# GLOBAL INCOME INEQUALITY BY 2050: CONVERGENCE, REDISTRIBUTION, AND CLIMATE CHANGE

PHILIPP BOTHE
LUCAS CHANCEL
AMORY GETHIN
CORNELIA MOHREN

WORKING PAPER N°2025/09

UPDATED VERSION
APRIL 2026

WORLD INEQUALITY LAB

# Global Inequality by 2050: The Role of Redistribution and Climate Change

Philipp Bothe, Lucas Chancel, Amory Gethin, Cornelia Mohren*

April 3, 2026

**Abstract**

This article investigates how national income convergence, redistribution, and climate change will shape the world distribution of income until 2050, using a novel source of data on global inequality before and after taxes. Despite ongoing convergence in national income, the global bottom 50% post-tax income share only marginally rises from 9.7% to 11.1% under "business-as-usual", while the top 1% share increases by 0.5 percentage points. Yet, if countries were to adopt the most effective redistribution policies implemented by the best performers in their respective country income group, the global bottom 50% income share could increase to 20%. Redistribution of pre-tax incomes accounts for 60% of this increase, with the remainder due to post-tax redistribution. Climate change is set to exacerbate inequalities, potentially offsetting all the increase in the global bottom 50% share since 1980.

**JEL Codes:** D31, E01, H23, H50, I38, Q54
**Keywords:** Income Inequality, Redistribution, Climate Change

*The authors acknowledge support from a European Union Horizon 2020 grant (WISE Horizons #101095219) as well as from a United Nations Development Program grant (#01000250 – SDG Integration). Philipp Bothe acknowledges support from a French government subsidy managed by the Agence Nationale de la Recherche (ANR) under the framework of the "Investissements d'avenir programme" (ANR-17-EURE-001). Philipp Bothe: Paris School of Economics, philipp.bothe@psemail.eu; Lucas Chancel: Sciences Po and Paris School of Economics, lucas.chancel@sciencespo.fr; Amory Gethin: The World Bank, Washington, DC, USA, amory.gethin@gmail.com; Cornelia Mohren: Sciences Po and Paris School of Economics, cornelia.mohren@sciencespo.fr. We are grateful for the outstanding research assistance provided by Stella Muti. We also thank Ishan Nath for providing data on climate damage estimates, as well as Thomas Piketty and members of the World Inequality Lab for their valuable comments on earlier versions of this paper. The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors. They do not necessarily represent the views of the International Bank for Reconstruction and Development/World Bank and its affiliated organizations, or those of the Executive Directors of the World Bank or the governments they represent.

## 1 Introduction

What will global income inequality look like in 2050? Will the economic catch-up of developing countries lead to a more equitable global distribution? Or will the continued rise of top incomes sustain or even exacerbate current levels of inequality? To what extent can national-level public policy shape these outcomes? The dynamics of global income inequality have attracted considerable attention over the past decades (Bourguignon and Morrisson, 2002; Anand and Segal, 2008; Lakner and Milanovic, 2016; Alvaredo et al., 2018; Patel et al., 2021), yet its future evolution remains uncertain. This paper contributes to this debate by providing new, systematic projections of global inequality under a range of redistribution and climate scenarios.

Over the past 20 years, global inequality has stabilized at a high level. Before taxes and transfers, the richest 1% of the world's population earn around 20% of total pre-tax income, while the bottom half receive about 8.5%. In other words, an individual in the top 1% earns over a hundred times the average income of an individual in the bottom 50%.

Although the 2000s and 2010s witnessed some increase in the global income share of the bottom 50% and middle 40% due to convergence in national incomes, this improvement has been relatively modest by historical standards (Chancel and Piketty, 2021). Moreover, the rise in within-country inequality has offset much of the impact of between-country convergence. Consequently, absent substantial redistribution within countries, the future trajectory of global inequality remains unclear. The extent to which climate change might exacerbate existing inequalities adds another layer of uncertainty.

This paper develops novel estimates of the future trajectories of global income inequality by combining the most recent information on pre- and post-tax inequality from the World Inequality Database with projections of national income and population growth. We simulate the evolution of income shares and growth rates across global income groups under alternative assumptions about within-country growth incidence and the progressivity of national tax-and-transfer systems. In doing so, our approach builds on and extends existing work on income inequality projections within the framework of the Shared Socioeconomic Pathways (SSPs) (Rao et al., 2019; Narayan et al., 2023). In addition, we assess the potential distributional consequences of climate change for global inequality.

Our projections suggest that, although rapid economic growth in developing countries will modestly raise the average income of the global bottom 50%, rising within-country inequality will continue to disproportionately benefit the global top 1%. Consequently, overall global income inequality is projected to remain largely unchanged relative to 2023 in a business-as-usual scenario.

Policies targeting within-country inequality through changes in tax-and-transfer systems appear insufficient on their own to significantly alter global income inequality. Instead, substantial reductions in pre-tax inequality will be required to reshape future inequality. This result underscores the critical role played by "pre-tax redistribution" in shaping the long-run evolution of the income distribution, in line with recent contributions on the subject (Blanchet et al., 2022; Bozio et al., 2024). Our results show that if all countries were to align both growth incidence and post-tax redistribution with the most progressive profiles in their country income groups, the global bottom 50% income share could double by 2050, reaching more than 20% (post taxes and transfers). At the same time, the distributional consequences of climate change are projected to counteract this effect, potentially offsetting all gains in bottom income shares from income convergence between countries observed in recent decades.

## 2 Concepts and Data

### 2.1 Concepts

**Pre-tax and Post-tax Redistribution.** This article examines the impact of government interventions on inequality within countries and globally. Government policies can influence the national income distribution through various stages (Rodrik and Stantcheva, 2021): the pre-production phase (e.g., educational programs for low-income children), the production phase (e.g., minimum wage policies), and the post-production phase (e.g., taxation and cash transfers). The post-production phase is commonly referred to as "redistribution," while the first two stages are often termed "predistribution" (Hacker, 2011).

A notable issue with the redistribution and predistribution dichotomy is its polysemy. For example, increased government spending on public education and health has been classified as redistribution by some (Lustig and Pessino, 2014) and as predistribution, at least partially, by others (Rodrik and Stantcheva, 2021). In addition, policies affecting the distribution of incomes (or wealth) before taxes have also been labelled "redistributive" policies (Freeman, 1996). Indeed, a minimum wage has the power to redistribute incomes from rich to poor between time t and time t+1. Changes in private property regimes and other shocks affecting income and wealth before taxes have also been referred to as a form of "redistribution" (Piketty, 2020). One example is the case of land, with a relatively large literature on "land redistribution" (Binswanger-Mkhize et al., 2009; Finley et al., 2021). As a result, using the term redistribution to focus only on the restricted effect of government action on post-tax incomes may lead to confusion.

To clarify terminology, we propose to use "pre-tax redistribution" and "post-tax redistribution" to encompass all forms of government interventions that affect the distribution of income and wealth. Pre-tax redistribution encompasses all government policies affecting the distribution of income during the pre-production and production phases. This concept aligns with what has been referred to as "predistribution" (Blanchet et al., 2022). Post-tax redistribution encompasses all policies that modify income in the post-production phases via the direct effect of taxes and transfers on post-tax incomes.[1]

### 2.2 Data

We mobilize the World Inequality Database (WID), which contains annual series on national income, pre-tax and post-tax income inequality, and demographics in 146 countries since 1980. National income series are based on data from national statistical institutes, macroeconomic data from the United Nations System of National Accounts, and other historical archives (Alvaredo et al., 2020). Pre-tax and post-tax income inequality series are constructed by combining household surveys, income tax data, tax simulation tools, and existing fiscal incidence studies (Fisher-Post and Gethin, 2023). They are constructed in accordance with the DINA framework, which ensures that all income flows, taxes, and transfers are allocated to individuals, aligning the distributions of both pre-tax and post-tax incomes with total national income. The data are available for 127 generalized percentiles, including each percentile within the bottom 99% (p0p1 to p98p99), followed by a more detailed decomposition of incomes within the top 1%. Henceforth, we use the term percentiles to refer to these generalized percentiles. Our historical dataset thus contains a total of about 800,000 country-level-percentile observations from 1980 to 2023. Based on this database, we construct global pre-tax and post-tax income distributions in each year by ranking all country-percentiles in the world and combining them with population estimates available in each country.

We derive projections of economic and population growth through 2050 from the Shared Socioeconomic Pathways (SSPs) (Riahi et al., 2017). The SSPs consist of narrative frameworks describing broad socio-economic developments over the coming decades, accompanied by quantitative projections of population and GDP growth. Our analysis primarily relies on projections of population and GDP from SSP2 ("Middle of the Road"), a scenario in which global social, economic, and technological trends broadly follow historical patterns (Fricko et al., 2017). We use GDP projections from Crespo Cuaresma (2017) and population projections from KC et al. (2024), as provided in Release 3.1 of the SSP database hosted by IIASA.[2] It is important to note that our projections pertain to national income (NI), which we assume grows at the same rate as projected GDP. As we will demonstrate later, assumptions about economic and population growth are pivotal in shaping our projections of between-country inequality. To assess the robustness of our findings, we briefly explore the implications of alternative SSP scenarios in Section 4.2, and examine them in greater detail in Supplemental Appendix Section A.3.

## 3 Stylized Facts about Global Inequality

**The Evolution of Global Pre-Tax Inequality.** Global pre-tax inequality has risen since 1980 and has stabilized at high levels in recent years (Alvaredo et al., 2018; Chancel et al., 2022). The share of the richest 1% before taxes and transfers rose from 17% in 1980 to more than 21% in the early 2000s, before oscillating around 20% since then.[3] Meanwhile, the global bottom

[1] All definitions and concepts are in line with those defined in the Distributional National Accounts project (Alvaredo et al., 2020).
[2] https://data.ece.iiasa.ac.at/ssp
[3] See Supplemental Appendix Figure A.2a.

50% income share increased from about 6.2% in 1980 to 8.7% in 2023, mostly due to the rise of China and India. For most groups between the bottom 50% and the top 1%, growth has been comparatively sluggish, reflecting the low-income gains experienced by the majority of income earners in Europe and North America.[4]

**The Growing Importance of Within-Country Inequality.** These trends are the product of two opposing forces. On the one hand, recent decades have witnessed a slight decline in between-country inequality, driven by the high growth and catch-up of China and other emerging countries. On the other hand, within-country inequality has risen sharply in the Anglosphere, Russia, China, and India, while it has stabilized at high levels in the most unequal regions in the world, especially in South Africa, Brazil and the Middle East (Alvaredo et al., 2018). As a result, the role of within-country inequality in shaping the world distribution of income has considerably increased. These dynamics can be well captured through a Theil index decomposition: according to this measure, within-country inequality accounted for 42% of global inequality in 1980, compared to 65% in 2023.[5]

To put it another way, consider two counterfactual scenarios with either no between-country inequality or no within-country inequality. In the first scenario, eliminating cross-country income differences would have increased the global bottom 50% share by 14 percentage points in 1980, but only around 6 points in 2023. In the second scenario, erasing within-country inequalities would have raised the bottom 50% share by 3 percentage points in 1980, compared to 15 points in 2023. A similar pattern can be seen for the top 1%.[6]

**The Dominant Role of Pre-Tax Redistribution.** The rise of within-country inequality raises the question of the role played by pre-tax and post-tax redistribution in shaping long-run inequality dynamics. Two key results arise from the data. First, the impact of tax-and-transfer systems on inequality (post-tax redistribution) has increased markedly. Taxes and transfers reduced the ratio of the average income of the world's richest 10% to that of the bottom 50% by 10% in 1980, compared to 19% in 2023. Second, post-tax inequality remains high nonetheless: after taxes and transfers, the top 1% still captured more than 17% of global income in 2023, while the bottom 50% received less than 10%.[7] This means that an individual in the top 1% earned about 89 times more than an individual in the bottom 50% in terms of post-tax income, compared to 120 times more in terms of pre-tax income.

The main reason for the relatively modest impact of post-tax redistribution policies on global inequality is that pre-tax inequality within countries is correlated with both their national income and post-tax inequality levels (Fisher-Post and Gethin, 2023). This implies that countries that are extremely unequal before taxes and transfers are also extremely unequal after taxes and transfers.[8]

## 4 Global Inequality Projections, 2024-2050

In this section, we use the evidence on historical trends to project global income inequality through 2050 under different pre-tax and post-tax redistribution scenarios. We describe our methodology in Section 4.1 before presenting the projections in Section 4.2. We discuss the robustness of our results to different assumptions on income and population growth as well as different reference periods for the projections in Supplemental Appendix Section A.3.

### 4.1 Methodology

**Business-As-Usual.** We start by generating a set of plausible trajectories of global income inequality until 2050 based on different assumptions regarding the evolution of pre-tax and post-tax inequality within countries. National income and population growth follow the trajectories consistent with the Shared Socioeconomic Pathways (SSPs). Our main results employ growth and population projections consistent with SSP2.[9] We project the evolution of absolute pre- and post-tax income of

[4]See Figure 3.

[5]See Supplemental Appendix Figure A.2b.

[6]See Supplemental Appendix Figure A.3.

[7]See Supplemental Appendix Figure A.2.

[8]As shown in Supplemental Appendix Figure A.4, the regions with the highest top 10% to bottom 50% pre-tax ratios exhibit a smaller reduction in this ratio when post-tax redistribution systems are accounted for.

[9]Supplemental Appendix Figure A.21 illustrates the sensitivity of our results to different SSP trajectories.

each country-level percentile individually for the period 2024-2050.

The business-as-usual (BAU) scenario assumes that each percentile $p$ captures the same share of national income growth as over 2000-2023. That is, we fix the distribution of growth within countries and allocate aggregate national income growth according to the historically observed distribution of growth in each country.[10] Hence, total pre-tax income of percentile $p$ in country $c$ belonging to a country income group $g$ in year $t$ is computed as:

$$y_{pcgt} = y_{pcgt-1} + \delta_{pcg}(Y_{cgt} - Y_{cgt-1}) \tag{1}$$

where $Y_{cgt}$ denotes national income in country $c$ and country income group $g$ in year $t$ and $\delta_{pcg}$ is the share of growth captured by percentile $p$ in country $c$ and country income group $g$ over the 2000-2023 period.

As for post-tax income, the comprehensive data collection effort conducted by Fisher-Post and Gethin (2023) enables us to compute effective post-tax redistribution as the difference between pre-tax and post-tax income by percentile for all countries in our sample. In the BAU, we assume that the share of national income redistributed to a given percentile within a country will continue to follow the same trend as in the baseline period. That is, post-tax income $r_{pcgt}$ is computed as:

$$r_{pcgt} = y_{pcgt} + \eta_{pcgt} Y_{cgt} \tag{2}$$

with $\eta_{pcgt} = \eta_{pcgt-1}(1 + g^{\eta}_{pcg})$ the share of national income redistributed to/from percentile $p$ growing at the same percentile-country specific average growth rate $g^{\eta}_{pcg}$ as observed over 2000-2023.[11] Per capita incomes of percentile $p$ are then simply obtained as $\tilde{y}_{pcgt} = \frac{y_{pcgt}}{N_{pcgt}}$ and $\tilde{r}_{pcgt} = \frac{r_{pcgt}}{N_{pcgt}}$, where $N_{pcgt}$ is the population of percentile $p$ in country $c$ and country income group $g$ at time $t$.

Note that by definition:

$$\sum_{p=1}^{127} y_{pcgt} = \sum_{p=1}^{127} r_{pcgt} = Y_{cgt} \quad , \quad \sum_{p=1}^{127} \delta_{pcg} = 1 \;\text{ and }\; \sum_{p=1}^{127} \eta_{pcgt} = 0. \tag{3}$$

The procedure described above generates a path of pre-and post-tax income for each country-percentile until 2050 that mirrors the structure of the observed historical evolution of the income distribution in each country. Based on these projected country-level distributions, we then generate the global distribution of pre- and post-tax income in each year.

In addition to pre-tax and post-tax redistribution, population growth emerges as a crucial factor influencing global inequality trends. Specifically, as a given country experiences comparatively rapid population growth, its impact on global pre-tax and post-tax inequality dynamics becomes relatively more important. Additionally, changes in population size mechanically affect the income distribution by altering the size of global percentiles. For instance, under certain conditions, even if all country-level percentiles experience inequality-neutral income growth, the share of income held by the global top 1% might still decrease, simply because more country-level percentiles are now included in this top income bracket. This drives down the top 1% income share as relatively less affluent country-level percentiles will find themselves represented in an increasingly large top bracket. We distinguish these factors driving the projection results below.

**Policy Scenarios.** Building on the BAU scenario, we run several policy scenarios to simulate the effects of changing pre-tax and post-tax redistribution profiles on global inequality. Each scenario introduces different assumptions on growth incidence ($\delta_{pcg}$) and the net share of taxes and transfers received/paid by a given percentile as a fraction of national income ($\eta_{pcgt}$).

More precisely, we assume that countries converge to the pre- and post-tax redistribution patterns of leaders within their country income group, following the World Bank classification into low-income, lower-middle-income, upper-middle-income,

[10] If the growth rate of NI between 2000 and 2023 is not strictly positive, future growth is assumed to be inequality neutral. If the growth rate of NI from 2000-2023 is strictly positive, but the growth rate of pre-tax income for a percentile $p$ is not, the future share of growth captured by this percentile is assumed to be 0, and growth captured by other percentiles is rescaled accordingly.

[11] Note that this procedure can induce rank shifts in the within-country distributions. We thus rerank all percentiles below the top 1% in every country in each period.

and high-income countries (World Bank, 2024) (see also Figure A.1). This grouping reflects the premise that countries at similar levels of economic development share comparable institutional capacity to implement redistributive policies (Lindert, 2004). We acknowledge that this grouping nonetheless brings together countries with quite heterogeneous redistribution profiles and institutional settings today. In the Supplemental Appendix, we therefore present results from policy scenarios using convergence to regional rather than income group leaders and find qualitatively similar impacts on global inequality.

In the pre-tax redistribution scenario, we construct a synthetic growth incidence profile for each country income group, defined as average pre-tax redistribution across the three most equal countries. These leaders are identified as the countries with the highest bottom 50% pre-tax income shares in 2050 under the BAU. We then let all other countries within the same income group adopt this synthetic growth incidence profile: $\delta_{pcg} = s^*_{pg2050}$ with $s^*_{pg2050}$ the average pre-tax income share of percentile $p$ in the three most equal countries within an income group $g$ in 2050. In other words, we assume that the distribution of pre-tax income growth will lead each country to gradually converge towards the pre-tax inequality levels observed in the most equal countries in their country income group.

Similarly, the post-tax redistribution scenario identifies the three countries within each country income group that redistribute the highest share of national income to the bottom 50% in 2050 under BAU. We then let all countries within a group converge to these synthetic post-tax redistribution profiles over the projection period so that $\eta_{pcg2050} = \eta^*_{pg2050}$. This means that all countries within a country income group that are not among the most redistributive gradually increase the progressivity of their tax-and-transfer system to eventually adopt a common profile. The country leaders in our policy scenarios are presented in Supplemental Appendix Tables A.2 and A.3. Such a scenario could, in principle, lead to historically unprecedented post-tax redistribution from the top of the income distribution while disregarding the political and institutional feasibility of such redistribution policies. To avoid such cases, we constrain post-tax redistribution from the top 10% within each country to not exceed historical precedents. Practically, let

$$u_{pcgt} = \frac{r_{pcgt} - y_{pcgt}}{y_{pcgt}} \tag{4}$$

be the income change of a given country-level percentile through post-tax redistribution, and let

$$\bar{u}_{pg} = \min_{\substack{c,t \\ t<2024}} u_{pcgt} \quad \forall\, p \geq 90 \tag{5}$$

be the historical minimum of this ratio within income group $g$ for the top of the income distribution. The constraint then simply imposes $u_{pcgt} \geq \bar{u}_{pg}$ for all $p \geq 90$. This is equivalent to imposing $\eta_{pcgt} \geq \bar{u}_{pg} \cdot \frac{y_{pcgt}}{Y_{cgt}}$ for all $p \geq 90$. The effective post-tax redistribution share is then given by $\eta_{pcgt} = \max\left(\eta^*_{pg2050},\ \bar{u}_{pg} \cdot \frac{y_{pcgt}}{Y_{cgt}}\right)$ for all $p \geq 90$.[12]

In the combined scenario, finally, we assume that countries adopt both pre-tax and post-tax redistribution convergence scenarios. Note that income changes induced by the two scenarios are not necessarily additive as they induce different dynamics of pre-tax and post-tax inequality within countries. As discussed above, we also show robustness of our main results when countries converge to regional rather than income group best performers (Figure A.23).

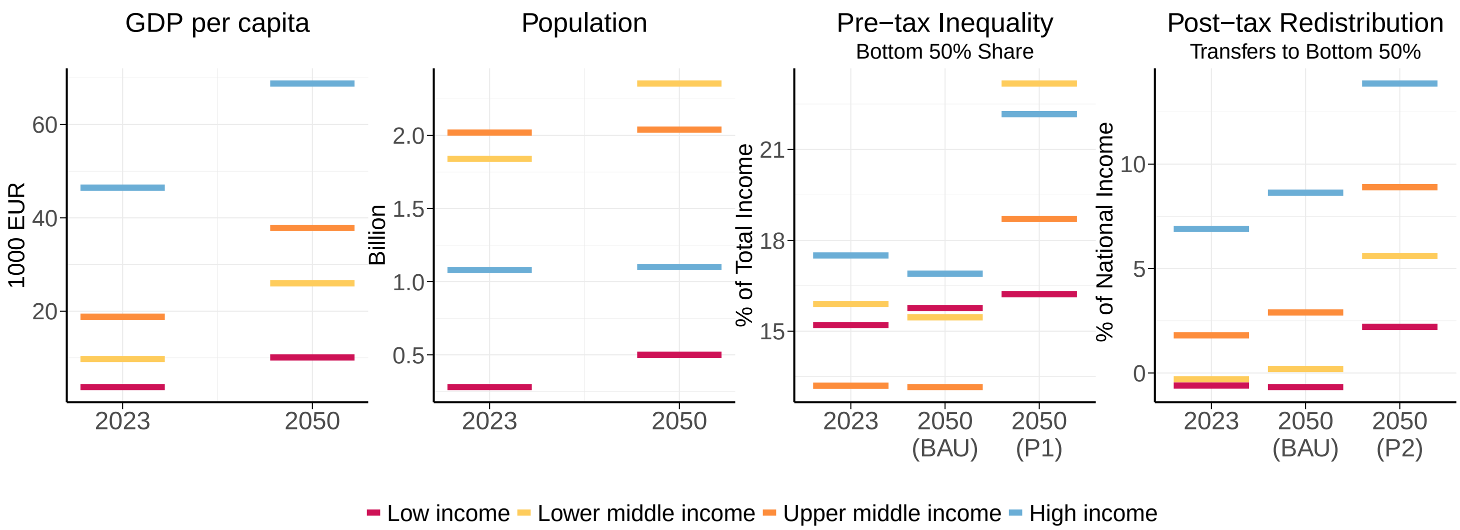
The key parameters and assumptions underlying our projections are summarized in Figure 1.[13] Consistent with the "Middle of the Road" narrative of SSP2, we project that income and population trends follow their historical regional trajectories. This implies a strong catch-up in per-capita income in lower-income countries over the coming decades (+170% from 2023 to 2050 in low-income countries, +166% in lower-middle-income countries, but only +48% in high-income countries). Regarding population dynamics, the highest growth is projected in low-income countries (+79%), while population near-stagnation is expected in upper-middle income (+1%) and high-income countries (+2%).

In terms of within-country inequality, the BAU scenario reflects a continuation of past trends, whereas the policy scenarios assume convergence toward the redistribution profiles of country income groups leaders. Under BAU, the share of pre-tax

[12] Note that $\bar{u}_{pg} < 0\ \forall g, p > 90$ in the historical data since 1980. When the historical constraint binds, we rescale post-tax redistribution to the Bottom 90% to respect the accounting identities in Equation 3.

[13] See also Supplemental Appendix Table A.1 and Figure A.5.

Figure 1: Key Assumptions




*Note:* All panels display population-weighted country income groups aggregates of country-level data. NI and population are exogenously determined and follow SSP2 consistent pathways. Pre-tax inequality refers to the pre-tax share of national income held by the bottom 50% within each country income group. Post-tax redistribution denotes the share of national income redistributed to the bottom 50% of pre-tax income earners. BAU, P1 and P2 denote the business-as-usual, pre-tax redistribution and post-tax redistribution scenarios respectively. For more information see Supplemental Appendix Table A.1.

income captured by the bottom 50% develops differently across income groups. It increases in low-income countries (+0.6pp), while it decreases in lower-middle-income countries (-0.4pp) and high-income countries (-0.6pp) and remains stable in upper-middle-income countries. In the pre-tax redistribution scenario (P1), the bottom 50% share increases across all country income groups relative to the BAU projection, ranging from an additional 1pp (low income) to 7.3pp (lower middle income). For post-tax redistribution, we observe a significant impact from incorporating historical trends into the 2050 BAU projections for high-income and upper-middle income countries, where the share of national income redistributed to the bottom 50% increases by between 1.7pp and 1.1pp respectively. This is amplified in the post-tax redistribution scenario (P2), where all income groups show an increase in redistribution relative to BAU in 2050. The impact of the policy scenario is particularly strong in high-income countries (+7.0pp as compared to BAU), upper-middle-income countries (+7.1pp), and lower-middle-income countries (+5.9%) reflecting the substantial heterogeneity in tax-and-transfer systems across countries within country income groups.

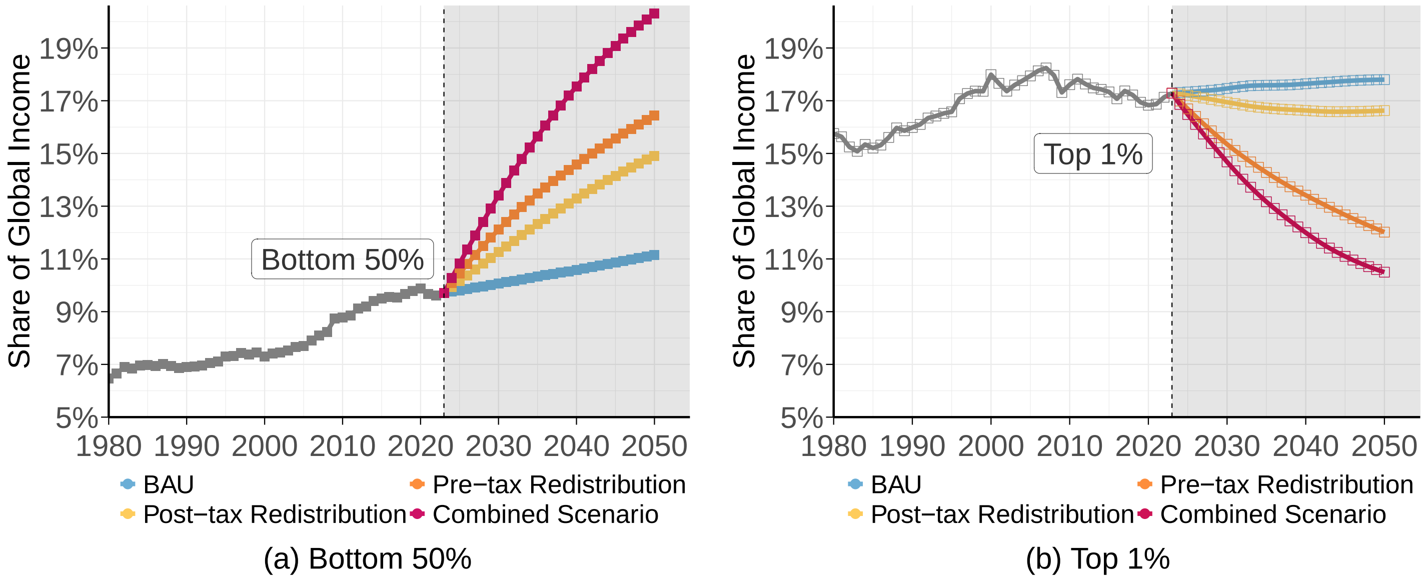
## 4.2 Projections

**Global Income Shares.** Figure 2 presents the evolution of the post-tax income shares of the bottom 50% and top 1% of the global distribution under our various scenarios. In the BAU scenario, the post-tax income share of the bottom 50% is expected to slightly rise, from 9.7% in 2023 to 11.1% in 2050. This modest increase is largely driven by higher national income growth in low-income countries.[14] At the same time, the top 1% post-tax income share increases slightly from 17.3% to 17.8%. Hence, despite the small catch-up of the bottom 50%, global inequality remains high in the baseline scenario. By 2050, an average individual in the top 1% still earns almost 80 times the average income of an individual in the bottom 50%, compared to 89 in 2023.[15] We discuss the opposing forces underlying global inequality dynamics further below.

What leverage does national-level redistribution policy have to alter these global inequality trends? Under the pre-tax redistribution scenario, the income share of the global bottom 50% increases by 5.3pp as compared to the BAU and reaches an income share in 2050 that is still below today's top 1% share (see Figure 2). Note that the average income of the bottom 50% increases to approximately PPP€ 12,000 in 2050, but remains small relative to the top 1% average income of PPP€ 440,000 in the same year.[16] The average income of the top 1% still increases by 24% over the projection period. As we will discuss in more

[14] See Supplemental Appendix Figure A.5.
[15] See Supplemental Appendix Figure A.8.
[16] See Supplemental Appendix Figure A.8.

Figure 2: The Future of Global Inequality under Different Projection Scenarios: Bottom 50% and Top 1% Income Shares, 1980-2050




*Note:* Series in gray plot the observed historical evolution of the post-tax income shares of the global bottom 50% and top 1% over 1980-2023. The shaded gray area represents the projection period. Each panel displays the evolution of the global top 1% and bottom 50% post-tax income shares under different projection scenarios.

detail below, the reduction in their relative share results from comparatively slower income growth under the counterfactual growth incidence profiles, not from a compression of the top 1% average income in absolute terms.

Figure 2 also shows how the world distribution of income could evolve if countries were to converge to more redistributive tax-and-transfer systems. In this post-tax redistribution scenario, the bottom 50% post-tax income share grows to 14.9% while that of the top 1% decreases to 16.6%. Thus, following the most redistributive observed path in terms of taxes and transfers in each country income group yields lower inequality levels than the BAU path. Yet, as is directly evident from Figure 2, the top 1% to bottom 50% income ratio still exceeds 55 under this scenario. Notably, the results show that a significantly more progressive tax system within countries does not lead to a reduction of the top 1% share. The increase in the bottom 50% is limited to 3.8pp as compared to the BAU.

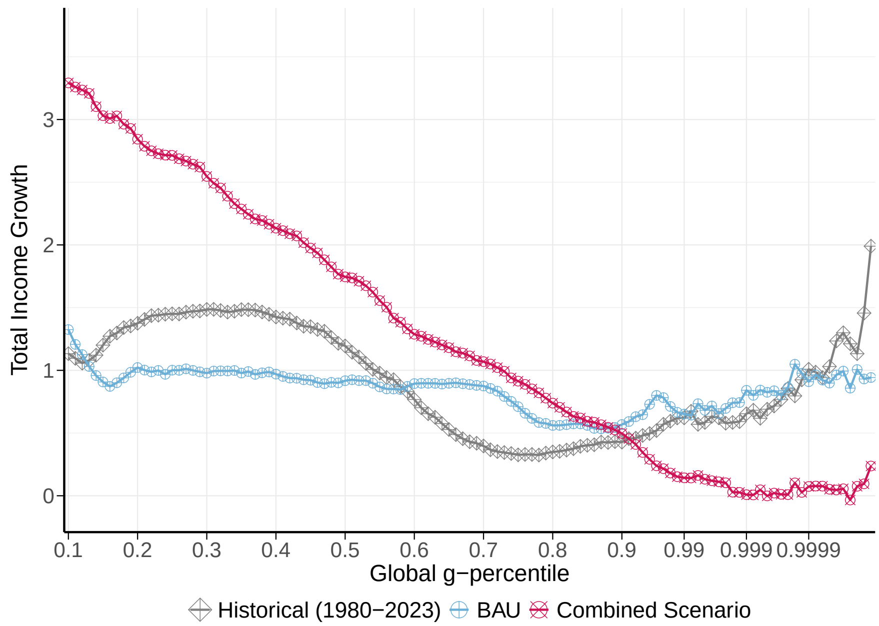
Taken together, the projection results indicate that moving towards a significantly more progressive tax-and-transfer system within each country income group does induce a reduction of global inequality. However, pre-tax redistribution appears to provide much greater leverage in terms of global inequality reduction. In other words, while post-tax redistribution remains an important instrument, the results suggest that a significantly more equal distribution of global incomes can only be generated if bottom income earners are to receive a larger fraction of market income. Post-production transfers alone are not sufficient to significantly compress the global income scale in our scenarios.[17]

The most ambitious scenario in terms of global inequality reduction, combining pre-tax and post-tax redistribution convergence, is also displayed in Figure 2. In this scenario, the poorest half of the world's population earn 20.3% of global income in 2050, while the top 1% capture 10.5%. This represents an average income ratio of 1:26 between the bottom 50% and the top 1%—a sizeable reduction as compared to BAU (1:80 in 2050) and the current observed gap (1:89 in 2023). Overall, the pre-tax redistribution scenario accounts for around 60% of the increase in the global bottom 50% share by 2050 above the BAU baseline, with the remainder due to post-tax redistribution.

**Global Growth Incidence.** Figure 3 illustrates the mechanics of the projection results by plotting the total income growth rate

[17]Note, however, that the two scenarios show comparable effects on the bottom 50% share if we try to incorporate an additional indirect effect of post-tax redistribution on pre-tax shares, as in Blanchet et al. (2022). See Supplemental Appendix Section A.2 for more details.

Figure 3: The Distribution of Global Economic Growth Under Different Projection Scenarios: 1980-2023 versus 2024-2050




*Note:* The figure plots total real post-tax income growth by percentile of the world distribution of income over 1980-2023 and 2024-2050. The BAU scenario displays total income growth over the projection period under business-as-usual. The combined scenario displays total income growth expected under the combined pre- and post-tax redistribution scenarios.

experienced by each global percentile in 1980-2023 (observed) and 2024-2050 (BAU and combined scenario). In the historical data, we recover the well-known "elephant curve" of global inequality and growth (Lakner and Milanovic, 2016; Alvaredo et al., 2018): real income gains have been highest at the middle and very top of the world distribution of income since 1980. In the BAU, growth will be only very slightly progressive, which explains the relative stability of global inequality in this scenario.

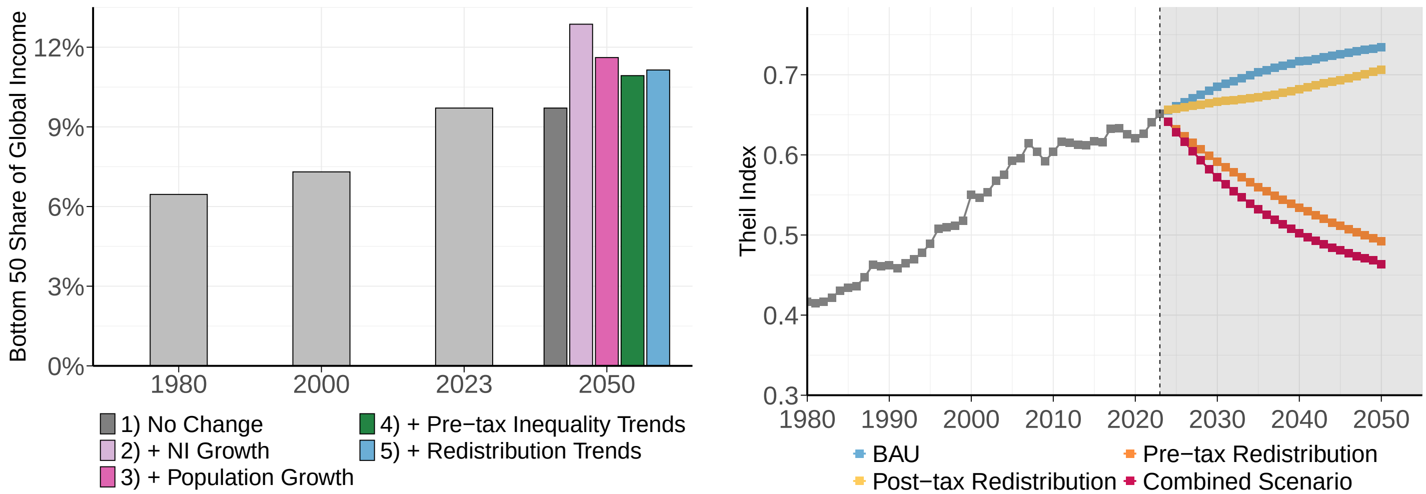
The curve for the combined scenario shows the growth incidence profile that would be required over the period 2024-2050 to achieve the inequality levels displayed in Figure 2. This scenario implies substantially faster income growth for the bottom 80% of the post-tax income distribution than in the BAU scenario. While they experience an average growth rate of about 91% in the BAU, the combined scenario would see their incomes grow by 196%. Our most ambitious scenario with regard to global inequality reduction thus implicitly assumes an increase of income growth rates by more than 100% for a substantial part of the distribution relative to the BAU. However, note that these substantial shifts are achieved solely by letting countries converge to pre-tax and post-tax redistribution profiles observed within their global income group. Aligning on the most progressive countries within a country income group with regard to pre-tax inequality and post-tax redistribution thus appears theoretically sufficient to achieve the compression of global inequality shown in Figures 2 and 3.

**Drivers of Global Inequality Trends.** In Figure 4a, we decompose the evolution of the bottom 50% income share under the BAU scenario by isolating the effect of four drivers: aggregate national income growth, population growth, pre-tax inequality dynamics, and post-tax redistribution dynamics. The bars representing the 50% income shares in 2050 result from five distinct runs of the projections, where each of these factors is gradually added.

National income growth has a strong effect on the bottom 50% income share, lifting it by more than 3 percentage points in 2050. This reflects the strong catch-up of low- and middle-income countries expected over the next decades, which induces a significant reduction in between-country inequality and a rise in the global bottom 50% income share.

Next, we account for cross-country differences in population growth. This lowers the bottom 50% income share by approximately 1 percentage point, reflecting a compositional effect. Since population is projected to grow faster in poorer regions, more individuals from these countries enter the global bottom 50%, which "pushes" relatively richer national percentiles into

Figure 4: Decomposition of Global Inequality




(a) Drivers of the Bottom 50% Income Share under BAU

(b) Theil Index of Within-Country Inequality

*Note:* Panel (a) shows the contribution of different parameters to the evolution of the global bottom 50% post-tax income share under BAU. '1) No change' holds all variables constant at 2023 values (including the distribution of pre-tax income and post-tax redistribution). '2) + NI growth' sets national income growth back to the SSP2 consistent growth rates while holding all other variables fixed at their 2023 levels. '3) + population growth' additionally adds population growth back into the projections. Finally, 4) and 5) incorporate pre-tax inequality and post-tax redistribution dynamics. Panel (b) shows the evolution of the Theil index of global within-country inequality under the different scenarios.

higher global income groups.

Projecting changes in pre-tax inequality in the BAU further reduces the global bottom 50% income share by about 0.7 percentage points, reflecting the rising trend in within-country inequality. Finally, the projected rise of post-tax redistribution slightly increases the bottom 50% share by 0.2 percentage points, yielding the BAU scenario presented above.

Overall, this decomposition underscores the important role of national income growth and population dynamics in shaping global income inequality. To assess the robustness of our findings to our assumptions about these key parameters, we replicate Figure 2 using alternative SSP scenarios (see Supplemental Appendix Figures A.17 to A.20).

The contrast in the bottom 50% income share under the combined policy scenario is most pronounced between SSP3 ("Regional Rivalry") and SSP5 ("Fossil-Fueled Development"), differing by more than 3 percentage points. This is driven by contrasting dynamics: high population and low income growth in lower-income countries in SSP3, and the reverse in SSP5 (Supplemental Appendix Tables A.4 and A.5). However, since SSP2 reflects the "Middle of the Road" path, deviations from our main results remain modest. We find that no SSP produces a BAU outcome where the 2050 bottom 50% share differs by more than 1 percentage point from the SSP2-based projection (Supplemental Appendix Figure A.21). Importantly, our qualitative conclusions about the relative roles of pre-tax and post-tax redistribution remain robust across all SSPs (see Supplemental Appendix Section A.3).

Our policy scenarios also demonstrate that redistributive measures within countries have significant potential to influence global inequality. To further illustrate this, Figure 4b presents the projected evolution of the role of within-country inequality in global inequality under different scenarios. In the BAU scenario, the importance of within-country inequality is expected to rise in the coming decades, with the Theil index increasing from 0.65 in 2023 to 0.73 by 2050. Our three policy scenarios, all aimed at redistributing income within countries, could significantly mitigate this trend. Under the post-tax redistribution scenario, the Theil index in 2050 would remain at 0.71, while the pre-tax redistribution scenario could reduce the importance of within-country inequality in global inequality to levels observed around 1995. Combining pre-tax and post-tax redistribution in our third policy scenario could succeed in bringing the Theil index of within-country inequality back to levels last seen around 1990.

# 5 The Impact of Climate Change on Global Inequality

## 5.1 Methodology

A growing literature highlights the heterogeneous effects of climate change on economic growth across countries (Burke et al., 2015; Diffenbaugh and Burke, 2019; Kalkuhl and Wenz, 2020; Nath et al., 2024). To illustrate the potential implications of climate change for the evolution of global inequality, we incorporate estimates of future climate impacts by Nath et al. (2024) in our national income projections.[18]

Modifying national income growth to account for climate damages while leaving growth incidence profiles within countries untouched implicitly assumes that the distribution of climate-related damages across income percentiles will not change in the future relative to our baseline period. To see this, recall that the pre-tax income growth of a given percentile $p$ in country $c$ across the projection period is governed by the observed growth incidence over 2000-2023.

Hence, to the extent that climate change has impacted the income distribution during the baseline period, the within-country distribution of climate damages is already reflected in the growth incidence profiles adopted during the projection period. While studies show that past climate impacts are regressive within countries (Gilli et al., 2024; Palagi et al., 2022), the central question for our application is whether they will become *more* regressive in the future. To fix ideas, we introduce a simple formalization. Let aggregate climate damages in country $c$, income group $g$, and in year $t$ be denoted by:

$$D_{cgt} = Y_{cgt} - \hat{Y}_{cgt}$$

where $Y_{cgt}$ is the SSP consistent national income level and $\hat{Y}_{cgt}$ denotes national income under climate change as estimated by Nath et al. (2024). Letting $y_{pcgt}$ and $r_{pcgt}$ denote pre-tax and post-tax incomes of percentile $p$ in country $c$, income group $g$, and year $t$, the post-damage incomes are given by:

$$\hat{y}_{pcgt} = y_{pcgt} - D_{cgt} d_{pcg} \quad (6)$$
$$\hat{r}_{pcgt} = \hat{y}_{pcgt} + \eta_{pcgt} \hat{Y}_{cgt} \quad (7)$$

with all variables defined as above and the damage share of percentile $p$ given by:

$$d_{pcg} = k_{c\varsigma} s^{\varsigma}_{pcg2023}$$

where $s_{pcg2023}$ denotes the pre-tax income share of percentile $p$ in 2023, $\varsigma$ is the income elasticity of climate damages as in Dennig et al. (2015) and $k_{c\varsigma}$ is a constant ensuring that damage shares sum to one across percentiles within a country. Note that since the observed distribution of income growth across percentiles already incorporates an implicit distribution of climate related income losses, the parameter $\varsigma$ can be thought of as dictating the *additional* regressivity (or progressivity) of climate damages in the future. The parameter $\varsigma$ is thus not entirely equivalent to the one conceptually introduced in Dennig et al. (2015) and estimated by Gilli et al. (2024). The estimates provided in Gilli et al. (2024) are nonetheless tremendously useful for our case to derive reasonable bounds for $\varsigma$ to be used in our projections. Note that $\varsigma = 1$ implies that damages are proportional to income within countries. Since in this case, the share in national income growth captured by percentile $p$ remains the same as in the base period, this amounts to assuming that the within-country distribution of climate damages does not change in the future. As the overall magnitude of climate-related damages is set to increase in the future (Bilal and Känzig, 2024) and adaptation remains limited (Burke et al., 2024), we view $\varsigma = 1$ as a conservative assumption and use it as an upper bound in our projections. Adopting $\varsigma = 0.64$, the main estimate provided by Gilli et al. (2024), amounts to assuming a substantial increase in the regressivity of climate damages relative to our base period. We thus adopt this value as a lower bound.[19] Supplemental Appendix Figures A.10 and A.11 illustrate the estimated distribution of climate damages and benefits for selected countries under our different assumptions on these elasticities.

[18] We use data on climate impacts under RCP8.5 provided by Nath et al. (2024). These estimates are for country-level GDP; we assume that the relative impacts on NI are the same. These projections are based on two sets of damage functions: their own, which we refer to as the "low-impact climate scenario," and those of Burke et al. (2015), referred to as the "high-impact climate scenario". See Supplemental Appendix Table A.1.

[19] In line with Gilli et al. (2024), we also set a separate income elasticity of climate benefits equal to 1.01 (1 in the uniform scenario).

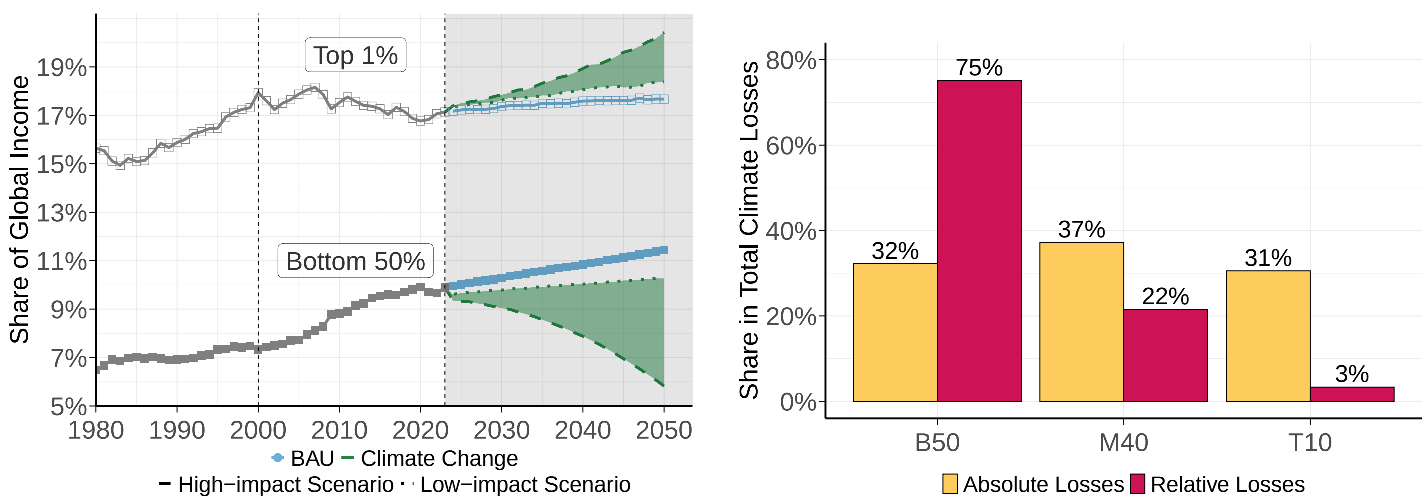
## 5.2 Projections

Figure 5a shows the main results of this exercise. Our findings indicate that climate change could have large redistributive effects. Over the coming decades, climate-induced damages are projected to fully offset the anticipated increase in the global bottom 50% income share projected in the BAU scenario. Instead of rising to 11%, it could reach approximately 10.3% under a low-impact climate scenario and 5.8% under a high-impact climate scenario. In the latter case, the bottom 50% share would regress to a level below the one observed in the 1980s. Meanwhile, the top 1% income share is projected to slightly increase due to climate change, by up to 2.7pp in the high-impact scenario. These projections also suggest that climate change could significantly undermine the effectiveness of our policy scenarios in reducing global inequality over the coming decades.

In Figure 5b, we present the projected distribution of climate-induced losses by global income group in 2050 under the high-impact climate scenario.[20] In absolute terms, climate-related losses increase along the income distribution, with the global middle 40% absorbing 37% of total damages. A key factor driving this pattern is that many households in the bottom 50% have low incomes under the BAU scenario, implying that their absolute exposure to climate-induced income losses is limited.

Another meaningful approach may therefore be to present the distribution of losses in relative terms.[21] We find that the bottom 50% of the global population bears 75% of total climate losses, while the richest individuals account for 3%. This finding reflects the stark inequality in financial resilience by global income groups, with the richest households having significantly greater resources to mitigate the economic consequences of climate change.

Figure 5: Global Inequality Projections under Climate Change




(a) Evolution of Global Income Shares

(b) Distribution of Climate Damages in 2050

*Note:* Panel (a) shows the evolution of post-tax income shares of the global top 1% and bottom 50% under two different climate change scenarios. The dashed line represents climate damages consistent with the estimates based on the damage function by Burke et al. (2015), while the dotted line builds on the central estimates of country-level damages by Nath et al. (2024). The within-country distribution of damages is as described in Section 5 for both scenarios with $\varsigma = 0.64$ (and the elasticity of benefits equal to 1.01). BAU results are plotted for comparison. Note that these projections do not include the exact same set of countries as the baseline results presented above as Nath et al. (2024) build their estimates on a more restricted sample of countries than our projections. Panel (b) shows the distribution of climate damages across global pre-tax income groups from the high impact climate scenario. Absolute losses are gross absolute monetary losses due to climate change in 2050 relative to the BAU scenario. Relative losses represent the relative reduction in income relative to the BAU scenario in 2050. Results are computed based on the subsample of countries that incur climate-related income losses in 2050. Countries that are projected to benefit from climate change are not included.

[20] The results in Figure 5 are based on a lower-bound income elasticity of climate damages within countries under a high-impact climate scenario. Results with the upper-bound elasticity are shown in Supplemental Appendix Figure A.12, while results for the lower-bound elasticity in a low-impact climate scenario are shown in Supplemental Appendix Figure A.14. While the scenarios differ in terms of their aggregate effects, the distribution of these effects across groups are broadly comparable.

[21] To calculate the distribution of relative losses, we first express the annual climate damage as a share of pre-tax income for each global percentile. We then aggregate these shares and calculate the relative loss for each percentile as a share of this sum. This approach has the advantage that it takes into account the income levels – and thus the vulnerability – of global percentiles when quantifying their exposure to climate change.

## 6 Conclusion

In this paper, we project global income inequality up to 2050 under various scenarios on the evolution of national income, population, pre-tax and post-tax inequality, and climate change in 146 countries. Without significant changes to current redistribution policies, global inequality will remain high, with the top 1% continuing to receive more than 17% of global post-tax income. While economic growth in developing countries is likely to modestly improve the incomes of the world's poorest 50%, it will be insufficient to significantly reduce global income disparities: under our BAU scenario, the global bottom 50% income share will reach around 11% in 2050.

Progressive post-tax redistribution policies, while important, will most likely have a limited impact on the world distribution of income unless they are accompanied by pre-tax redistribution measures reshaping the distribution of labor and capital income. Our findings suggest that convergence toward the redistribution profiles of country income group leaders could be sufficient to offset the effect of four decades of rising within-country inequality. The study of more ambitious redistribution scenarios is left for further research.

Climate change is likely to further exacerbate existing inequalities: in a high climate impact scenario, it could reduce the bottom 50% income share to levels last seen in 1980. We find that the share of relative losses due to climate change borne by the bottom 50% is strongly concentrated under a high-climate-damage scenario, accounting for around three quarters of total relative losses.

## References


Alvaredo, F., Atkinson, A. B., Blanchet, T., Chancel, L., Bauluz, L., Fisher-Post, M., Flores, I., Garbinti, B., Goupille-Lebret, J., Martínez-Toledano, C., et al. (2020). Distributional national accounts guidelines, methods and concepts used in the World Inequality Database. *World Inequality Lab*.

Alvaredo, F., Chancel, L., Piketty, T., Saez, E., and Zucman, G. (2018). *World Inequality Report 2018*. Harvard University Press.

Anand, S. and Segal, P. (2008). What do we know about global income inequality? *Journal of Economic Literature*, 46(1):57–94.

Bilal, A. and Känzig, D. R. (2024). The macroeconomic impact of climate change: Global vs. local temperature. *NBER Working Paper*, 32450.

Binswanger-Mkhize, H. P., Bourguignon, C., and van den Brink, R. J. E. (2009). *Agricultural land redistribution: Toward greater consensus*. Agriculture and rural development. Washington, DC: World Bank.

Blanchet, T., Chancel, L., and Gethin, A. (2022). Why is Europe more equal than the United States? *American Economic Journal: Applied Economics*, 14(4):480–518.

Bourguignon, F. and Morrisson, C. (2002). Inequality among world citizens: 1820–1992. *American Economic Review*, 92(4):727–744.

Bozio, A., Garbinti, B., Goupille-Lebret, J., Guillot, M., and Piketty, T. (2024). Predistribution versus redistribution: Evidence from France and the United States. *American Economic Journal: Applied Economics*, 16(2):31–65.

Burke, M., Hsiang, S. M., and Miguel, E. (2015). Global non-linear effect of temperature on economic production. *Nature*, 527(7577):235–239.

Burke, M., Zahid, M., Martins, M. C. M., Callahan, C. W., Lee, R., Avirmed, T., Heft-Neal, S., Kiang, M., Hsiang, S. M., and Lobell, D. (2024). Are we adapting to climate change? *NBER Working Paper*, 32985.

Chancel, L. and Piketty, T. (2021). Global income inequality, 1820–2020: The persistence and mutation of extreme inequality. *Journal of the European Economic Association*, 19(6):3025–3062.

Chancel, L., Piketty, T., Saez, E., and Zucman, G. (2022). *World Inequality Report 2022*. Harvard University Press.

Crespo Cuaresma, J. (2017). Income projections for climate change research: A framework based on human capital dynamics. *Global Environmental Change*, 42:226–236.

Dennig, F., Budolfson, M. B., Fleurbaey, M., Siebert, A., and Socolow, R. H. (2015). Inequality, climate impacts on the future poor, and carbon prices. *Proceedings of the National Academy of Sciences*, 112(52):15827–15832.

Diffenbaugh, N. S. and Burke, M. (2019). Global warming has increased global economic inequality. *Proceedings of the National Academy of Sciences*, 116(20):9808–9813.

Finley, T., Franck, R., and Johnson, N. D. (2021). The effects of land redistribution: Evidence from the French Revolution. *The Journal of Law and Economics*, 64(2):233–267.

Fisher-Post, M. and Gethin, A. (2023). Government redistribution and development global estimates of tax-and-transfer progressivity, 1980-2019. *World Inequality Lab Working Paper*, 2023/17.

Freeman, R. B. (1996). The minimum wage as a redistributive tool. *The Economic Journal*, 106(436):639–649.

Fricko, O., Havlik, P., Rogelj, J., Klimont, Z., Gusti, M., Johnson, N., Kolp, P., Strubegger, M., Valin, H., Amann, M., et al. (2017). The marker quantification of the Shared Socioeconomic Pathway 2: A middle-of-the-road scenario for the 21st century. *Global Environmental Change*, 42:251–267.

Gilli, M., Calcaterra, M., Emmerling, J., and Granella, F. (2024). Climate change impacts on the within-country income distributions. *Journal of Environmental Economics and Management*, 127:103012.

Hacker, J. (2011). The institutional foundations of middle-class democracy. *Policy Network*, 6(5):33–37.

Kalkuhl, M. and Wenz, L. (2020). The impact of climate conditions on economic production. Evidence from a global panel of regions. *Journal of Environmental Economics and Management*, 103:102360.

KC, S., Dhakad, M., Potančoková, M., Adhikari, S., Yildiz, D., Mamolo, M., Sobotka, T., Zeman, K., Abel, G., Lutz, W., and Goujon, A. (2024). Updating the Shared Socioeconomic Pathways (SSPs) global population and human capital projections. IIASA Working Paper WP-24-003, International Institute for Applied Systems Analysis (IIASA), Laxenburg, Austria.

Lakner, C. and Milanovic, B. (2016). Global income distribution: From the fall of the Berlin Wall to the Great Recession. *The World Bank Economic Review*, 30(2):203–232.

Lindert, P. H. (2004). *Growing Public: Social Spending and Economic Growth since the Eighteenth Century*. Cambridge University Press.

Lustig, N. and Pessino, C. (2014). Social spending and income redistribution in Argentina during the 2000s: The increasing role of noncontributory pensions. *Public Finance Review*, 42(3):304–325.

Narayan, K. B., O'Neill, B. C., Waldhoff, S. T., and Tebaldi, C. (2023). Non-parametric projections of national income distribution consistent with the shared socioeconomic pathways. *Environmental Research Letters*, 18(4):044013.

Nath, I. B., Ramey, V. A., and Klenow, P. J. (2024). How much will global warming cool global growth? *NBER Working Paper*, 32761.

O'Neill, B. C., Kriegler, E., Riahi, K., Ebi, K. L., Hallegatte, S., Carter, T. R., Mathur, R., and Van Vuuren, D. P. (2014). A new scenario framework for climate change research: The concept of Shared Socioeconomic Pathways. *Climatic change*, 122:387–400.

Palagi, E., Coronese, M., Lamperti, F., and Roventini, A. (2022). Climate change and the nonlinear impact of precipitation anomalies on income inequality. *Proceedings of the National Academy of Sciences*, 119(43):e2203595119.

Patel, D., Sandefur, J., and Subramanian, A. (2021). The new era of unconditional convergence. *Journal of Development Economics*, 152:102687.

Piketty, T. (2020). *Capital and Ideology*. Harvard University Press.

Rao, N. D., Sauer, P., Gidden, M., and Riahi, K. (2019). Income inequality projections for the shared socioeconomic pathways. *Futures*, 105:27–39.

Riahi, K., van Vuuren, D. P., Kriegler, E., Edmonds, J., O'Neill, B. C., Fujimori, S., Bauer, N., Calvin, K., Dellink, R., Fricko, O., Lutz, W., Popp, A., Crespo Cuaresma, J., KC, S., Leimbach, M., Jiang, L., Kram, T., Rao, S., Emmerling, J., Ebi, K., Hasegawa, T., Havlik, P., Humpenöder, F., Da Silva, L. A., Smith, S., Stehfest, E., Bosetti, V., Eom, J., Gernaat, D., Masui, T., Rogelj, J., Strefler, J., Drouet, L., Krey, V., Luderer, G., Harmsen, M., Takahashi, K., Baumstark, L., Doelman, J. C., Kainuma, M., Klimont, Z., Marangoni, G., Lotze-Campen, H., Obersteiner, M., Tabeau, A., and Tavoni, M. (2017). The shared socioeconomic pathways and their energy, land use, and greenhouse gas emissions implications: An overview. *Global Environmental Change*, 42:153–168.

Rodrik, D. and Stantcheva, S. (2021). A policy matrix for inclusive prosperity. *NBER Working Paper*, 28736.

World Bank (2024). World bank country classifications by income level for 2024–2025. World Bank Data Blog, accessed 19 January 2026, https://blogs.worldbank.org/en/opendata/world-bank-country-classifications-by-income-level-for-2024-2025.

# Supplemental Appendix

**Global Income Inequality by 2050:**

Convergence, Redistribution, and Climate Change

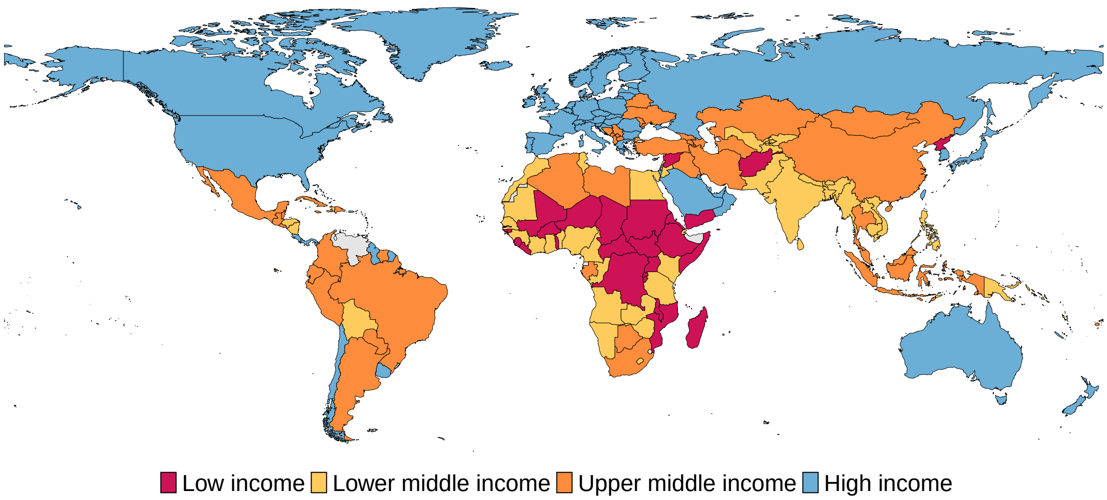
Philipp Bothe, Lucas Chancel, Amory Gethin, Cornelia Mohren

March 19, 2026

*Philipp Bothe: Paris School of Economics, philipp.bothe@psemail.eu; Lucas Chancel: Sciences Po and Paris School of Economics, lucas.chancel@sciencespo.fr; Amory Gethin: The World Bank, Washington, DC, USA, amory.gethin@gmail.com; Cornelia Mohren: Sciences Po and Paris School of Economics, cornelia.mohren@sciencespo.fr.

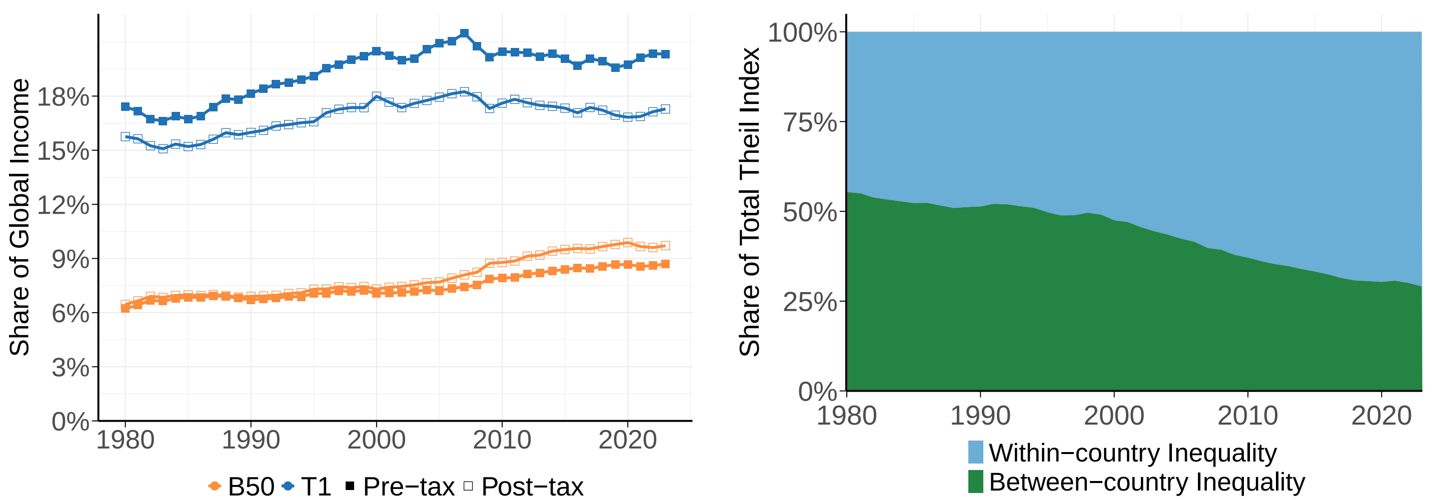
## A.1 Additional Figures and Tables

Figure A.1: Country Income Groups in 2024




*Note:* Country income groups are obtained from the World Bank (World Bank, 2024).

Figure A.2: Historical Evolution of Inequality

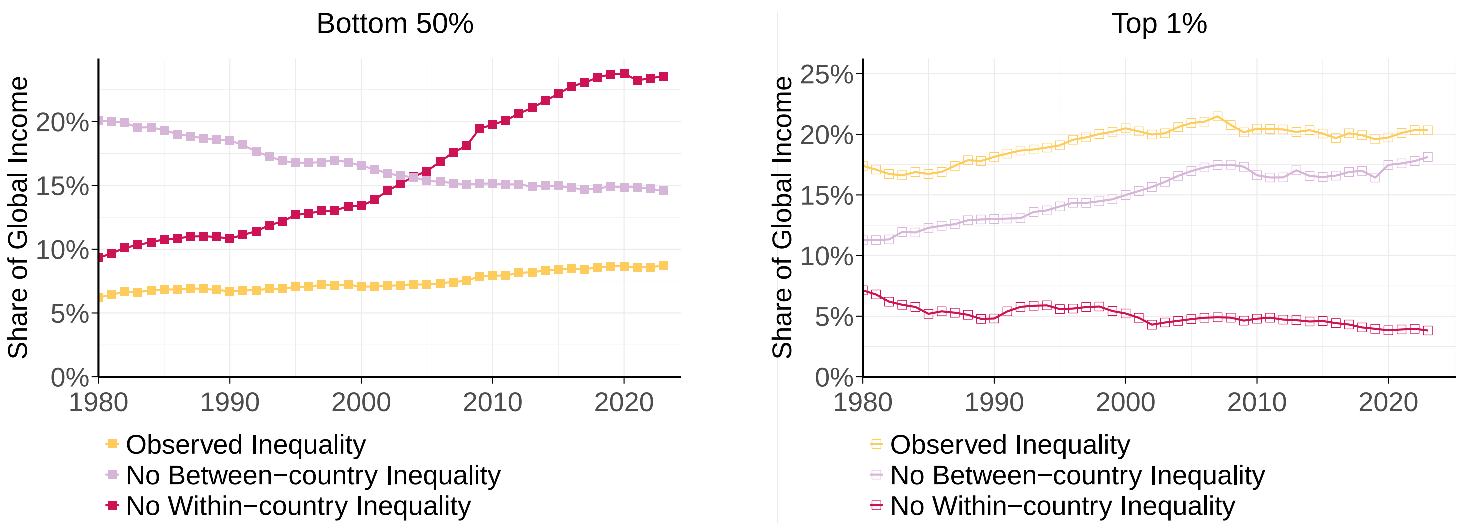



(a) Income Shares of Global Income Groups

(b) Between- vs. Within-Country Inequality (Theil Index)

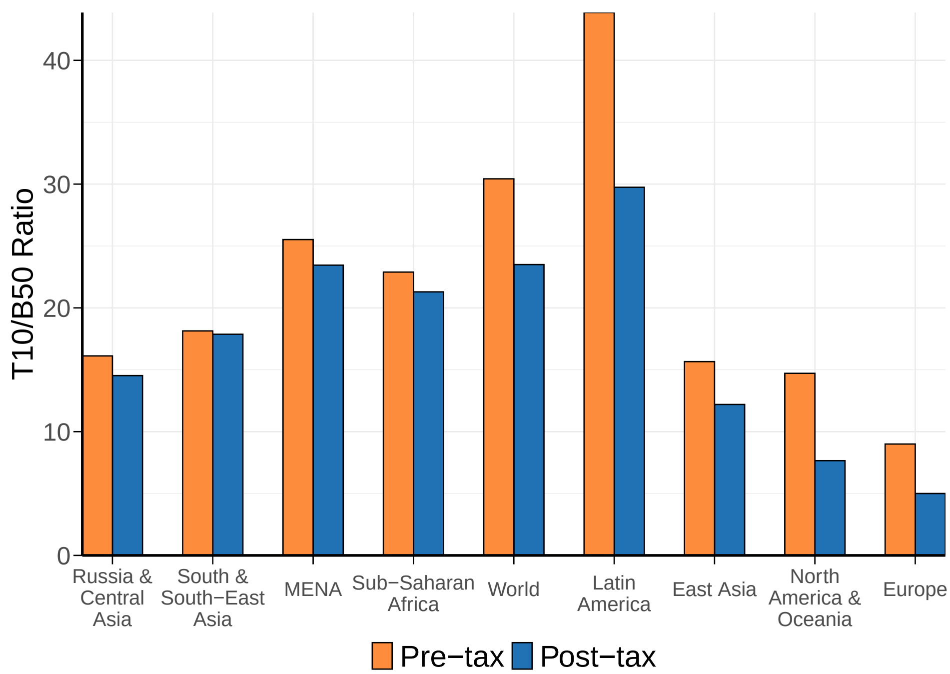
*Note:* Panel (a) shows the historical evolution of pre-tax and post-tax income shares of the global bottom 50% and top 1%. Panel (b) illustrates the historical evolution of the composition of global income inequality as measured by the Theil index.

Figure A.3: Global Income Shares: Between-Country vs Within-Country Inequality, Pre-Tax, 1980-2023




*Note:* The two panels show the observed evolution of income shares of the global bottom 50% and the global top 1%, as well as their hypothetical evolution in the absence of between-country inequality and within-country inequality.

Figure A.4: Top 10% to Bottom 50% Average Income Ratios, Pre-Tax and Post-Tax




*Note:* The figure shows the ratio of top 10% to bottom 50% average pre-tax and post-tax incomes in 2023. Region aggregates are population-weighted country averages. The observations are sorted by the reduction in the ratio from pre-tax to post-tax (lowest at the left).

Table A.1: Overview of Key Parameters

| | National Income | | Population | | Pre-tax Inequality | | | Post-tax Redistribution | | | Climate Impacts | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *NI per capita in 2023 EUR (PPP)* | | *Total adult population in billions* | | *Bottom 50% Pre-tax income share* | | | *Share of national income transferred to the Bottom 50%* | | | *Change in NI per capita due to climate change* | | |
| | 2023 | Δ2023–2050 | 2023 | Δ2023–2050 | 2023 | BAU | P1 | 2023 | BAU | P2 | 2023 | 2050 (Low) | 2050 (High) |
| *By Income Group* | | | | | | | | | | | | | |
| **Low income** | 3 733 | +170% | 0.28 | +79% | 15.2% | +0.6pp | +1.0pp | −0.6% | −0.1pp | +2.8pp | – | −10% | −35% |
| **Lower middle income** | 9 759 | +166% | 1.84 | +28% | 15.9% | −0.4pp | +7.3pp | −0.3% | +0.5pp | +5.9pp | – | −10% | −38% |
| **Upper middle income** | 18 818 | +101% | 2.02 | +1% | 13.2% | −0.0pp | +5.5pp | 1.8% | +1.1pp | +7.1pp | – | −6% | −15% |
| **High income** | 46 483 | +48% | 1.08 | +2% | 17.5% | −0.6pp | +4.7pp | 6.9% | +1.7pp | +7.0pp | – | −1% | +4% |
| *By Region* | | | | | | | | | | | | | |
| **East Asia** | 19 438 | +96% | 1.26 | −9% | 14.3% | −0.7pp | +5.4pp | 2.3% | +1.7pp | +7.0pp | – | −4% | −8% |
| **Europe** | 42 745 | +50% | 0.44 | −1% | 21.0% | +0.4pp | +3.9pp | 8.3% | +1.5pp | +5.2pp | – | 0% | +8% |
| **Latin America** | 23 995 | +80% | 0.36 | +10% | 8.9% | +1.3pp | +7.2pp | 3.3% | +1.5pp | +6.0pp | – | −8% | −24% |
| **MENA** | 27 685 | +94% | 0.36 | +29% | 15.1% | +2.1pp | +5.2pp | 1.0% | +0.3pp | +7.1pp | – | −8% | −25% |
| **North America & Oceania** | 58 909 | +37% | 0.32 | +12% | 14.1% | −1.8pp | +5.0pp | 7.7% | +2.1pp | +6.5pp | – | −3% | −3% |
| **Russia & Central Asia** | 26 735 | +67% | 0.21 | +4% | 17.9% | +0.5pp | +4.6pp | 1.0% | −0.8pp | +9.3pp | – | +5% | +30% |
| **South & South-East Asia** | 10 134 | +164% | 1.69 | +17% | 15.6% | −1.3pp | +7.4pp | −0.1% | +0.8pp | +6.4pp | – | −11% | −39% |
| **Sub-Saharan Africa** | 6 705 | +110% | 0.59 | +72% | 14.7% | +1.2pp | +4.1pp | 0.0% | −0.4pp | +4.3pp | – | −10% | −36% |
| **World** | 20 508 | +78% | 5.22 | +15% | 15.1% | −0.2pp | +5.7pp | 2.0% | +0.6pp | +6.0pp | – | −7% | −22% |

*Note:* The table displays the evolution of aggregates of country-level data, at the country income group and at the regional level (both population-weighted). NI and population are exogenously determined and follow SSP2 consistent pathways. Pre-tax inequality refers to the pre-tax share of national income held by the bottom 50% within each country income group and region. Post-tax redistribution denotes the share of national income redistributed to the bottom 50% of pre-tax income earners. BAU, P1 and P2 denote the business-as-usual, pre-tax redistribution and post-tax redistribution scenarios respectively. The climate impacts depict the change in NI between BAU and the low-impact and high-impact scenarios as described in Section 5.

Table A.2: Country income group leaders in 2050 Bottom 50% Pre-tax Income Share under BAU

| **Region** | **Leaders** | **Bottom 50% Share in 2050** |
|---|---|---|
| High income | Iceland, Greece, Norway | 28.2% |
| Upper middle income | Belarus, Malaysia, Maldives | 23.1% |
| Lower middle income | Zambia, Senegal, Guinea | 38.4% |
| Low income | Sierra Leone, Malawi, Liberia | 18.1% |

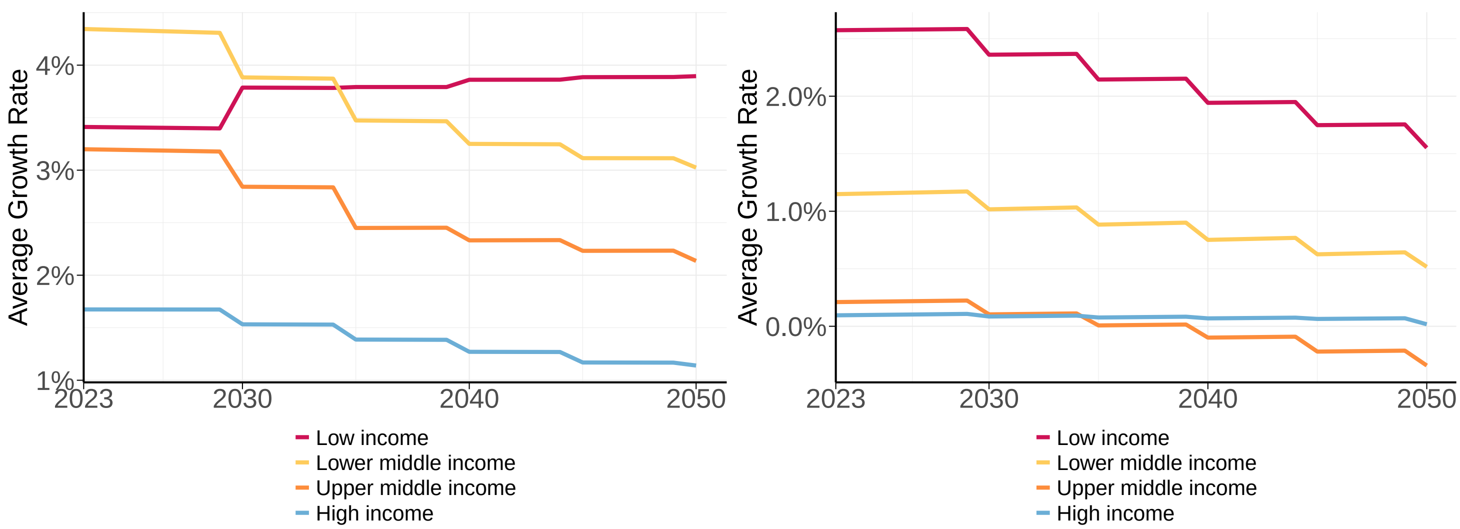
*Note:* The table shows the countries with the highest bottom 50% pre-tax income share in 2050 under the business-as-usual scenario in each country income group. For each group, an average of the three country profiles with the highest bottom 50% pre-tax share is used.

Table A.3: Country income group leaders in 2050 Share of NI Redistributed to Bottom 50% under BAU

| **Region** | **Leaders** | **% NI Redistributed in 2050** |
|---|---|---|
| High income | France, Korea, Netherlands | 14.5% |
| Upper middle income | Georgia, Serbia, South Africa | 12.0% |
| Lower middle income | Lesotho, Namibia, Timor-Leste | 6.3% |
| Low income | Burundi, DR Congo, Mozambique | 2.7% |

*Note:* The table shows the countries that redistribute the highest share of national income to the bottom 50% of pre-tax earners in 2050 under the business-as-usual scenario in each country income group. For each group, an average of the three most redistributive country profiles is used.

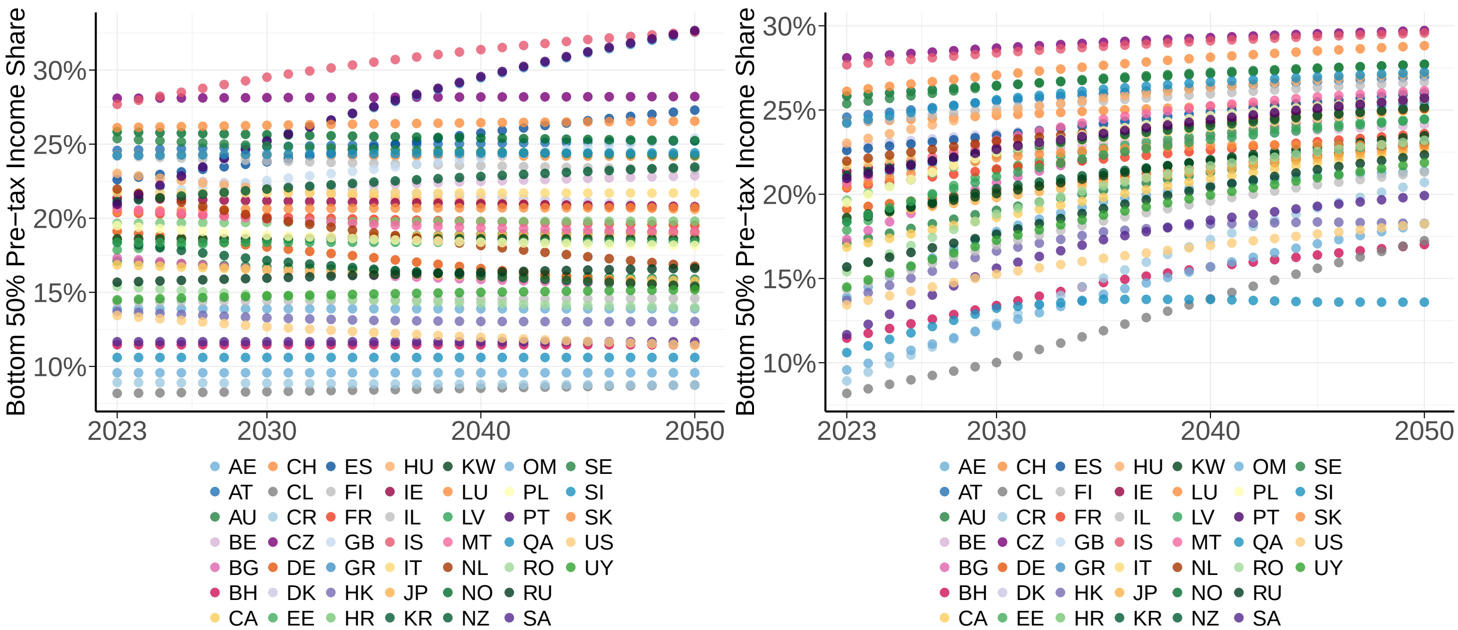
Figure A.5: Projected Average Annual Growth Rates of Per-Capita National Income and Population




(a) National Income (b) Population

*Note:* Country-level projections are aggregated to the country income group level with population weights. The estimates rely on OECD interpretations. See Section 2 for more information.

Figure A.6: Projected Bottom 50% Pre-Tax Income Shares, High Income Countries

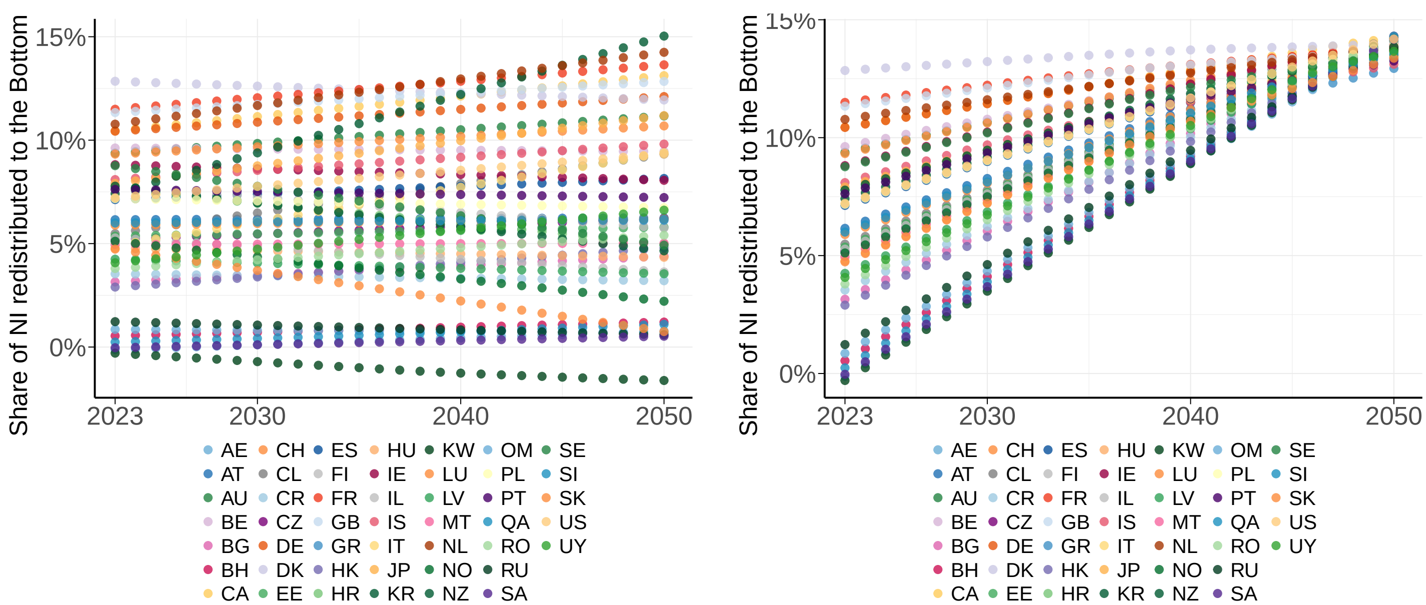



(a) BAU

(b) Pre-Tax Redistribution Scenario

*Note:* Panel (a) and Panel (b) show the evolution of the bottom 50% pre-tax income shares in high-income countries under BAU- and the pre-tax redistribution scenarios, respectively.

Figure A.7: Projected Shares of National Income Redistributed to Bottom 50%, High Income Countries

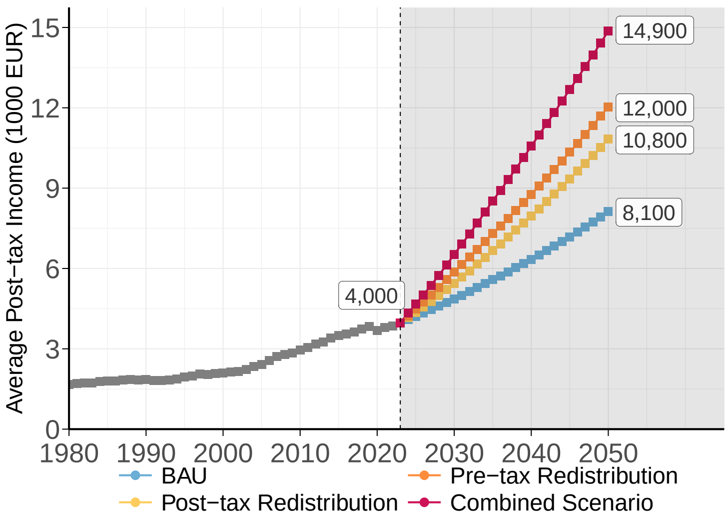



(a) BAU

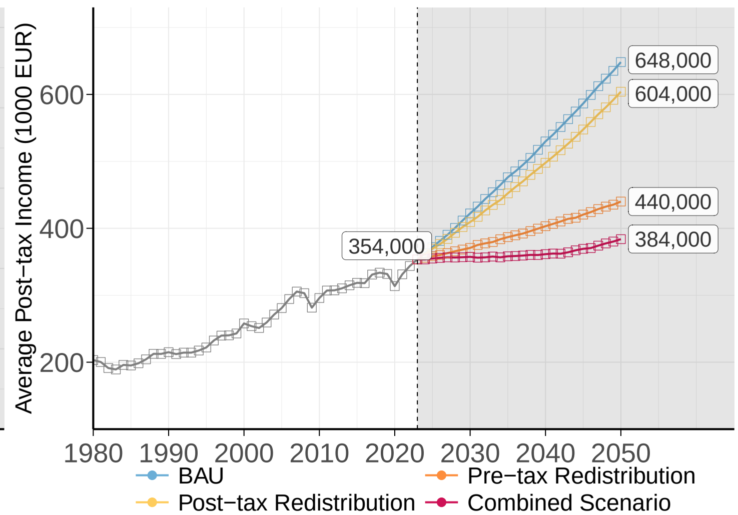
(b) Post-Tax Redistribution Scenario

*Note:* Panel (a) and Panel (b) show the evolution of the share of NI redistributed to the bottom 50% in high-income countries under BAU- and the post-tax redistribution scenarios, respectively.

Figure A.8: Evolution of Absolute Income under Different Scenarios, Bottom 50% and Top 1%



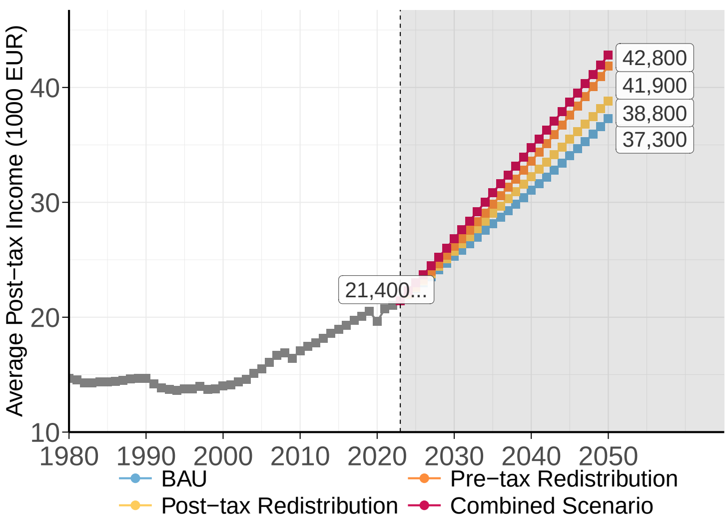

(a) Bottom 50%



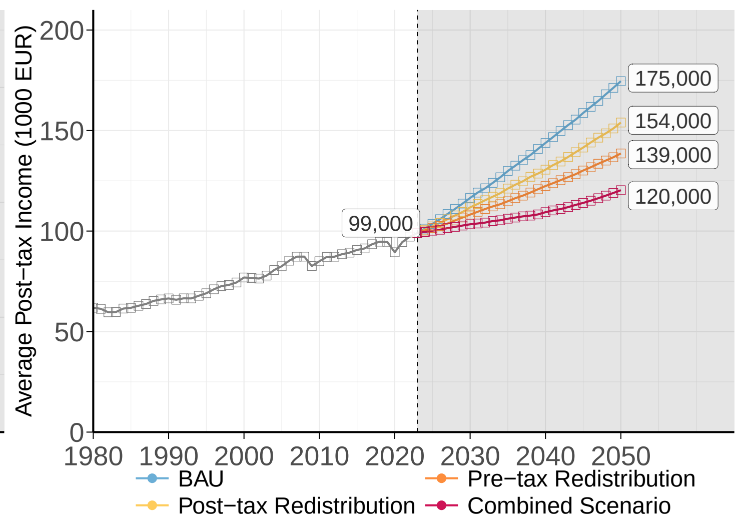

(b) Top 1%

*Note:* Series shown in gray for 1980-2023 plot the observed historical evolution of the real (2023€ PPP) average post-tax incomes of the global bottom 50% and top 1%, respectively. The shaded gray area represents the projection period. Each line displays the evolution of global top 1% and bottom 50% post-tax incomes under a different set of projection assumptions.

Figure A.9: Evolution of Absolute Income under Different Scenarios, Middle 40% and Top 10%



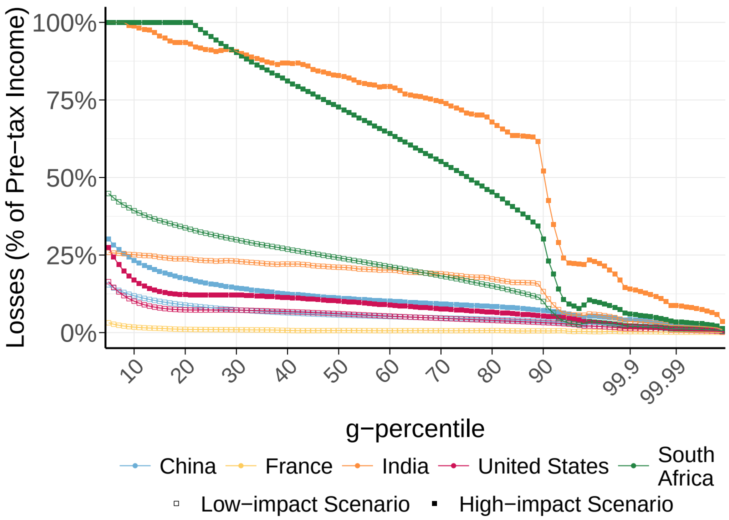

(a) Middle 40%



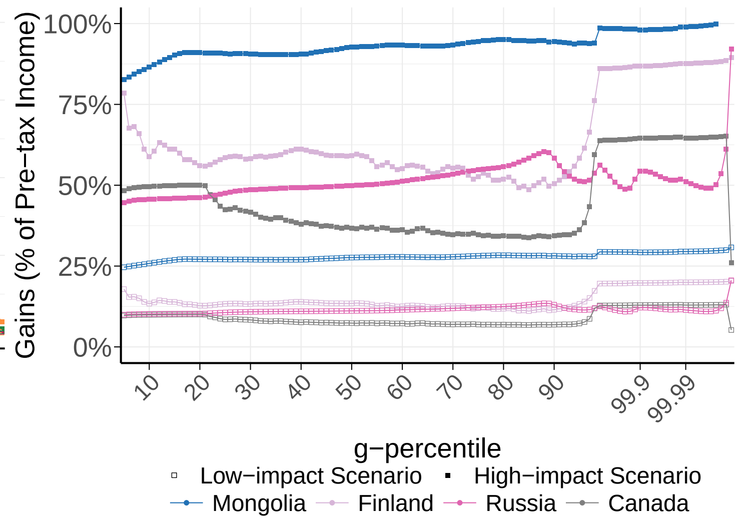

(b) Top 10%

*Note:* Series shown in gray for 1980-2023 plot the observed historical evolution of the real (2023€ PPP) average post-tax incomes of the global middle 40% and top 10%, respectively. The shaded gray area represents the projection period. Each line displays the evolution of global top 10% and middle 40% post-tax incomes under a different set of projection assumptions.

Figure A.10: Projected Climate Impacts in 2050, Lower Bound on Within-Country Effects



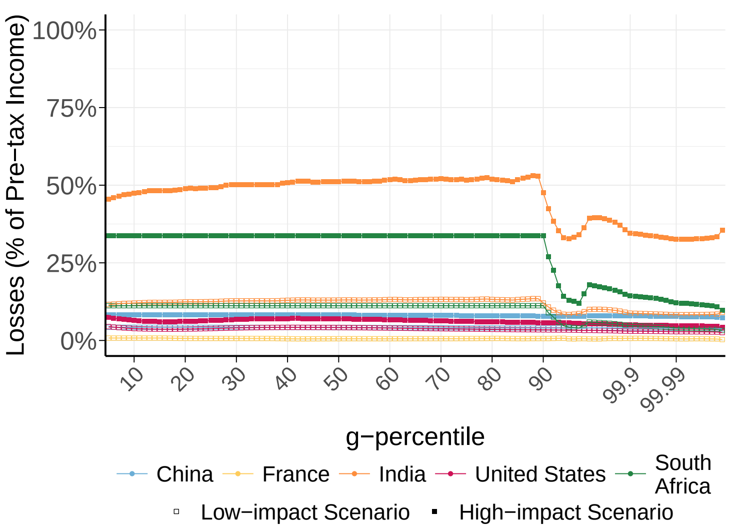

(a) Losses



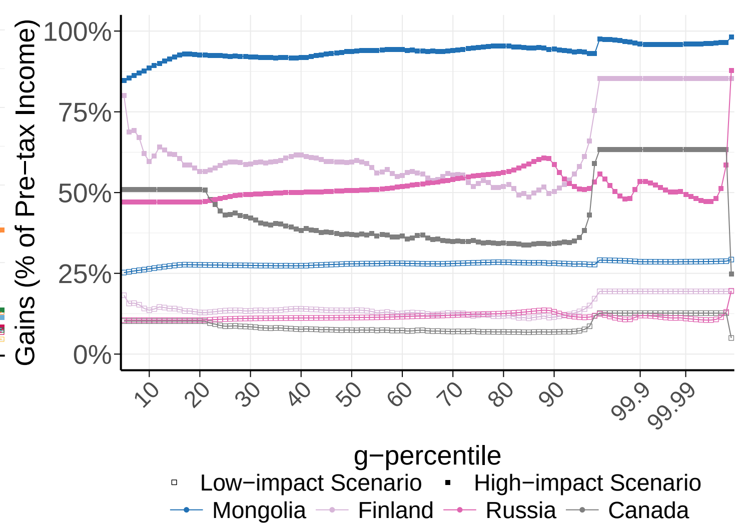

(b) Gains

*Note:* The panels show the projected losses and gains induced by climate change on the pre-tax incomes of g-percentiles in a selected set of countries in 2050. The low-impact scenario represents climate damages consistent with the estimates from Nath et al. (2024), the high-impact scenario builds on impacts as estimated by Burke et al. (2015). The within-country distribution of damages is as described in Section 5 for both scenarios.

Figure A.11: Projected Climate Impacts in 2050, Upper Bound on Within-Country Effects



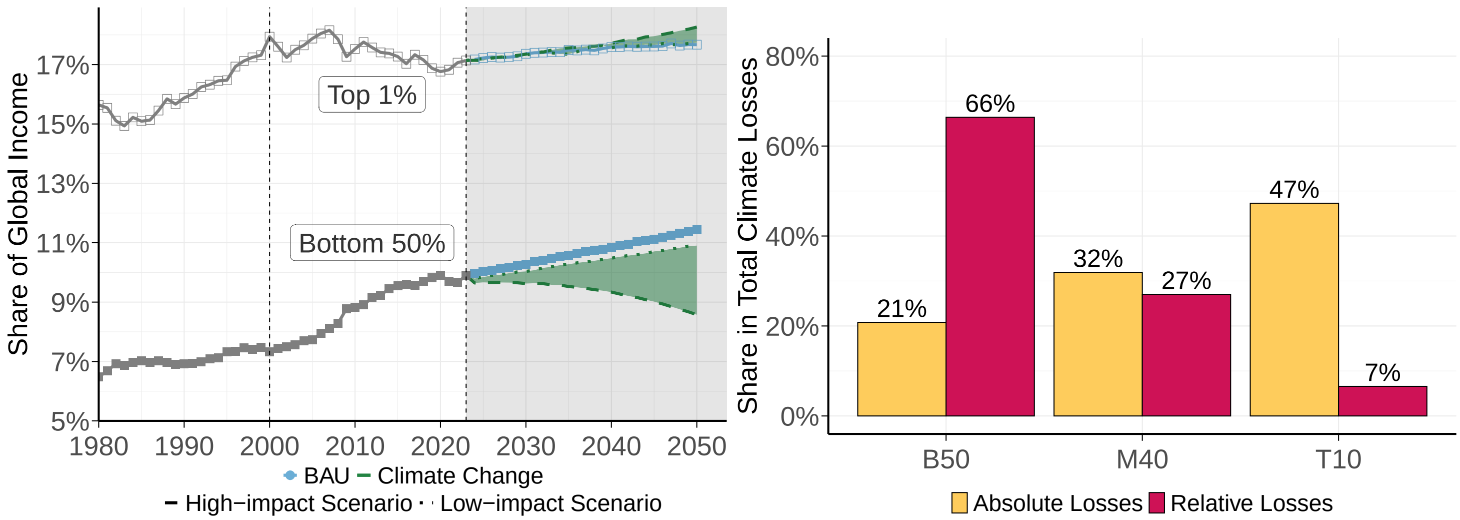

(a) Losses




(b) Gains

*Note:* The panels show the projected losses and gains induced by climate change on the pre-tax incomes of g-percentiles in a selected set of countries in 2050. The low-impact scenario represents climate damages consistent with the estimates from Nath et al. (2024), the high-impact scenario builds on impacts as estimated by Burke et al. (2015). The within-country distribution of damages is as described in Section 5 for both scenarios.

Figure A.12: Inequality Projections under Climate Change, Upper Bound on Within-Country Effects

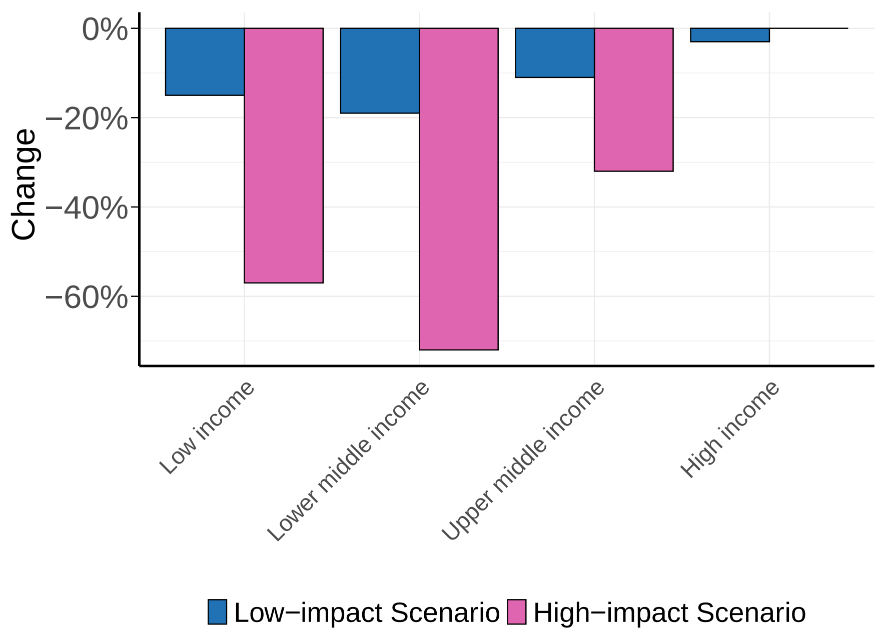



(a) Evolution of Global Income Shares

(b) Distribution of Climate Damages in 2050

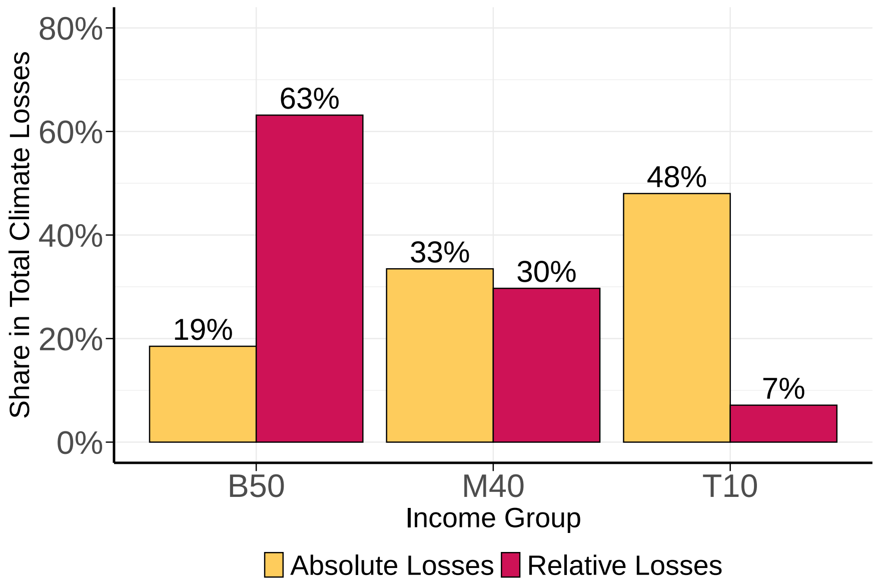
*Note:* Panel (a) shows the evolution of global post-tax income shares of the global top 1% and bottom 50% of post-tax income earners under two different climate scenarios. The dashed line represents climate damages consistent with the estimates from Burke et al. (2015), while the dotted line builds on country-level damages as estimated by Nath et al. (2024). The within-country distribution of damages is as described in Section 5 for both scenarios with $\varsigma = 1$ (and the elasticity of benefits equal to 1). BAU results are plotted for comparison. Note that these projections do not include the exact same set of countries as the baseline results presented above as Burke et al. (2015) and Nath et al. (2024) build their estimates on a more restricted sample of countries than our projections. Panel (b) shows the distribution of climate damages across global pre-tax income groups from the high-impact scenario. Absolute losses are gross absolute monetary losses due to climate change in 2050 relative to the BAU scenario. Relative losses represent the relative reduction in income relative to the BAU scenario in 2050. Results are computed based on the subsample of countries that incur climate-related income losses in 2050. Countries that benefit from climate change according to Burke et al. (2015) are not included.

Figure A.13: Projected Change in Bottom 50% Pre-Tax Incomes across Regions in 2050 due to Climate Change




*Note:* The figure shows the projected losses and gains induced by climate change on the pre-tax incomes of the bottom 50% across country income groups in 2050. The estimates are population-weighted country aggregates. The low-impact scenario represents climate damages consistent with the estimates from Nath et al. (2024), the high-impact scenario builds on impacts as estimated by Burke et al. (2015). The within-country distribution of damages is as described in Section 5 for both scenarios (adopting $\varsigma = 0.64$).

Figure A.14: Distribution of Climate Damages in 2050, Low-Impact Scenario




*Note:* The figure shows the distribution of climate damages across global pre-tax income groups from the low-impact scenario. Absolute losses are gross absolute monetary losses due to climate change in 2050 relative to the BAU scenario. Relative losses represent the relative reduction in income relative to the BAU scenario in 2050. Results are computed based on the subsample of countries that incur climate-related income losses in 2050. Countries that benefit from climate change according to Nath et al. (2024) are not included.

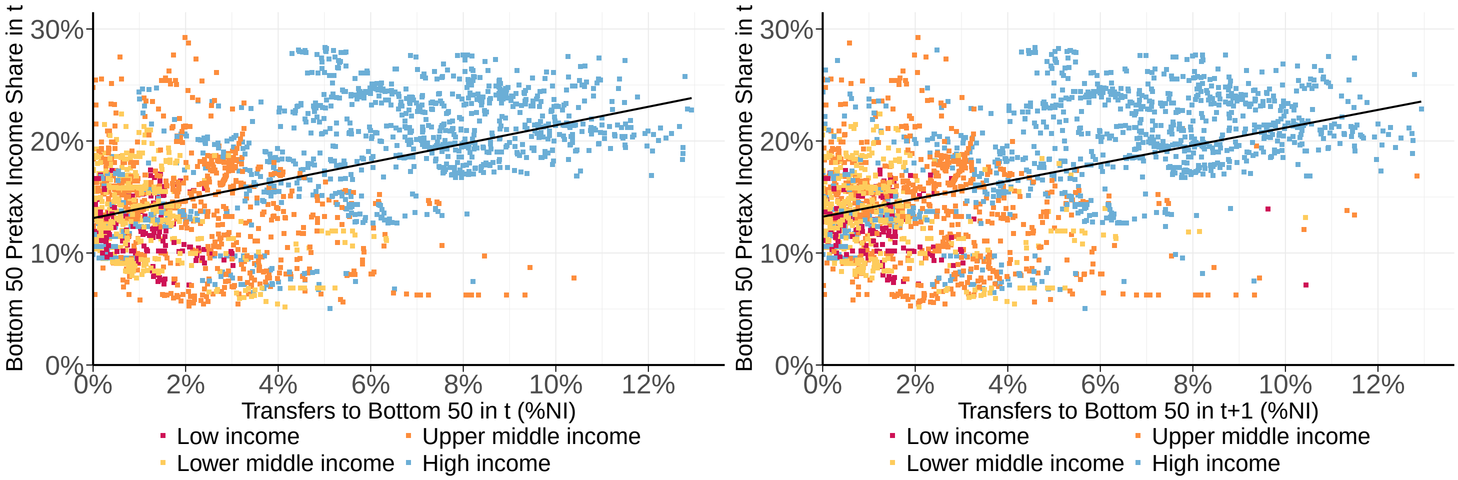
## A.2 Additional Results

**Effect of Post-tax Redistribution on Pre-tax Inequality:** Previous literature provides suggestive evidence that post-tax redistribution may positively influence pre-tax inequality (Blanchet et al., 2022), potentially through mechanisms such as progressive effects of human capital investments. Figure A.15 illustrates a positive correlation between post-tax redistribution to the bottom 50% in period *t* and their pre-tax income shares in periods *t* and *t+1*. Of course, this relationship should be interpreted with care and not in a strictly causal way.

To account for a potential indirect effect of post-tax redistribution on pre-tax inequality, we incorporate an estimated elasticity derived from a simple regression of the bottom 50% pre-tax income share in *t* on post-tax redistribution to the bottom 50% in *t*. Based on this regression, we assume that a 1 percentage point increase in post-tax redistribution leads to a 0.59 percentage point increase in the bottom 50% pre-tax income share in *t*.

Figure A.16 shows that the inclusion of this elasticity has a negligible impact on global income shares in the BAU and pre-tax redistribution scenarios, but could substantially increase the share captured by the bottom 50% in the policy scenarios with strong post-tax redistribution: In the post-tax redistribution and the combined scenario, the bottom 50% income share could be more than 1 percentage point higher than projected before.

Figure A.15: Relationship Between Post-Tax Redistribution and Pre-Tax Inequality

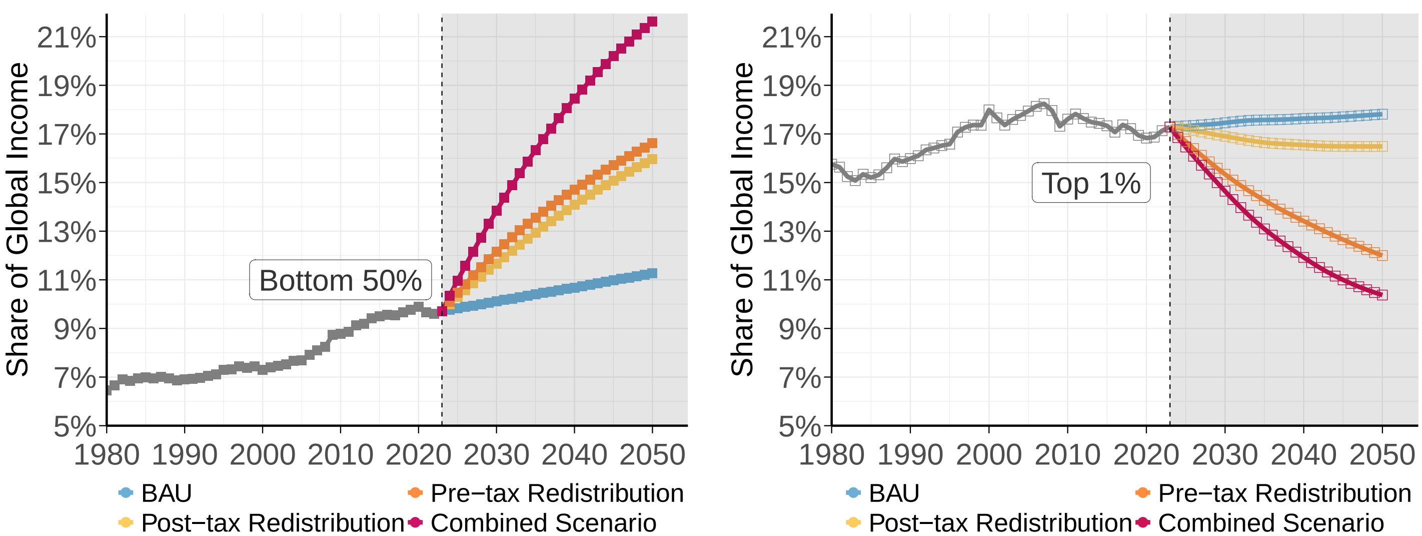



(a) t

(b) t+1

*Note:* The figure plots the link between the share of national income transferred to the bottom 50% in year $t$ and the pre-tax income share of the bottom 50% in year $t$ (Panel (a)) and in year $t+1$ (Panel (b)) for all years between 2000 and 2023.

Figure A.16: Projected Inequality under Different Scenarios, with Post-Tax Redistribution Indirectly Affecting Pre-Tax Inequality




(a) Bottom 50%

(b) Top 1%

*Note:* Series shown in gray for 1980-2023 plot the observed historical evolution of post-tax income shares of the global bottom 50% and top 1%, respectively. The shaded gray area represents the projection period. Each panel displays the evolution of global top 1% and bottom 50% post-tax income shares under a different set of projection assumptions. Projections include a feedback effect of post-tax redistribution on pre-tax inequality. Based on the relationship shown in Figure A.15 we assume that a 1 pp increase in post-tax redistribution to the bottom 50% increases the pre-tax income share of this group by 0.59 pp.

## A.3 Robustness

**Different SSP Trajectories:** We also show the robustness of our results to various projections of the development of national income and population in the coming decades. Recall that the SSP pathways aim to describe plausible development trajectories of society and ecosystems based on different assumptions about future challenges for adaptation and mitigation policies related to climate change (O'Neill et al., 2014). An overview of the national income and population assumptions underlying all different SSP scenarios is provided in Tables A.4 and A.5. Importantly, these scenarios are modeled without taking into account climate change or climate policies. In this sense, they can illustrate well the effect of different exogenous growth and population assumptions on our inequality projections. However, they should by no means be understood as depicting the evolution of inequality under different climate change and transition scenarios. Climate risks have been shown to have a significant impact on both within-country and between-country inequality (Palagi et al., 2022; Diffenbaugh and Burke, 2019; Kalkuhl and Wenz, 2020). We use existing estimates in the literature to project the impact of climate change in Section 5.

Figures A.17 to A.20 reproduce our main results on the evolution of the global bottom 50% and top 1% post-tax income shares shown in Figure 2 in the main text using different assumptions on income and population growth based on different SSP scenarios. The results indicate that our projections are sensitive to assumptions about population and income growth rates and there is considerable variation across SSPs. The difference of the bottom 50% share in the combined policy scenario under the two most extreme SSP scenarios, notably SSP3 and SSP5, amounts to more than 3 percentage points with the bottom 50% reaching an income share of about 23% under SSP5. This effect is largely driven by extreme income growth rates and slow population growth in low-income regions under SSP5. However, since SSP2 represents the "Middle of the Road" scenario, the difference between our main results and the results obtained using other SSPs are substantially more moderate. Figure A.21 underlines this by plotting the BAU results for each SSP on the same graph. The SSP assumptions matter for the projected bottom 50% share. Yet, the difference in the 2050 bottom 50% share with our main results based on SSP2 does not exceed 1pp for any SSP under BAU. Note also that the qualitative conclusions regarding the relative importance of pre-tax and post-tax redistribution remain unchanged when modifying the SSP assumptions used in the projections.

Table A.4: Average Annual Growth Rates of NI Per Capita Between 2023 and 2050 under Different SSP Scenarios

| | SSP1 | SSP2 | SSP3 | SSP4 | SSP5 |
|---|---|---|---|---|---|
| Low income | 0.047 | 0.037 | 0.025 | 0.026 | 0.054 |
| Lower middle income | 0.043 | 0.037 | 0.027 | 0.030 | 0.049 |
| Upper middle income | 0.030 | 0.027 | 0.020 | 0.027 | 0.036 |
| High income | 0.017 | 0.014 | 0.010 | 0.017 | 0.020 |

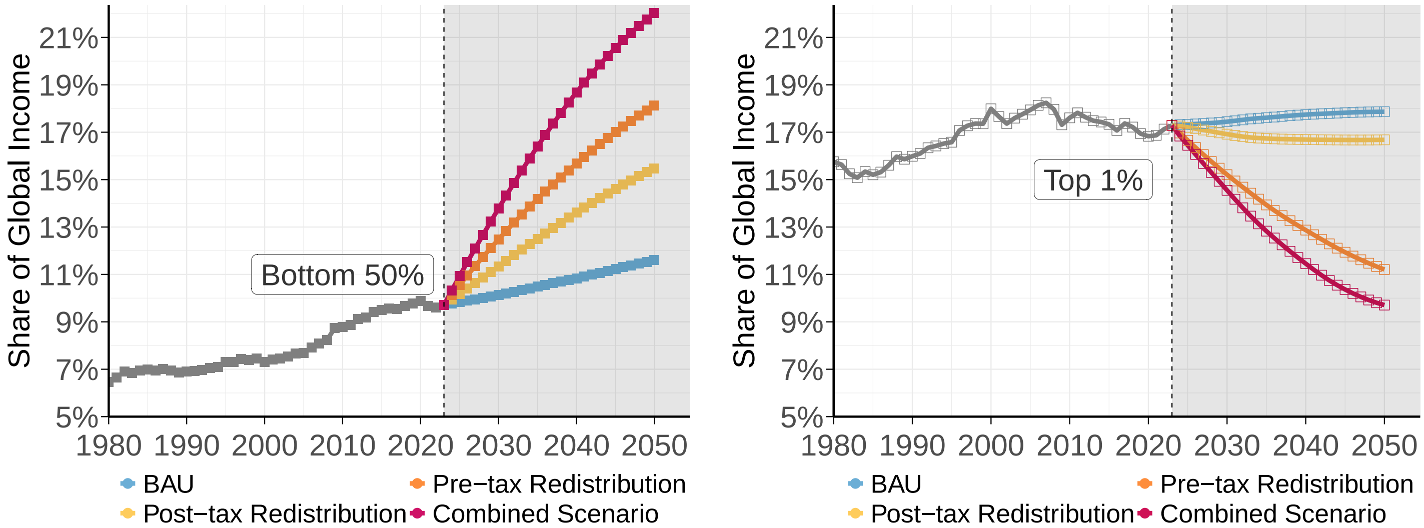
*Note:* Country-level projections are aggregated to the country income group level with population weights. The estimates rely on OECD interpretations. See Section 2 for more information.

Table A.5: Average Annual Population Growth Rates Between 2023 and 2050 under Different SSP Scenarios

| | SSP1 | SSP2 | SSP3 | SSP4 | SSP5 |
|---|---|---|---|---|---|
| Low income | 0.017 | 0.022 | 0.025 | 0.025 | 0.016 |
| Lower middle income | 0.007 | 0.009 | 0.012 | 0.011 | 0.006 |
| Upper middle income | 0.000 | 0.000 | 0.001 | 0.000 | 0.000 |
| High income | 0.001 | 0.001 | 0.000 | -0.001 | 0.003 |

*Note:* Country-level projections are aggregated to the country income group level with population weights. The estimates rely on OECD interpretations. See Section 2 for more information.

Figure A.17: Projected Inequality under Different Scenarios, SSP1

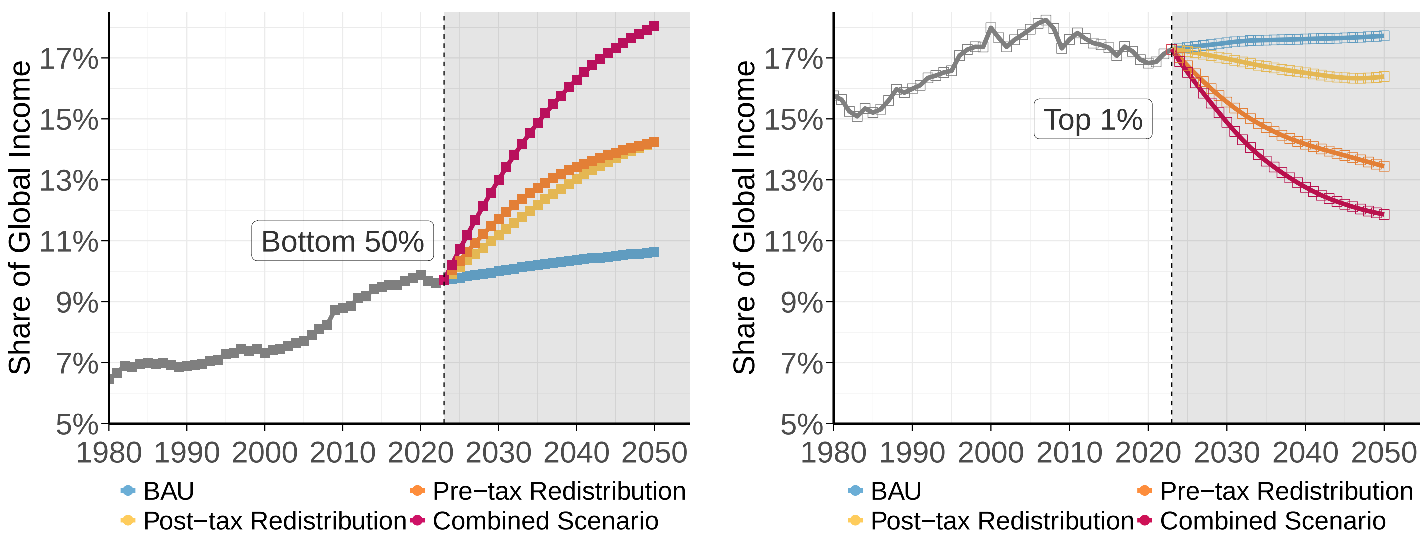



(a) Bottom 50%

(b) Top 1%

*Note:* Series shown in gray for 1980-2023 plot the observed historical evolution of the post-tax income shares of the global bottom 50% and top 1% respectively. The shaded gray area represents the projection period. Each panel displays the evolution of global top 1% and bottom 50% post-tax income shares under a different set of projection assumptions. BAU projection results are retained in all panels for comparison.

Figure A.18: Projected Inequality under Different Scenarios, SSP3

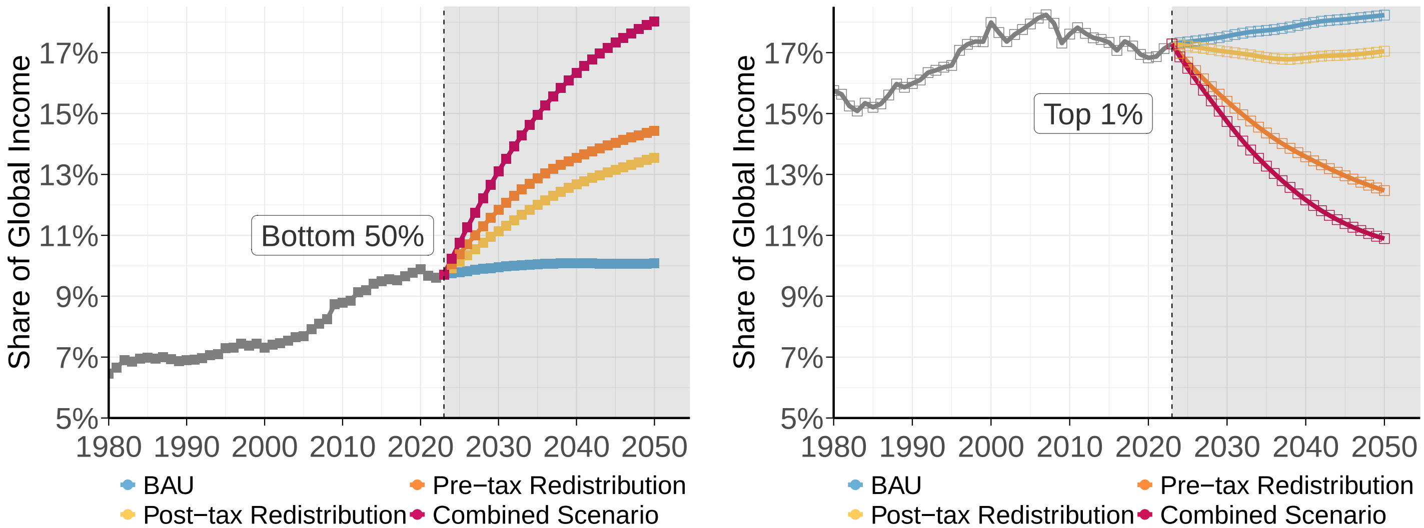



(a) Bottom 50%

(b) Top 1%

*Note:* Series shown in gray for 1980-2023 plot the observed historical evolution of the post-tax income shares of the global bottom 50% and top 1% respectively. The shaded gray area represents the projection period. Each panel displays the evolution of global top 1% and bottom 50% post-tax income shares under a different set of projection assumptions. BAU projection results are retained in all panels for comparison.

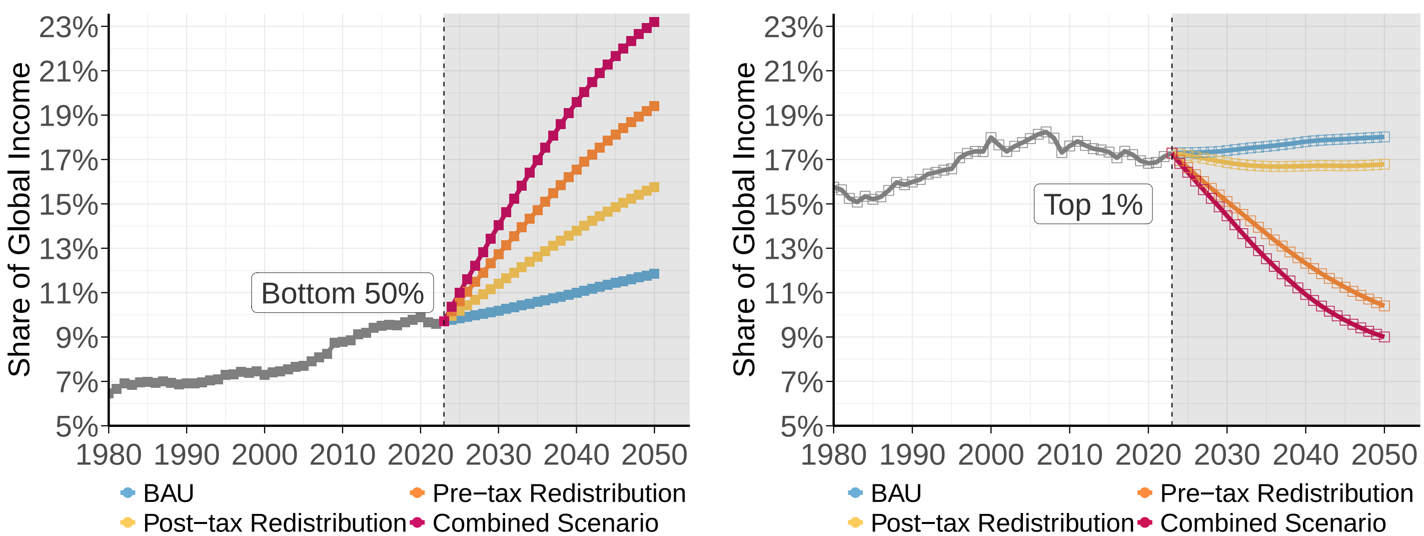
Figure A.19: Projected Inequality under Different Scenarios, SSP4




(a) Bottom 50% (b) Top 1%

*Note:* Series shown in gray for 1980-2023 plot the observed historical evolution of the post-tax income shares of the global bottom 50% and top 1% respectively. The shaded gray area represents the projection period. Each panel displays the evolution of global top 1% and bottom 50% post-tax income shares under a different set of projection assumptions.

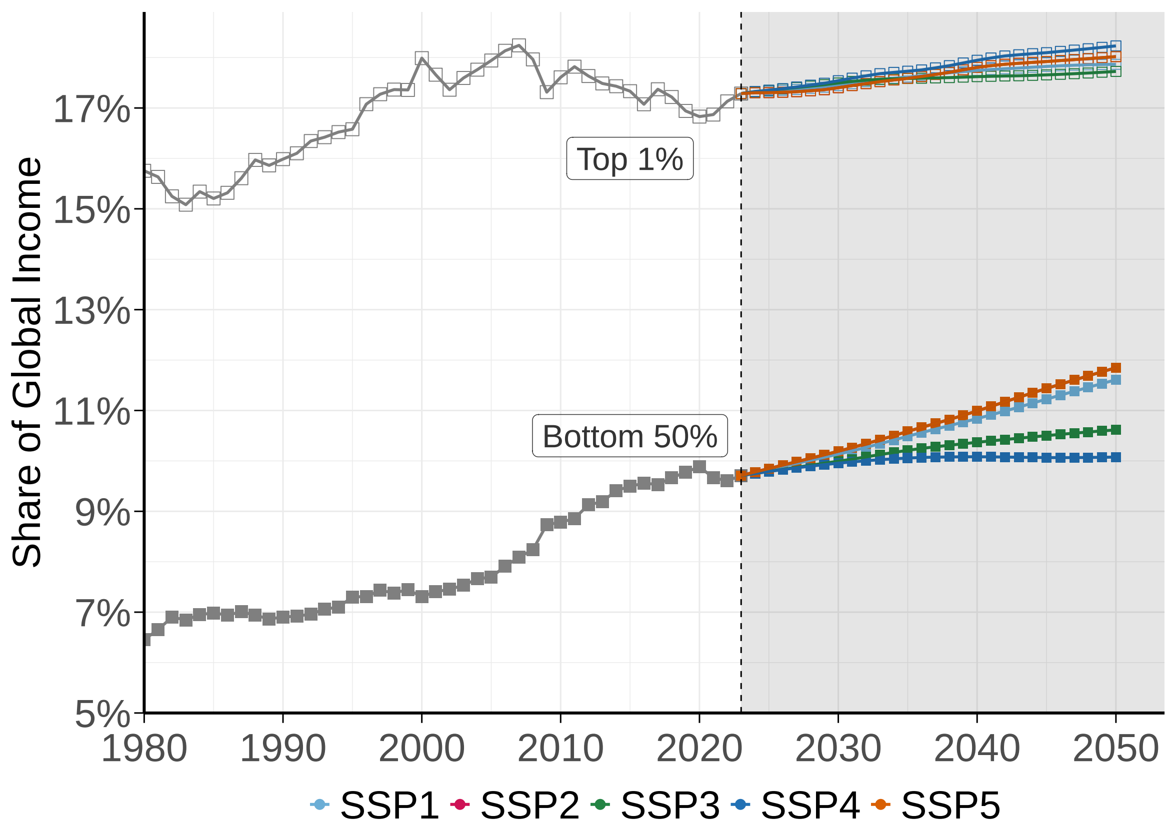
Figure A.20: Projected Inequality under Different Scenarios, SSP5




(a) Bottom 50% (b) Top 1%

*Note:* Series shown in gray for 1980-2023 plot the observed historical evolution of the post-tax income shares of the global bottom 50% and top 1% respectively. The shaded gray area represents the projection period. Each panel displays the evolution of global top 1% and bottom 50% post-tax income shares under a different set of projection assumptions.

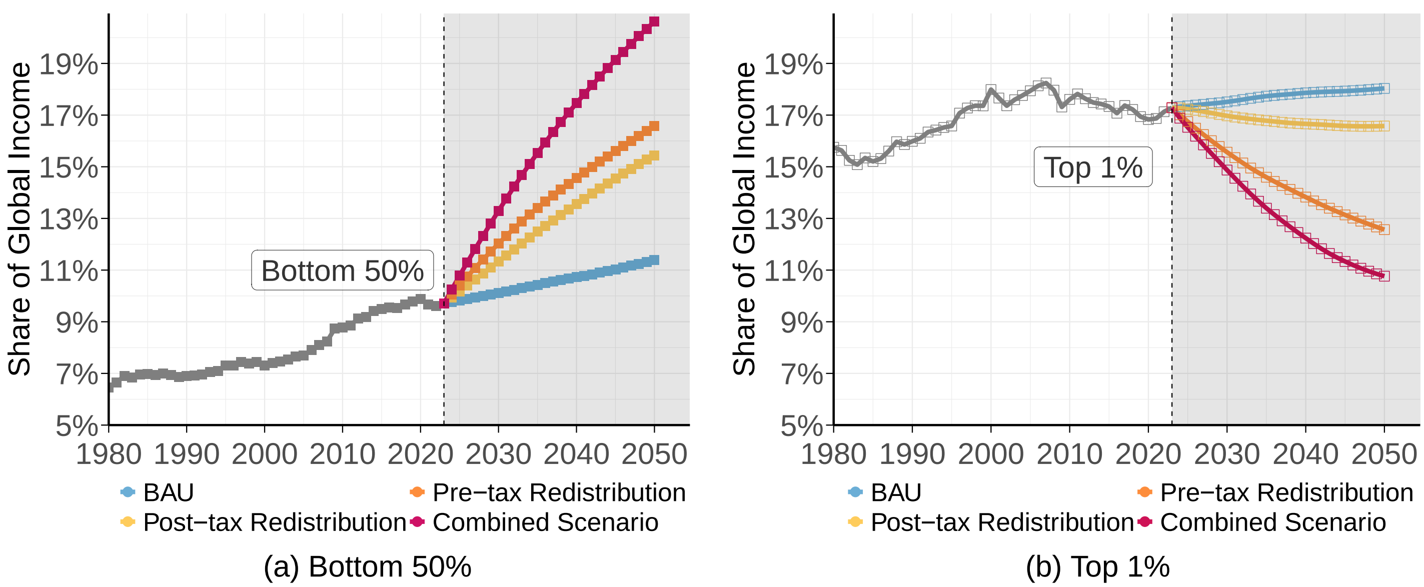
Figure A.21: Projected Inequality under BAU, All SSP Scenarios




*Note:* Series shown in gray for 1980-2023 plot the observed historical evolution of the post-tax income shares of the global bottom 50% and top 1% respectively. The shaded gray area represents the projection period. Each line represents the projected income shares under BAU assumptions for income and population growth consistent with each SSP scenario.

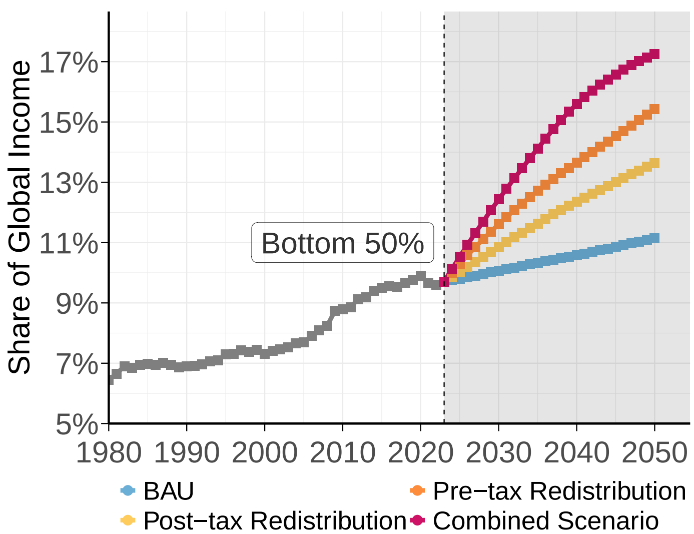
**Different Base Year:** Another central parameter in developing the BAU scenario is the choice of baseline period from 2000 to 2023 for our projections. This implies that the BAU results shown above are based on extrapolation of within-country inequality trends observed over this specific period. To explore the sensitivity of our results to the choice of a different base period, we present the projections using 1980-2023 as the reference period. The general picture remains largely unchanged. The projected top 1% share in 2050 is slightly higher when using 1980 as the starting year which reflects a comparatively more rapid average growth of the top 1% share over this period as can be seen in Figure A.2. Yet, the BAU results are strikingly similar to the main results using 2000 as the starting year. Regarding the policy scenarios, post-tax redistribution induces a slightly stronger inequality reduction as compared to the main results. The conclusion that pre-tax redistribution policies appear to be more promising especially with regard to the global top 1% income share remains valid also when choosing a different starting year.

Figure A.22: Projected Inequality under Different Scenarios, 1980-2023 as Reference Period

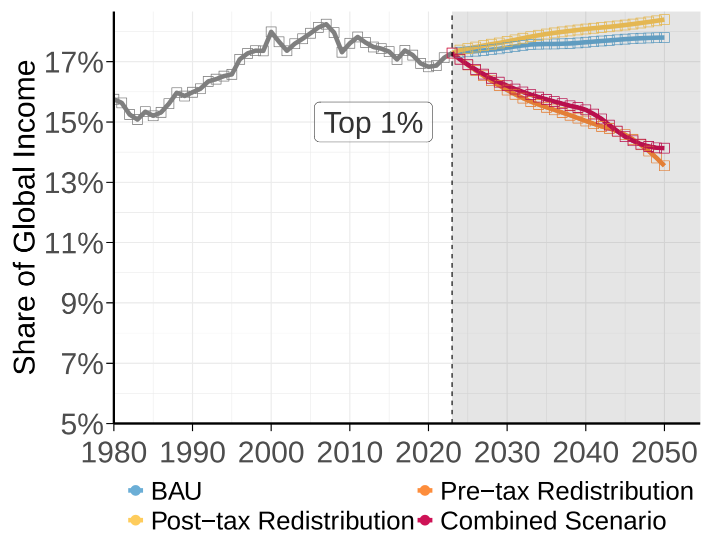



*Note:* Series shown in gray for 1980-2023 plot the observed historical evolution of the post-tax income shares of the global bottom 50% and top 1% respectively. The shaded gray area represents the projection period. Each panel displays the evolution of global top 1% and bottom 50% post-tax income shares under a different set of projection assumptions.

Figure A.23: Projected Inequality with Convergence to Regional Leaders




(a) Bottom 50%




(b) Top 1%

*Note:* Series shown in gray for 1980-2023 plot the observed historical evolution of the post-tax income shares of the global bottom 50% and top 1% respectively. The shaded gray area represents the projection period. Each panel displays the evolution of global top 1% and bottom 50% post-tax income shares under a different set of projection assumptions.