

The elephant curve of global inequality and growth

Facundo Alvaredo, Lucas Chancel, Thomas Piketty,
Emmanuel Saez, Gabriel Zucman

Abstract

We show that global income inequality can be relatively well estimated from 1980 to 2016, by combining data on national incomes and available Distributional National Accounts. Our contribution is threefold. First, we attempt to go beyond country-level inequality data by comparing inequality dynamics between and within large geographic aggregates such as Europe, North America or Asia. We show that inequality increased almost everywhere, but at different speeds, revealing the important of national institutions and policy in the shaping of inequality. Second, we combine data on income inequality within these aggregates to estimate a global distribution of income since 1980. We show that our general conclusions are robust to several alternative methodologies to measure global inequality. According to our benchmark results, the global richest 1% adults captured 27% of total income growth since 1980, that is two times more than the bottom 50% adults, who collectively captured 12% of total growth over the period. The top 1% income share increased from 16% to 20% over the period. We observe a trend-break after the financial crisis, but this is only due to between-country reduction in inequality, as within-country inequality continued to rise. Third, we estimate the future evolution of global inequality between 2016 and 2050 by testing several assumptions about national income and population growth rates and inequality dynamics. We find that optimistic assumptions about growth in emerging countries in the future will not be sufficient to reduce global inequality between individuals between now and 2050 if countries continue their own inequality trends since 1980, highlighting the need for a renewed debate on the set of policies required to generate more equitable growth pathways.

1. Introduction: managing data limitations to construct a global distribution of income

The dynamics of global inequality have attracted growing attention in recent years.ⁱ However, we still know relatively little about how the distribution of global income and wealth is evolving. Available studies have largely relied on household surveys, a useful source of information, but one that does not accurately track the evolution of inequality at the top of the distribution. New methodological and empirical work carried out in the context of WID.world allows a better understanding of global income dynamics.

We stress at the outset that the production of global inequality dynamics is in its infancy and will still require much more work. It is critical that national statistical and tax institutions release income and wealth inequality data in many countries where data are not available currently—in particular, in developing and emerging countries. Researchers also need to thoroughly harmonize and analyze these data to produce consistent, comparable estimates. The World Inequality Lab and the WID.world research consortium intend to continue contributing to these tasks in the coming years.

Even if there are uncertainties involved, it is already possible to produce meaningful global income inequality estimates. The WID.world database contains internationally comparable income inequality estimates covering the entire population, from the lowest to the highest income earners, for many countries: the United States, China, India, Russia, Brazil, the Middle East, and the major European countries (such as France, Germany, and the United Kingdom). A great deal can already be inferred by comparing inequality trends in these regions. Using simple assumptions, we have estimated the evolution of incomes in the rest of the world so as to distribute 100% of global income every year since 1980. This exercise should be seen as a first step towards the construction of a fully consistent global distribution of income. We plan to present updated and extended versions of these estimates in the future editions of the *World Inequality Report* and on WID.world, as we gradually manage to access more data sources, particularly in Africa, Latin America, and Asia.

The exploration of global inequality dynamics presented here starts in 1980, for two main reasons. First, 1980 corresponds to a turning point in inequality and redistributive policies in many countries. The early 1980s mark the start of a rising trend in inequality and major policy changes, both in the West (with the elections of Ronald Reagan and

Margaret Thatcher, in particular) and in emerging economies (with deregulation policies in China and India). Second, 1980 is the date from which data become available for a large enough number of countries to allow a sound analysis of global dynamics.

The rest of this paper is organized as follows, we give an overview of the methodology followed to construct our estimates of global income inequality since 1980 and of our projections of global income inequality up to 2050. We then discuss our results on the evolution of global income inequality at the level of world regions and of the world as a whole. Next, we discuss the results of our projections of global income inequality up to 2050 and we conclude.

2. Methodology

A detailed version of the methodology is described in "Building a global income distribution brick by brick" by L. Chancel and A. Gethin (WID.world Technical Note 2017/5) and in "Global inequality User Guide" by the same authors (WID.world Technical Note 2017/9). The first document describes the methodology step by step and provides estimates for alternative assumptions, revealing these have little impacts on our general conclusions. The second document describes the set of computer codes and raw sources used to construct our estimates, so as to allow any interested user to reproduce them. We describe below the general lines of this methodology, and redirect interested readers to the two above-mentioned documents as well as the set of computer codes we used.

Our estimates are based on a combination of sources used at the national level (including tax receipts, household surveys and national accounts). Consistent estimates of national income inequality are now available for the USA, Western Europe (and in particular France, Germany, the United Kingdom) as well as China, India, Brazil, Russia and the Middle East. These regions represent approximately two thirds of the world adult population and three quarters of global income.

We here seek to distribute the totality of global income, to the totality of the world population. To achieve this, we must distribute the quarter of global income to the third of the global population for which there is currently no consistent income inequality data available. One crucial information we have, however, is total national income in each country. This information is essential, as it already determines a large part of global income inequality among individuals.

We tested different alternative assumptions to distribute national incomes in countries where there are no available Distributional National Accounts (Alvaredo et al. 2016) and found that these had very moderate impacts on the distribution of global income, given the limited share of income and population concerned by these assumptions. In our benchmark results, we assume that countries with missing inequality information had similar levels of inequality as other countries in their region. Take an example, we know the average income level in Malaysia, but not (yet) how national income is distributed to all individuals in this country. We then assumed that the distribution of income in Malaysia was the same, and followed the same trends, as in the region formed by China and India. This is indeed an over simplification, but to some extent this is an acceptable method as alternative assumptions have a limited impact on our general conclusions.

Sub-Saharan Africa is a particular case: we did not have any country with consistent income inequality data over the past decades (whereas in Asia we have consistent estimates for China and India, in Latin America, we have estimates for Brazil, etc.). For Sub-Saharan Africa, we thus relied on household surveys available from the World Bank (these estimates cover 70% of Sub-Saharan Africa's population and yet a higher proportion of the region's income). These surveys were matched with fiscal data available from WID.world so as to provide a better representation of inequality at the top of the social pyramid.

Our projections of global income inequality dynamics are based on global income inequality dynamics observed between 1980 and 2016 as well as on the modeling of three forces: within-country income inequality, national level total income growth, and demographics.

Three scenarios are defined to project the evolution of inequality up to 2050. All our scenarios run up to the halfway mark of the twenty-first century; this has us looking out at a time span similar to the one that has passed since 1980—the starting date of our analyses in the previous chapters. Our first scenario represents an evolution based on "business as usual"—that is, the continuation of the within-country inequality trends observed since 1980. The second and third are variants of the business-as-usual scenario. The second scenario illustrates a high within-country inequality trend, whereas the third scenario represents a low within-country inequality trend. All three scenarios have the same between-country inequality evolutions. This means that a given country has the same average income growth rate in all three scenarios. It also has the same population growth rate in all three scenarios. For estimations of future total income and population growth we turned to the OECD 2060 long-term forecasts.ⁱⁱ We also relied on the United Nations World Population Prospects.ⁱⁱⁱ

In the first scenario, all countries follow the inequality trajectory they have followed since the early 1980s. For instance, we know that the bottom 50% income earners in China captured 13% of total Chinese growth over the 1980–2016 period.^{iv} We thus assume that bottom 50% Chinese earners will capture 13% of Chinese income growth up to 2050. The second scenario assumes that all countries follow the same inequality trajectory as the United States over the 1980–2016 period. Following the above example, we know that bottom 50% US earners captured 3% of total growth since 1980 in the United States. The second scenario then assumes that within all countries, bottom 50% earners will capture 3% of growth over the 2017–2050 period. In the third scenario, all countries follow the same inequality trajectory as the European Union over the 1980–2016 period—where the bottom 50% captured 14% of total growth since 1980.

3. Global income inequality dynamics (1980-2016)

Income inequality between main world regions

We now present our basic findings regarding the evolution of income inequality within the main world regions. Three main findings emerge.

First, we observe rising inequality in most of the world's regions, but with very different magnitudes. More specifically, we display in Figure 1a the evolution of the

top 10% income share in Europe (Western and Eastern Europe combined, excluding Ukraine, Belorussia, and Russia), North America (defined as the United States and Canada), China, India, and Russia. The top 10% share has increased in all five of these large world regions since 1980. The top 10% share was around 30–35% in Europe, North America, China, and India in 1980, and only about 20–25% in Russia. If we put these 1980 inequality levels into broader and longer perspective, we find that they were in place since approximately the Second World War, and that these are relatively low inequality levels by historical standards (Piketty, 2014). In effect, despite their many differences, all these world regions went through a relatively egalitarian phase between 1950 and 1980. For simplicity, and for the time being, this relatively low inequality regime can be described as the “post-war egalitarian regime,” with obvious important variations between social-democratic, New Deal, socialist, and communist variants to which we will return.

Figure 1a. Top 10% income shares across the world, 1980–2016: Rising inequality almost everywhere, but at different speed

Top 10% income shares then increased in all these regions between 1980 and 2016, but with large variations in magnitude. In Europe, the rise was moderate, with the top 10% share increasing to about 35–40% by 2016. However, in North America, China, India, and even more so in Russia (where the change in policy regime was particularly dramatic), the rise was much more pronounced. In all these regions, the top 10% share rose to about 45–50% of total income in 2016. The fact that the magnitude of rising inequality differs substantially across regions suggests that policies and institutions matter: rising inequality cannot be viewed as a mechanical, deterministic consequence of globalization.

Next, there are exceptions to this general pattern. That is, there are regions—in particular, the Middle East, Brazil (and to some extent Latin America as a whole), and South Africa (and to some extent sub-Saharan Africa as a whole)—where income inequality has remained relatively stable at extremely high levels in recent decades. Unfortunately, data availability is more limited for these three regions,

which explains why the series start in 1990, and why we are not able to properly cover all countries in these regions (see Figure 1b).

Figure 1b. Top 10% income shares across the world, 1980–2016: Is world inequality moving toward the high-inequality frontier?

In spite of their many differences, the striking commonality in these three regions is the extreme and persistent level of inequality. The top 10% receives about 55% of total income in Brazil and sub-Saharan Africa, and in the Middle East, the top 10% income share is typically over 60% (see Figure 1c). In effect, for various historical reasons, these three regions never went through the post-war egalitarian regime and have always been at the world's high-inequality frontier.

The third striking finding is that the variations in top-income shares over time and across countries are very large in magnitude, and have a major impact on the income shares and levels of the bottom 50% of the population. It is worth keeping in mind the following orders of magnitude: top 10% income shares vary from 20–25% to 60–65% of total income (see Figures 2.1.1a and 2.1.1b). If we focus upon very top incomes, we find that top 1% income shares vary from about 5% to 30% (see Figure 1d), just like the share of income going to the bottom 50% of the population (see Figure 1e).

Figure 1c. Top 1% income shares across the world, 2016

Figure 1d. Top 1% income shares across the world, 2016

Figure 1e. Bottom 50% income shares across the world, 1980–2016

In other words, the same aggregate income level can give rise to widely different income levels for the bottom and top groups depending on the distribution of income

prevailing in the specific country and time period under consideration. In brief, the distribution matters quite a bit.

What have been the growth trajectories of different income groups in these regions since 1980? Table 1 presents income growth rates in China, Europe, India, Russia, and North America for key groups of the distribution. The full population grew at very different rates in the five regions. Real per-adult, national income growth reached an impressive 831% in China and 223% in India. In Europe, Russia, and North America, income growth was lower than 100% (40%, 34%, and 74%, respectively). Behind these heterogeneous average growth trajectories, the different regions all share a common, striking characteristic.

Table 1. Global income growth and inequality, 1980–2016

In all these countries, income growth is systematically higher for upper income groups. In China, the bottom 50% earners grew at less than 420% while the top 0.001% grew at more than 3 750%. The gap between the bottom 50% and the top 0.001% is even more important in India (less than 110% versus more than 3 000%). In Russia, the top of the distribution had extreme growth rates; this reflects the shift from a regime in which top incomes were constrained by the communist system towards a market economy with few regulations constraining top incomes. In this global picture, in line with Figure 1, Europe stands as the region with the lowest growth gap between the bottom 50% and the full population, and with the lowest growth gap between the bottom 50% and top 0.001%.

The right-hand column of Table 1 presents income growth rates of different groups at the level of the entire world. These growth rates are obtained once all the individuals of the different regions are pooled together to reconstruct global income groups. Incomes across countries are compared using purchasing power parity (PPP) so that a given income can in principle buy the same bundle of goods and services in all countries. Average global growth is relatively low (60%) compared to emerging countries' growth rates. Interestingly enough, at the world level, growth rates do not rise monotonically with income groups' positions in the distribution. Instead, we observe high growth at the bottom 50% (94%), low growth in the middle 40% (43%),

and high growth at the top 1% (more than 100%)—and especially at the top 0.001% (close to 235%).

To better understand the significance of these unequal rates of growth, it is useful to focus on the share of total growth captured by each group over the entire period. Table 2 presents the share of growth per adult captured by each group. Focusing on both metrics is important because the top 1% global income group could have enjoyed a substantial growth rate of more than 100% over the past four decades (meaningful at the individual level), but still represent only a little share of total growth. The top 1% captured 35% of total growth in the US-Canada, and an astonishing 69% in Russia.

Table 2: Share of growth captured by income groups, 1980–2016

At the global level, the top 1% captured 27% of total growth—that is, twice as much as the share of growth captured by the bottom 50%. The top 0.1% captured about as much growth as the bottom half of the world population. Therefore, the income growth captured by very top global earners since 1980 was very large, even if demographically they are a very small group.

The elephant curve of global inequality and growth

A powerful way to visualize the evolution of global income inequality dynamics is to plot the total growth rate of each income groups (see Box 2.1.2). This provides a more precise representation of growth dynamics than Table 1. To properly understand the role played by each region in global inequality dynamics, we follow a step-by-step approach to construct this global growth curve by adding one region after another and discussing each step of the exercise.

We start with the distribution of growth in a region regrouping Europe and North America (Figure 2). These two regions have a total of 880 million individuals in 2016 (520 million in Europe and 360 million in North America) and represent most of the population of high-income countries. In Euro-America, cumulative per-adult income growth over the 1980–2016 period was +28%, which is relatively low as compared to the global average (+66%). While the bottom 10% income group saw their income

decrease over the period, all individuals between percentile 20 and percentile 80 had a growth rate close to the average growth rate. At the very top of the distribution, incomes grew very rapidly; individuals in the top 1% group saw their incomes rise by more than 100% over the time period and those in the top 0.01% and above grew at more than 200%.

How did this translate into shares of growth captured by different groups? The top 1% of earners captured 28% of total growth—that is, as much growth as the bottom 81% of the population. The bottom 50% earners captured 9% of growth, which is less than the top 0.1%, which captured 14% of total growth over the 1980–2016 period. These values, however, hide large differences in the inequality trajectories followed by Europe and North America). In the former, the top 1% captured as much growth as the bottom 51% of the population, whereas in the latter, the top 1% captured as much growth as the bottom 88% of the population. (See chapter 2.3 for more details.)

Figure 2. Total income growth by percentile in US-Canada and Western Europe, 1980-2016

The next step is to add the population of India and China to the distribution of Euro-America. The global region now considered represents 3.5 billion individuals in total (including 1.4 billion individuals from China and 1.3 billion from India). Adding India and China remarkably modifies the shape of the global growth curve (Figure 3).

The first half of the distribution is now marked by a "rising tide" as total income growth rates increase substantially from the bottom of the distribution to the middle. The bottom half of the population records growth rates which go as high as 260%, largely above the global average income growth of 146%. This is due to the fact that Chinese and Indians, who make up the bulk of the bottom half of this global distribution, enjoyed much higher growth rates than their European and North American counterparts. In addition, growth was also very unequally distributed in India and China, as revealed by Table 1.

Between percentiles 70 and 99 (individuals above the poorest 70% of the population but below the richest 1%), income growth was substantially lower than the global

average, reaching only 40–50%. This corresponds to the lower- and middle-income groups in rich countries which grew at a very low rates. The extreme case of these is the bottom half of the population in the United States, which grew at only 3% over the period considered. (See Chapter 2.4.)

Earlier versions of this graph have been termed "the elephant curve," as the shape of the curve resembles the silhouette of the animal. These new findings confirm and amplify earlier results.^v In particular they confirm the share of income growth captured at the top of the global income distribution—a figure which couldn't be properly measured before.

Figure 3. Total income growth by percentile in China, India, US-Canada, and Western Europe, 1980-2016

At the top of the global distribution, incomes grew extremely rapidly—around 200% for the top 0.01% and above 360% for the top 0.001%. Not only were these growth rates important from the perspective of individuals, they also matter a lot in terms of global growth. The top 1% captured 23% of total growth over the period—that is, as much as the bottom 61% of the population. Such figures help make sense of the very high growth rates enjoyed by Indians and Chinese sitting at the bottom of the distribution. Whereas growth rates were substantial among the global bottom 50%, this group captured only 14% of total growth, just slightly more than the global top 0.1%—which captured 12% of total growth. Such a small share of total growth captured by the bottom half of the population is partly due to the fact that when individuals are very poor, their incomes can double or triple but still remain relatively small—so that the total increase in their incomes does not necessarily add up at the global level. But this is not the only explanation. Incomes at the very top must also be extraordinarily high to dwarf the growth captured by the bottom half of the world population.

The next step of the exercise consists of adding the populations and incomes of Russia (140 million), Brazil (210 million), and the Middle East (410 million) to the analysis. These additional groups bring the total population now considered to more than 4.3 billion individuals—that is, close to 60% of the world total population and two thirds of the world adult population. The global growth curve presented in Appendix Figure A2.3

is similar to the previous one except that the "body of the elephant" is now shorter. This can be explained by the fact that Russia, the Middle East, and Brazil are three regions which recorded low growth rates over the period considered. Adding the population of the three regions also slightly shifts the "body of the elephant" to the left, since a large share of the population of the countries incorporated in the analysis is neither very poor nor very rich from a global point of view and thus falls in the middle of the distribution. In this synthetic global region, the top 1% earners captured 26% of total growth over the 1980–2016 period—that is, as much as the bottom 65% of the population. The bottom 50% captured 15% of total growth, more than the top 0.1%, which captured 12% of growth.

The final step consists of including all remaining global regions—namely, Africa (close to 1 billion individuals), the rest of Asia (another billion individuals), and the rest of Latin America (close to half a billion). In order to reconstruct income inequality dynamics in these regions, we take into account between-country inequality, for which information is available, and assume that within countries, growth is distributed in the same way as neighboring countries for which we have specific information (see Box 2.1.1). This allows us to distribute the totality of global income growth over the period considered to the global population.

When all countries are taken into account, the shape of the curve is again transformed (Figure 4). Now, average global income growth rates are further reduced because Africa and Latin America had relatively low growth over the period considered. This contributes to increasing global inequality as compared to the two cases presented above. The findings are the same as those presented in the right-hand column of Table 1.1.2: the top 1% income earners captured 27% of total growth over the 1980–2016 period, as much as the bottom 70% of the population. The top 0.1% captured 13% of total growth, about as much as the bottom 50%.

Figure 4. Total income growth by percentile across all world regions, 1980-2016

The geography of global income inequality was transformed over the past decades

What is the share of African, Asians, Americans, and Europeans in each global income groups and how has this evolved over time? Figures 2.1.5 and 2.1.6 answer these questions by showing the geographical composition of each income group in 1990 and in 2016. Between 1980 and 1990, the geographic repartition of global incomes evolved only slightly, and our data allow for more precise geographic repartition in 1990, so it is preferable to focus on this year. In a similar way to how Figures 2.1.2 through 2.1.4 decomposed the data, Figures 2.1.5 and 2.1.6 decompose the top 1% into 28 groups (see Box 2.1.1). To be clear, all groups above percentile 99 are the decomposition of the richest 1% of the global population.

In 1990, Asians were almost not represented within top global income groups. Indeed, the bulk of the population of India and China are found in the bottom half of the income distribution. At the other end of the global income ladder, US-Canada is the largest contributor to global top-income earners. Europe is largely represented in the upper half of the global distribution, but less so among the very top groups. The Middle East and Latin American elites are disproportionately represented among the very top global groups, as they both make up about 20% each of the population of the top 0.001% earners. It should be noted that this overrepresentation only holds within the top 1% global earners: in the next richest 1% group (percentile group p98p99), their share falls to 9% and 4%, respectively. This indeed reflects the extreme level of inequality of these regions, as discussed in chapters 2.10 and 2.11. Interestingly, Russia is concentrated between percentile 70 and percentile 90, and Russians did not make it into the very top groups. In 1990, the Soviet system compressed income distribution in Russia.

Figure 5. Geographic breakdown of global income groups, 1990

Figure 6: Geographic breakdown of global income groups, 2016

In 2016, the situation is notably different. The most striking evolution is perhaps the spread of Chinese income earners, which are now located throughout the entire global

distribution. India remains largely represented at the bottom with only very few Indians among the top global earners.

The position of Russian earners was also stretched throughout from the poorest to the richest income groups. This illustrates the impact of the end of communism on the spread of Russian incomes. Africans, who were present throughout the first half of the distribution, are now even more concentrated in the bottom quarter, due to relatively low growth as compared to Asian countries. At the top of the distribution, while the shares of both North America and Europe decreased (leaving room for their Asian counterparts), the share of Europeans was reduced much more. This is because most large European countries followed a more equitable growth trajectory over the past decades than the United States and other countries, as will be discussed in chapter 2.3.

Since 2000, the picture is more nuanced but within-country inequality is on the rise

How did global inequality evolve between 1980 and 2016? Figure 7 answers this question by presenting the share of world income held by the global top 1% and the global bottom 50%, measured at purchasing power parity. The global top 1% income share rose from about 16% of global income in 1980 to more than 22% in 2007 at the eve of the global financial crisis. It was then slightly reduced to 20.4% in 2016, but this slight decrease hardly brought back the level of global inequality to its 1980 level. The income share of bottom half of the world population oscillated around 9% with a very slight increase between 1985 and 2016.

The first insight of this graph is the extreme level of global inequality sustained throughout the entire period with a top 1% income group capturing two times the total income captured by the bottom 50% of the population—implying a factor 100 difference in average per-adult income levels. Second, it is apparent that high growth in emerging countries since 2000, in particular in China, or the global financial crisis of 2008 was not sufficient to stop the rise in global income inequality.

Figure 7: Global top 1% and bottom 50% income shares, 1980–2016

When global inequality is decomposed into a between- and within-country inequality component, it is apparent that within-country inequality continued to rise since 2000 whereas between-country inequality rose up to 2000 and decreased afterwards. Figure 8 presents the evolution of the global 10% income share, which reached close to 50% of global income in 1980, rose to 55% in 2000–2007, and decreased to slightly more than 52% in 2016. Two alternative scenarios for the evolution of the global top 10% share are presented. The first one assumes that all countries had exactly the same average income (that is, that there was no between-country inequality), but that income was as unequal within these countries as was actually observed. In this case, the top 10% share would have risen from 35% in 1980 to nearly 50% today. In the second scenario, it is assumed that between-country inequality evolved as observed but it is also assumed that everybody within countries had exactly the same income level (no within-country inequality). In this case, the global top 10% income share would have risen from nearly 30% in 1980 to more than 35% in 2000 before decreasing back to 30%.

Figure 8. Global top 10% income share, 1980–2016: between versus within-country inequality

Measured at market exchange rate, global inequality is even higher

Prices can be converted from one currency to another using either market exchange rates or purchasing power parities (as we did above). Market exchange rates are the prices at which people are willing to buy and sell currencies, so at first glance they should reflect people's relative purchasing power. This makes them a natural conversion factor between currencies. The problem is that market exchange rates reflect only the relative purchasing power of money in terms of tradable goods. But non-tradable goods (typically services) are in fact cheaper relative to tradable ones in emerging economies (given the so-called Balassa-Samuelson effect). Therefore, market exchange rates will underestimate the standard of living in the poorer countries. In addition, market exchange rates can vary for all sorts of other reasons—sometimes purely financial and/or political—in a fairly chaotic manner. Purchasing power parity is an alternative conversion factor that addresses these problems (based on observed

prices in the various countries). The level of global income inequality is therefore substantially higher when measured using market exchange rates than it is with purchasing power parity. It increases the global top 1% share in 2016 from 20% to 24% and reduces the bottom 50% share from nearly 10% to 6% (Figure 9).

Figure 9. Global top 1% and bottom 50% income shares, 1980–2016 : PPP versus market exchange rates

Purchasing power parity definitely gives a more accurate picture of global inequality from the point of view of individuals who do not travel across the world and who essentially spend their incomes in their own countries. Market exchange rates are perhaps better to inform about inequality in a world where individuals can easily spend their incomes where they want, which is the case for top global earners and tourists, and increasingly the case for anyone connected to the internet. It is also the case for migrant workers wishing to send remittances back to their home countries. Both purchasing power parity and market exchange rates are valid measures to track global income inequality, depending on the object of study or which countries are compared to one another.

In this report, we generally use purchasing power parity for international comparisons, but at times, market exchange rates are also used to illustrate other meaningful aspects of international inequality.

Carefully looking at countries' diverse growth trajectories and policy changes is necessary to understand drivers of national and global inequality

The past forty years were marked by a steep rise of global inequality, and growth in emerging countries was not high enough to counterbalance it. Whether future growth in emerging countries might invert the trend or not is a key question, which will be addressed in Part 5 of this report. Before turning to that question, one should understand better the drivers of the trends observed since 1980.

Given that this period was marked by increasing trade integration between countries, it might seem reasonable to seek explanations in economic trade models. The standard economic models of international trade, however, fail to account for dynamics of inequality observed over the past four decades. Take Heckscher-Ohlin, the most well-known of the two-skill-groups economic trade models. According to it, trade liberalization should increase inequality in rich countries, but reduce it in low-income countries.

How does the model reach this conclusion? The underlying mechanism is fairly simple. It is built around the fact that there are more high-skilled workers (such as aeronautical engineers) in the United States than in China, and more low-skilled workers (such as textile workers) in China than in the United States. Before trade liberalization started between these two countries, aeronautical engineers were relatively scarce in China and thus enjoyed relatively high pay compared to textile workers which were abundant. Conversely, in the United States, low-skilled earners were relatively scarce at the time, and the income differential between engineers and textile workers was limited.

When the United States and China started to trade, each country specialized in the domain for which they had the most workers, in relative terms. China thus specialized in textiles, so that textile workers were in higher demand and saw their wages increase, while aeronautical engineers came to be in lower demand and saw their wages decrease. Conversely, the United States specialized in aircraft building, so the aeronautical engineers saw their wages increase, while the textile workers saw their wages decrease. By virtue of the factor price equalization theorem, the wages of low-skilled workers in China and the United States started to converge, along with the wages of high-skilled workers.

While inequality did rise in the United States, as this model predicts, it also sharply rose in China, as well as in India and Russia, as seen in Figure 1a—contrary to the model's predictions. Regardless of whether the Heckscher-Ohlin is otherwise valid or not, it cannot account for the evolution of global inequality. How can we account for these empirical findings? As Table 1 suggests, countries followed very different growth and inequality trajectories over the past decades. It seems necessary to carefully look at these trajectories as well as the institutional and policy shifts which may have occurred in various regions of the world over the past forty years.

Understanding the drivers of global income inequality requires a thorough analysis of the distribution of national income growth within countries, as in done in the World Inequality Report 2018 and WID.world country specific working papers.

4. Projecting the future of global income inequality

The past four decades have been marked by steeply rising income inequality within countries. At the global level, inequality has also risen sharply since 1980, but the situation more or less stabilized beginning in the early 2000s. What will happen in the future? Will growth in emerging countries lead to a sustained reduction in global income inequality? Or will unequal growth within countries drive global income inequality back to its 2000 levels? We now discuss different possible global income inequality scenarios between now and 2050.

Fortunately, more data are available to measure income inequality, and in this chapter we present more elaborate projections of global income inequality. Before discussing the results, it is necessary to stress what can and cannot be reliably projected. As the saying goes, "all models are wrong; some are useful." Our projections are attempts to represent possible states of global inequality in the future, so as to better understand the role played by key determinants. The purpose of our projections is not to predict the future. The number of forces (or variables) that we consider in our analysis is limited. This makes our projections straightforward and simple to understand, but also limits their ability to predict the future.

Under business as usual, global inequality will continue to rise, despite strong growth in low-income countries.

Figure 10 shows the evolution of the income shares of the global top 1% and the global bottom 50% for the three scenarios. Under the business-as-usual scenario (scenario 1), the income share held by the bottom 50% of the population slightly decreases from approximately 10% today to less than 9% in 2050. At the top of the global income distribution, the top 1% income share rises from less than 21% today to more than 24% of world income. Global inequality thus rises steeply in this scenario, despite strong growth in emerging countries. In Africa, for instance, we assume that average

per-adult income grows at sustained 3% per year throughout the entire period (leading to a total growth of 173% between 2017 and 2050).

These projections show that the progressive catching-up of low-income countries is not sufficient to counter the continuation of worsening of within-country inequality. The results also suggest that the reduction (or stabilization) of global income inequality observed since the financial crisis of 2008, discussed in Chapter 2, could largely be a short-run phenomenon induced by the shocks on top incomes, and the growth slowdown in rich countries (particularly in Europe).

Figure 10. Top 1% versus bottom 50% shares of global income, 1980–2050

In scenario two, future global income inequalities are amplified as compared to scenario one, as the gap between the global top 1% share and the global bottom 50% share in 2050 widens. In this scenario, the global top 1% would earn close to 28% of global income by 2050, while the bottom 50% would earn close to 6%, less than in 1980, before emerging countries started to catch up with the industrialized world. In this scenario, the increase in the top 1% income share (a positive change of eight percentage points over the 2016–2050 period) is largely, but not entirely, made at the expense of the bottom 50% (a negative change of four percentage points).

Scenario three presents a more equitable global future. It shows that global inequality can be reduced if all countries align on the EU inequality trajectory—or more equitable ones. In this scenario, the bottom 50% income share rises from 10% to approximately 13% in 2050, whereas the top 1% decreases from 21% to 19% of total income. The gap between the shares held by the two groups would, however, remain large (at about six percentage points). This suggests that, although following the European pathway in the future is a much better option than the business-as-usual or the US pathway, even more equitable growth trajectories will be needed for the global bottom 50% share to catch up with the top 1%. Achieving a world in which the top 1% and bottom 50% groups capture the same share of global income would mean getting to a point where the top 1% individuals earn on average fifty times more than those in the bottom half. Whatever the scenarios followed, global inequalities will remain substantial.

Within country inequality trends are critical for global poverty eradication

What do these different scenarios mean in terms of actual income levels, and particularly for bottom groups? It is informative to focus on the dynamics of income shares held by different groups, and how they converge or diverge over time. But ultimately, it can be argued that what matters for individuals—and in particular those at the bottom of the social ladder—is their absolute income level. We stress again here that our projections do not pretend to predict how the future will be, but rather aim to inform on how it *could* be, under a set of simple assumptions.

Figure 12 depicts the evolution of average global income levels and the average income of the bottom half of the global population in the three scenarios described above. The evolution of global average income does not depend on the three scenarios. This is straightforward to understand: in each of the scenarios, countries (and hence the world as a whole) experience the same total income and demographic growth. It is only the matter of how this growth is distributed within countries that changes across scenarios. Let us reiterate that our assumptions are quite optimistic for low-income countries, so it is indeed possible that global average income would actually be slightly lower in the future than in the figures presented. In particular, the global bottom 50% average income would be even lower.

In 2016, the average per-adult annual income of the poorest half of the world population was €3 100, in contrast to the €16 000 global average—a ratio of 5.2 between the overall average and the bottom-half average. In 2050, global average income will be €35 500 according to our projections. In the business-as-usual scenario, the gap between average income and the bottom would widen (from a ratio of 5.2 to a ratio of 5.6) as the bottom half would have an income of €6 300. In the US scenario, the bottom half of the world population earn €4 500 per year and per adult—rising the global average income to bottom 50% income ratio of 7.9. Average income of the global bottom half will be €9 100 in the EU scenario, reducing the bottom 50% to average income ratio to 3.9.

The gap between global average income and the average income of the bottom half of the population is particularly high in all scenarios. However, the difference in average income of the bottom 50% between the EU scenario and the US scenario is important, as well. Average income of the global bottom 50% would be more than twice higher in

the EU scenario than in the US scenario at €9 100 versus €4 500. This suggests that within-country inequality trajectories matter—and matter substantially—for poverty eradication. In other words, pursuing high-growth strategies in emerging countries is not merely sufficient to lift the global bottom half out of poverty. Reducing inequality within countries is also key.

Figure 12. Global average income versus global 50% average, 1980–2050

Figure 13. Global bottom 50% average income, 1980–2050

The scenarios point toward another crucial insight: global inequality is not bound to rise in the future. Our analysis (in Part 2) of the different income inequality trajectories followed by countries showed that, if anything, more equitable growth does not mean dampened growth. This result is apparent when time periods are compared (the United States experienced higher growth in the 1950s–1960s when inequality was at its lowest) or when countries are compared with one another (over the past decades, China grew much faster than India, with a lower level of inequality, and the EU had a more equitable path than the United States but a relatively similar growth rate). This suggests that it is possible to pursue equitable development pathways in a way that does not also limit total growth in the future.

5. Conclusion

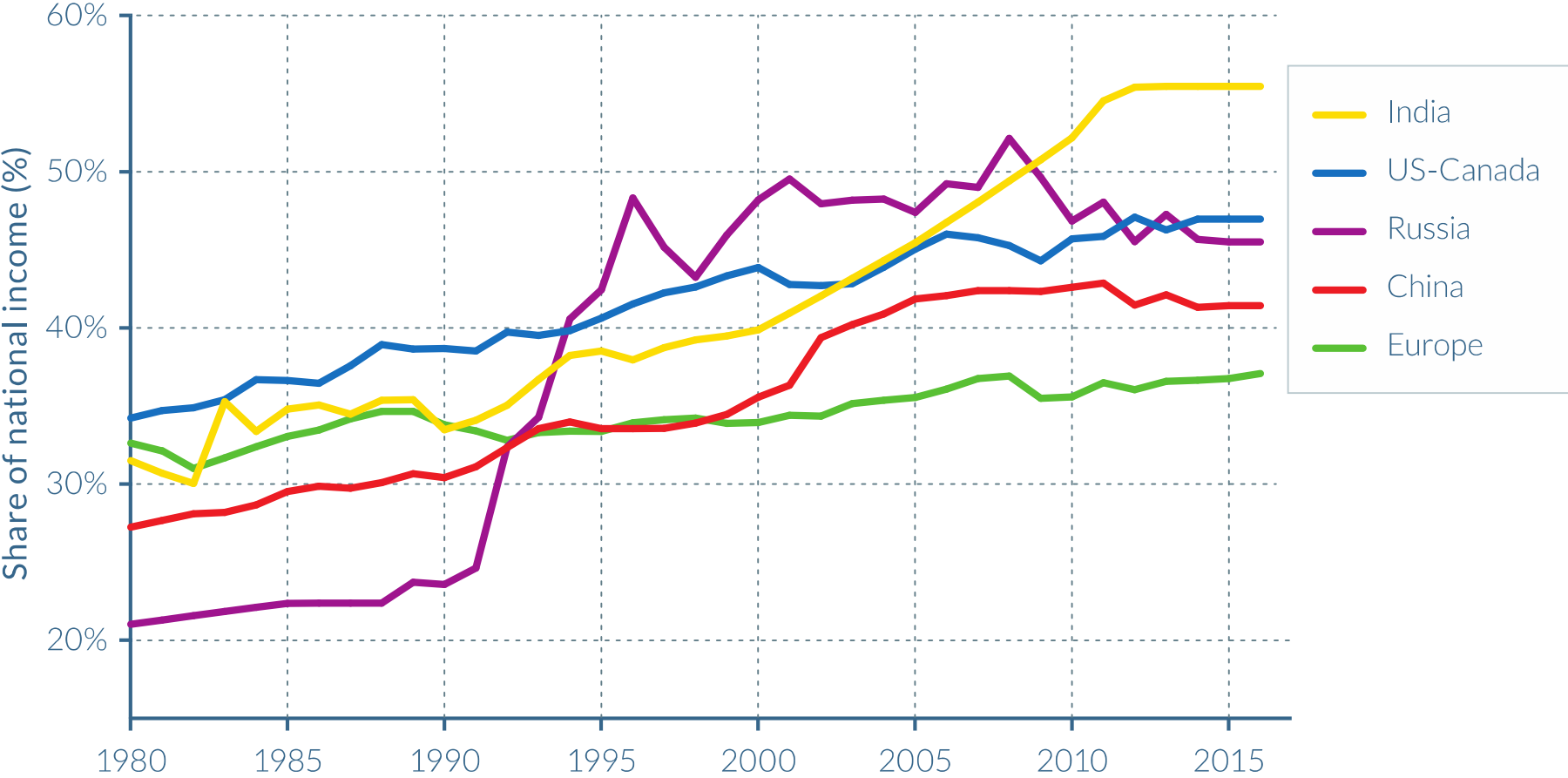
Despite the limited available data on global inequality, we have attempted to estimate the main features of global inequality dynamics in the last 40 years by making assumptions about inequality trajectories within broad geographical areas, and on the basis of Distributional National Accounts already covering a large share of global income. Interestingly, and partly because existing inequality data from WID.world already covers about three quarters of world income and two thirds of world population, our results are relatively robust to alternative specifications for missing countries.

We find that the global top 1% captured 27% of total income growth between 1980 and 2016, against 12% for the bottom 50%. We also show that global inequality is likely to further rise in the future, even under optimistic growth assumption in emerging countries, if countries follow their own inequality trend. These results suggest a necessary discussion over the types of policies implemented by governments to trigger and redistribute income growth.

We have proceeded in a transparent manner, providing detailed codes and sources on WID.world, so as to contribute to increase the level of transparency of existing global inequality statistics. As more reliable estimates will become available for a growing number of "missing" countries, especially in South-East Asia, Africa, Eastern Europe and Latin America, we will be able to get a more precise picture of global inequality. In the future, we also hope to gradually improve our projections of global inequality by testing more scenarios and formulating plausible assumptions about growth dynamics in the long run.

Tables and Figures

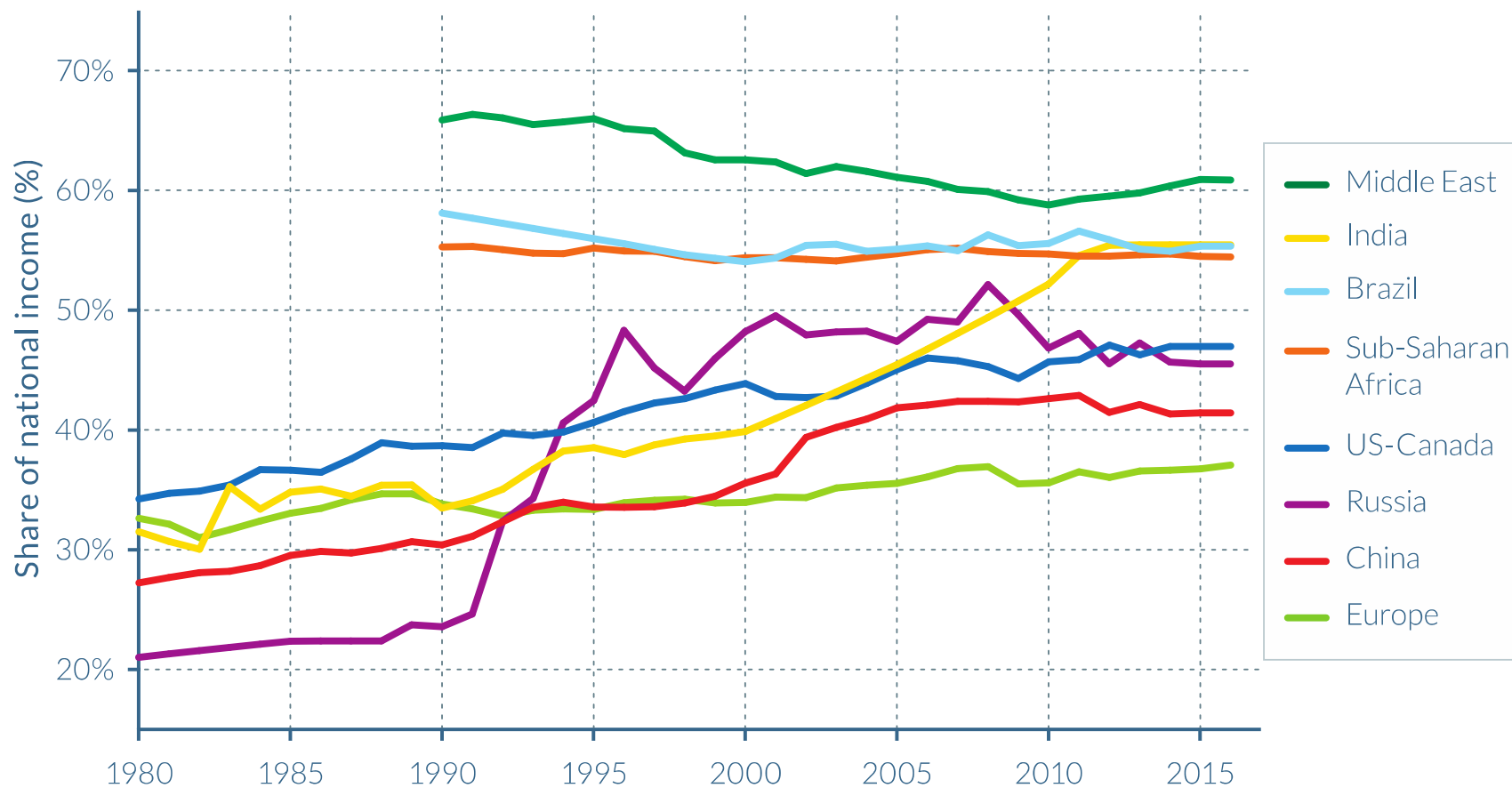
Figure 1a. Top 10% income shares across the world, 1980–2016: Rising inequality almost everywhere, but at different speed



Source: WID.world (2017). See wir2018.wid.world for data series and notes.

In 2016, 47% of national income was received by the top 10% in US-Canada, compared to 34% in 1980.

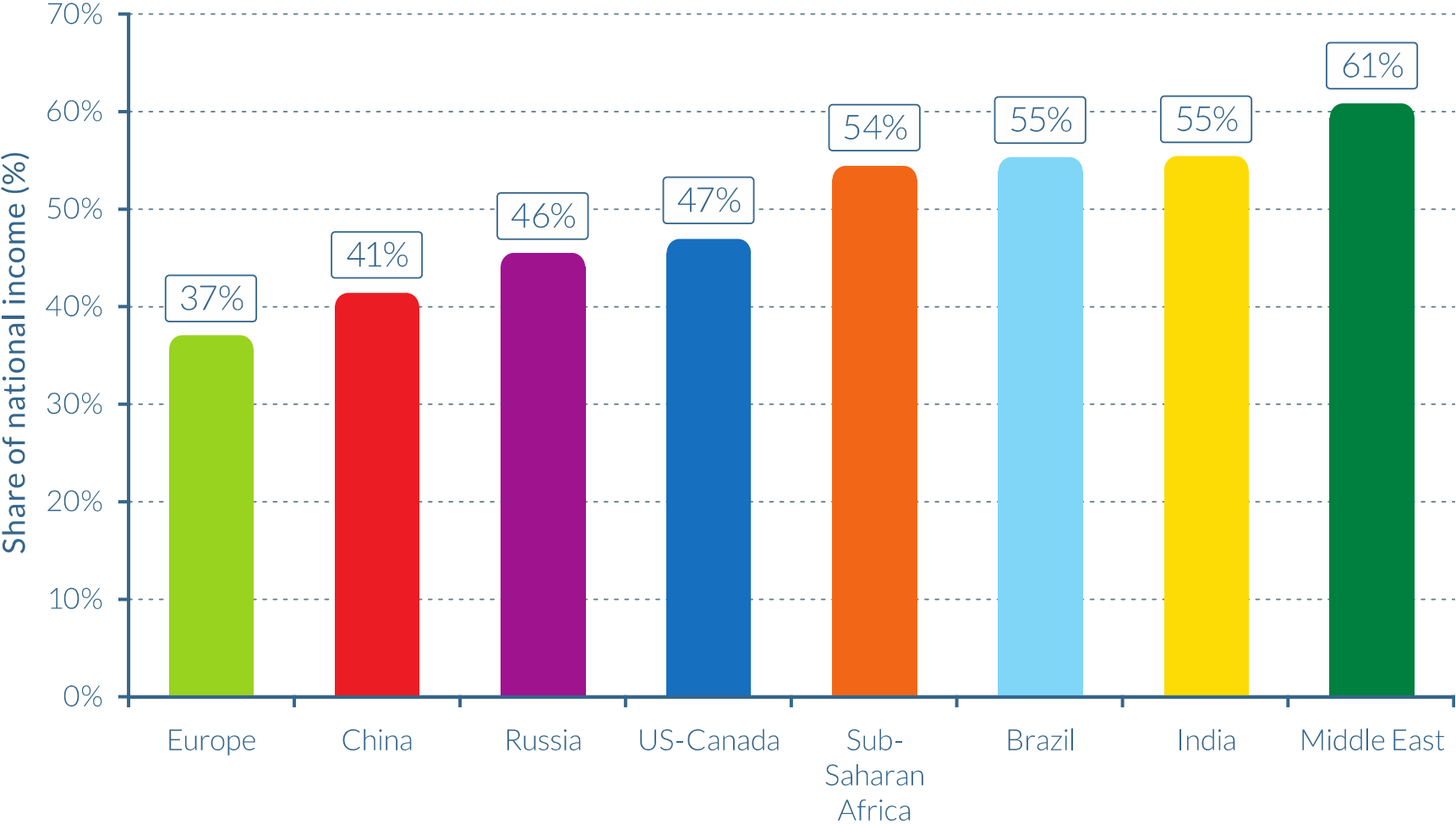
Figure 1b. Top 10% income shares across the world, 1980–2016: Is world inequality moving toward the high-inequality frontier?



Source: WID.world (2017). See wir2018.wid.world for data series and notes.

In 2016, 55% of national income was received by the Top 10% in India, against 31% in 1980.

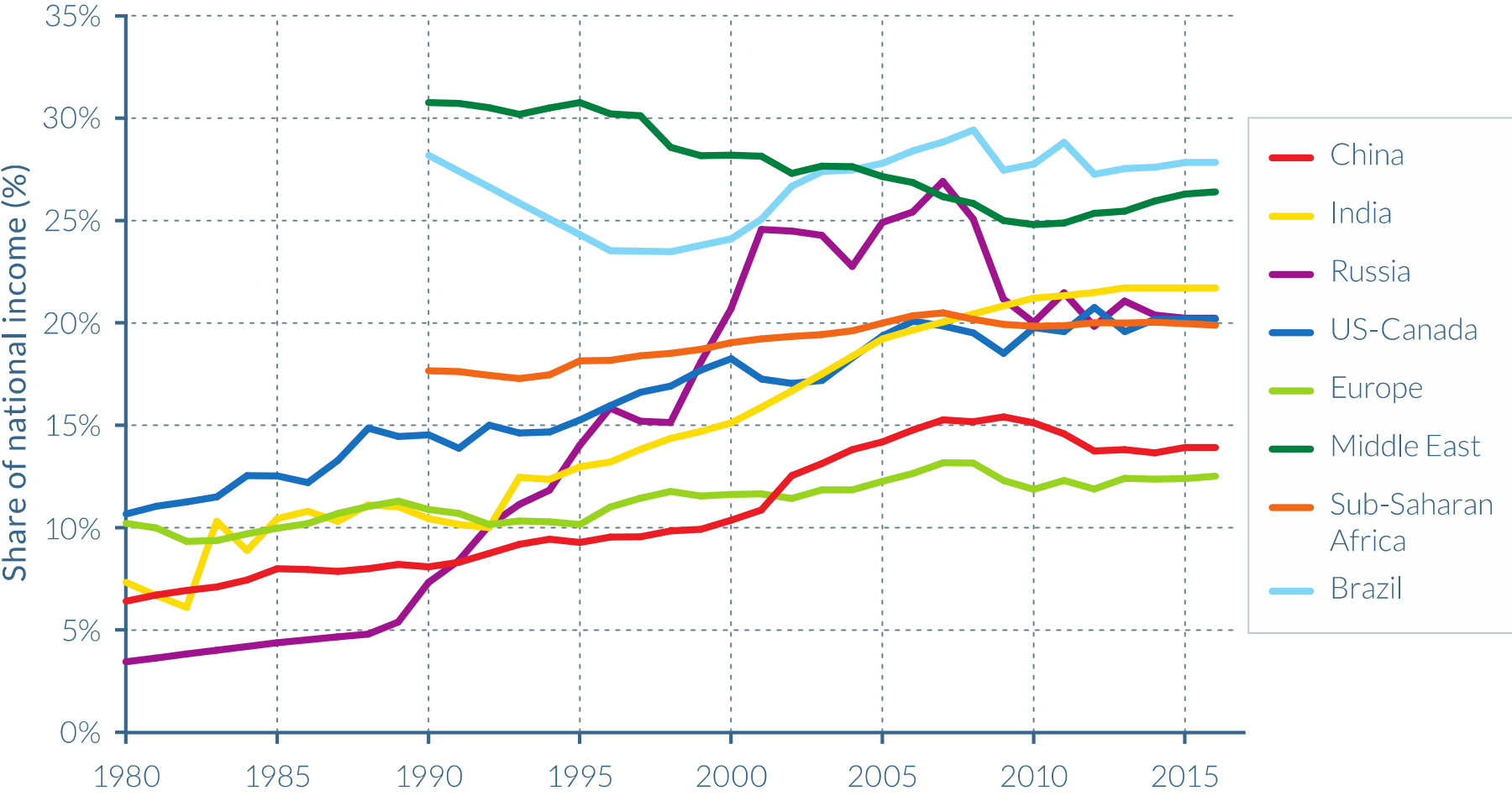
Figure 1c. Top 1% income shares across the world, 2016



Source: WID.world (2017). See wir2018.wid.world for data series and notes.

In 2016, 37% of national income was received by the Top 10% in Europe against 61% in the Middle-East.

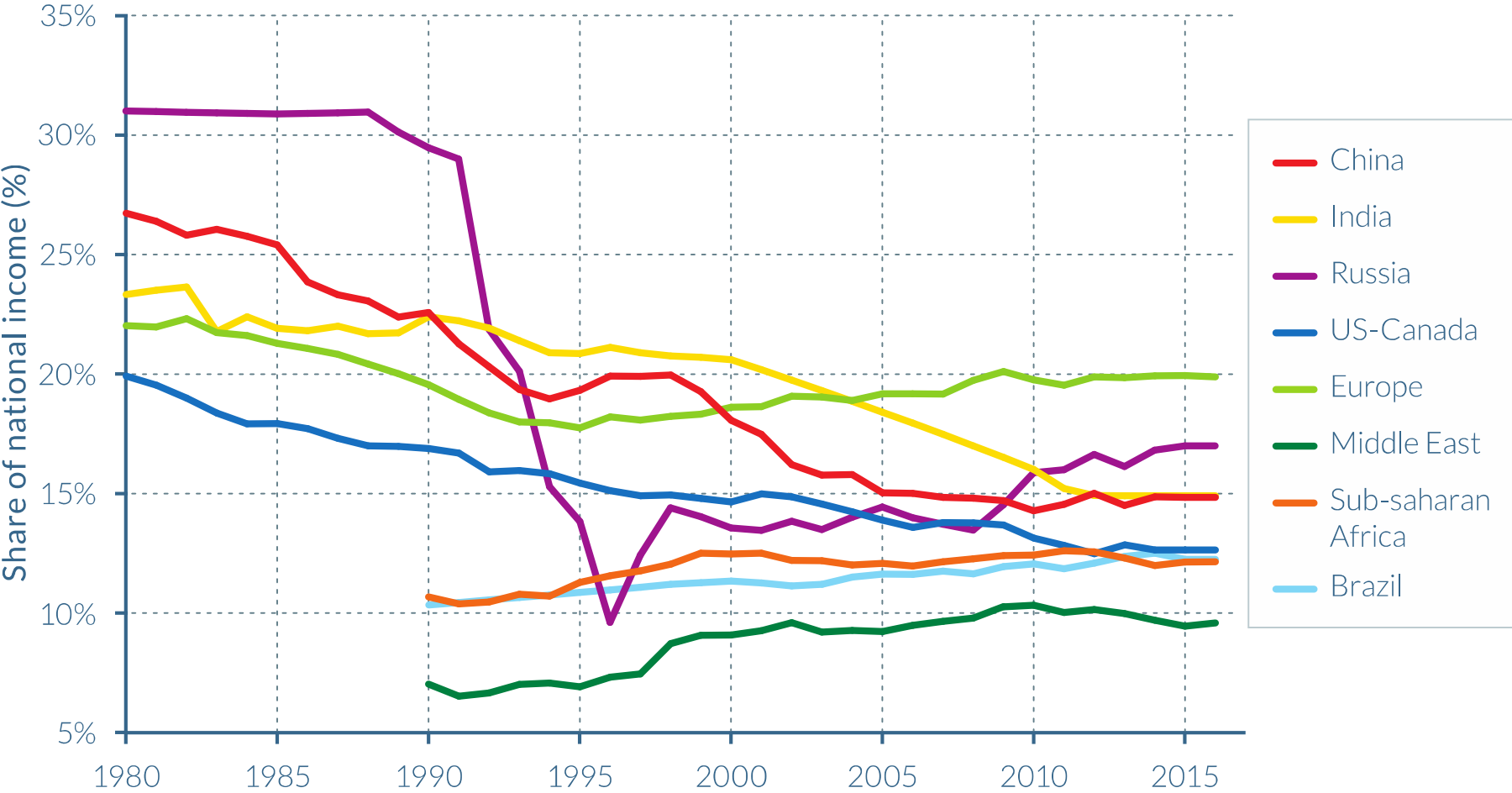
Figure 1d. Top 1% income shares across the world, 2016



Source: WID.world (2017). See wir2018.wid.world for data series and notes.

In 2016, 14% of national income was received by the Top 1% in China.

Figure 1e. Bottom 50% income shares across the world, 1980–2016



Source: WID.world (2017). See wir2018.wid.world for data series and notes.

In 2016, 12% of national income was received by the Bottom 50% in Sub-Saharan Africa.

Table 1. Global income growth and inequality, 1980–2016

	Total cumulative real growth per adult					
Income group	China	Europe	India	Russia	US-Canada	World
Full Population	831%	40%	223%	34%	63%	60%
Bottom 50%	417%	26%	107%	-26%	5%	94%
Middle 40%	785%	34%	112%	5%	44%	43%
Top 10%	1 316%	58%	469%	190%	123%	70%
Top 1%	1 920%	72%	857%	686%	206%	101%
Top 0.1%	2 421%	76%	1 295%	2 562%	320%	133%
Top 0.01%	3 112%	87%	2 078%	8 239%	452%	185%
Top 0.001%	3 752%	120%	3 083%	25 269%	629%	235%

Source: WID.world (2017). See [wir2018.wid.world](#) for data series and notes.

From 1980 to 2016, the average income of the Bottom 50% in China grew 417%. Income estimates are calculated using 2016 Purchasing Power Parity (PPP) euros. PPP accounts for differences in the cost of living between countries. Values are net of inflation.

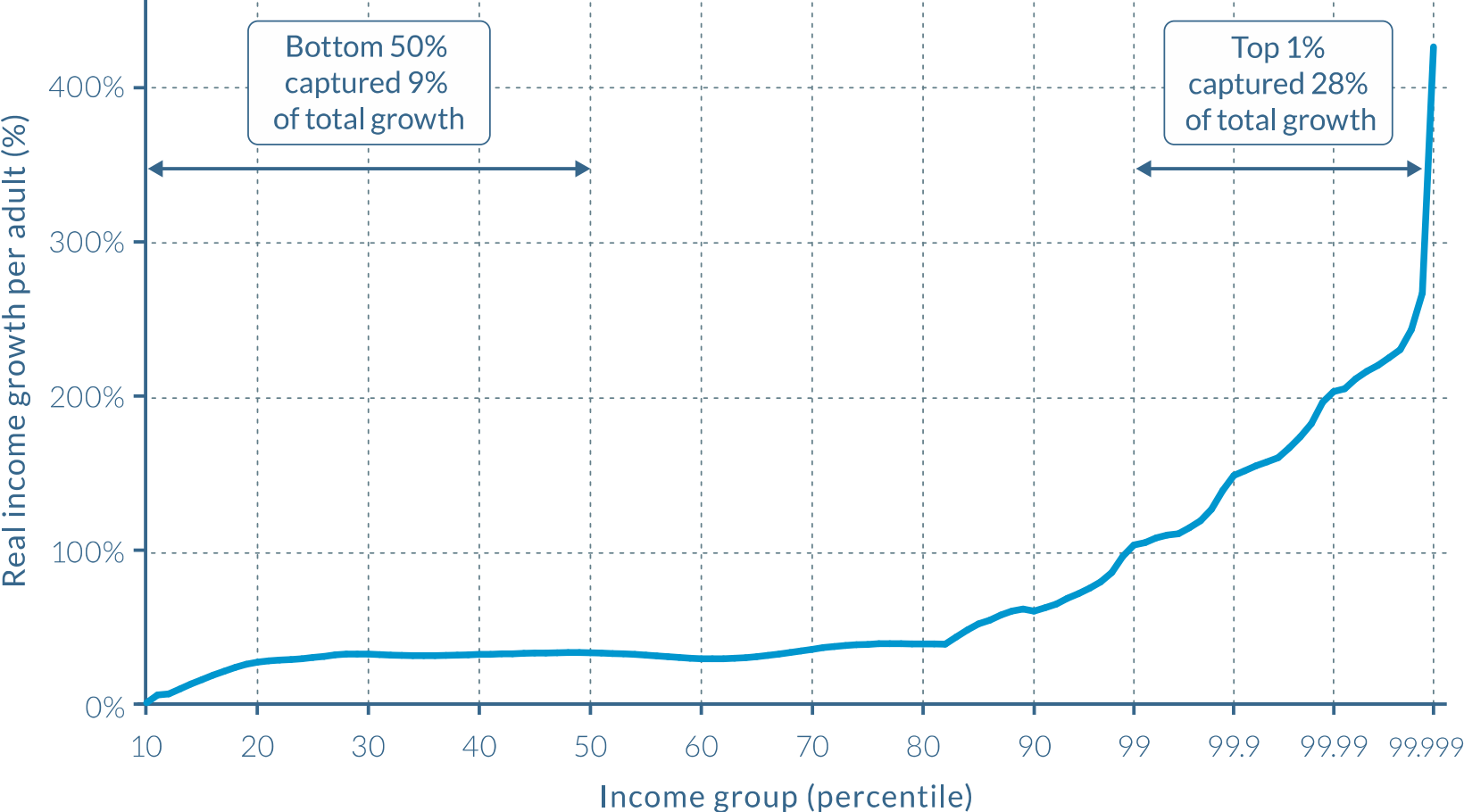
Table 2: Share of growth captured by income groups, 1980–2016

Income group	China	Europe	India	Russia	US-Canada	World
Full Population	100%	100%	100%	100%	100%	100%
Bottom 50%	13%	14%	11%	-24%	2%	12%
Middle 40%	43%	38%	23%	7%	32%	31%
Top 10%	43%	48%	66%	117%	67%	57%
Top 1%	15%	18%	28%	69%	35%	27%
Top 0.1%	7%	7%	12%	41%	18%	13%
Top 0.01%	4%	3%	5%	20%	9%	7%
Top 0.001%	2%	1%	3%	10%	4%	4%

Source: WID.world (2017). See [wir2018.wid.world](#) for data series and notes.

From 1980 to 2016, the Middle 40% in Europe captured 38% of total income growth in the region. Income estimates are calculated using 2016 Purchasing Power Parity (PPP) euros. PPP accounts for differences in the cost of living between countries. Values are net of inflation.

Figure 2. Total income growth by percentile in US-Canada and Western Europe, 1980-2016



Source: WID.world (2017). See wir2018.wid.world for data series and notes.

On the horizontal axis, the world population is divided into a hundred groups of equal population size and sorted in ascending order from left to right, according to each group's income level. The Top 1% group is divided into ten groups, the richest of these groups is also divided into ten groups, and the very top group is again divided into ten groups of equal population size. The vertical axis shows the total income growth of an average individual in each group between 1980 and 2016. For percentile group p99p99.1 (the poorest 10% among the world's richest 1%) growth was 104% between 1980 and 2016. The Top 1% captured 28% of total growth over this period. Income estimates account for differences in the cost of living between countries. Values are net of inflation.

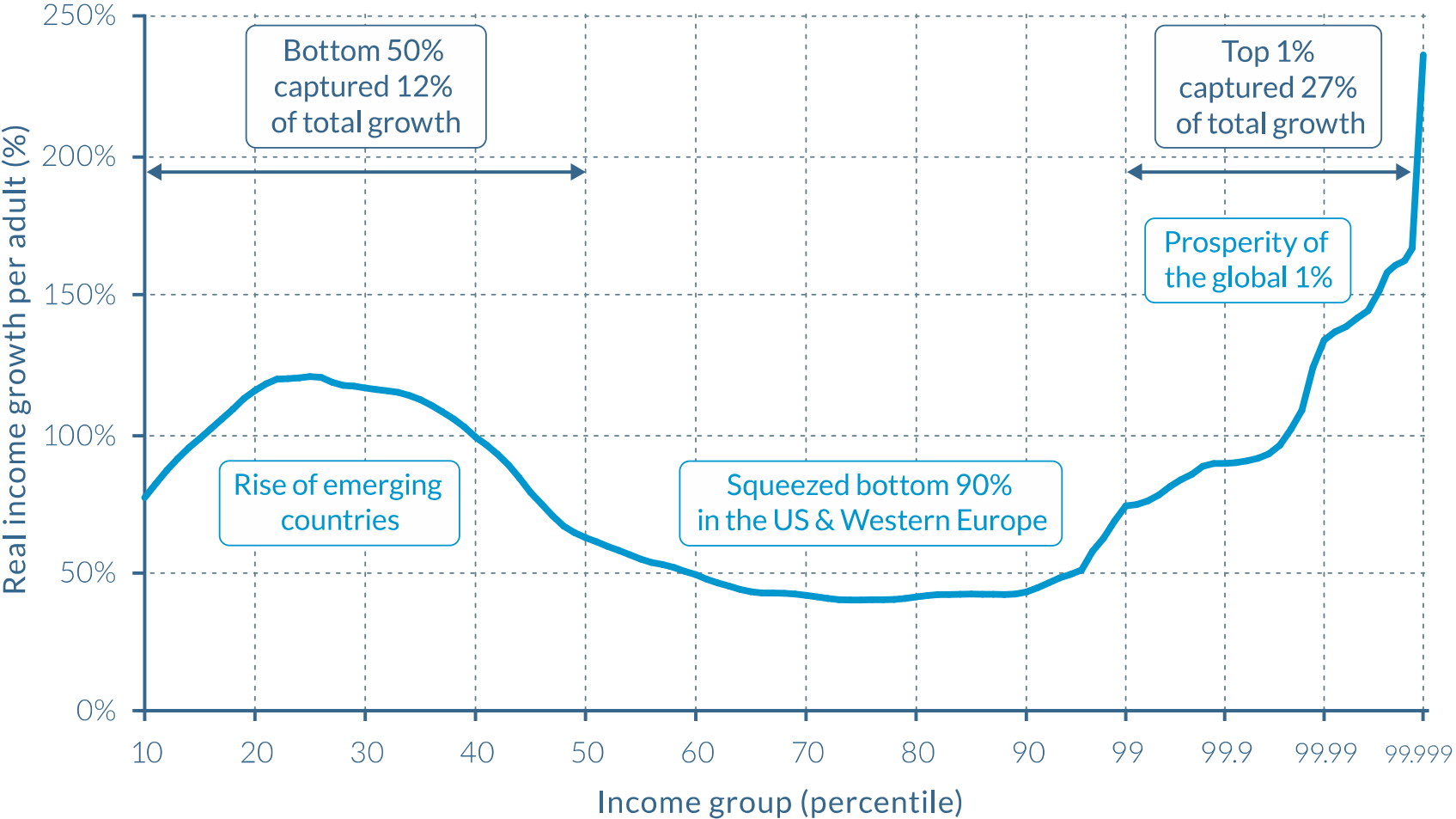
Figure 3. Total income growth by percentile in China, India, US-Canada, and Western Europe, 1980-2016



Source: WID.world (2017). See wir2018.wid.world for data series and notes.

On the horizontal axis, the world population is divided into a hundred groups of equal population size and sorted in ascending order from left to right, according to each group's income level. The Top 1% group is divided into ten groups, the richest of these groups is also divided into ten groups, and the very top group is again divided into ten groups of equal population size. The vertical axis shows the total income growth of an average individual in each group between 1980 and 2016. For percentile group p99p99.1 (the poorest 10% among the world's richest 1%), growth was 77% between 1980 and 2016. The Top 1% captured 23% of total growth over this period. Income estimates account for differences in the cost of living between countries. Values are net of inflation.

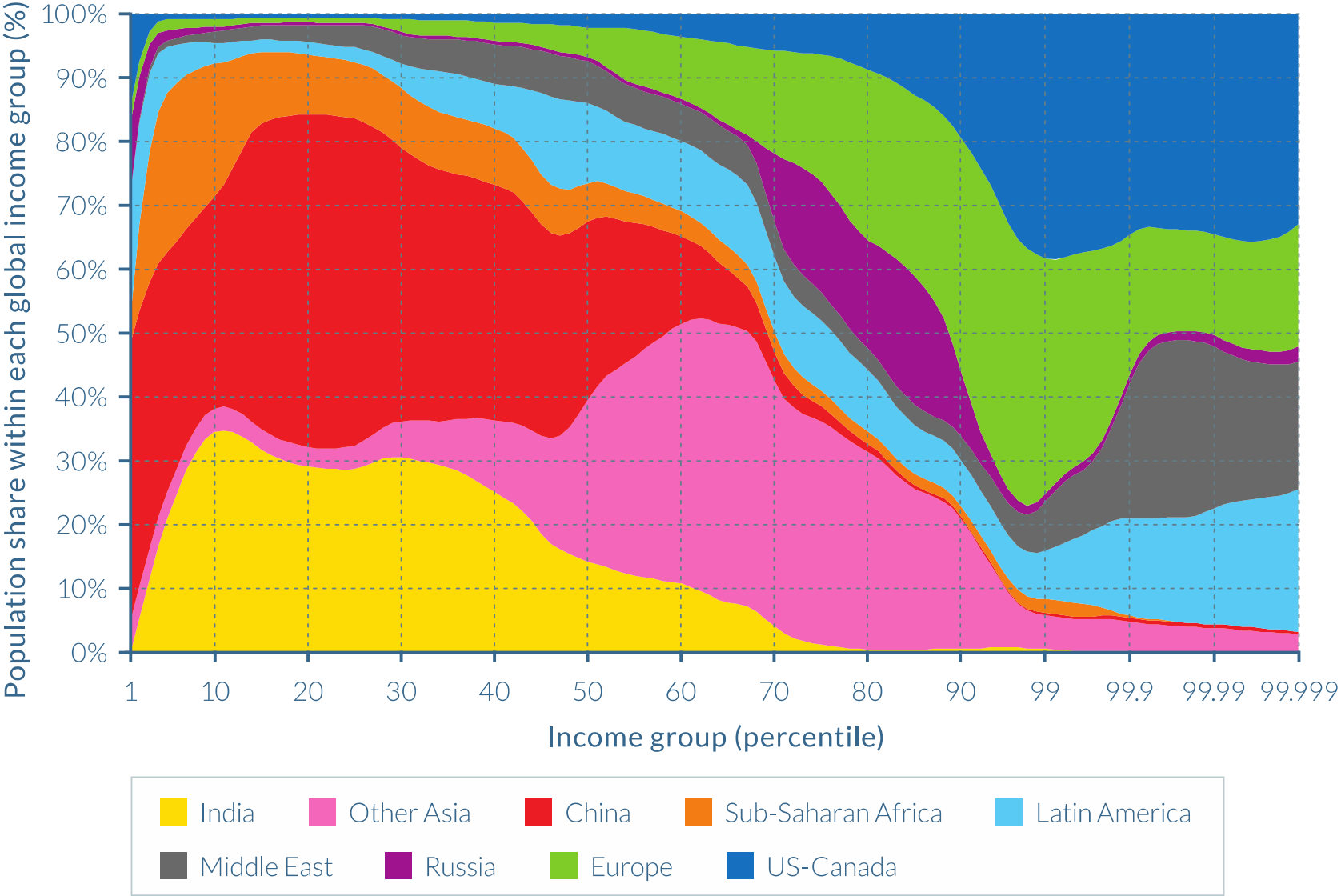
Figure 4. Total income growth by percentile across all world regions, 1980-2016



Source: WID.world (2017). See wir2018.wid.world for more details.

On the horizontal axis, the world population is divided into a hundred groups of equal population size and sorted in ascending order from left to right, according to each group's income level. The Top 1% group is divided into ten groups, the richest of these groups is also divided into ten groups, and the very top group is again divided into ten groups of equal population size. The vertical axis shows the total income growth of an average individual in each group between 1980 and 2016. For percentile group p99p99.1 (the poorest 10% among the world's richest 1%), growth was 74% between 1980 and 2016. The Top 1% captured 27% of total growth over this period. Income estimates account for differences in the cost of living between countries. Values are net of inflation.

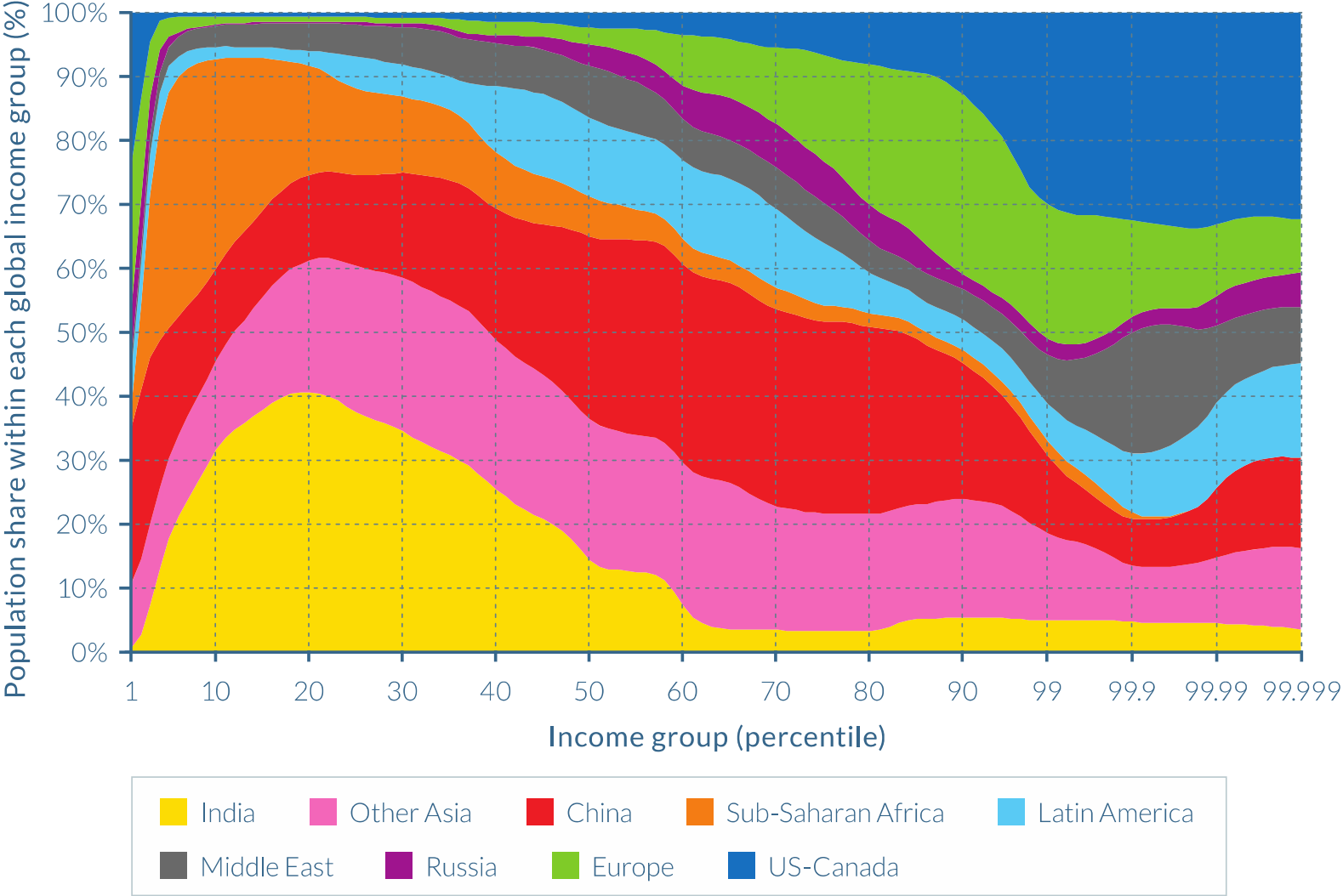
Figure 5. Geographic breakdown of global income groups, 1990



Source: WID.world (2017). See wir2018.wid.world for data series and notes.

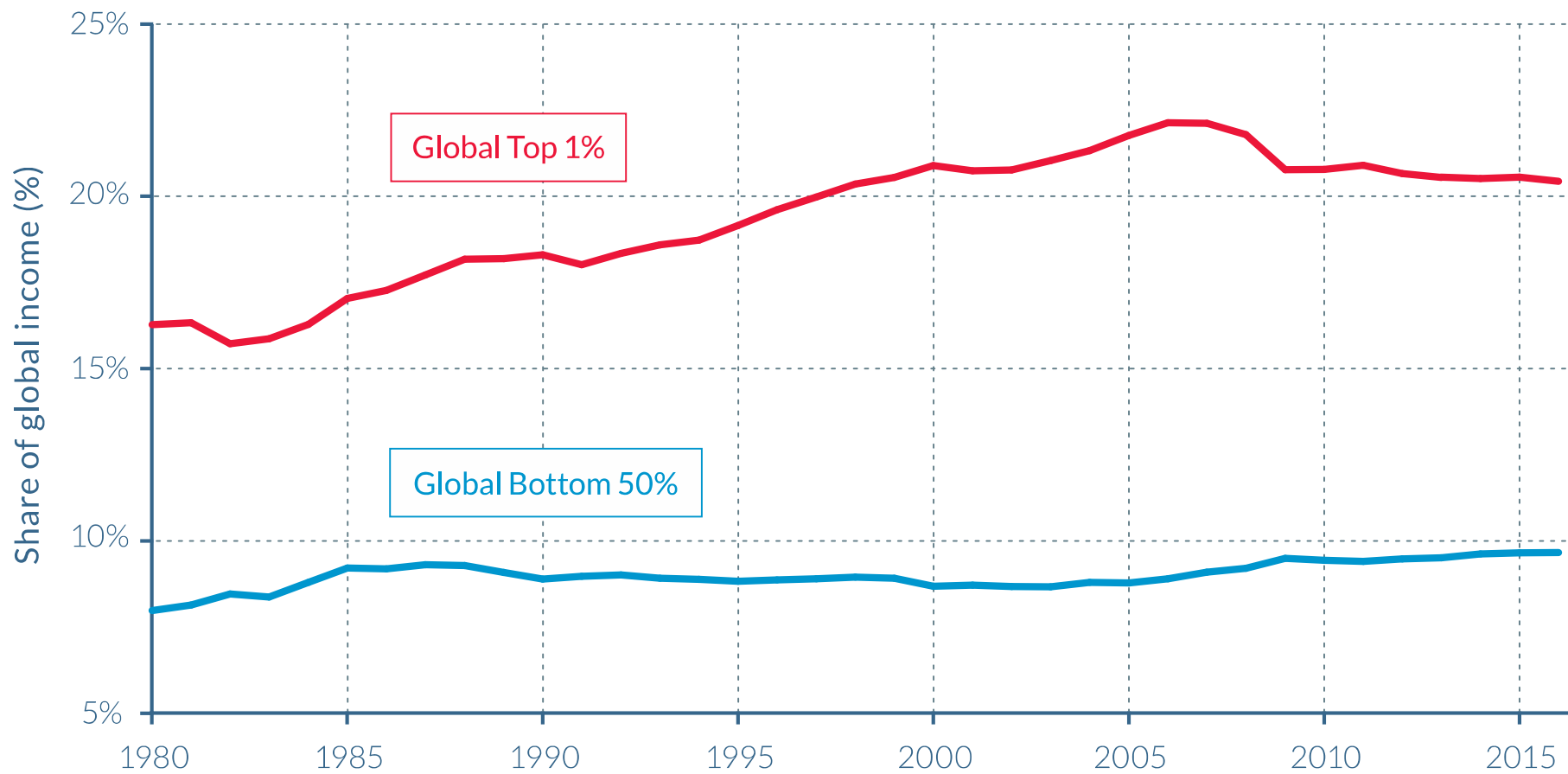
In 1990, 33% of the population of the world's Top 0.001% income group were residents of the US and Canada.

Figure 6: Geographic breakdown of global income groups, 2016



Source: WID.world (2017). See wir2018.wid.world for data series and notes.
 In 2016, 5% of the population of the world's Top 0.001% income group were residents of Russia.

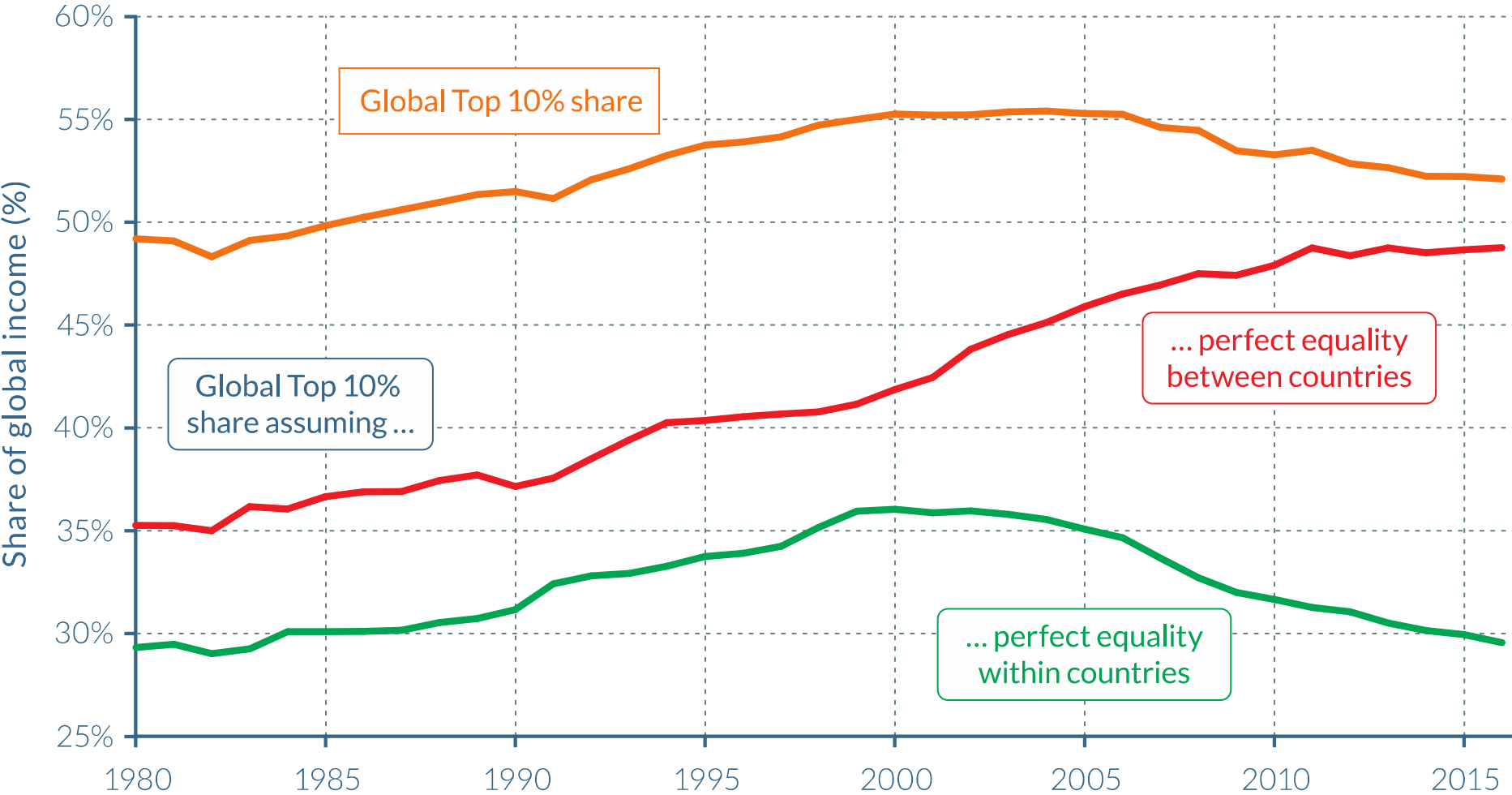
Figure 7: Global top 1% and bottom 50% income shares, 1980–2016



Source: WID.world (2017). See [wir2018.wid.world](#) for data series and notes.

In 2016, 22% of global income was received by the Top 1% against 10% for the Bottom 50%. In 1980, 16% of global income was received by the Top 1% against 8% for the Bottom 50%.

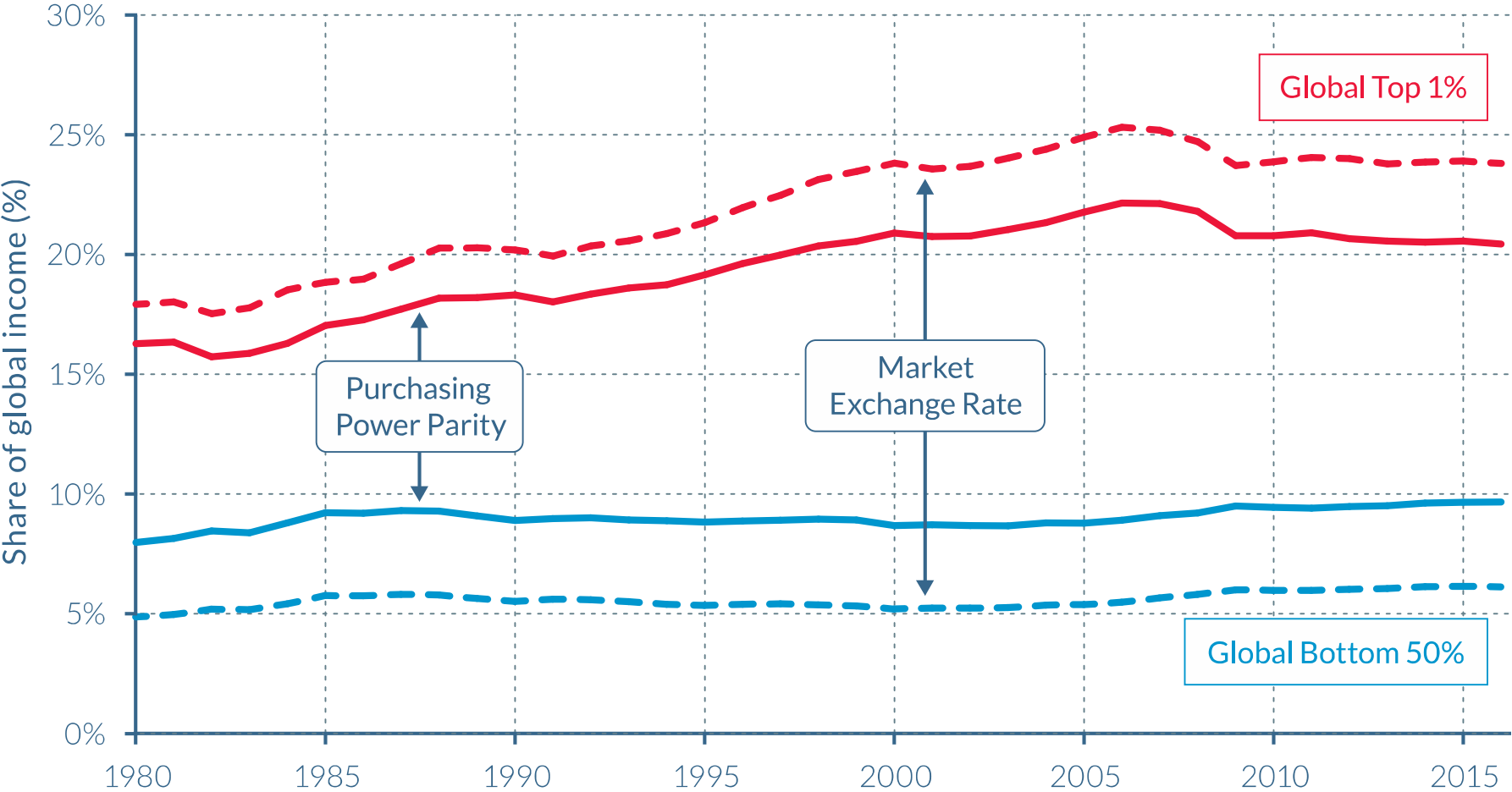
Figure 8. Global top 10% income share, 1980–2016: between versus within-country inequality



Source: WID.world (2017). See wir2018.wid.world for data series and notes.

In 2010, 53% of the world's income was received by the Top 10%. Assuming perfect equality in average income between countries, the Top 10% would have received 48% of global income.

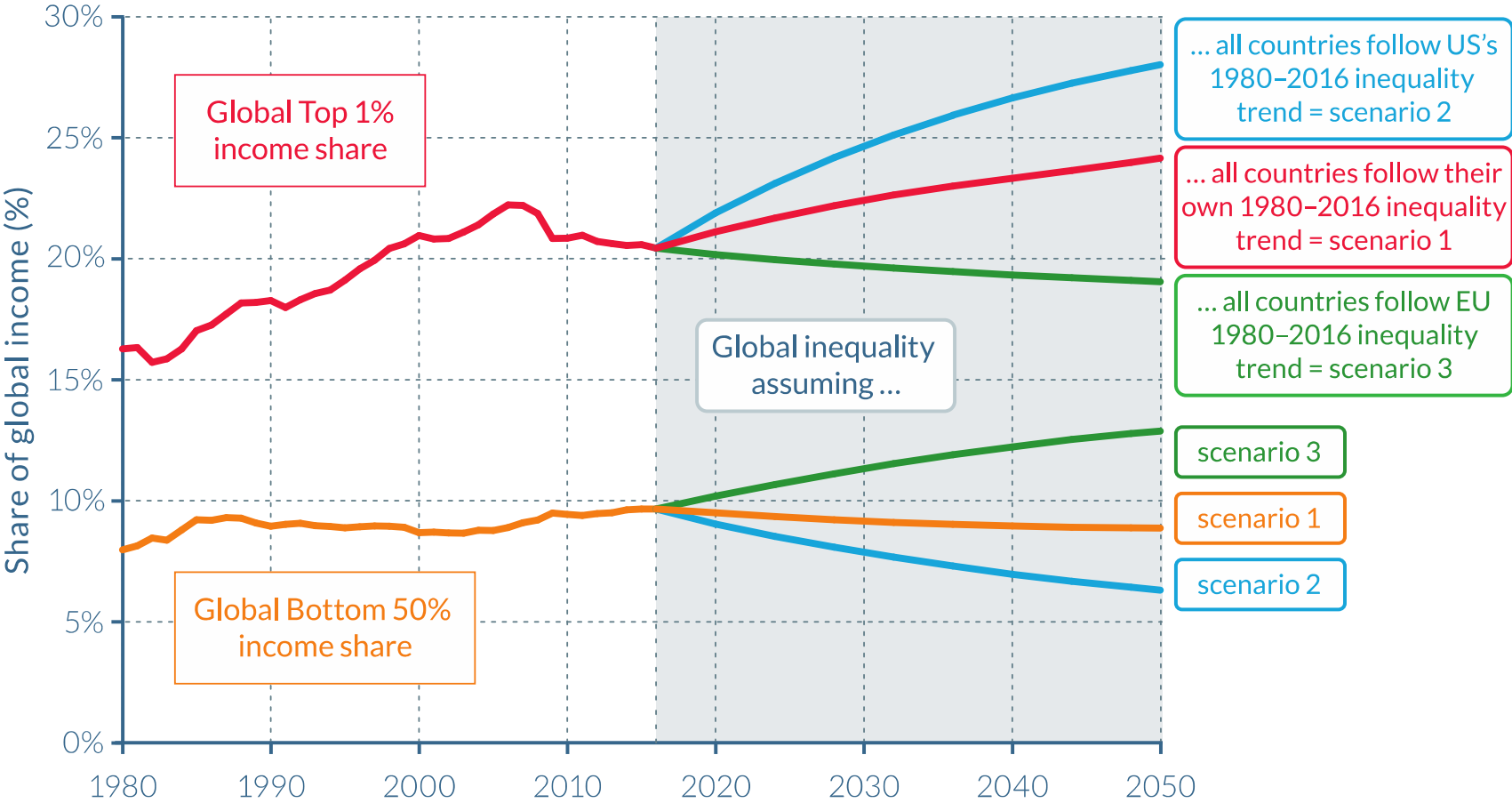
Figure 9. Global top 1% and bottom 50% income shares, 1980–2016 : PPP versus market exchange rates



Source: WID.world (2017). See wir2018.wid.world for data series and notes.

In 2010, the Top 1% received 24% of global income when measured using Market Exchange Rates (MER). When measured using Purchasing Power Parity (PPP), their share was 21%. Thick lines are measured at PPP values, dashed lines at MER values. Income estimates account for differences in the cost of living between countries. Values are net of inflation.

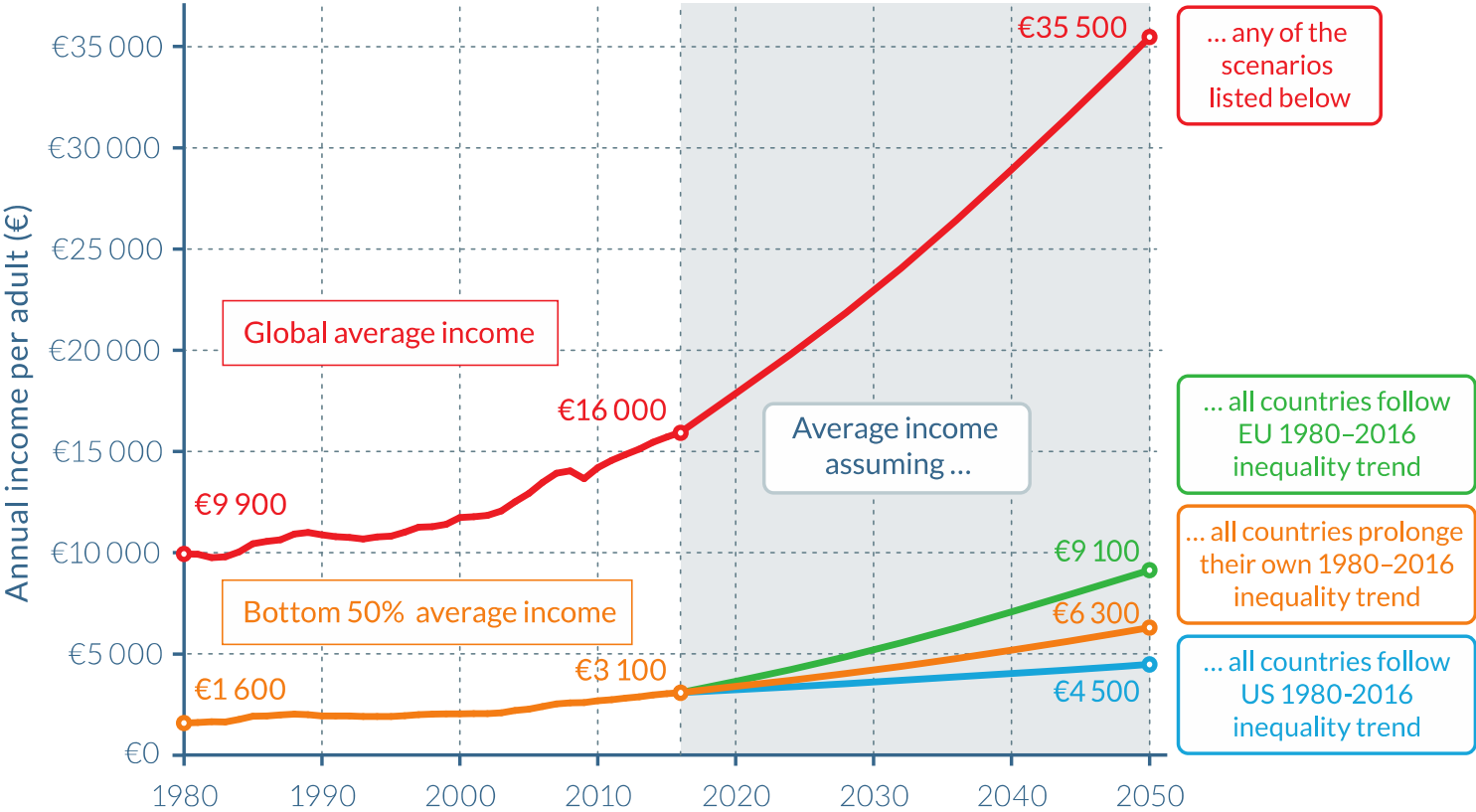
Figure 10. Top 1% versus bottom 50% shares of global income, 1980–2050



Source: WID.world (2017). See wir2018.wid.world for data series and notes.

If all countries follow the inequality trajectory of the US between 1980 and 2016 from 2017 to 2050, the income share of the global Top 1% will reach 28% by 2050. Income share estimates are calculated using Purchasing Power Parity (PPP) euros. PPP accounts for differences in the cost of living between countries. Values are net of inflation.

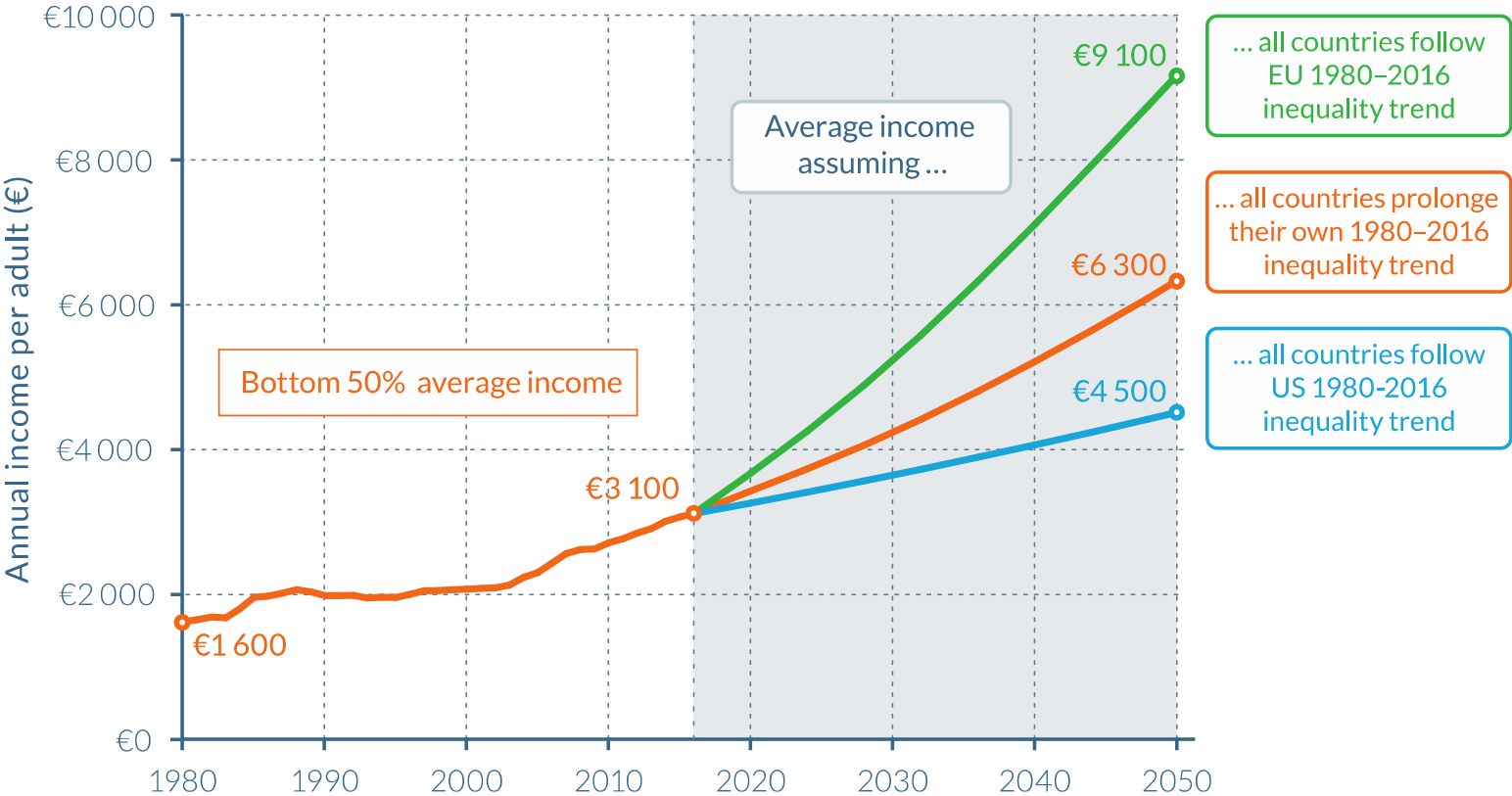
Figure 12. Global average income versus global 50% average, 1980–2050



Source: WID.world (2017). See wir2018.wid.world for data series and notes.

By 2050, the global average income will reach €35 500, compared to €16 000 in 2016. If all countries follow Europe's inequality trajectory between 1980 and 2016, the average income of the Bottom 50% of the world population will be €9 100 by 2050. Income estimates are calculated using Purchasing Power Parity (PPP) euros. For comparison, €1 = \$1.3 = ¥4.4 at PPP. PPP accounts for differences in the cost of living between countries. Values account for inflation.

Figure 13. Global bottom 50% average income, 1980–2050



Source: WID.world (2017). See [wir2018.wid.world](#) for data series and notes.

If all countries follow the inequality trajectory of Europe between 1980 and 2016, the average income of the Bottom 50% of the world population will be €9 100 by 2050. Income estimates are calculated using Purchasing Power Parity (PPP) euros. For comparison, €1 = \$1.3 = ¥4.4 at PPP. PPP accounts for differences in the cost of living between countries. Values are net of inflation.

ⁱ See, for instance, C. Lakner and B. Milanovic, “Global Income Distribution: From the Fall of the Berlin Wall to the Great Recession,” *World Bank Economic Review* 30, no. 2 (2016): 203–232; as well as P. Liberati, “The World Distribution of Income and Its Inequality, 1970–2009,” *Review of Income and Wealth* 61, no. 2 (2015): 248–273;; and I. Ortiz and M. Cummins, “Global Inequality: Beyond the Bottom Billion: A Rapid Review of Income Distribution in 141 Countries,” UNICEF Social and Economic Policy Working Paper, UNICEF, April 2011, https://www.unicef.org/socialpolicy/files/Global_Inequality.pdf. For existing global wealth reports, see the “Global Wealth Report 2016,” Credit Suisse Research Institute, Credit Suisse AG, Zurich, November 2016, <http://publications.credit-suisse.com/tasks/render/file/index.cfm?fileid=AD783798-ED07-E8C2-4405996B5B02A32E>.

ⁱⁱ OECD (2017), GDP long-term forecast. doi: 10.1787/d927bc18-en. Note that the rates we use are voluntarily more optimistic than the rates assumed by the OECD to compute their total global income in 2050 for Africa, Latin America, and Asia. Assuming higher growth rates tends to reduce global inequality. Ours should be seen as a conservative approach to the rise of global inequality in the coming decades.

ⁱⁱⁱ UNDESA (2017) UN Population Prospects. <https://esa.un.org/unpd/wpp/>. Note that we use the medium variant of the UN prospects.

^{iv} These projections may be done at the level of regions rather than of countries, when there are not sufficiently detailed data over the 1980-2016 period.

^v Lakner and Milanovic, “Global Income Distribution: From the Fall of the Berlin Wall to the Great Recession.”