difference to the dominant force of unequal world development. The tripartite world of the second half of the twentieth century began to crumble in the last two decades of the century however. The rise of China, and around the same time or a bit later of India, Indonesia, Bangladesh etc., was indeed a *mirror* image of the Industrial Revolution. But, like in a mirror-image, while the Industrial Revolution increased between country gaps, the rise of Asia reduced them.

The period from around 1980 to 2020 thus witnessed the largest reshuffle of individual income positions since the Industrial Revolution. Global middle and high-middle income positions that were "populated" almost exclusively by upper parts of income distributions of

Western countries and Japan, began to be taken over by the populations from the "rising Asia". The reshuffle has not yet affected, to a significant extent, the very top of the global income distribution (the top 5 percent or the top 1 percent), but if the differential in real income growth between Asia and the West persists, the reshuffle will be felt there too. The positional reshuffle is, by historical standards, dramatic because of the numbers of people involved in these upward movements. If the numbers of people going up were smaller, the extent of the reshuffle would be obviously less. But when millions of people with similar incomes overtake a person, he or she falls down, positionally, very fast. The positional decline does not imply, of course, a real income decline. Very often it goes together with an absolute improvement in real income. But not with an absolute improvement that is equal to that of other people with similar incomes from other countries.

Does positional decline matter? In many ways, not. We often do not know our national income positions, much less so global. But in other ways, it matters. Lots of consumption is "globalized": there are international goods and services that are affordable only to the select segments of the globally affluent or of the global middle class. One does not need to know exactly where he or she falls in the global income ladder; yet inability to easily purchase certain "global" goods and services (foreign travel, latest smart phone, subscription to the popular show, attendance of a sporting event) will soon, even if indirectly, convey that message.

The current period is therefore one of dramatic developments where the progression of incomes in China without doubt plays the key role. In fact, never in history have so many people's incomes increased so much so fast. Whatever happens in the future will not erase the magnitude of this historical success. China's role in the reshuffling of global incomes is not over, but its role in reducing global inequality is at, or is soon coming to, an end. The parts of the world whose income convergence now becomes of key importance are India and half a dozen of populous African countries, which are also the only part of the world likely to register massive population growth—which indeed makes them even more important for the matters of global inequality. Will Africa in the twenty-first century replicate Asia of the latter part of the twentieth? This is the critical question for the continued income convergence—which is not merely a numerical objective, but a means towards the creation of a more equal world eloquently envisaged two and a half centuries ago by Adam Smith:

> At the particular time when these discoveries [of the Americas] were made, the superiority of force happened to be so great on the side of the Europeans that they were enabled to commit with impunity every sort of injustice in those remote countries. Hereafter, perhaps, the natives of those countries may grow stronger, or those of Europe may grow weaker, and the inhabitants of all the different quarters of the world may arrive at that equality of courage and force which, by inspiring mutual fear, can alone overawe the injustice of independent nations into some sort of respect for the rights of one another (*Wealth of Nations*, Chapter 7).

Annex I. Revisions of the Bourguignon-Morrisson dataset

The original Bourguignon-Morrisson database consists of 33 country/blocs each having its own distribution and covering the period 1820-1992, at approximately ten-year intervals (there are in total 11 benchmark years; all of them except 1992 which is not used are listed in Tables A1 and A2). The distributions are bloc-specific and in principle blocs should consist of countries that have similar distributions. Since the compositions of the blocs do not change, the implicit assumption is that the income distribution in each country within the bloc evolves in the same manner throughout two centuries. This is obviously a huge assumption, but, given the lack of data, it is difficult to improve upon it.

The country/blocs may consist of individual countries, like France, Mexico, Nigeria, Poland, the United States, France etc. In that case GDPs per capita of the bloc are straightforward: they come from the Maddison original database where GDPs were expressed in 1990s PPPs. The distributions are also straightforward because they relate to individual countries. Most of the blocs however include more than one country. There, the GDPs per capita (on which is imposed a given distribution) are, in principle, population-weighted averages coming from the same Maddison database. But in same cases, when the number of countries in a bloc is large and GDPs for all countries are not available, the average GDP per capita might reflect only GDPs of a few countries, i.e. of the countries for which the Maddison database provides GDPs per capita in that year. To clarify: if a bloc consists of three countries and only the GDP per capita of one country is available, that country's GDP per capita will be applied to the entire bloc. Similarly, income distribution (which might have been calculated from one country) will be imposed on all. In the extreme case, there are three country/blocs that consist of respectively 47 African, 46 Asian and 37 Latin American and Caribbean countries. The problems just listed are obviously at their extreme here, especially because the data on these countries GDPs and even more so on their income distributions are scarce, and in some cases simply non-existent.

Finally, the problem of changed borders and of the increasing number of countries in the world is ignored by assuming countries in existence in 1990 to have existed as such (and implicitly within the 1990s borders) throughout the two centuries.[25]

For the purpose of this paper, the Bourguignon and Morrison data have been modified in three ways. First, the GDPs per capita used by Bourguignon and Morrison have been replaced by GDPs per capita from the 2017 version of the Maddison Project which uses 2011 PPPs.[26] (The same year PPPs are used for other years, from 1988 until 2018 which gives consistency to the series.) Thus, for example when Bourguignon and Morrisson use the "old" estimate of GDP per capita for the United States in (say) year 1880, this has been replaced with a "new" Maddison estimate expressed in 2011 PPPs. The same "replacement" is done for composite bloc GDPs per capita that are part of Bourguignon's and Morrisson's 33 country blocks. For example, the average GDP per capita value for the bloc composed of Colombia, Peru and Venezuela has been replaced by the population-weighted average of the new GDPs per capita for those three countries. The increase in the number of countries in the new Maddison database means that this new composite GDPs per capita may be more accurate and may better reflect the actual population-weighted GDP per capita of the bloc. For example, the Bourguignon-Morrisson bloc's GDP per capita might have reflected only the GDP per capita of Colombia, if the other two were unavailable, whereas in the new data series, GDPs per capita for all three countries may be available and the bloc mean's is therefore the population-weighted average of the three. The three "extreme" blocs consist, as already mentioned, of 47 African counties, 46 Asian countries, and 37 Latin American and Caribbean countries. Instead of an approximate and undocumented GDP per capita used by Bourguignon and Morrisson for these blocs, I have created a population-weighted average GDP per capita for each group using the 2017 Maddison Project numbers. Obviously, the GDP per capita data are still not available for all years and for all countries, but the new blocs' average incomes are certainly more representative of the "true" incomes of each bloc than they were previously with fewer GDPs per capita available. In

[25] This is an inevitable problem with all long-term historical data series, and the Bourguignon-Morrisson database here simply follows the approach used by Maddison.

[26] The variable used is CGDPPC.

conclusion, the modifications explained so far keep the original structure of the Bourguignon-Morrisson data base unchanged, namely 33 country/blocs with their mean incomes and with each bloc having its own income distribution, but it uses more recent and more "abundant" GDP data in order to revise the mean incomes of country/blocs. It is the change *within* the original Bourguignon-Morrisson framework.

The second modification attempts to reflect better, by using the new data, the between-country component in the calculation of global inequality. As is obvious from the previous discussion, using a single GDP per capita for 46 or 37 countries, even if GDPs per capita were available for all countries in the bloc, reduces the variability among GDPs per capita and lowers the between component of inequality indexes. I have thus calculated a new between component for each benchmark year using all the GDPs per capita data that are available in the 2017 Maddison database. This new between-component is then used in the decomposition of inequality indexes. This modification obviously improves the between component but creates a problem because it is not fully consistent with the calculation of the Concept 3 (global) inequality which is obtained from 33 blocs with their "compressed" (averaged) mean GDPs per capita. There is no fully satisfactory solution to this problem short of having income distributions for all countries in all years. That, of course, is with the current level of knowledge impossible (do we know income distributions in Angola in 1850 and 1910?). I have thus decided to use for global inequality the actually calculated values from the revised Bourguignon-Morrisson series and for the between-inequality, the value obtained from the use of all available GDPs per capita. This means that the within inequality component is calculated as the residual.

The third modification concerns the population in each country. Here changes are much smaller, but they are not always non-trivial because for some countries (mostly in Africa) Bourguignon and Morrisson did not have any data, while in the 2017 Maddison Project update populations for such countries are available. The effect of the third modification however is much smaller than of the other two.

Table A1 shows the resulting differences for the Theil index. Global (or Concept 3) inequality is in all years but one greater with the new 2011 PPPs than with the old 1990s PPPs. The difference is larger in the post World War II years when it amounts to between 7.8 and 11.3 Theil points. This difference is, as explained, due only to the new GDPs per capita and populations; everything else is the same.

Between-country (or Concept 2) inequality is often greater when using 2011 PPPs for the 33 country-blocs (compare lines 4 and 3 in Table A1), but even more so when we calculate it using all the available GDPs per capita for each country (compare lines 5 and 3 in Table A1). This significantly increases the number of available GDPs per capita, passing from 33 to more than 100 in more recent years, and thus GDP per capita variability. This pushes the between-component beyond what it is with only 33 population-weighed GDPs per capita. The difference is again greater for the post World War II years, and in 1980, it reaches more than 17 Theil points.

In the calculations, I have used line 2 for global inequality and line 5 for the between inequality. Figure A1 summarizes the reasons for the estimated increase in global inequality compared to the Bourguignon-Morrisson data. The area in Figure A1 shows the increase in Concept 2 inequality *within* the original Bourguignon-Morrisson framework, i.e. the increase due to the use of the new 2017 Maddison data on income and population. The changes up to, and including, 1929 are minimal. Afterwards the increases (as aleady mentioned) become more substantial reaching about 10 Theil points on average. The main reason are the changes in GDPs per capita, not in population. [27]

[27] Consider the situation In 1950 (which is representative of the period 1960-1980). The increase in Concept 2 Theil inequality is more than 10 points (see Figure A1). With the "old" Bourguignon-Morrisson's populations that increase would be 8.4 Theil points. Thus, most of the increase (more than 80%) is due to the new Maddison 2017 GDPs per capita values. With the Gini, the increase is entirely explained by the new GDPs per capita. The tables below show the change compared to the initial Bourguignon-Morrisson values:

Theil points:

	"Old" population	"New" population
"Old" GDPs per capita	0	-0.2
"New" GDPs per capita	8.4	10.1

The line in Figure A1 shows the additional increase in Concept 2 inequality (2 to 3 Theil points) due to the inclusion of all counties' GDPs per capita in the calculations.

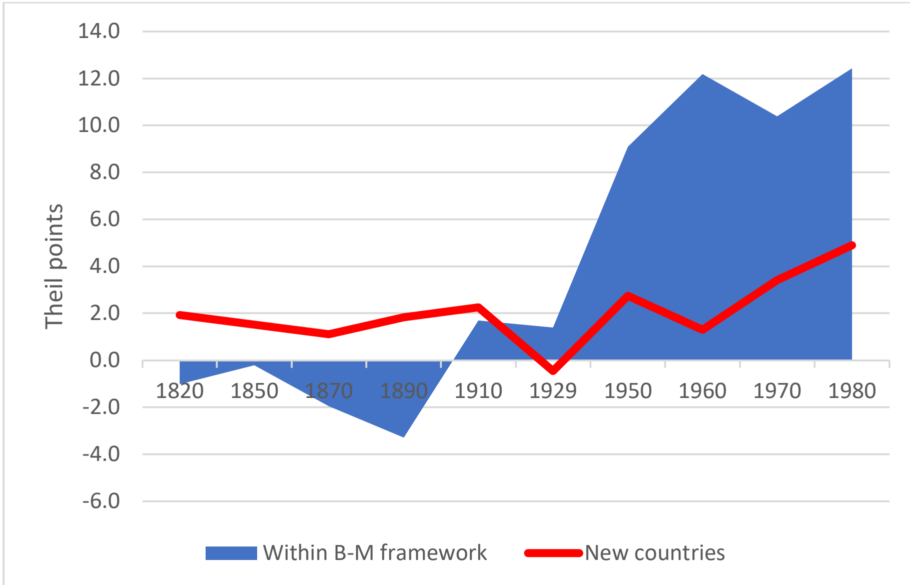
Figure A2 displays the overall difference in Concept 2 inequality between the revised and the original Bourguignon-Morrisson series in Gini terms. It is at most 3 Gini points, with the average increase (after 1929) of about 1.5 Gini points.

The results for the period after 1980 (eight benchmark years) are, as explained in the text, based on micro data from household surveys. They use disposable (after tax) income as their preferred indicator, and are thus no longer obtained from National Accounts. Since the data come from the nationally-representative surveys, they also provide distributions and all other statistics directly. Thus the quality of information is significantly better after 1980. There are however still many issues with household survey data: they are at times based on household income and at times on household consumption. It is impossible to avoid the mixing of the two although considerable effort was made to minimize "cross-overs", that is that the same country would be represented in one year by an income, and in another year, by a consumption survey. The sample of countries is relatively large, averaging more than 120, and the coverage of the world population and income is between 90 and 95 percent. Property income among the top of national income distributions is generally underestimated and thus imparts a downward bias to national measures of inequality, and very likely to the global too. Countries that do not field surveys are, as a rule, poor and/or in the midst of war or conflict: this additionally biases global inequality estimates down. Much more information about household survey data, decisions what data to use, and problems can be found in Lakner and Milanovic (2016), Milanovic (2021), Darvas (2019), World Bank (2022) as well in the literature reviews by Anand and Segal (2008) and Anderson and Pandian (2018).

Gini points:

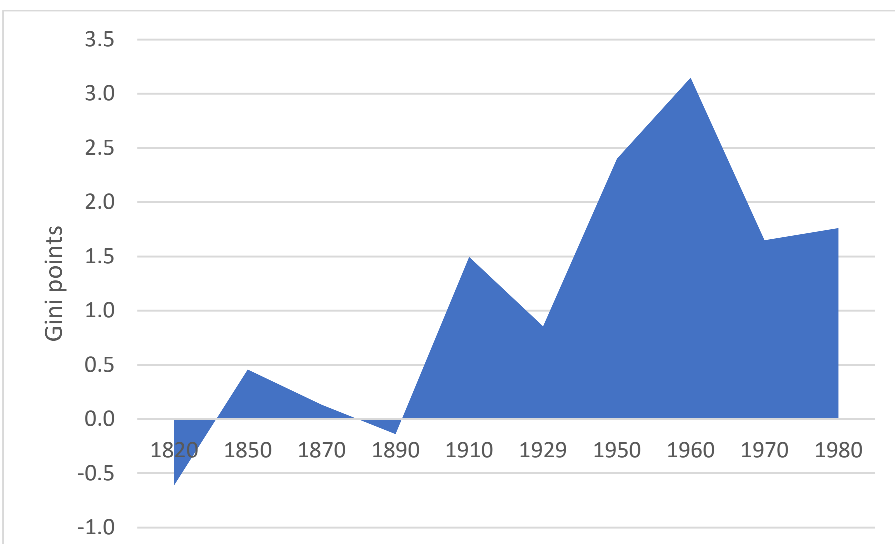
	"Old" population	"New" population
"Old" GDPs per capita	0	-0.1
"New" GDPs per capita	3.5	3.5

Figure A1. Difference in Concept 2 inequality between the revised and original Bourguignon-Morrisson data (Theil 0 index)



Note: The area shows the change in the Theil index due to the replacement of GDPs per capita from the “old” Maddison data series, expressed in 1990 PPPs, with the new 2017 Maddison Project data with GDPs per capita expressed in 2011 PPPs. The line shows the additional change in Concept 2 inequality due to the introduction in the calculation of the between components of all countries available in the 2017 Maddison Project data.

Figure A2. Difference in calculated global inequality between the revised and the original Bourguignon-Morrisson series (in Gini points)



Note. The area shows the difference in Concept 3 inequality between the revised and original Bourguignon-Morrisson data series.

Table A1. Historical global inequality: the original and the revised Bourguignon-Morrisson (B-M) series (Theil index)

	1820	1850	1870	1890	1910	1929	1950	1960	1970	1980
Global inequality (Concept 3)										
1. From B-M	42.2	48.5	54.4	61.0	66.8	69.0	77.5	76.6	82.3	85.0
2. With B-M income shares, new GDPs and 2011 PPPs	41.7	49.2	54.7	60.6	71.3	73.1	87.5	87.9	90.1	94.5
Difference (2)-(1)	-0.5	0.7	0.3	-0.4	4.5	4.1	10.0	11.3	7.8	9.5
Between country inequality (Concept 2)										
3. From B-M	6.1	12.8	18.8	25.0	29.9	36.5	48.2	45.8	49.2	49.9
4. Using 33 regional blocs with new GDPs & 2011 PPPs	5.2	12.6	16.8	21.7	31.6	37.9	57.3	58.0	59.6	62.3
5. Using all GDPs per capita available in Maddison 2017	7.0	14.1	18.0	23.5	33.8	37.4	60.0	59.3	63.0	67.2
Difference (5)-(3)	0.9	1.3	-0.8	-1.5	3.9	0.9	11.8	13.5	13.8	17.3

Table A2. Level and composition of global inequality (data used in this paper)

	1820	1850	1870	1890	1910	1929	1950	1960	1970	1980
Source of data	Revised Bourguignon-Morrisson data									
Gini points										
Global	49	54	56	59	62	62	66	67	67	67
Between-country inequality	17	27	32	36	43	47	56	55	55	56
Residual inequality (within- and overlap)	32	27	24	23	20	15	10	12	12	11
Share of the between inequality (in %)	35	50	57	61	69	76	85	82	82	84
Theil (0) points										
Global	42	49	55	61	72	72	88	88	90	95
Between-country inequality	7	14	18	24	34	37	60	59	63	67
Within-country inequality	35	35	37	37	38	35	28	29	27	27
Share of the between inequality (in %)	17	29	33	39	47	51	68	67	70	71
Data coverage										
Number of regions	33	33	33	33	33	33	33	33	33	33
Number of countries with GDP per capita	47	32	66	40	65	56	140	147	150	167
Source of data	1	1	1	1	1	1	1	1	1	1

	1988	1993	1998	2003	2008	2011	2013	2018
Source of data	Nationally-representative household surveys							
Gini								
Global inequality	69	69	68	69	66	63	62	60
Between-country inequality	63	62	62	60	58	54	51	47
Within-country inequality	6	7	6	9	8	9	11	13
Share of the between country inequality (in %)	91	90	91	87	88	86	82	78
Theil								
Global inequality	100	97	93	94		78	76	71
Between-country inequality	81	75	70	70		55	45	39
Within-country inequality	19	22	23	24		23	31	32
Share of the between country inequality (in %)	81	77	75	74		71	59	55
Data coverage								
Number of nationally representative household surveys *	75	115	121	133	136	111	131	123
Coverage of world population (in %)	81	92	92	94	94	88	95	91
Coverage of world GDP (in %) **	91	97	97	96	96	91	95	97
Source of data	2	2	2	2	4	3	4	5

Definition of data sources: 1 = Revised Bourguignon and Morrisson dataset as explained here; 2 = Lakner and Milanovic (2016); 3 = Expansion of Lakner and Milanovic (unpublished data); 4 = Milanovic (2021); 5 = new unpublished data.

* Includes in the total number of surveys urban and rural household surveys for China, India, and Indonesia as separate “countries” with, in the cases of India and China, own PPPs. ** Calculated in terms of world GDP in nominal dollar terms. The share is higher in PPP terms, but cannot be exactly calculated because of countries that do not report GDP in international dollars (although they do in nominal dollar terms).

Annex II. Alternative Indian data and their influence on the global incidence curve for 2018

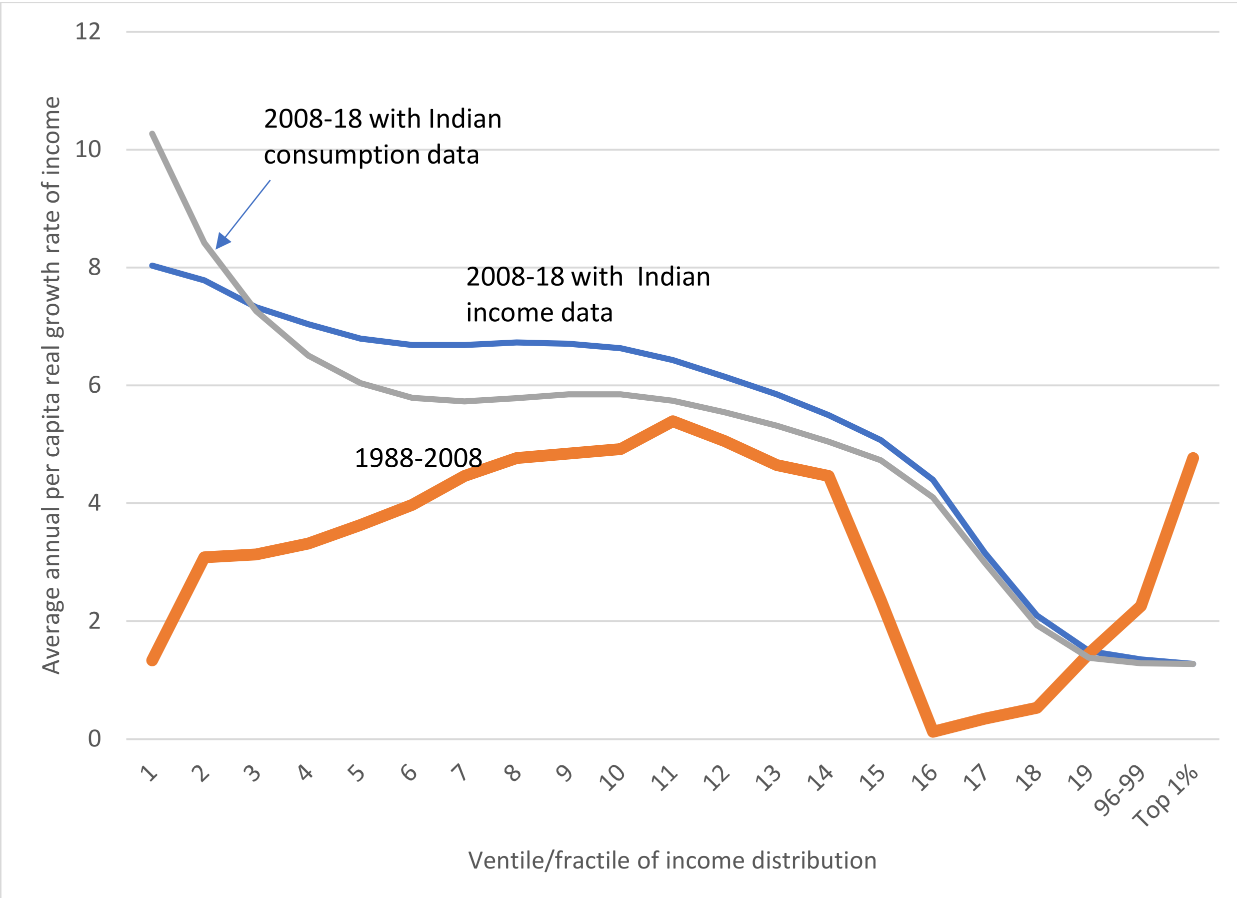
There is a special problem with Indian data which has a long history. Indian household survey data on consumptions (National Sample Survey or NSS) have been collected since 1952, much earlier than in many developed and developing countries. Their primary function when they were inaugurated was to study the evolution of poverty in India, and to be used to better target the poor and thus reduce poverty. The data were also used as a proxy for income distribution, although they were, for that purpose, less reliable than would be an alternative income survey. The issues came to the head during the so-called Great Indian Poverty debate in 2005-06 (see Deaton and Kozel, 2005; Himanshu and Kunal Sen, 2014) when the change in the recall period used by NSS produced significant change in the poverty count, and NSS data seemed to consistently show much lower growth in real consumption than the National Accounts. This led to the questioning of NSS as a reliable tool both for poverty and inequality monitoring. In 2004, Indian National Council of Applied Economic Research together with the University of Maryland launched a nationally-representative income survey (Indian Human Development Survey), interviewing more than 40,000 households. The survey was also included in LIS database, and accordingly harmonized with other surveys. The next round of the survey was fielded and completed in 2011, and was included in LIS. As expected, income surveys provided probably a more realistic picture of India's inequality, with both rural and urban Ginis significantly higher than in the previous NSS data and the average level of income also higher than the average level of consumption. The third round was supposed to take place in 2017, but was delayed, and then further affected by covid. Final results were never published. The non-completion of the 2017 income survey created an important void in the data availability.

To compound the problems, the NSS 2017 survey was, after a journalistic leak that showed the results as significantly at odds with what was expected (see the discussion in Subramanian 2019, and more recently in Sinha Roy and van der Weide 2022), formally withdrawn by the government and its results were never published. Thus both income and consumption surveys became unavailable.

In order to remedy this situation, Sinha Roy and van der Weide (2022) decided to use an entirely different (private) survey of consumption and modify it to the extent possible so that it comes as close of possible to NSS. Sinha Roy and van der Weide have thus estimated recent (2018) Indian consumption distribution with the objective of producing an estimate of poverty given that the government own numbers were no longer produced. One could use their data with the caveat that they come from an entirely new, and so far never used, source (for this particular purpose). Another possibility was to extrapolate, using real income growth, from the earlier income data calculated for 2011. I have used both approaches, and as Figure A3 shows, with both the shape of the global growth incidence curve for 2008-18 is broadly the same. The Sinha Roy and van der Weide estimates yield a more pro-poor global growth because they show levels of consumption among the poorest groups in India to be higher than are the levels of income among the equivalent percentiles. For the baseline 2008-18 scenario (illustrated in Figure 5 in the text) I have used the extrapolated income data mostly because they yield a more conservative results regarding the income gains among the poorest global ventiles, and are consistent with the income surveys used in 2004 and 2011. In any case, what is evident from both surveys is that the growth among the bottom global percentiles is driven by the growth among the poorest Indians who increasingly "populate" that group.[28]

[28] With Sinha Roy and van der Weide numbers, Indian population in the bottom global quintile reaches 640 million.

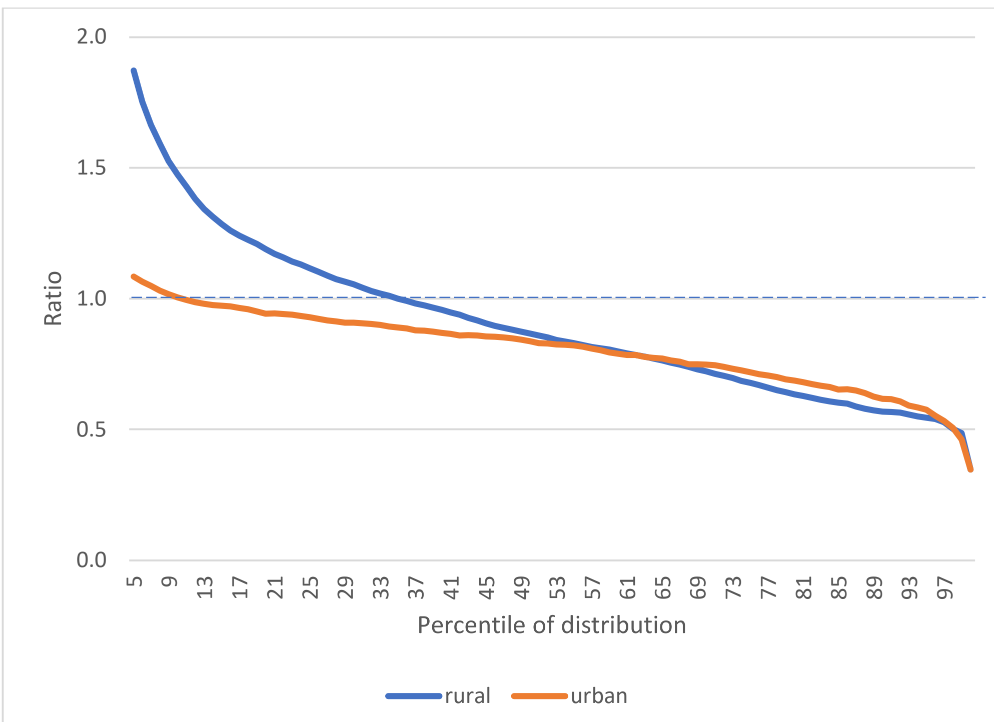
Figure A3. Global growth incidence curve 2008-18 with two different estimates of Indian distribution



Note: see the explanation for Figure 5. The Indian income data are extrapolations, using the real GDP growth rate, from the 2011-12 income data. The Indian consumption data are from Sinha Ry and van der Weide (2022), kindly provided by the authors.

As already implied from the global growth incidence curve, Sinha Roy and van der Weide consumption data show among the poorest Indian rural percentiles much higher levels than the extrapolation of the Indian income data (consumption numbers are in some cases almost twice as high as income; see Figure A4). For the urban population, however, the consumption/income difference on the bottom is almost non-existent: income and consumption levels are about the same. For the top groups however, in both rural and urban areas, Sinha Roy and van der Weide data give significantly lower levels, being for the highest percentile just over one-half of what the extrapolated income data imply. Consequently, Sinha Roy and van der Weide data yield much lower inequality in both rural and urban areas, and for India as a whole. For rural and urban areas, the income Gini are respectively 48 and 49, while the consumption Gini are only 31 and 36. For all-India, income Gini is 51 and consumption Gini 34. This large gap between income and consumption Gains in India has already been noticed before when consumption data from NSS were compared with income data from Indian Human Development Survey.

Figure A4. Consumption vs income levels at equivalent percentiles of rural and urban distributions



Note: Value greater than 1 means that consumption levels are greater than income levels (at equivalent percentiles of the distribution). Consumption data from Sinha Roy and van der Weide (2022); income data extrapolated from the 2011 survey.

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