GOVERNMENT REDISTRIBUTION AND GLOBAL POVERTY REDUCTION*

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Abstract

This article studies the contribution of national tax-and-transfer systems to the historical reduction of global poverty. We combine survey microdata, national accounts, government budgets, tax simulators, and existing fiscal incidence studies to construct a new database on the distributional incidence of taxes and transfers covering nearly the entire world population from 1980 to 2023. Government redistribution increases with development and this pattern is driven by transfers, which are larger and more progressive in high-income countries. Tax progressivity is generally close to zero and uncorrelated with country income. Redistribution has expanded in most regions of the world, but cross-country convergence has been limited. Transfers received by the world's poorest 20% have increased substantially and can account for about one-third of their real posttax income growth from 1980 to 2023. Public education and healthcare explain half of this contribution. By ignoring these in-kind transfers, standard income distribution statistics strongly underestimate redistribution in developing countries and its contribution to global poverty reduction.

JEL codes: D31, H50, I14, I24, I32.

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I. Introduction

Income inequality has risen in many countries in recent decades. This trend has attracted significant attention in the research community and the general public, leading to a multiplication of studies on the structure of inequality and the role of taxes and transfers in affecting it. Yet, because most efforts remain country-specific, we lack a global view on how government policies shape inequality in different parts of the world. Basic questions remain unanswered: which countries most reduce inequality through taxes and transfers? Has government redistribution increased? Are developing countries catching up? And to what extent have tax-and-transfer systems contributed to the reduction of global poverty and inequality?

This article makes progress in answering these questions by constructing a new database on government redistribution in 176 countries from 1980 to 2023. Our estimates account for all major forms of taxes and transfers, including personal income taxes, corporate and consumption taxes, cash transfers, and public education and health expenditure. We distribute these taxes and transfers using a common methodological framework, which ensures that our measures are comparable across countries and over time, consistent with official government budgets, and aligned with national accounts aggregates. Our central finding is that government redistribution has considerably expanded in most parts of the world and can account for about one-third of real posttax income growth among the world's poorest 20% from 1980 to 2023. Public education and healthcare, which represent the dominant form of redistribution in developing countries yet are typically ignored in standard income distribution statistics, explain half of this contribution.

In the absence of administrative microdata, which largely do not exist for our sample, several new sources and methodological innovations allow us to take such a global view. We combine novel datasets on pretax income inequality, government revenue and expenditure aggregates, and their distributional incidence. Pretax income distributions are taken from recent developments of the World Inequality Database (Chancel et al., 2022). On the aggregate side, we construct a new database on government expenditure by function, which we combine with tax revenue series from Bachas et al. (2026). On the distribution side, we assemble a new microdatabase of

several thousand household surveys reporting the distributional incidence of social assistance, education, and healthcare for almost the entire world population. We complement them with additional sources covering key features of tax-and-transfer systems, such as personal income tax statutory schedules, social contributions exemptions, and interactions between tax systems and the informal sector (Bachas, Gadenne, and Jensen, 2022; Jensen, 2022). We validate our estimates against those of high-quality studies where those exist. We also construct "specification bounds" to investigate the sensitivity of our main conclusions to polar assumptions on tax and transfer progressivity. Finally, we are publishing and plan to regularly update a publicly available database covering transfers, taxes, and pretax and posttax incomes at the country-year-percentile level, which will allow researchers to replicate the main results presented here and further explore the determinants of government redistribution around the world.

The analysis of this new database delivers three sets of substantive findings.

First, we study cross-country variations in redistribution and the relative roles of taxes and transfers in shaping them. Redistribution increases sharply with development and this is entirely due to transfers, which are both larger and more progressive in richer countries. The poorest 50% receive about 3% of national income in the form of social assistance, public education, and healthcare in the average African country, compared to 7% in Latin America and 11-12% in Europe and the United States. In contrast, tax progressivity is generally weak and uncorrelated with per-capita income: in many countries, low- and high-income households face about the same effective tax rates. However, noticeable regional patterns arise: taxes are progressive in Africa and Anglosphere countries but regressive in Eastern Europe and Latin America, where a large fraction of revenue comes from regressive indirect taxes. Overall, the main driver of redistribution ends up being the size of the welfare state. Aggregate spending on social assistance, education, and healthcare accounts for 80-90% of cross-country variations in redistribution, while tax progressivity and the progressivity of each type of transfer together account for 10-20%.

Second, we find that redistribution has expanded in most countries in the world but cross-country convergence has been limited. The net reduction in inequality enabled by taxes and transfers approximately doubled in magnitude from 1980 to 2023 in the average country. However,

this figure masks significant heterogeneity. Redistribution rose substantially in Western Europe, the Anglosphere, and Latin America, but only modestly in Eastern Europe and Africa. The growth of redistribution was entirely driven by transfers, especially public education and healthcare. Tax progressivity remained stable and close to zero in most countries.

Finally, we study the contribution of the expansion of redistribution to the reduction of global poverty from 1980 to 2023. Government transfers have been central to the growth of incomes at the bottom of the world distribution of income. The average income of the world's poorest 20% increased by about 120% in terms of pretax income, compared to 190% in terms of posttax income. Government redistribution thus accounts for about 40% of global bottom 20% income growth during this period. Public education and healthcare, traditionally excluded from global inequality statistics, explain half of this contribution. This finding is robust to valuing these public services at their net present value rather than their cost of provision, which we do by exploiting indicators on the evolution of school attendance, returns to schooling, and the quality of healthcare. We also find that the bulk of redistribution was driven by national efforts: foreign aid represents less than 5% of transfers received by the global poor. National tax-and-transfer systems have therefore played an important role in the historical reduction of global poverty.

A growing literature has made progress in constructing comparable income distribution statistics. Piketty, Saez, and Zucman (2018) develop Distributional National Accounts (DINA) for the United States, allocating the entirety of national income to individuals. A number of DINA studies have been conducted since then. The advantage of this methodology is that it produces estimates of inequality that are consistent with macroeconomic growth. A key limitation is that the majority of studies focus on pretax income.[1] This paper builds on this body of work to expand the analysis to the distribution of taxes and transfers. We also highlight the key role played by public education and healthcare, which represent the bulk of government transfers received by households in developing countries yet are typically ignored or allocated using *ad hoc* assumptions in existing studies.[2]

[1]Notable exceptions covering taxes and transfers, but generally for short time periods, include Blanchet, Chancel, and Gethin (2022) for Europe, Bozio et al. (2024) and Germain et al. (2021) for France, Bruil et al. (2022) for the Netherlands, Czajka and Gethin (2025) for South Africa, and Flores, De Rosa, and Morgan (2022) for Latin America.

[2]Nearly all existing DINA studies allocate education proportionally to disposable income, and many allocate healthcare as a lump sum or proportionally. A handful of studies have used detailed administrative data to study the distributional incidence of public services in specific contexts (Bruil et al., 2022; Germain et al., 2021; Gethin, 2026).

Our work also relates to the broader literature on fiscal progressivity. A large body of work documents how taxes and transfers shape inequality in different contexts (e.g., OECD, 2008). The majority of these studies focus on high-income countries. One exception is the Commitment to Equity Institute, which has spearheaded fiscal incidence studies in developing countries, usually focusing on a single year (Lustig, 2018; World Bank, 2022). A growing literature also documents key features of tax-and-transfer systems in the developing world, such as the progressivity of the personal income tax (Jensen, 2022), consumption taxes (Bachas, Gadenne, and Jensen, 2022), and social protection programs (Banerjee et al., 2024). Our analysis builds on this research agenda in two directions. First, we construct comparable measures of redistribution that cover all main forms of taxes and transfers and are consistent with the national accounts. Second, we expand the scope of the analysis to cover nearly the entire world population and a long historical time period. While our work cannot replace detailed country-specific analysis, it allows us to take the first truly global perspective on redistribution and its role in the historical reduction of global poverty.

Finally, this article contributes to our understanding of the forces shaping the world distribution of income. Global inequalities have undergone profound transformations, including declining poverty (Bourguignon and Morrisson, 2002; Chen and Ravallion, 2010; Hammar and Waldenström, 2020), the emergence of a new "global median class" (Lakner and Milanovic, 2016), and rising top income inequality (Chancel and Piketty, 2021). In a companion paper, Gethin (2025) estimates the contribution of educational expansion to worldwide growth and poverty reduction from 1980 to 2019. Our analysis takes this work on the drivers of pretax income one step further by investigating how government redistribution has shaped the world distribution of posttax income.

The paper is organized as follows. Section II outlines the data and methodology. Section III documents cross-country and historical variations in tax-and-transfer progressivity. Section IV studies the role of redistribution in shaping the world distribution of income. Given the major contribution of public education and healthcare to the rise of redistribution, Section V investigates the implications of valuing these services at their net present value rather than their cost of provision. Section VI concludes.

II. Data and Methodology

This section presents the data and methodology used to construct our new database on government redistribution. Section II.A outlines our methodological framework. Sections II.B, II.C, II.D, II.E, and II.F describe the data sources used to measure pretax inequality, government revenue and expenditure aggregates, the distributional incidence of transfers, the distributional incidence of taxes, and overall posttax inequality, respectively. Section II.G validates our methodology by comparing our estimates with those available from high-quality studies.

II.A. Conceptual Framework

Our methodology follows the distributional national accounts (DINA) framework, which aims to estimate the distribution of income, taxes, and transfers in a way that is consistent with national accounting principles (Chancel et al., 2025; Piketty, Saez, and Zucman, 2018). The DINA methodology distributes all income flows to individuals, as well as taxes paid and transfers received, to arrive at both pretax and posttax income distributions that match 100% of national income.

The DINA approach establishes three income concepts: factor national income, pretax national income, and posttax national income. Factor national income refers to labor and capital incomes received before any form of government intervention. Pretax national income corresponds to income after the operation of the pension and unemployment systems, but before the operation of the tax-and-transfer system. Pretax income equals factor income, minus social contributions paid, plus social insurance benefits received. Posttax national income corresponds to income after the operation of the tax-and-transfer system. All taxes are removed from individual pretax incomes—including personal income and corporate taxes, property and wealth taxes, and indirect taxes—and all public spending is distributed, including cash transfers, in-kind benefits, and collective government expenditure.

We focus on measures of government redistribution that compare the distribution of pretax

national income to that of posttax national income.[3] Starting from pretax income m_i received by individual i, we add government transfers $g(m_i)$ and deduct taxes $\tau(m_i)$ to reach posttax income y_i:

$$y_i = m_i + g(m_i) - \tau(m_i) \tag{1}$$

Our analysis therefore relies on three ingredients: data on the distribution of pretax income, data on total transfers disbursed and total taxes collected in each country, and data on the distributional incidence of each type of tax and transfer.

II.B. Pretax Income Inequality

Our starting point is the World Inequality Database, which contains data on the distribution of pretax national income in 176 countries over the 1980-2023 period. The database was constructed by compiling estimates from existing DINA studies, which have been harmonized to create comparable distributional statistics (Chancel et al., 2025). The data cover average pretax income by percentile. By construction, average income equals net national income per capita in each country.

II.C. Government Expenditure and Revenue Aggregates

Government Expenditure Aggregates. To study the distribution of transfers, we first need to know the level and composition of government expenditure. Somewhat surprisingly, there exists no single data source covering public spending and its composition around the world. We have constructed a new database on general government expenditure for the purpose of this paper (see Appendix B.1). We draw on data from two types of sources. A first set of sources provides information on total government expenditure and its breakdown by function, such as the IMF, Eurostat, the OECD, CEPAL, and the United Nations. A second set of sources covers specific dimensions of expenditure, such as UNESCO for education, the World Health Organization for healthcare, and other country-specific sources to better cover the historical period for countries

[3] As in the existing studies that apply the DINA framework, we prefer to compare posttax income with pretax income rather than factor income. This comparison has the advantage of not making estimates of redistribution too sensitive to demographic factors, such as the size of the elderly population (where retired persons earn zero factor income but do receive significant social security benefits). See Blanchet, Chancel, and Gethin (2022).

such as China, India, and the Soviet Union. In total, we assembled and linked series from about 20 sources, allowing us to construct a database covering 176 countries (over 99% of the world population). Each spending item is based on the international classification of general government expenditure by function (COFOG), ensuring that data series are comparable across countries and over time (see United Nations Statistics Commission, 2008).

Tax Revenue Aggregates. We rely on aggregate tax revenue series recently constructed by Bachas et al. (2026), who collected new government revenue statistics to estimate the evolution of macroeconomic tax rates in 153 countries (96% of the world population) since 1965. Their database provides information on total tax revenue as a share of national income, disaggregated into personal income taxes (code 1100 in the OECD classification of taxes; OECD, 2022), corporate income taxes (1200), social insurance contributions (2000, 3000), property and wealth taxes (4000), indirect taxes (5000), and other taxes (6000). We further decompose property taxes into taxes on households (4110) and taxes on businesses (4120) using OECD data.

II.D. Distributional Incidence of Transfers

We now present the data sources and methodology used to allocate transfers to individuals. In our main analysis, we focus on three types of transfers whose distributional incidence can be reliably observed: social assistance, public education, and public healthcare.

Social Assistance. Social assistance expenditure includes spending on cash transfers and in-kind social benefits such as food stamps, which are typically included in traditional measures of government redistribution (e.g., OECD, 2011).[4] We distribute spending on these programs to their beneficiaries as recorded in survey data and existing fiscal incidence studies. We use five main sources: the Luxembourg Income Study, the EU-SILC survey, the World Bank's Atlas of Social Protection database (ASPIRE), the Commitment to Equity Institute (CEQ) database, and Piketty, Saez, and Zucman (2018) for the United States. Together, these sources allow us to cover the

[4]More specifically, we follow the definition of social assistance expenditure adopted by the COFOG classification of the UN System of National Accounts. Social assistance consists of non-contributory transfers to households in need. It excludes contributory pensions, unemployment insurance, and workfare programs.

distribution of social transfers by pretax income percentile in 135 countries (94% of the world population) and 1,200 country-years.

Public Education. Following the literature, we distribute education spending to children attending school in the household (e.g., Bruil et al., 2022; Germain et al., 2021; Lustig, 2018). We mobilize a new microdatabase constructed for the purpose of this paper, comprising about 1,700 nationally representative surveys fielded in 156 countries (97% of the world population). These surveys are the ones routinely run by statistical institutes to track the evolution of poverty and inequality, such as the CPS in the United States. They record detailed information on the structure of the household, school attendance, age, and total household income or consumption. The World Bank has assembled a large number of these surveys for most countries in the world since the 1980s. We were able to access this microdatabase, which constitutes our primary data source. We complemented it with surveys available from the Luxembourg Income Study and additional country-specific sources to further expand coverage (see Appendix B.2).

We calculate the education transfer received by income group p in country c at time t as:

$$g^{\text{educ}}_{pct} = n^{pri}_{pct} g^{pri}_{pct} + n^{sec}_{pct} g^{sec}_{pct} + n^{ter}_{pct} g^{ter}_{pct} \tag{2}$$

where n^k_{pct} is the number of children in school at level k, g^k_{pct} is average spending per child on level k, and $k \in \{pri, sec, ter\}$ refers to primary, secondary, and tertiary education. We thus allocate to each child attending school at level k the per-pupil expenditure on education at this level. Data on the costs of primary, secondary, and tertiary education per child come from the public spending database constructed in this paper. The number of children attending school by level and per-capita household income is computed from the microdatabase.

Based on equation (2), it is useful to notice that the distribution of education spending is driven by three factors. The first one is inequality in access to schooling: education is more unequally distributed in countries where only children from high-income households attend school. The second one is spending inequality: countries differ in relative expenditure on primary, secondary, and tertiary education. The third one relates to demography: education transfers received are

larger in households with more children in school. The first two factors tend to increase inequality in education spending. The third factor generally makes education expenditure more progressive, because low-income households tend to have more children.

Equation (2) assumes that all children receive the same level of per-pupil expenditure nationwide. An important concern relates to geographical inequalities in spending and education quality: poorer children may attend less funded schools with less qualified teachers, implying that we might be overestimating the progressivity of education spending. We investigate this issue in the appendix in two ways. First, we study the implications of accounting for geographical inequalities, exploiting local education spending data available in 12 countries. Second, we go one step further and study education quality inequalities in 135 countries, drawing on test score microdata assembled in the World Bank's Global Learning Assessment Database. In both cases, we find that accounting for spatial or quality inequalities is of second-order importance, in the sense that it barely affects estimates of overall education transfers received by the bottom 50% and their variations across countries (see Appendix Figures B1 and B2). This finding provides reassuring evidence that equation (2) yields an excellent approximation of cross-national variations in the progressivity of education spending.

Public Healthcare. We distribute health expenditure proportionally to intensity of use of the public healthcare system. We combine three sources: country-specific surveys, the World Health Survey, and the CEQ database. These surveys cover simple measures of public healthcare use, such as the number of visits made to a public health institution in the past month.[5] They allow us to cover 92 countries (84% of the world population) and 177 country-years.

As in the case of education, the progressivity of public healthcare expenditure depends on two main factors. The first one is access: it may be more difficult for low-income households to access a public healthcare provider. The second one is health inequality: low-income individuals may have greater healthcare needs and hence use the healthcare system more intensively. The first factor

[5]As for education, we investigate the sensitivity of our results to using more precise measures of the distribution of public health spending. In particular, we compare our measures to those derived from two studies using administrative data and three countries for which we could find spatially disaggregated data on health spending. As shown in Appendix Figure B3, our estimates are not sensitive to using these more precise measures.

increases inequality in health spending, while the second one reduces it.

Specification Bounds. Our estimates of the progressivity of social assistance, education, and healthcare do not cover all target country-years. We impute missing data to obtain worldwide coverage over 1980-2023 using two simple assumptions (1) for missing countries and (2) for missing years in a given country.

For missing countries, we use regional averages of distributional incidence profiles. Our main results are unaffected by this imputation, since we always cover a large fraction of the world population for at least one year for each type of transfer.

For missing years in a given country, we extrapolate series backwards and forwards. In our main specification, we fill in missing values by assuming that progressivity has remained constant over time. We account for uncertainty surrounding this extrapolation by constructing "specification bounds" on the progressivity of transfers in each country. First, we estimate long-run trends in progressivity in countries with available data. Second, we use variations in these trends to get plausible bounds on the rate of change in progressivity. We find that progressivity is a slow-moving variable: the bottom 50% share of spending almost never changes by more than 5 percentage points per decade.[6] We use this empirical regularity to construct conservative bounds on progressivity in missing years using these predicted rates of change. Appendix Figure B4 illustrates this process in the context of Indonesia. The poorest 50% of Indonesians received 42% of secondary education spending in the early 1990s, so this share was almost certainly 37%-47% in the early 1980s.

II.E. Distributional Incidence of Taxes

We now present the data sources and methodology used to estimate the distributional incidence of taxes. In the absence of administrative microdata reporting tax burdens in each country, we make a number of simplifying assumptions, which we will validate by comparing our estimates to existing high-quality studies in Section II.G.

[6] In practice, we find that the bottom 50% share of transfers slightly increased on average in countries with available data, consistent with evidence from existing country-specific studies (e.g., Bozio et al., 2024; Gethin, 2026). Our benchmark assumption of constant progressivity should thus be seen as conservative.

Personal Income Taxes. We first microsimulate personal income taxes (PIT) in each country. Only taxpayers with income above the PIT exemption threshold K pay any taxes. We estimate K from Bachas et al. (2026) and Jensen (2022). Above the PIT exemption threshold, we estimate the structure of personal income tax incidence using statutory rate schedules from the World Tax Indicators (WTI) database (Peter, Buttrick, and Duncan, 2010). This database provides information on the average and marginal statutory income tax rates at the average income, then at two, three, and four times that level, and finally the top marginal tax rate. We complement the WTI with inputs from Strecker (2021), Vegh and Vuletin (2015), and other sources. On this basis, we can approximate a continuous schedule of statutory personal income tax rates.

Drawing on additional data sources, we also make three distinctions (1) between countries whose PIT systems tax married couples' joint income versus those that only tax individual incomes, (2) between countries whose PIT systems tax dividends and capital gains differently from labor income, and (3) between the pretax and taxable income distributions (since (1) and (2) may induce some re-ranking). Appendix B.3 provides more details.

Appendix Figure B5 illustrates how accounting for the key features of PIT systems implies large variations in PIT progressivity across countries. For instance, China and the United States both have progressive personal income taxes but the tax base and rates are much larger in the U.S. In contrast, Russia has a large tax base but weak PIT progressivity.

Corporate Income Taxes. Following the literature, we allocate the corporate income tax (CIT) proportionally to corporate equity ownership (Chancel et al., 2025). We collected estimates of CIT incidence by generalized percentile from existing DINA studies covering 42 countries, including the United States (Piketty, Saez, and Zucman, 2018), Europe (Blanchet, Chancel, and Gethin, 2022), the Netherlands (Bruil et al., 2022), Australia (Fisher-Post, Herault, and Wilkins, 2022), Brazil (Palomo et al., 2025), South Africa (Czajka and Gethin, 2025), Latin America (Flores, De Rosa, and Morgan, 2022), and Nepal (Etang and Gethin, 2026). All these studies point to a similar pattern: corporate taxes are very progressive, because corporate equity ownership is highly concentrated at the top of the distribution. Given the similarities observed across these contexts, we take the average of these tax incidence profiles to distribute total CIT revenue in each country. For sensitivity

analysis, we consider lower and upper bounds corresponding to the average of the ten most and ten least progressive profiles observed (see Appendix Figure B6).

Indirect Taxes. Indirect taxes include all consumption taxes such as value-added and sales taxes, excise taxes, and import duties. We distribute them to consumers, but we also account for the fact that part of consumption goes untaxed because it takes place in the informal sector.[7] We proceed in two steps. First, we estimate income-to-consumption ratios along the income distribution. Second, we estimate the informal share of consumption by generalized percentile.

Our estimates of the income-to-consumption ratio come from the same collection of DINA studies as above. They all suggest that this ratio is logit-shaped (see also Chancel et al., 2023, Blasco, Guillaud, and Zemmour, 2023, and Deudibe, Mahler, and Lakner, 2026 for similar cross-country evidence). We take the average profile observed across studies to estimate consumption in each country-year, which amounts to assuming that the income-to-consumption ratio rises with income from 0 to 2.5 times the median. For sensitivity analysis, we consider lower and upper bounds corresponding to the average of the ten most and ten least progressive profiles observed (see Appendix Figure B7).

We then account for the fact that low-income households tend to purchase goods in informal markets to a greater extent than high-income households. As a result, a larger fraction of their consumption goes untaxed, especially in low-income countries where informality is high. We build on Bachas, Gadenne, and Jensen (2022), who estimate the share of consumption made in informal markets by percentile in a sample of developing countries. They find that informality is relatively greater among low-income households in poor countries than in rich countries (see Appendix Figure B8). Drawing on this empirical regularity, we estimate the share of consumption $s_{ct}(p)$ made in the formal market for percentile p in country c at time t as a linear function, whose slope

[7] We do not account for the potentially heterogeneous incidence of VAT and sales taxes relative to excise taxes and tariffs. This heterogeneity is second-order in comparison to the large regressivity generated by declining consumption-to-income ratios with income.

depends on the level of economic development:

$$s_{ct}(p) = p \times \theta_{ct} \quad (3)$$

$$\theta_{ct} = \alpha + \beta GDP_{ct} \quad (4)$$

where GDP_{ct} denotes GDP per capita in 2023 PPP USD. This adjustment significantly reduces the regressivity of indirect taxes in poorer countries, although it is generally not sufficiently strong to make them progressive as a share of income. Appendix Figure B9 illustrates the implications for Niger, one of the poorest countries in our sample.

Property and Wealth Taxes. Property and wealth taxes include taxes on immovable property, wealth taxes, inheritance and gift taxes, and taxes on financial and capital transactions. They are typically very small, 2% of national income on average. Following Piketty, Saez, and Zucman (2018), we assume that residential property taxes are paid by households proportionally to housing wealth, while business property taxes and inheritance, wealth, and financial transaction taxes are distributed proportionally to capital income excluding mixed income and imputed rents. Unfortunately, we do not observe the concentration of housing wealth, so we assume that residential property taxes are paid proportionally to pretax income. This is consistent with available evidence suggesting that the distribution of housing property taxes is relatively flat (Czajka and Gethin, 2025; Piketty, Saez, and Zucman, 2018). For other wealth taxes, we use the same corporate tax stylized profile as above.

Social Contributions. Social contributions are of second-order importance for the results presented in this paper, since they are mostly used to finance pension and unemployment benefits that are excluded from our measures of redistribution. However, we still estimate their distributional incidence in order to study overall tax progressivity, as well as to deduct the small fraction of contributions that is used to finance public healthcare in a handful of countries (see below). We distribute them proportionally to labor income, excluding income that is not taxed due to exemptions or evasion. To do so, we rely on a unique database provided by the International Labor Organization (ILO), which compiles labor force surveys fielded in a large number of countries since

the 1990s. We observe whether individuals pay social contributions, and estimate the propensity to do so along the labor income distribution. Informal work and exemptions are more prevalent at the bottom of the distribution, while capital income is more prevalent at the top. As a result, middle-income groups often display the highest effective tax rates. Appendix Figure B10 illustrates the implications of this adjustment for Argentina, where a large fraction of low-income earners work in the informal sector.

II.F. Pretax and Posttax Income Inequality

We construct measures of posttax income by deducting taxes from and adding transfers to pretax incomes (equation (1)). An important issue is that our database only covers the distribution of social assistance, education, and healthcare; we have no information on the incidence of other public services such as transport, public order and safety, and defense. As a result, deducting all taxes but only adding back these transfers would yield highly imbalanced measures of posttax income, since tax revenue typically exceeds spending on these three categories of expenditure. To account for this issue, we consider two alternative measures of posttax income.

In our benchmark specification, we only distribute social assistance, education, and healthcare and only deduct the fraction of taxes that are used to finance them.[8] We also make an adjustment for the fact that a small fraction of government transfers is financed by foreign aid flowing from rich to poor countries (we come back to this in Section IV.C). Hence, posttax income equals pretax income, plus social assistance, public education, and health transfers, minus the net-of-foreign-aid taxes used to finance them. Total pretax income equals total posttax income. Worldwide net foreign aid sums to zero.

In an alternative specification, we deduct all taxes from individual incomes and add back all government expenditure. Following the literature (Chancel et al., 2025; Piketty, Saez, and Zucman, 2018), we allocate all transfers other than social assistance, education, and healthcare, as well as the government deficit, proportionally to posttax disposable income (pretax income, minus direct

[8]We account for the fact that public healthcare is financed through social contributions rather than taxes in some countries. We assume that education and social assistance are funded through general taxation, but we test the sensitivity of our results to funding some basic education with property taxes, as is the case in a few countries such as the United States. See Appendix B.2 for more details.

taxes, plus cash transfers). We view this as a conservative assumption given available evidence. For instance, Gethin (2026) finds that public services are generally more progressive than disposable income (although not as progressive as social assistance, education, and healthcare) and have become increasingly so in the context of post-apartheid South Africa. This broader measure of posttax income also equals pretax income in aggregate.

We systematically exclude private education and health spending from our analysis, as well as the fees or insurance premiums used to pay for them. These services are financed by households and hence outside of the scope of government redistribution that is the focus of this paper.

II.G. Validation

Data Sources. We validate our new measures of tax-and-transfer progressivity by comparing them with those available from the literature. From the eight DINA studies cited above, we were able to compile data on effective tax rates by pretax income percentile and the distribution of transfers in 45 countries and 657 country-years. We also collected estimates of the distributional incidence of transfers from the Commitment to Equity Database. We now compare these estimates with those constructed in this paper.

Challenges. One major difficulty is that existing studies are far from being comparable with one another, for three main reasons. First, they do not always follow the same methodology. For instance, Piketty, Saez, and Zucman (2018) distribute business property taxes proportionally to corporate equity, while other studies distribute them either proportionally to pretax income or in undocumented ways.

Second, the quality of data available to distribute taxes varies tremendously across countries, from comprehensive administrative data in the Netherlands (Bruil et al., 2022) to surveys in Latin America (Flores, De Rosa, and Morgan, 2022) and Europe (Blanchet, Chancel, and Gethin, 2022). As a result, estimates of effective tax rates paid and transfers received by percentile often suffer from significant sampling and measurement error.

Third, and most importantly, all existing studies allocate indirect taxes by relying on surveys

reporting pretax income and consumption. Because many households have close to zero pretax income, consumption-to-income ratios often diverge to infinity at the bottom of the distribution, making estimates of effective consumption tax rates very sensitive to outliers. The existing literature also suggests that cross-country variations in consumption-to-income profiles are likely driven by substantial measurement error and recommends using homogeneous conversion factors accordingly (Chancel et al., 2023; Deudibe, Mahler, and Lakner, 2026). In using a single stylized profile to calibrate indirect tax progressivity, we thus view our methodology as strengthening the comparability of tax progressivity statistics rather than weakening it.

Validation Results: Transfers. With these limitations in mind, we start by validating our estimates of the distributional incidence of transfers. We first focus on three high-quality studies covering France (Germain et al., 2021), the Netherlands (Bruil et al., 2022), and South Africa (Gethin, 2026). These studies use much more precise measures of the distribution of education and healthcare than we do and also account for geographical variations in public spending.[9] Figure Ia shows that our estimates of the share of national income received by the bottom 50% closely align with theirs. The main minor discrepancy is education, which appears more regressive in the French and Dutch studies because they study inequality at the level of the couple while we focus on the household.

Appendix Figure B11 extends this comparison to estimates from a broader set of countries available in the CEQ database, which are sourced from country-specific fiscal incidence studies conducted using survey microdata. Our estimates of social assistance, education, and healthcare transfers received by the bottom 50% closely map onto theirs.

Validation Results: Taxes. Figure Ib extends this analysis to taxes by comparing our estimates of effective tax rates by pretax income group (including specification bounds depicted as dashed lines) with those from seven high-quality studies that all combine surveys, tax data, and national accounts. Our results closely align with theirs. Taxes appear relatively flat in Nepal, the Netherlands, and Brazil, while they are slightly progressive in the United States, South Africa, Australia, and France.

[9] Germain et al. (2021) and Bruil et al. (2022) exploit comprehensive administrative microdata on school attendance and actual public health consumption. Gethin (2026) relies on household surveys providing rich information on school attendance by level and the use of different types of healthcare services, which are combined with administrative budget data on education and healthcare expenditure by function and province.

Appendix Figure B12a extends this analysis to effective tax rates faced by percentiles *p50*, *p75*, *p90* and *p99* across all DINA studies including lower-quality studies that rely on survey-reported tax liabilities. The two sets of estimates align relatively well. Appendix Figure B12b further disaggregates this comparison by type of tax. Our estimates fall very close to existing studies in the case of personal income taxes and corporate taxes. The correlation is lower for indirect taxes, reflecting the issues of diverging consumption-to-income ratios and substantial survey measurement error in existing studies highlighted above.

III. A Global View on Tax-and-Transfer Systems

We now exploit our new database to study cross-country and historical variations in government redistribution around the world. Section III.A analyzes transfer progressivity. Sections III.B, III.C, and III.D turn to taxes, overall government redistribution, and the relative importance of taxes and transfers, respectively. Section III.E quantifies the contributions of differences in pretax inequality versus tax-and-transfer systems in explaining cross-country variations in inequality.

Given that specification bounds have little impact on our main conclusions, we do not report them in the main figures for clarity. We reproduce key results using specification bounds in the appendix and report them for each country-year-percentile in our publicly available database. We stress that these bounds are useful to investigate sensitivity to extreme assumptions but should not be interpreted as confidence intervals. For instance, lower and upper bounds correspond to *jointly* assuming that corporate taxes, indirect taxes, and each type of transfer are all distributed as in the least or most progressive country-years—a highly unlikely scenario.

III.A. Transfer Progressivity

We start by documenting worldwide variations in the size and structure of transfers. As discussed in Section II, we focus on social assistance, education, and healthcare expenditure in the main analysis and relegate results including other public spending to the appendix. Figure II plots government expenditure on these three groups of policies by world region in 1980 and 2023. We divide the world into six regions: the Anglosphere (United States, United Kingdom, Canada,

Australia, and New Zealand), Western Europe, Eastern Europe (including Russia), Latin America, Asia, and Africa. We then calculate total spending as a share of national income in each country and plot population-weighted regional averages.[10]

Public spending has increased in most regions of the world in the past decades. However, there has been no regional convergence in the size of the welfare state. In 2023, government expenditure on social assistance, education, and healthcare represented 18-19% of national income in the Anglosphere and Western Europe, 13% in Latin America, and 7% in Africa. Poorer countries also dedicated a lower fraction of expenditure to social assistance programs, which represented about 15% of total transfers in Africa compared to 30% in Western Europe. Hence, ignoring the consumption of public education and healthcare would lead to dramatically underestimating redistribution, especially in poorer countries.[11]

In addition to differences in the level and composition of transfers, there are also significant regional variations in their progressivity. Figure III plots the average share of pretax income and government transfers received by the bottom 50% in each world region. Government transfers always unambiguously reduce inequality. The average share of pretax income received by the poorest 50% varies from 10% in Latin America to 20% in Western Europe. Meanwhile, 50-60% of transfers are received by the bottom 50%. In other words, the distribution of transfers is well approximated by a lump sum allocation in Africa and Asia and is even more progressive than a lump sum in Western Europe and the Anglosphere.[12]

Social assistance is the most progressive type of transfer, which is to be expected given the often explicitly pro-poor design of the corresponding programs (such as conditional cash transfers or food stamps). The poorest 50% receive between 55% (Africa) and 75% (Anglosphere) of social assistance transfers.

Education is less progressive than social assistance but still strongly reduces inequality: 45% of spending is received by the bottom 50% in Africa, compared to 70% in Western Europe. While

[10]Appendix Figure A1 plots the evolution of total spending including government expenditure other than social assistance, education, and healthcare.

[11]Appendix Figures A2, A3, and A4 plot social assistance, education, and health expenditure against GDP per capita. All three transfers increase with development, especially social assistance and healthcare.

[12]Appendix Figure A5 shows that transfer progressivity increases with development, although there are large variations at all development levels.

such a degree of progressivity might seem surprising, it is useful to remind the reader that it is the product of countervailing forces. On the one hand, children from high-income households tend to stay longer in school. On the other hand, low-income households tend to have more children. These effects more or less compensate each other, yielding a quasi-egalitarian distribution of education spending in the average country.

Public healthcare is about as progressive as education, which again reflects the joint effect of two forces. On the one hand, low-income households often have lower access to public healthcare because of user fees or travel distances. On the other hand, they tend to have greater healthcare needs. These two effects approximately offset each other to generate a lump-sum pattern, consistent with existing evidence using administrative data (Bruil et al., 2022; Germain et al., 2021).

Combining total spending and progressivity, Figure IV depicts average transfers received by pretax income quintile and world region in 2023, expressed as a share of national income. In Africa and Asia, transfers are small and flat: all quintiles receive 1-1.5% of national income. In Western Europe and the Anglosphere, in contrast, transfers are both larger and more progressive: the bottom 20% receive about 5% of national income, while the top 20% receive about 2.5%. Figure V plots total transfers received by the bottom 50% against GDP per capita, confirming the strong correlation between transfer progressivity and development ($\rho = 0.75$, population-weighted). However, significant variations remain at all levels of development, as exemplified by the large Brazilian and South African welfare states and the low transfers observed in some high-income countries such as Qatar, Luxembourg, or Singapore.

In terms of trend, there has been a significant expansion of transfers in most world regions but little convergence between low- and high-income countries. Transfers received by the bottom 50% increased from 7-8% in 1980 to 11-12% in 2023 in Western Europe and the Anglosphere (see Figure VI). A similar evolution is visible in Latin America starting in the 1990s, as well as in Asia from the turn of the twenty-first century onward. On the other hand, transfers have progressed at a much lower pace in Eastern Europe and have almost stagnated in Africa.

A natural concern is that the growth of redistribution might purely reflect changes in needs. In particular, the rise of education spending could have been driven by increases in the share of

the young population, while the rise of health spending could have been driven by population ageing given elderly adults' greater healthcare needs. We investigate this issue by constructing age-adjusted measures of education and health spending, comparing the evolution of expenditure to its counterfactual evolution absent any change in the demographic structure of each country (see Appendix B.7; see also Bharti et al. (2026) for a broader analysis of worldwide trends in age-adjusted expenditure over the past century). Appendix Figure A7 shows the results of this exercise. Age-adjusted health spending has increased less than unadjusted expenditure due to population ageing, while age-adjusted education spending has increased more due to fertility decline. The education effect slightly dominates: total age-adjusted redistribution has risen at a slightly faster pace than unadjusted redistribution in all world regions.

III.B. Tax Progressivity

We now turn to the distributional incidence of taxes. Figure VII plots aggregate tax revenue and net foreign aid received by world region in 1980 and 2023. Total taxation has increased in Latin America and Western Europe, while it has remained relatively stable in other regions. Western European and Anglosphere countries derive much larger tax revenue from personal income taxes than other regions, where indirect taxes are widespread. Overall, there have been no major changes in the composition of taxes within each region, although there are some exceptions. In Eastern Europe, corporate tax revenue has declined, while indirect taxes have expanded as a share of national income.

Figure VIII disaggregates taxes by pretax income group and world region in 2023. Consistent with Figure VII, effective tax rates are lowest in Sub-Saharan Africa (10-15%) and highest in Western Europe (45-50%). Taxes are progressive in Anglosphere countries and Africa, relatively flat in Western Europe and Asia, and regressive in Eastern Europe and Latin America. These differences reflect the fact that Eastern European and Latin American countries rely heavily on indirect taxes as a source of revenue, while indirect tax revenue is particularly low in Anglosphere countries. Eastern European countries have also moved toward a flat taxation of personal income in recent decades, which further reduces tax progressivity in comparison to other world regions. Overall,

effective tax rates vary only moderately by income group in most regions, suggesting that their role in shaping inequality is modest.

To make progress in quantifying these variations, we summarize tax progressivity with a simple indicator, the percent decrease in inequality generated by the tax system:

$$\gamma_\tau = \frac{r_{pre} - r_{net}}{r_{pre}} \tag{5}$$

where pre refers to pretax income, net refers to net-of-tax income (pretax income minus taxes), and $r = \frac{\bar{y}_{p90p100}}{\bar{y}_{p0p50}}$ is the ratio of the average income of the richest 10% to that of the poorest 50% individuals in each country-year. Positive values of γ_τ indicate progressive tax systems, while negative values indicate regressive tax systems.

Figure IX plots tax progressivity in 2023 against GDP per capita expressed in 2023 PPP USD. In the majority of countries, tax progressivity is close to zero: taxes typically increase or reduce inequality by less than 10%. The regional patterns documented in Figure VIII clearly stand out. Latin American and Eastern European countries have the most regressive tax systems. The Anglosphere, some Western European countries, and South Africa display the most progressive tax systems. The correlation between tax progressivity and GDP per capita is $\rho = -0.11$ (population-weighted). Hence, progressivity is only weakly correlated with development overall.

Figure X depicts the evolution of tax progressivity by world region from 1980 to 2023. In 2023, taxes reduced inequality by about 5-10% in the Anglosphere and Western Europe, left inequality almost unchanged in Africa, Asia, and Latin America, and increased inequality by almost 30% in Eastern Europe. Tax progressivity has remained remarkably stable in all regions except Eastern Europe, where it has strongly declined.[13]

One concern with this analysis is that our indicator of tax progressivity may not be perfectly comparable: in countries with higher pretax inequality, taxes may appear mechanically more progressive. As a robustness check, we thus consider a complementary indicator of "normalized" progressivity, defined as progressivity computed over a single, "normalized" distribution common

[13]Appendix Figures A9 and A10 reproduce Figures IX and X after excluding social contributions from our measures of tax progressivity. The results are similar.

to all countries (see Appendix B.4). The results are similar (see Appendix Figures A11 and A12).

III.C. Net Government Redistribution

Combining taxes and transfers, we derive estimates of overall redistribution in each country. As discussed in Section II, we focus on social assistance, education, and healthcare transfers and deduct the taxes that finance them to obtain net transfers summing to zero across income groups in each country-year. We report results deducting all taxes and adding all transfers in the appendix. Figure XI provides a global map of net redistribution, that is, total transfers received by the bottom 50% net of taxes, expressed as a share of national income. Tax-and-transfer systems always reduce inequality: the indicator is strictly positive in all countries in the world. However, there are large cross-country variations in redistribution, ranging from less than 2% of national income across most of Sub-Saharan Africa to 7-12% in several countries in Northern America, Western Europe, and Southern Africa. Redistribution follows clear regional patterns: it is highest in Northern America, Europe, Southern Africa, and Latin America, and lowest in Sub-Saharan Africa (excluding Southern Africa) and South and Southeast Asia.

Net redistribution strongly increases with development (Figure XII).[14] The correlation between net transfers received by the bottom 50% and GDP is $\rho = 0.69$ (population-weighted), only slightly lower than the one obtained for gross transfers in Figure V. The proximity between the two figures reflects the fact that tax progressivity is close to zero in most countries, so that deducting taxes from transfers does not change the overall pattern of which countries have the most progressive tax-and-transfer systems. Nevertheless, significant variations remain at all levels of development: a simple regression of redistribution on log GDP yields an R^2 of about 0.5, leaving half of cross-country differences in redistribution unexplained.

Similarly, Figure XIII shows that net redistribution has increased in most world regions, consistent with the pattern observed for gross transfers in Figure VI.[15] Beyond these regional averages, we find that redistribution has increased in the vast majority of countries (see Appendix Figure

[14]Appendix Figure A14 shows similar results when using broader measures of redistribution including other government expenditure.

[15]Appendix Figure A15 reproduces this figure for specification bounds. Appendix Figure A16 shows similar results when using broader measures of redistribution including other government expenditure.

A17). Interestingly, redistribution to the bottom 50% is about 2 points of national income larger in the Anglosphere than in Western Europe after deducting taxes. This result is consistent with Blanchet, Chancel, and Gethin (2022), who also find that tax-and-transfer progressivity is larger in the United States than in Western Europe due primarily to differences in tax progressivity.

III.D. The Relative Contributions of Taxes and Transfers

Combining our results on the weak progressivity of taxes and the large differences in transfers, we should expect transfers to be the dominant drivers of redistribution. We formalize this finding in Table I, which reports how inequality changes before and after removing taxes and adding transfers to individual incomes. In 2023, the top 10% to bottom 50% income ratio was approximately $r = 19$ in the average country. Removing taxes left inequality unchanged, while adding government transfers reduced the ratio by 5 points. By this measure, taxes account for 0% of the effect of government redistribution on inequality, while transfers account for 100%. There are some variations across regions: the contribution of taxes is 0-10% in Africa, the Anglosphere, and Western Europe, while it is negative in Eastern Europe and Latin America, where taxes increase inequality. Overall, transfers largely dominate taxes in shaping redistribution in all regions.[16]

A striking corollary is that the dominant driver of redistribution ends up being how much governments spend on social assistance, education, and healthcare. As shown in Appendix Figure A18, there is a strong correlation between aggregate expenditure on these transfers and the net transfer received by the bottom 50%. A simple regression of net transfers on aggregate expenditure yields an R-squared of over 0.9. Hence, total spending accounts for 90% of cross-country variations in redistribution; tax progressivity and the progressivity of each type of transfer together explain 10%. However, there are interesting exceptions. For instance, the United States and South Africa become relatively more redistributive after accounting for taxes due to their comparatively progressive tax systems. In contrast, Eastern European countries become significantly less redistributive due to their high reliance on regressive indirect taxes. In some Eastern European countries, net redistribution

[16]Appendix Table A1 further disaggregates the redistributive contributions of different categories of taxes and transfers. In the average country, personal income and corporate taxes each reduce inequality by 4-5%, while indirect taxes increase inequality by 12%. Social assistance, education, and health transfers each reduce inequality by 7-13%.

is almost half as large as in South Africa despite identical total public spending levels.

III.E. Predistribution versus Redistribution

We conclude this section by analyzing the relationship between redistribution and posttax inequality. Previous studies have suggested that redistribution plays an important role in explaining differences in inequality levels across OECD countries, in particular the gap between Europe and the United States (OECD, 2011). Recent studies have challenged this finding when using more comprehensive measures of pretax inequality and redistribution (Blanchet, Chancel, and Gethin, 2022; Bozio et al., 2024). Our new database allows us to revisit this evidence by providing a global view on the respective contributions of initial pretax inequality levels ("predistribution") versus taxes and transfers ("redistribution") in explaining cross-country inequality differences.

Figure XIV compares the bottom 50% share in terms of pretax national income and posttax national income across countries in 2023. This comparison provides direct evidence on the roles of pretax inequality versus redistribution in shaping the final distribution of income. If cross-country differences in posttax inequality were entirely driven by taxes and transfers and pretax inequality played no role, then pretax and posttax inequality should be uncorrelated. On the contrary, if posttax inequality were entirely driven by pretax inequality, then we should expect the ranking of countries to remain exactly the same before and after accounting for taxes and transfers.

The main takeaway is that there is a strong correlation between pretax and posttax inequality. Notwithstanding a few exceptions—such as South Africa and the United States, which display high pretax inequality but exceptionally progressive tax-and-transfer systems—the ranking of countries in terms of pretax and posttax income inequality is almost exactly the same. In particular, all European countries are among the most equal in the world, while all Latin American countries are among the most unequal, both in terms of pretax and posttax income. A useful way of quantifying this relationship is to run a cross-country regression of the bottom 50% posttax income share on the bottom 50% pretax income share depicted in Figure XIV. This regression delivers an R^2 of about 0.7 (population-weighted). We find similar results in panel regressions with country fixed effects: the within R^2 reaches 0.9. By these measures, "predistribution" accounts for 70-90% of

cross-country and historical variations in inequality, while "redistribution" accounts for 10-30%.

IV. Government Redistribution and the World Distribution of Income

We now study how the rise of government redistribution has shaped the evolution of the world distribution of income since 1980. To do so, we convert all pretax incomes, taxes, and transfers to real 2023 PPP USD in each country-year. We then rank all individuals in the world from the poorest to the richest, and aggregate average incomes and transfers received by global income percentile.

IV.A. Government Redistribution and Global Poverty Reduction

Figure XV plots the evolution of total government transfers received by the world's poorest 20% from 1980 to 2023. Transfers received by the global poor increased by more than 50% as a share of global GDP. This progress was largely driven by public education and healthcare, which represented about three-quarters of transfers in 2023 compared to half in 1980. At the same time, global income per capita approximately doubled, so that the real transfer received by the global bottom 20% was multiplied by three (see Appendix Figure A19). Taxes paid by the global poor have increased but remain tiny in comparison to transfers. As a result, net redistribution towards the global bottom 20% is almost identical to gross transfers and has increased at the same pace.

Figure XVI compares the evolution of the average pretax and posttax incomes of the world's poorest 20% from 1980 to 2023. Average pretax income increased by about 120%, while posttax income grew by 190%. Hence, government redistribution accounts for approximately 40% of global bottom 20% income growth. In 2023, transfers doubled the average income of the global poor. Appendix Figure A20 further decomposes the contributions of taxes and transfers by moving from pretax to posttax income step by step. Adding social assistance transfers to pretax incomes raises the global bottom 20% growth rate from about 120% to 160%, while adding education and healthcare further raises it to 190%. Removing taxes has almost no impact. In other words, social assistance and public services each account for about half of the growth in redistribution towards the world's poorest 20% since 1980. This result is robust to various alternative specifications, such as including other transfers, using World Bank income distribution data instead of the WID, and

removing China and India from the analysis. Depending on the exact specification and data sources used, redistribution is found to account for 30-40% of global bottom 20% growth.[17]

IV.B. Government Redistribution and Global Inequality

We now extend this analysis to the overall distribution of global economic growth. Figure XVII plots the real pretax and posttax income growth rates experienced by each percentile of the world distribution of income from 1980 to 2023.[18] Pretax growth has been greatest at the middle and top end of the distribution, generating what has been referred to as the "elephant curve" of global inequality and growth (Lakner and Milanovic, 2016). This pattern reflects the conjunction of trends in inequality between and within countries, including the rise of China and India (middle of the distribution), weaker growth in low-income countries (lower end) and high-income countries (upper-middle section), and increasing top income inequality in many parts of the world (top end).

While this pattern has been extensively documented, little is known of the role played by government redistribution in shaping it. As shown in Figure XVII, moving from pretax to posttax income raises growth rates for all groups within the bottom 60% of the world distribution of income, while it only slightly reduces them for the top 40%. Education and healthcare alone account for over half of this effect, pointing to the fundamental role played by these public services in making global economic growth more inclusive (see Appendix Figure A24). Appendix Figure A28 extends this analysis to global inequality, measured as the ratio of the world's richest 10% to poorest 50% average incomes. Global posttax inequality declined by 35% between 1980 and 2023. Redistribution accounts for about a third of this reduction. In 2023, taxes and transfers reduced the top 10% to bottom 50% global income ratio from over 40 to about 30.

[17]Appendix Figure A21 reproduces Figure XVI with specification bounds. Appendix Figure A22 shows similar results when using a broader measure of posttax income deducting all taxes and adding all government expenditure. Appendix Figure A23 reproduces the analysis using World Bank income distribution data instead of the WID. We also calculate that redistribution accounts for 30% of global bottom 20% growth when excluding China, 40% when excluding India, and 28% when excluding both countries from the analysis.

[18]Appendix Figure A25 reproduces Figure XVII with specification bounds. Appendix Figure A26 shows similar results when using a broader measure of posttax income deducting all taxes and adding all government expenditure. Appendix Figure A27 reproduces the analysis using World Bank income distribution data instead of the WID.

IV.C. The World Distribution of Foreign Aid

Finally, we study the role of foreign aid in shaping the world distribution of income. We construct measures of the world distribution of foreign aid by using data from the OECD Creditor Reporting System database, which reports estimates of net Official Development Assistance given and received by country. We restrict the analysis to foreign aid targeted toward social assistance, education, and healthcare, which represents about 20% of total worldwide aid during this period. On the receiver side, we assume that aid is received by households and distributed similarly to government transfers. On the donor side, we assume that aid is paid by individuals proportionally to taxes. Hence, we model the world distribution of aid as a transfer from taxpayers in rich countries to beneficiaries of social assistance, education, and healthcare in poor countries.

Figure XVIII depicts the evolution of net foreign aid transfers operated between global income groups from 1980 to 2023. Foreign aid approximately amounts to a transfer from the world's richest 10% to the world's poorest 70%. This transfer has become more progressive over time: it was more concentrated among the poorest deciles of the world distribution of income in 2023 than in 1980. However, total aid received by the global poor remains extremely small. In 2023, the world's poorest 20% received about 0.03% of world income in the form of foreign aid financing social assistance, education, and healthcare. This was equivalent to about 3% of their pretax income, and less than 5% of their government transfers received. Hence, foreign aid has played an insignificant role in the rise of redistribution towards the global poor, which was primarily the result of the development of national tax-and-transfer systems.

V. The Welfare Value of Education and Healthcare

Our previous analysis revealed that public education and healthcare represent the most important redistributive transfers in developing countries and explain a large fraction of the rise of transfers received by the global poor. Our estimates relied on valuing these public services at their cost of provision in a national accounts framework. An open question is whether these measures reflect individuals' willingness to pay for these services. In this last section, we make

progress in estimating the welfare value of public education and healthcare. This analysis should be considered more exploratory given the challenges surrounding this exercise. The main objective is to investigate the sensitivity of our results to this alternative valuation method. Importantly, we rely on completely different methodological principles and data sources than the ones used in our benchmark specification, which makes it a complementary exercise.

V.A. Net Present Value of Education

Framework. We value public education transfers as the net present value of expected returns from receiving an additional year of schooling. We make the following simplifying assumptions. There are four levels of education in the economy: no schooling (0), primary (1), secondary (2), and tertiary education (3). Individuals receive an average income y_{ctps} at time t, depending on their country c, income group p, and level of education s. They can go to school for one year, delivering a return γ_{cs} when they start working. They receive these monetary benefits of education every year for 45 years of working life (say, from age 20 to 65), discounting them at a rate δ. The economy grows at a constant rate g. With these assumptions, we show in Appendix B.6 that the net present value of the public education system is:

$$g_{ctp}^{\text{educ}} = \sum_{s=1}^{3} n_{ctps} \left(\sum_{i=t}^{t+45} \frac{(1+g)^i \gamma_{cs} y_{ctp,s-1}}{(1+\delta)^i} \right) \tag{6}$$

with n_{ctps} the number of children belonging to income group p that are enrolled in public schools at level s. Intuitively, the real value of public education is higher for low-income households when many of their children are in school (n_{ctps}), the return to schooling is large (γ_{cs}), expected income in the absence of additional schooling is also large ($y_{ctp,s-1}$), the economy is growing fast (g), and future benefits from education are discounted at a lower rate (δ).

Data Sources. The number of students in school by level and income group comes from the microdatabase collected in this paper. Returns to schooling γ_{cs} come from Gethin (2025). Data on expected incomes by education level and income group $y_{pt,s-1}$ are constructed by combining data on average incomes by education level from Gethin (2025), intergenerational mobility curves from

van der Weide et al. (2024), and observed and projected growth rates over 1980-2050 from the OECD. The discount rate is set at $\delta = 5\%$.

Discussion. We view this measure as providing a lower bound for two reasons. First, we focus exclusively on the monetary benefits of education, while schooling may also have positive effects on other dimensions of quality of life such as mental health, crime, or fertility (Oreopoulos and Salvanes, 2011). Second, education not only increases individual incomes, but may also generate positive human capital externalities (e.g., Gennaioli et al., 2013).

V.B. Net Present Value of Healthcare

Framework. In the same spirit, we estimate the net present value of public healthcare based on the monetary value of additional years of life expectancy enabled by the healthcare system. Let V_{ctp} be the value of a year of life for percentile p in country c at time t. Individuals can expect to live T_{ct} years longer, L_{ct} years of which can be attributable to public healthcare. An average individual thus receives every year until their death an annual life expectancy gain of $\frac{L_{ct}}{T_{ct}}$. The net present value of the public healthcare system is:

$$g^{\text{heal}}_{ctp} = \zeta^{publ} \sum_{i=0}^{T_{ct}} \frac{\frac{V_{cip} L_{ct}}{T_{ct}}}{(1+\delta)^i} \tag{7}$$

assuming that the public healthcare system accounts for a fraction ζ^{publ} of life expectancy gains.

One would like to estimate V_{ctp}, the value of a statistical life year, for every country and income group in the sample. Unfortunately, such estimates are not available. However, a lower bound on this value is the additional income that individuals can expect to receive (Hammitt and Robinson, 2011). This measure is a lower bound since individuals receive utility not only from income but also from leisure. Additional income is only realized from $T_{ct} - L_{ct}$, when individuals start benefiting from greater life expectancy, and is received until they die, in T_{ct}. The net present value of the healthcare system can then be reexpressed as:

$$g^{\text{heal}}_{ctp} = \frac{1}{T_{ct}} \zeta^{publ} \sum_{i=T_{ct}-L_{ct}}^{T_{ct}} \frac{y_{cip}}{(1+\delta)^i} \tag{8}$$

with y_{cip} the average income that income group p in country c can expect to receive at time i. In summary, the value of the healthcare system is the discounted sum of additional cash flows that individuals receive from living longer thanks to public healthcare.

Data Sources. Remaining years of life are calculated as the difference between life expectancy and the average age, as is common in the literature. ζ^{publ} is proxied by the share of public spending in total healthcare expenditure. Average incomes by income group y_{pci} come from this paper. The discount rate is $\delta = 5\%$, as for education. Life expectancy gains enabled by the public healthcare system L_{ct} are estimated by regressing the Healthcare Access and Quality index available from the Global Burden of Disease database on life expectancy and normalizing it using the coefficient obtained. The resulting index ranges from less than 1 (Eritrea) to 34 (Finland): an average Finn would live 34 years less if there were no (private and public) healthcare system at all. We provide a longer discussion and validation of this indicator in Appendix B.6. In particular, we find that it closely tracks high-quality estimates of medical progress in the United States (Cutler et al., 2022).

V.C. Main Results

Three main results emerge from the analysis of these additional indicators.

First, we compare cost-of-provision and welfare estimates of public education and healthcare in each country in Appendix Figure A29. The two measures are positively correlated ($\rho \approx 0.3$ for education and 0.6 for healthcare, population-weighted). Hence, cost of provision provides an imperfect but still useful first-order approximation of cross-country differences in the value of these public services.

Second, the net present value of public education and healthcare is higher than their cost of provision in almost all countries. However, there are large variations in this gap. The net present value of education is particularly low in India and South Africa, two countries that are well-known for having low quality of education (Mlachila and Moeletsi, 2019; Muralidharan and Sundararaman, 2015). The United States is one of the countries closest to the 45-degree line on healthcare, consistent with evidence on the low welfare value of Medicaid (Finkelstein, Hendren, and Luttmer, 2019).

Third, public education and healthcare have improved, and these gains have strongly benefited the global poor. The net present value of public education and healthcare received by the world's poorest 20% was about twice larger than their cost of provision in 2023 and has risen at about the same pace since 1980 (see Figure XIX). Hence, our main results on the role played by redistribution in shaping global poverty reduction are robust to using this alternative valuation method for in-kind public education and healthcare benefits.

VI. Conclusion

In this paper, we constructed a new publicly available database on the distributional incidence of taxes and transfers covering almost the entire world population from 1980 to 2023. Combining data on the structure and progressivity of tax-and-transfer systems, we derived measures of redistribution that are conceptually consistent, comparable across countries and over time, and successful in reproducing results from previous work covering a more limited number of countries. While our analysis cannot replace detailed country-specific studies using administrative data, it allowed us to adopt a truly global perspective on government redistribution and its role in the reduction of global poverty. As more data sources and high-quality country-specific analyses gradually become available, we plan to regularly update and improve our database.

Our analysis uncovered a number of new facts. Taxes do not significantly increase or decrease inequality in the majority of countries. However, because transfers strongly benefit low-income households, tax-and-transfer systems always reduce inequality. They do so much more in high-income countries, mainly because richer countries display larger welfare states, but also because they better target transfers towards low-income households. Redistribution has significantly expanded in most regions of the world but there has been only limited cross-country convergence. The rise of redistribution has played a major role in global poverty reduction. Under conservative assumptions, the growth of government transfers can account for about one-third of real posttax income growth among the world's poorest 20% from 1980 to 2023. This finding places government redistribution at the center of the historical reduction of global extreme poverty observed in the past decades.

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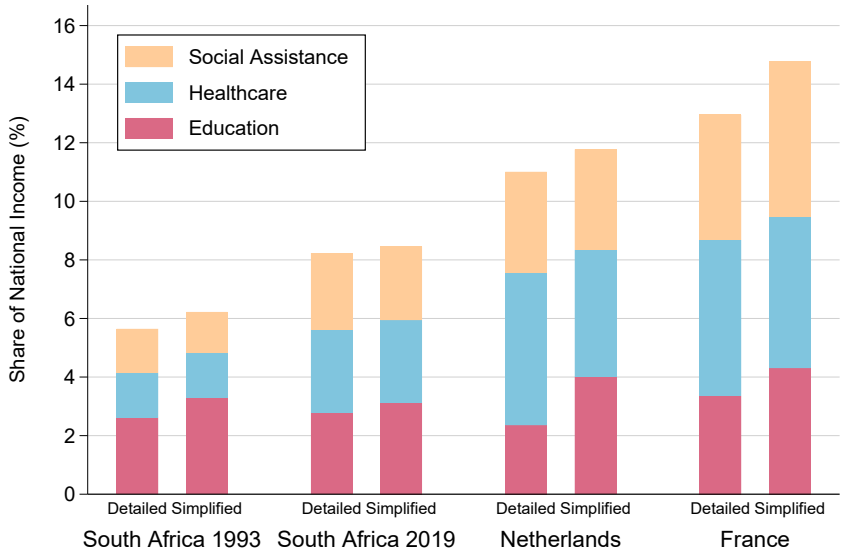
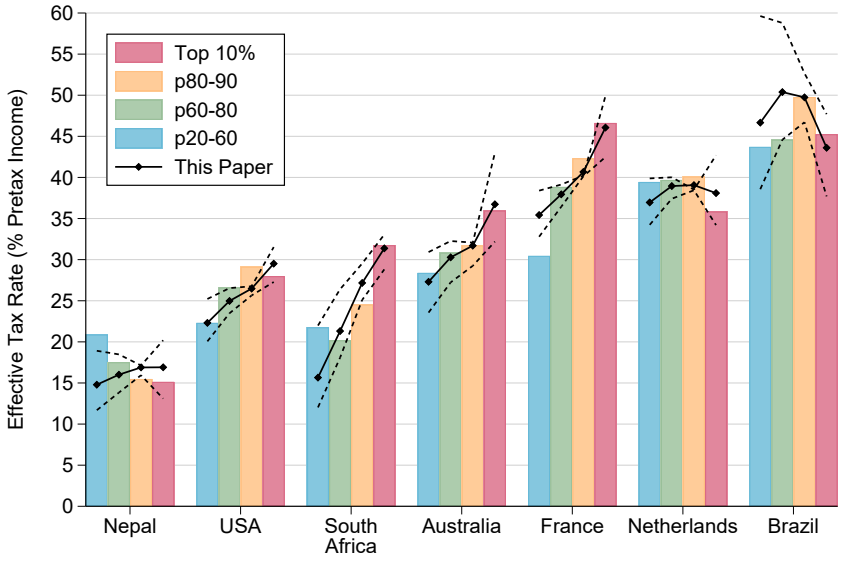
Figure I – Validation: Comparison with High-Quality Studies

(a) Transfers Received by the Bottom 50%

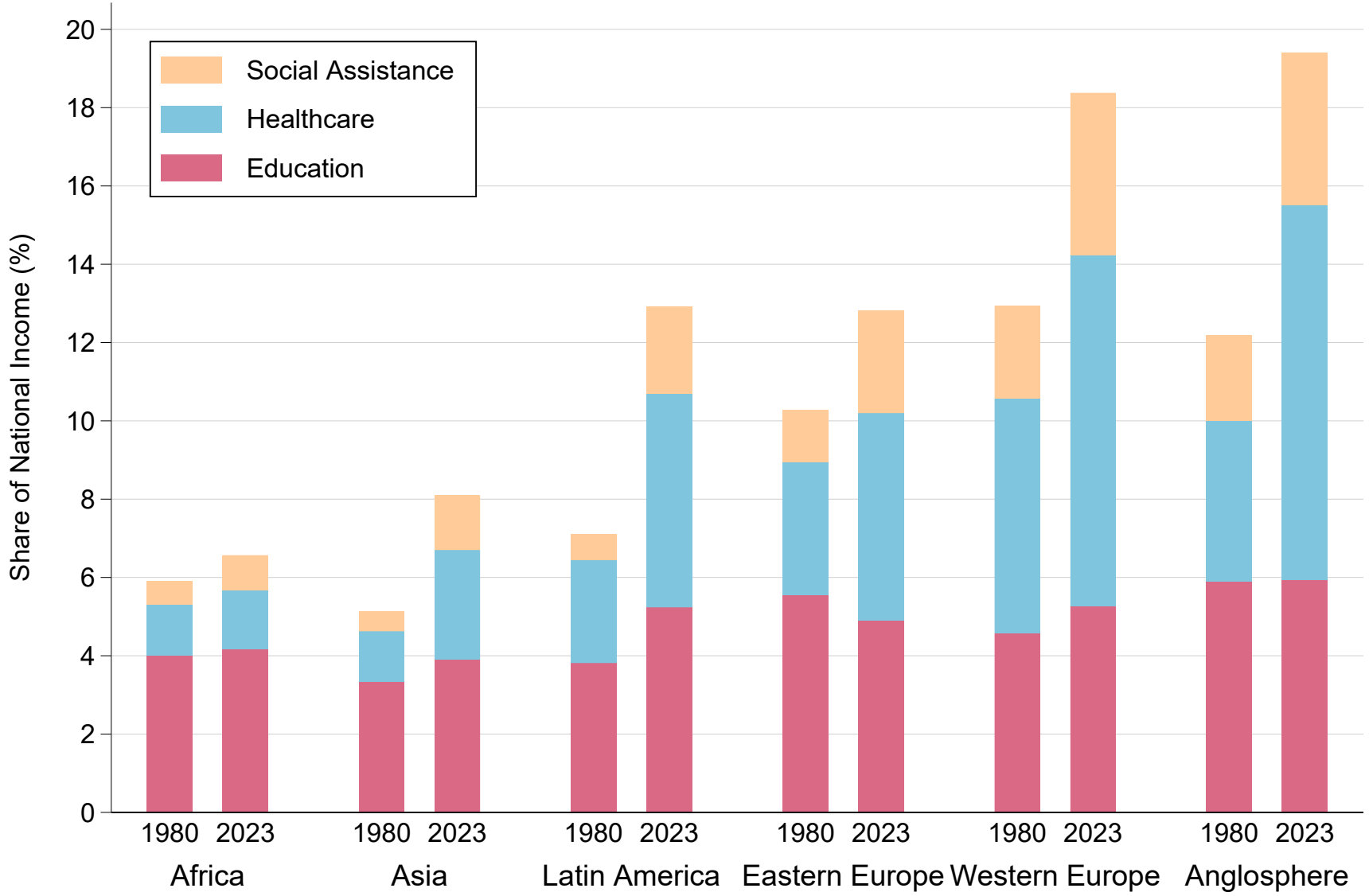


(b) Effective Tax Rates



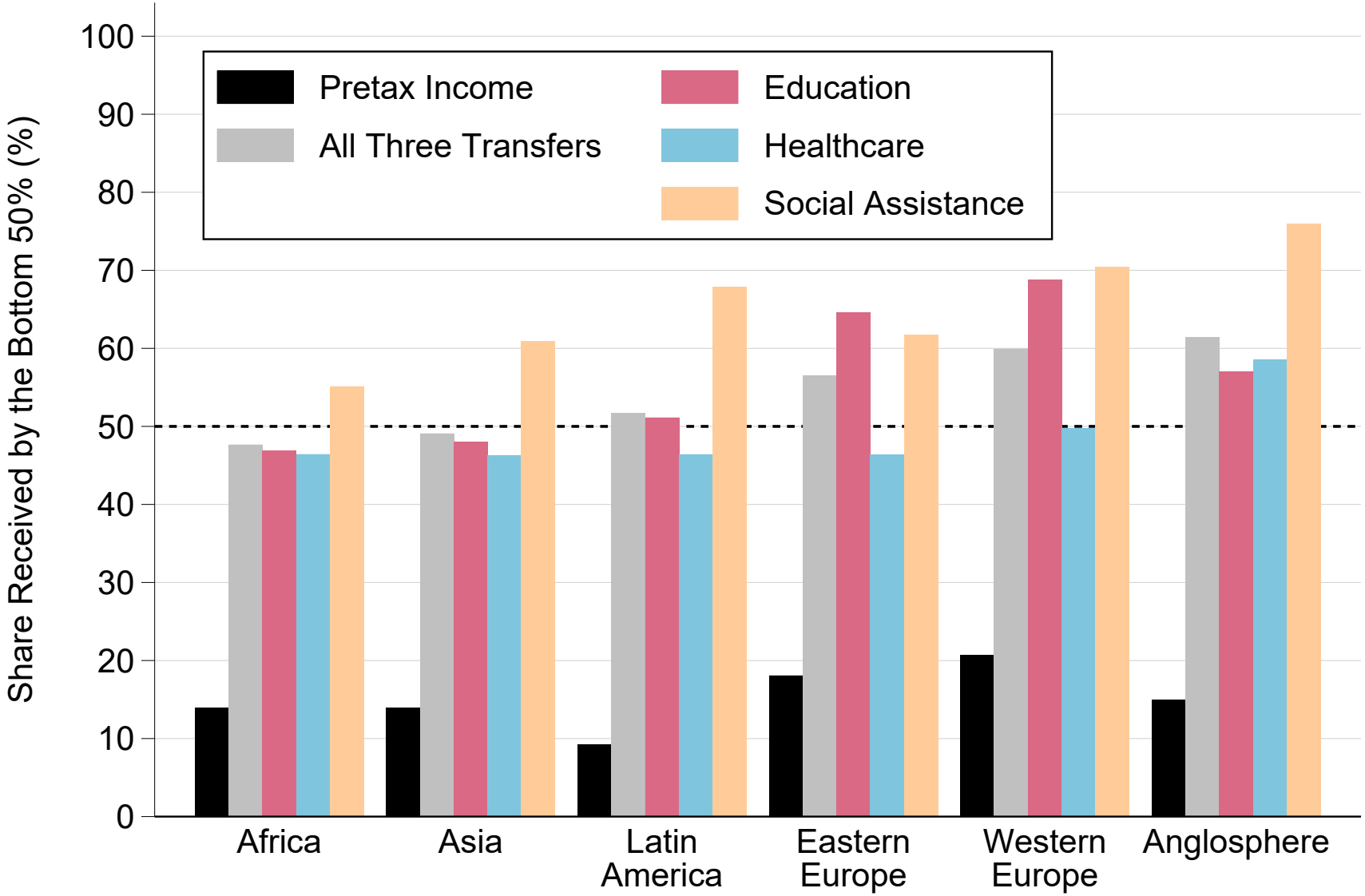
Notes. This figure compares our estimates of the progressivity of taxes and transfers with those available from high-quality DINA studies. Panel (a) plots social assistance, education, and healthcare transfers received by the bottom 50% as a share of national income. Panel (b) plots taxes paid as a share of pretax income (plus social transfers to avoid having effective tax rates diverge to infinity at the bottom of the distribution). Dashed lines depict specification bounds on tax progressivity. DINA studies cover Australia (Fisher-Post, Herault, and Wilkins, 2022), Brazil (Palomo et al., 2025), France (Bozio et al., 2024), Nepal (Etang and Gethin, 2026), the Netherlands (Bruil et al., 2022), South Africa (Czajka and Gethin, 2025), and the United States (Piketty, Saez, and Zucman, 2018). Panel (a) shows that our methodology accurately reproduces variations in the progressivity of transfers in South Africa (1993, 2019), the Netherlands, and France. Education is slightly less progressive in the Netherlands and France in existing studies than in our estimates because the unit of observation is the couple in these studies, while it is the household in this paper. Panel (b) shows that our methodology accurately reproduces the main cross-country variations in tax progressivity, in particular the flatness/regressivity of taxes in Nepal, the Netherlands, and Brazil, and the mild progressivity of taxes in other countries.

Figure II – Government Expenditure on Education, Healthcare, and Social Assistance by World Region



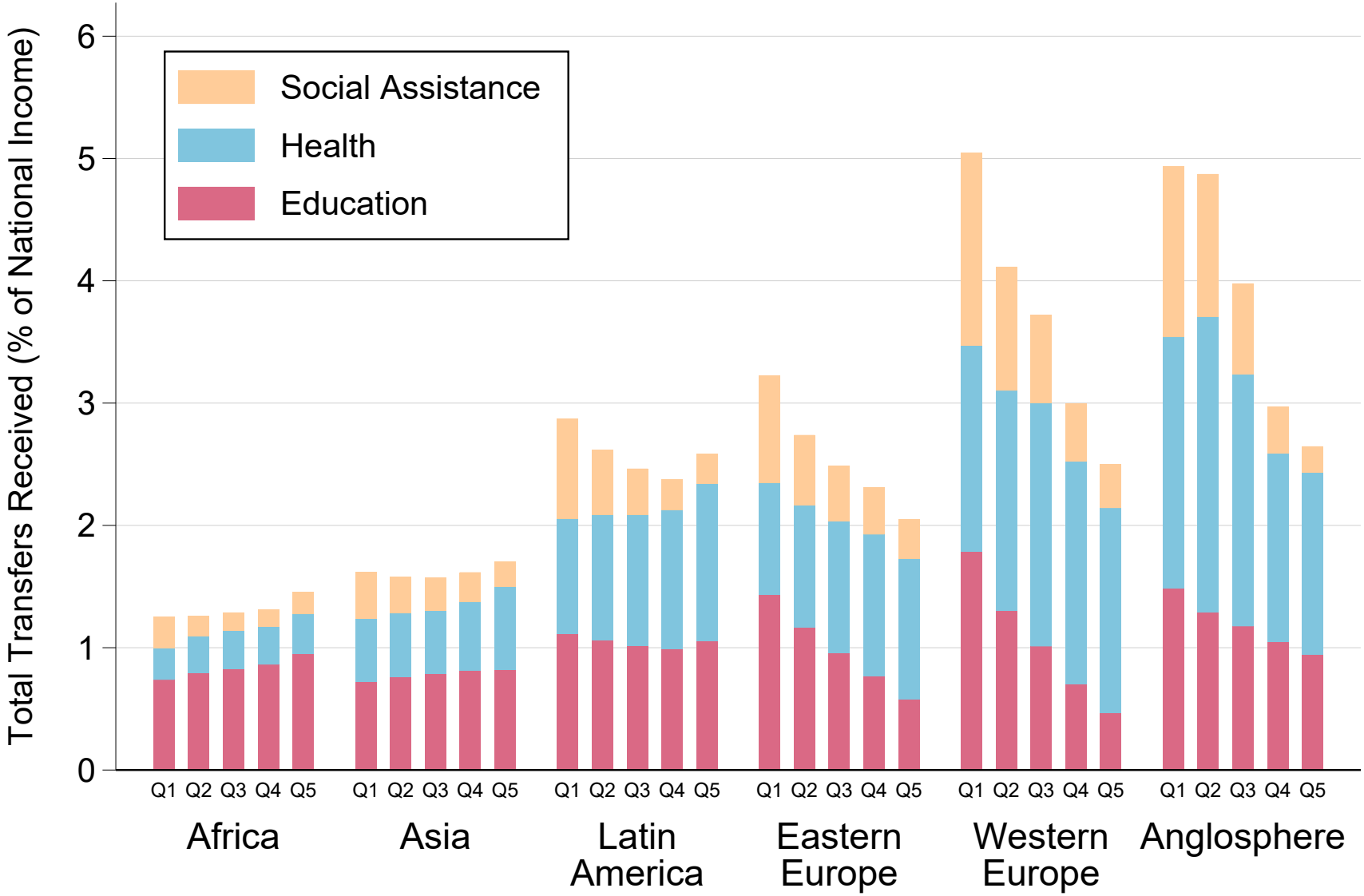
Notes. This figure plots general government expenditure on social assistance, education, and healthcare by world region in 1980 and 2023. Figures correspond to population-weighted averages of public spending as a share of national income in each world region. Public spending on social assistance, education, and healthcare increased as a share of national income in all world regions. This increase was particularly large in Latin America, Western Europe, and the Anglosphere. Education and healthcare represent a much larger share of public spending than social assistance, especially in Africa and Asia.

Figure III – Transfer Progressivity by World Region: Share of Income/Transfers Received by the Bottom 50%



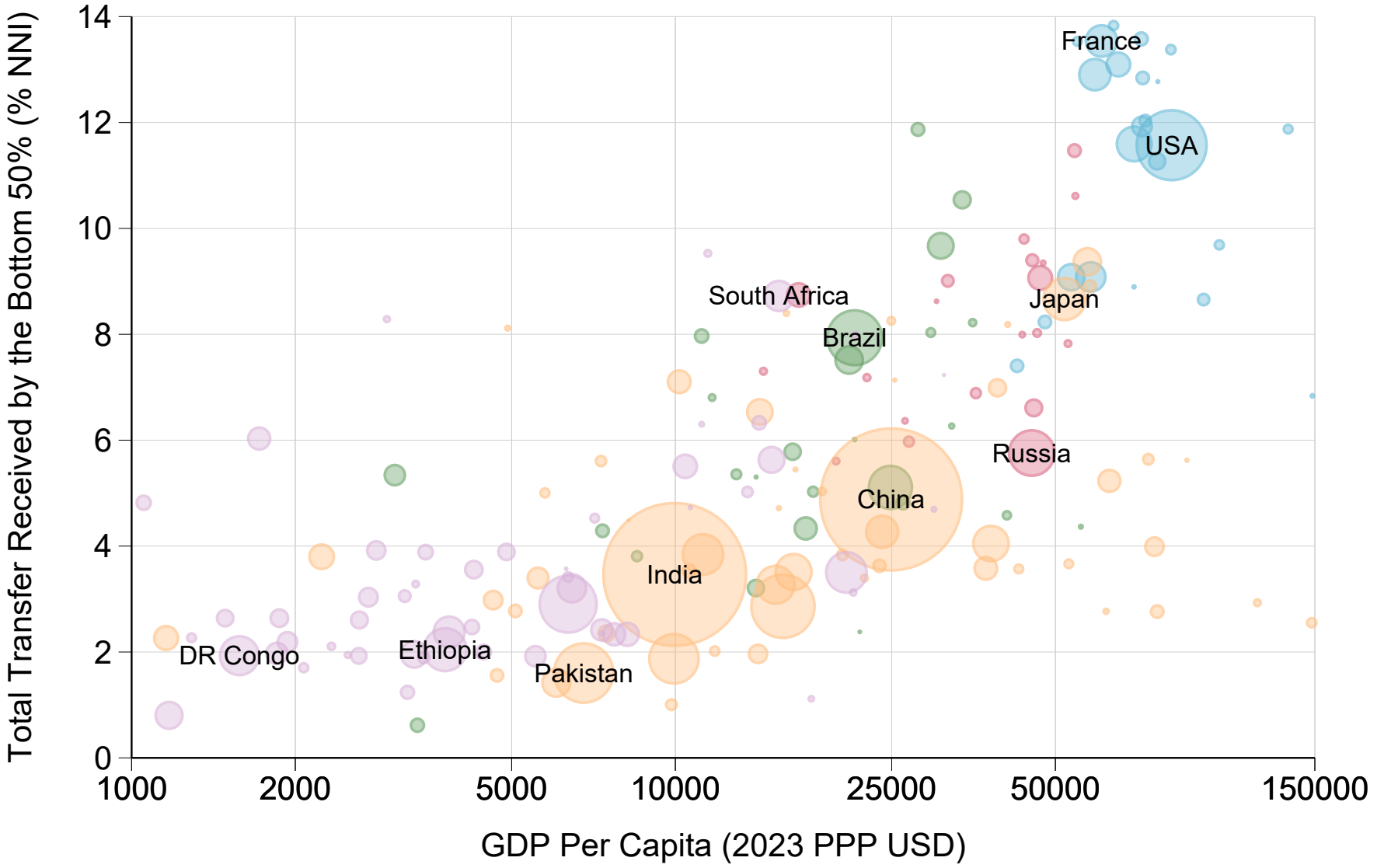
Notes. The figure plots the average share of pretax income, social assistance, public education, and public healthcare received by the bottom 50% by world region in 2023. Figures correspond to population-weighted averages of bottom 50% shares in each world region. "All three transfers": the sum of social assistance, public education, and public healthcare. In all world regions, all government transfers reduce inequality: they are less concentrated than pretax income. In Africa, the bottom 50% receive about 15% of pretax income, 45% of education and healthcare, and 55% of social assistance transfers. Transfers are significantly more progressive in the Anglosphere and Western Europe than in Africa and Asia.

Figure IV – Transfers Received by Income Quintile and World Region



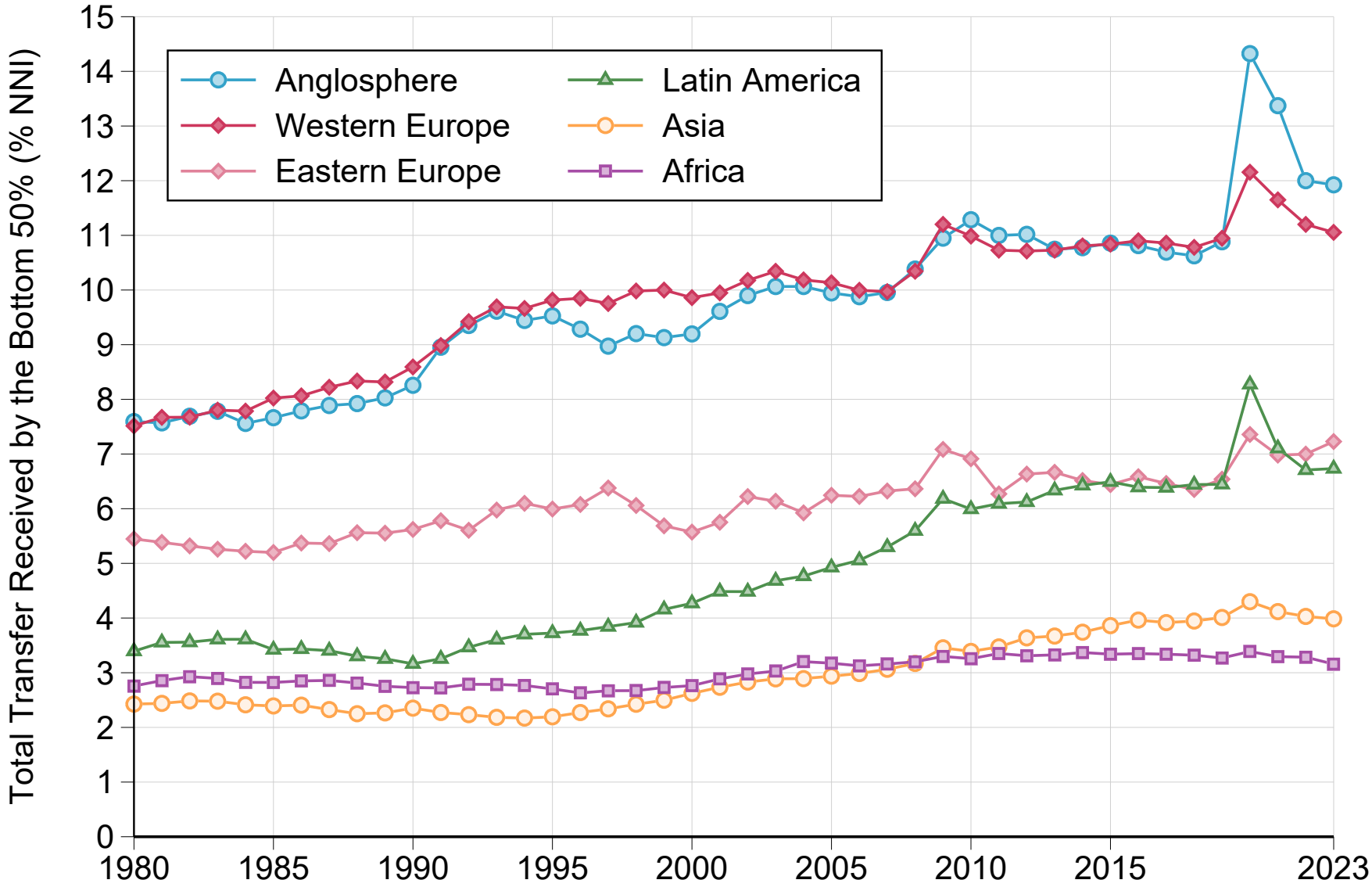
Notes. The figure plots social assistance, public education, and public healthcare transfers received by pretax income quintile and world region in 2023. Figures correspond to population-weighted averages of transfers received as a share of national income in each world region. Government transfers are both larger and more progressive in the Anglosphere and Western Europe than in Africa and Asia. Transfers amount to about 1-1.5% of national income for all pretax income quintiles in Africa and Asia, while they decline from about 5% of national income for the poorest 20% to 2.5% for the richest 20% in the Anglosphere and Western Europe.

Figure V – Transfer Progressivity and Development



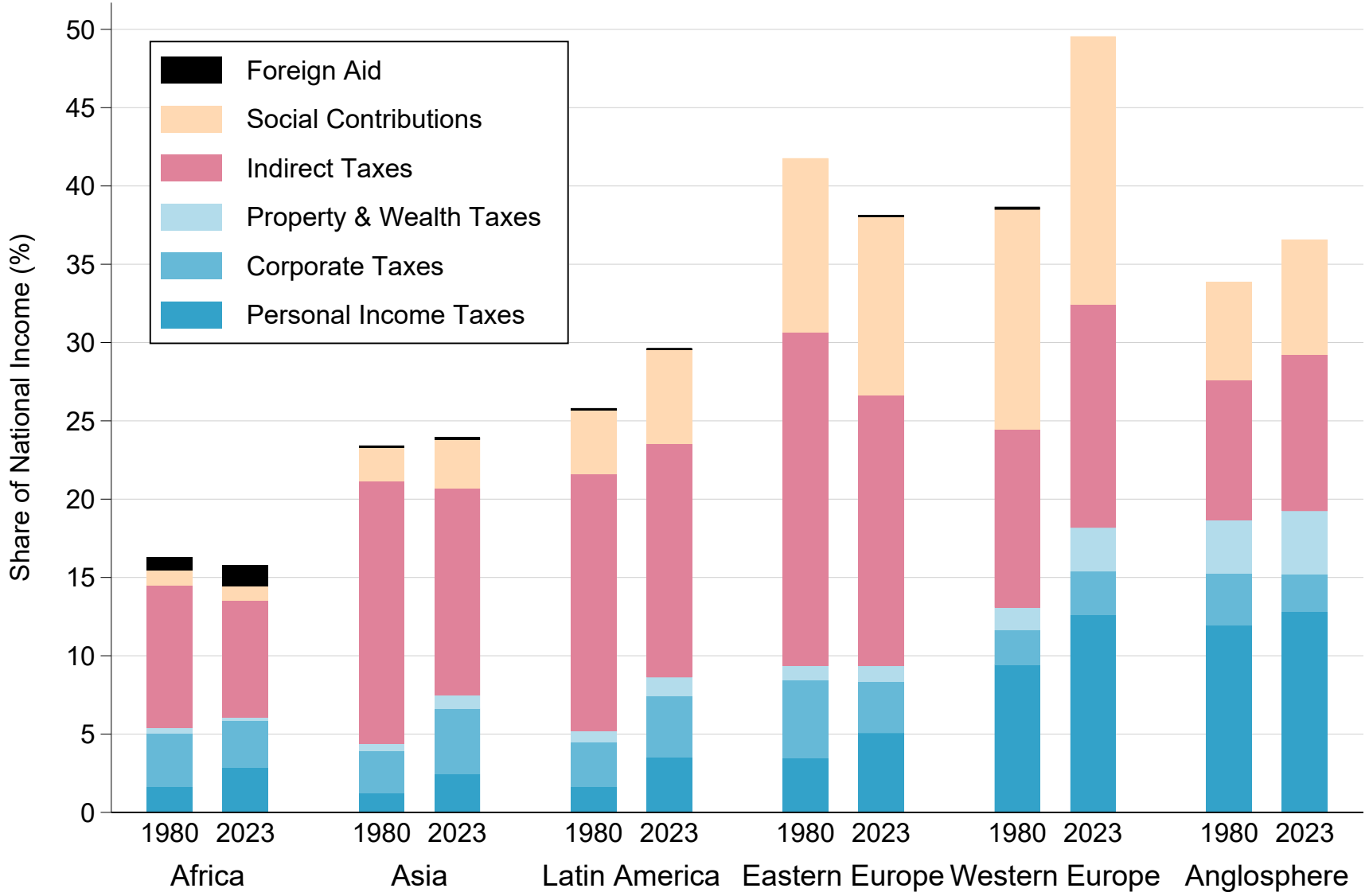
Notes. The figure plots transfer progressivity, measured as total government transfers (social assistance, education, and healthcare) received by the bottom 50% as a share of national income, against GDP per capita in 2023. The area of each country's circle is proportional to its population; selected countries' names are depicted. Colors correspond to world regions: Africa, Asia, Latin America, Eastern Europe, and Western Europe and the Anglosphere. Transfer progressivity strongly increases with development. Transfers received by the bottom 50% amount to about 2% of national income in the Democratic Republic of the Congo, compared to 14% in France.

Figure VI – The Evolution of Transfer Progressivity



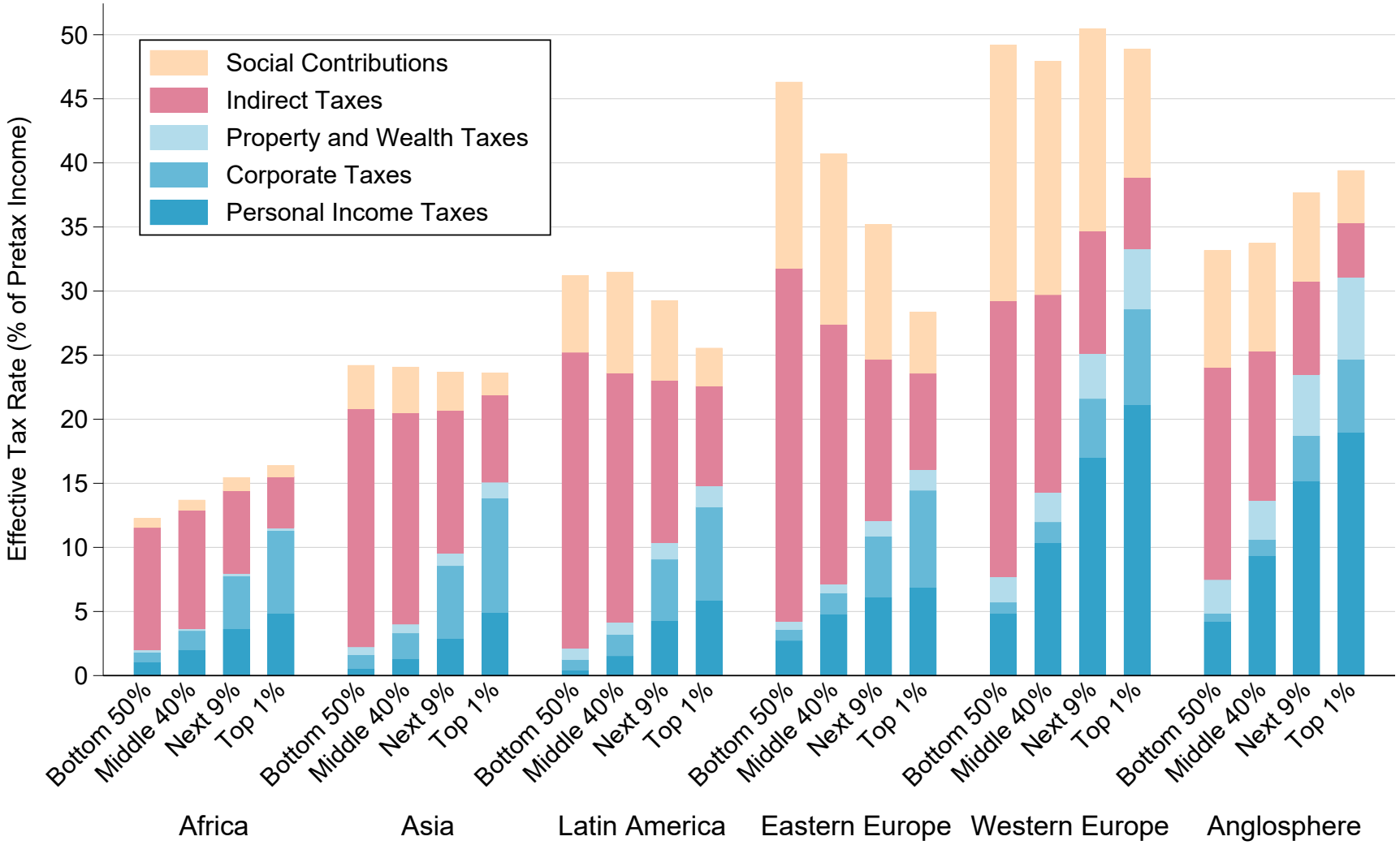
Notes. The figure plots the evolution of transfer progressivity from 1980 to 2023 by world region. Transfer progressivity is measured as total government transfers (social assistance, education, and healthcare) received by the bottom 50% as a share of national income. Figures correspond to population-weighted averages of transfer progressivity in each world region. Transfers received by the bottom 50% vary significantly across regions, from 3-4% of national income in Africa and Asia to 11-12% in the Anglosphere and Western Europe. Transfer progressivity has increased significantly in all world regions except Africa, where it has stagnated. Appendix Figure A6 reproduces this figure using specification bounds.

Figure VII – Tax Revenue and Foreign Aid by World Region



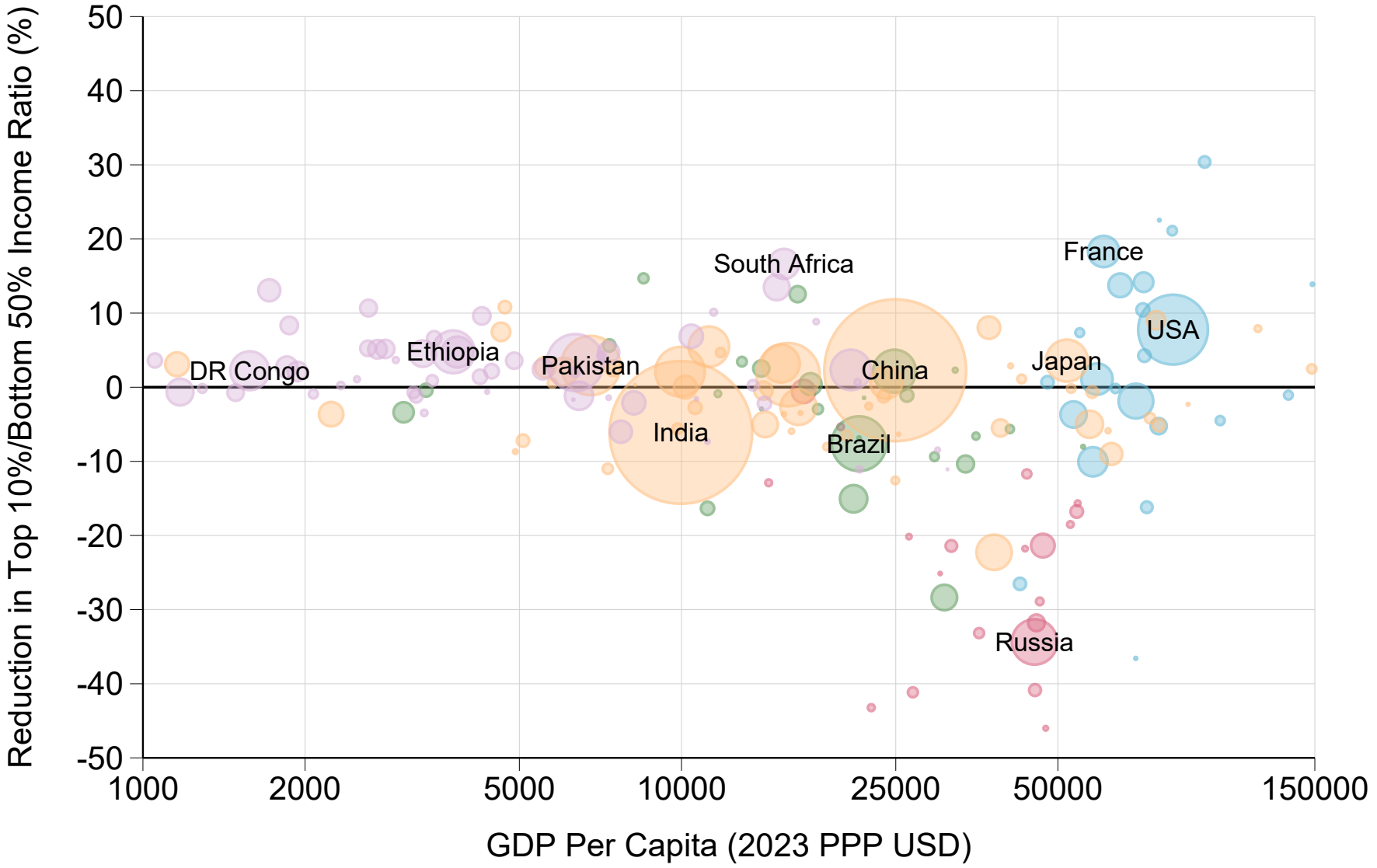
Notes. This figure plots total government revenue from national taxes and net Official Development Assistance by world region in 1980 and 2023. Figures correspond to population-weighted averages of country-level tax revenue and foreign aid expressed as a share of national income in each region. Total revenue remained approximately stable in Africa and Asia, increased in Latin America, Western Europe, and the Anglosphere, and declined in Eastern Europe from 1980 to 2023. Social contributions and personal income taxes represent the main sources of tax revenue in Western Europe, while indirect taxes are more important in Africa and Asia.

Figure VIII – Tax Progressivity by World Region: Effective Tax Rates by Pretax Income Group



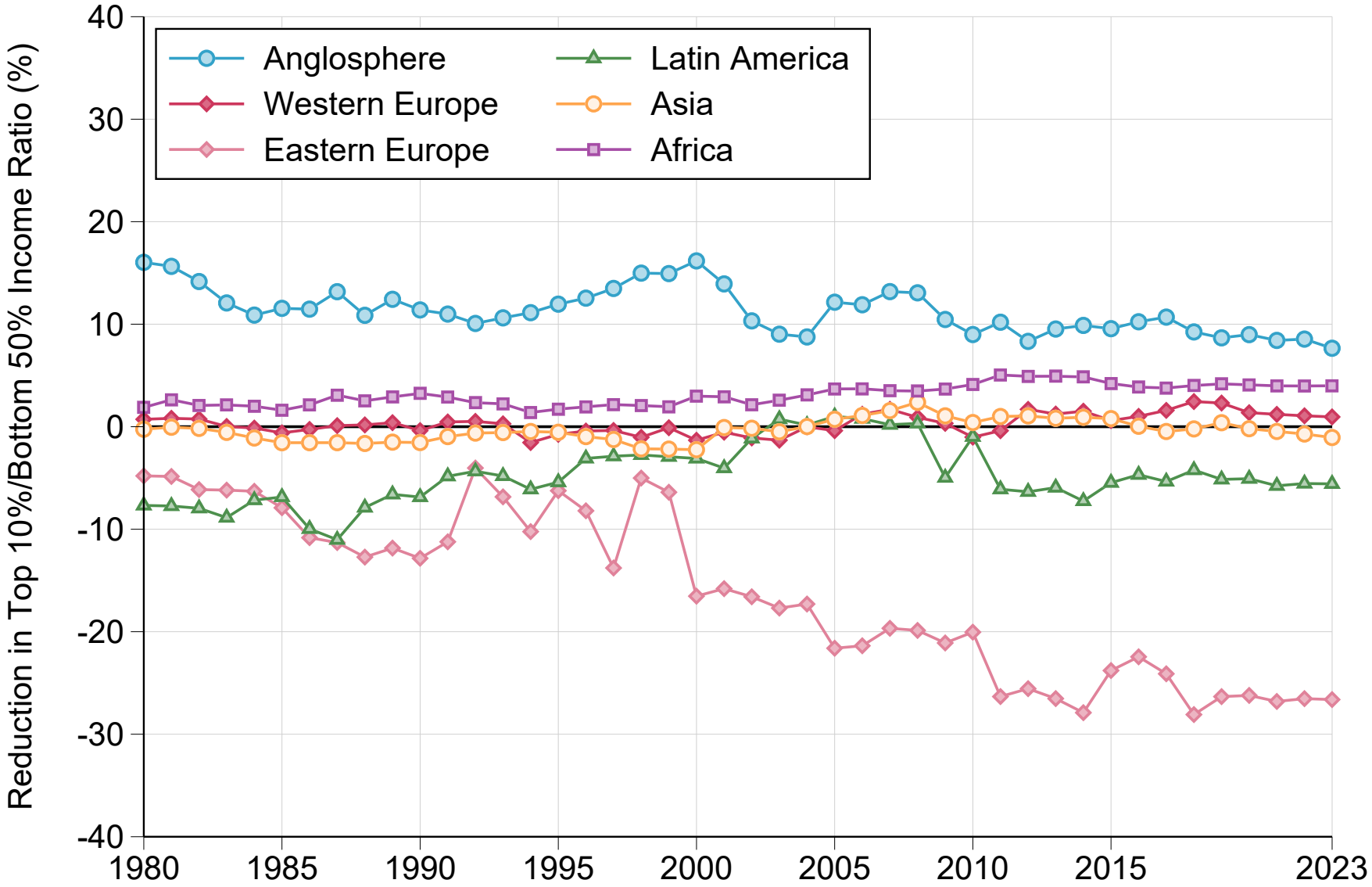
Notes. The figure plots average taxes and social contributions paid as a share of pretax income by pretax income group and world region in 2023. Figures correspond to population-weighted averages of taxes paid as a share of pretax income in each region. The pretax income groups displayed are the bottom 50% (p0p50), middle 40% (p50p90), next 9% (p90p99), and top 1% (p99p100). Taxes are progressive in Africa and the Anglosphere, approximately flat in Asia and Western Europe, and regressive in Latin America and Eastern Europe. Effective tax rates range from 10-15% in Africa to 45-50% in Western Europe. Indirect taxes are strongly regressive while corporate and personal income taxes are progressive. Appendix Figure A8 reproduces this figure after including specification bounds.

Figure IX – Tax Progressivity and Development



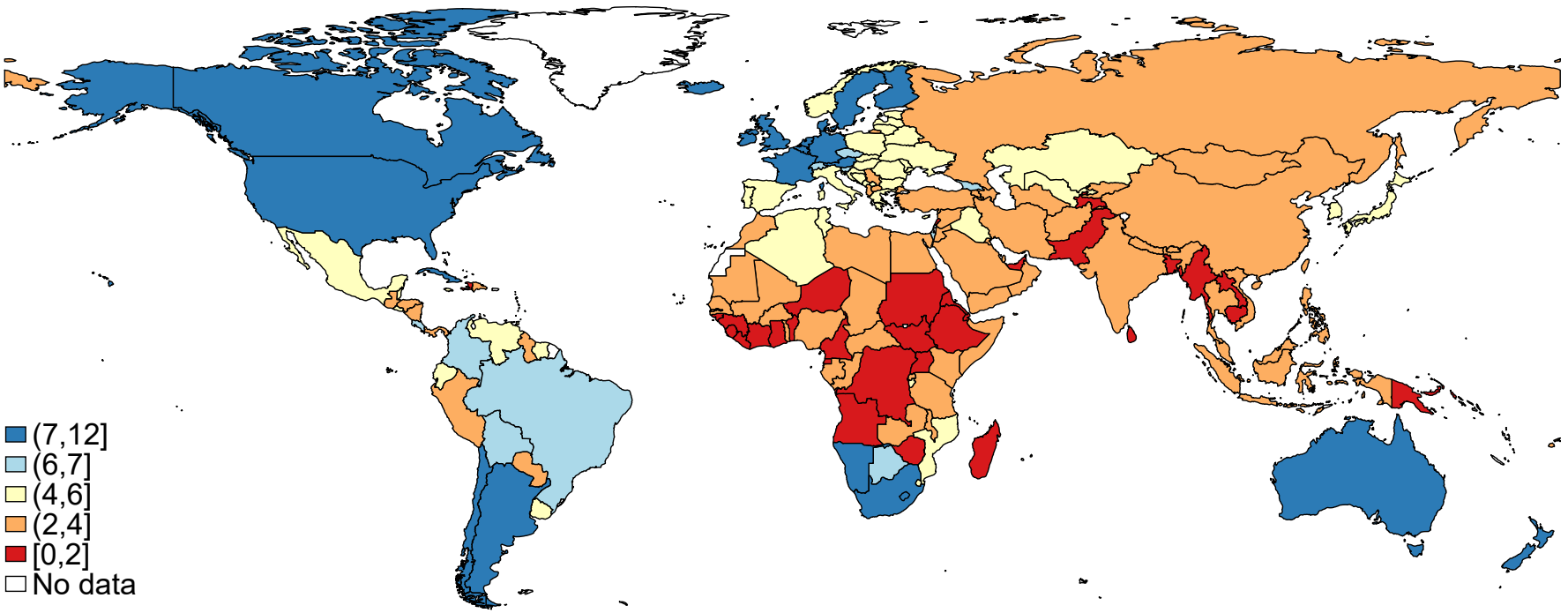
Notes. The figure plots tax progressivity against GDP per capita in 2023. Tax progressivity is measured as the percent reduction in the top 10% to bottom 50% pretax income ratio obtained when moving from pretax to after-tax income. The area of each country's circle is proportional to its population; selected countries' names are depicted. Colors correspond to world regions: Africa, Asia, Latin America, Eastern Europe, and Western Europe and the Anglosphere. Taxes reduce pretax inequality by about 10% in the United States, while they increase inequality in Russia. Tax progressivity is generally close to zero, ranging between -10% and +10% in the majority of countries, and is only weakly correlated with development. Appendix Figure A9 reproduces this figure after excluding social contributions from the analysis.

Figure X – The Evolution of Tax Progressivity



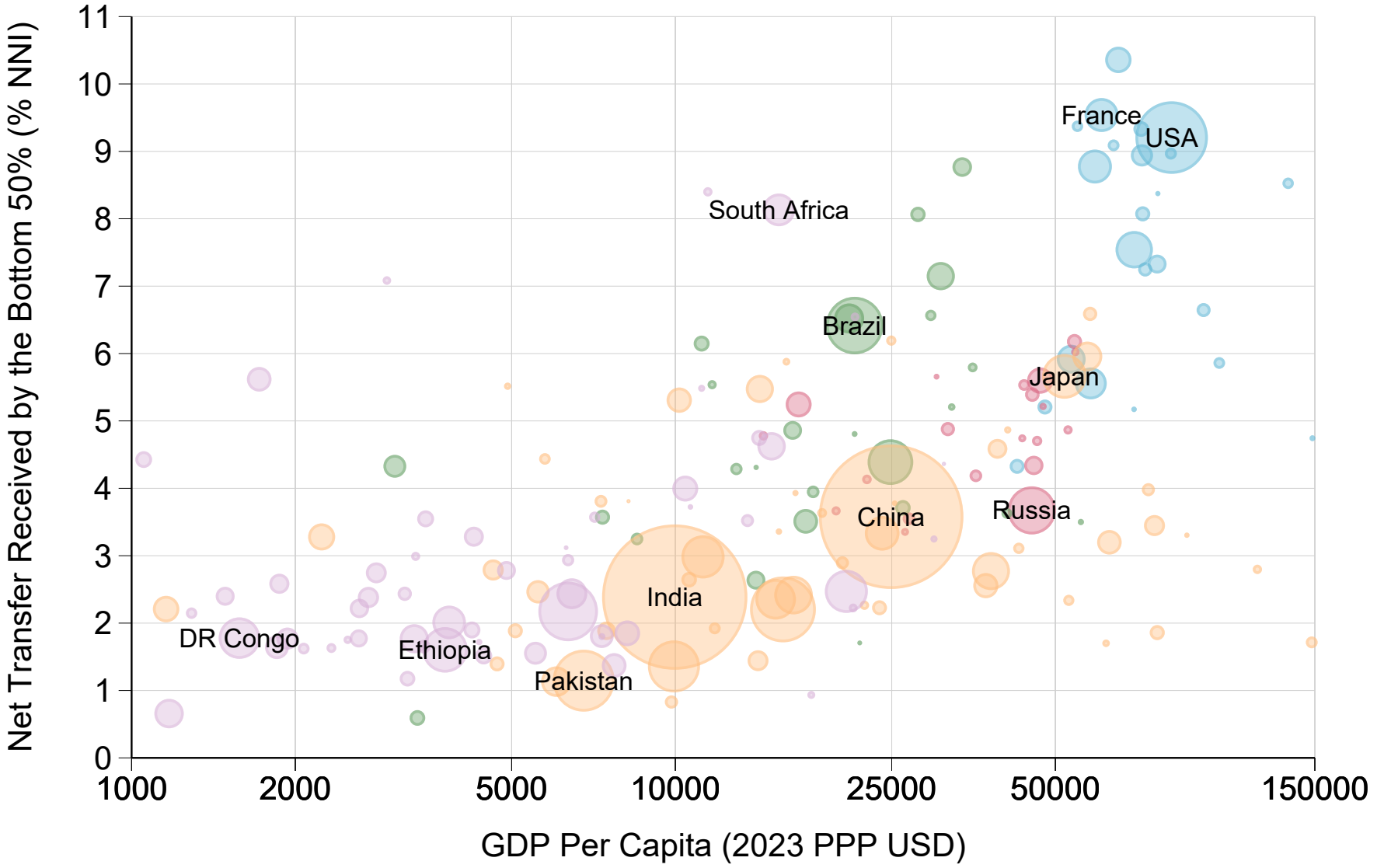
Notes. The figure plots the evolution of tax progressivity from 1980 to 2023 by world region. Tax progressivity is measured as the percent reduction in the top 10% to bottom 50% pretax income ratio obtained when moving from pretax to after-tax income. Figures correspond to population-weighted averages of tax progressivity in each world region. Tax progressivity is generally weak, ranging between -10% and +10%, and has remained stable in most world regions. Eastern Europe stands out as an exception: taxes are strongly regressive and have become increasingly so in this region. Appendix Figure A10 reproduces this figure after excluding social contributions from the analysis. Appendix Figure A13 reproduces this figure after including specification bounds.

Figure XI – A Global Map of Government Redistribution



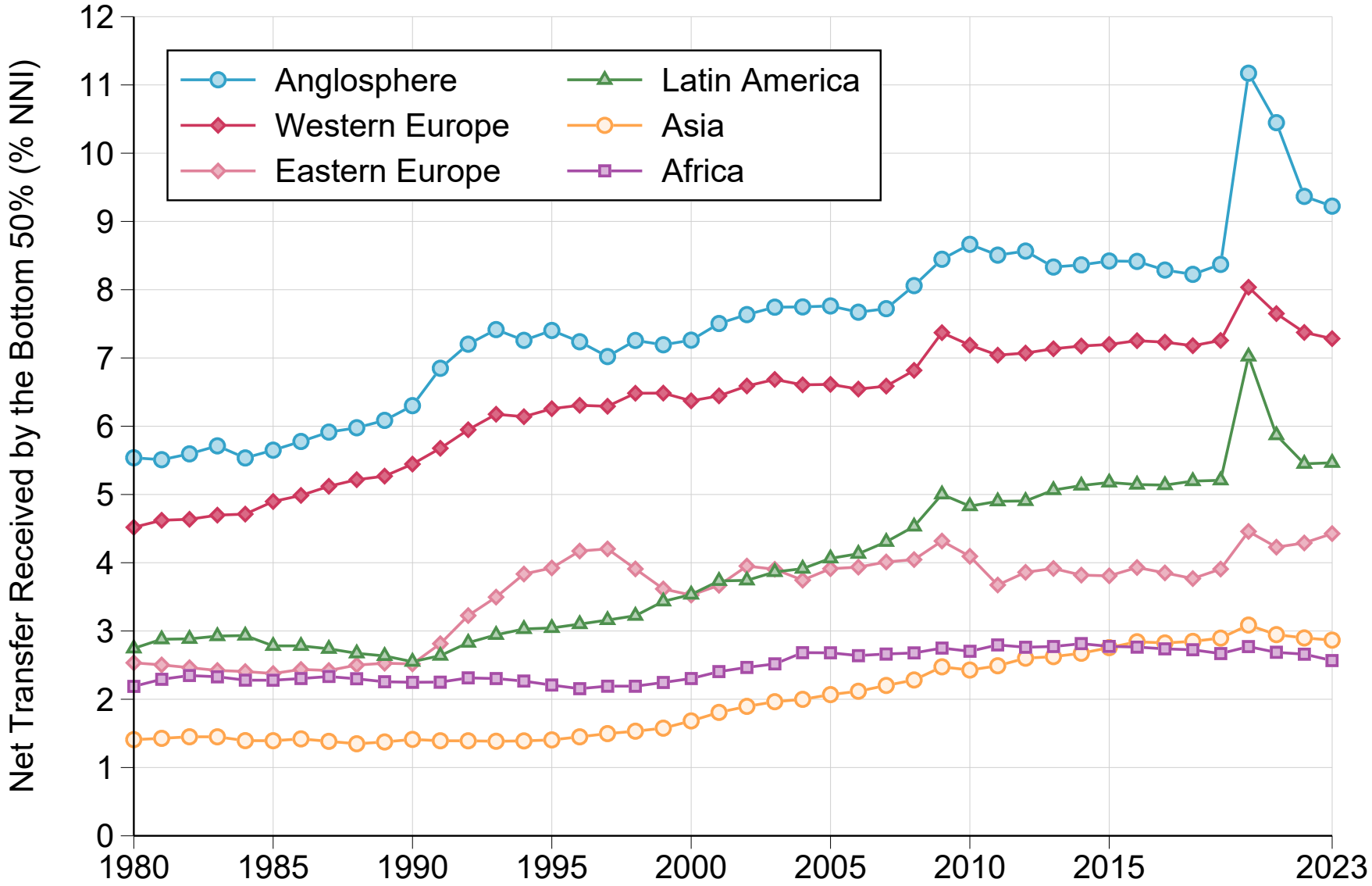
Notes. The figure depicts government redistribution in 2023 around the world, measured as the net government transfer received by the bottom 50%—the sum of social assistance, education, and healthcare transfers minus the taxes that pay for them—expressed as a share of national income. In all countries in the world, redistribution reduces inequality: the bottom 50% receive more in transfers than they pay in taxes. Government redistribution is substantially larger in Western Europe and Northern America than in South Asia and Sub-Saharan Africa.

Figure XII – Government Redistribution and Development



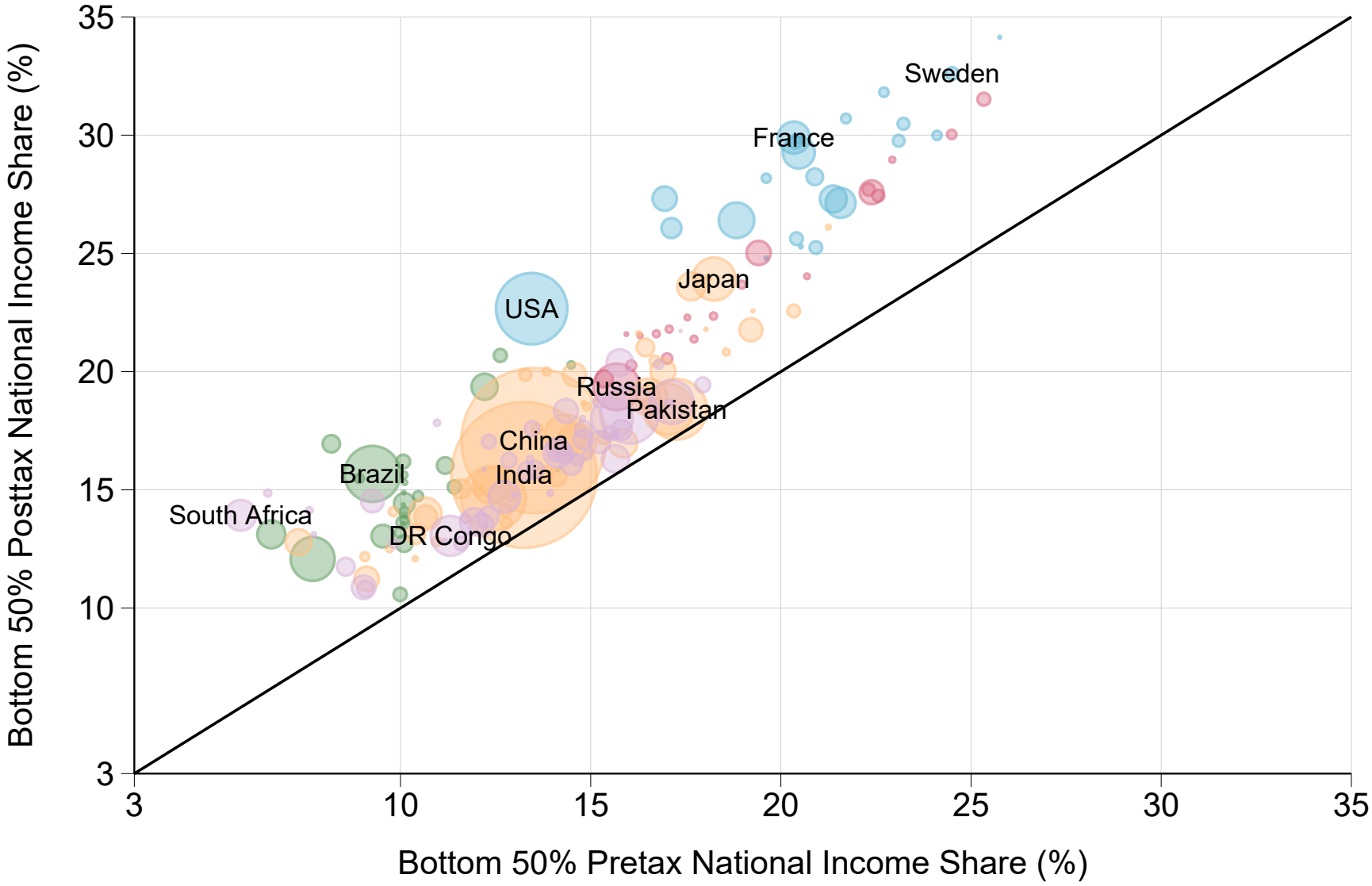
Notes. The figure plots government redistribution against GDP per capita in 2023. Redistribution is measured as the net government transfer received by the bottom 50%—the sum of social assistance, education, and healthcare transfers minus the taxes that pay for them—expressed as a share of national income. The area of each country's circle is proportional to its population; selected countries' names are depicted. Colors correspond to world regions: Africa, Asia, Latin America, Eastern Europe, and Western Europe and the Anglosphere. Net transfers received by the bottom 50% amount to about 2% of national income in the Democratic Republic of the Congo, compared to 10% in France. Government redistribution strongly increases with development.

Figure XIII – The Evolution of Government Redistribution



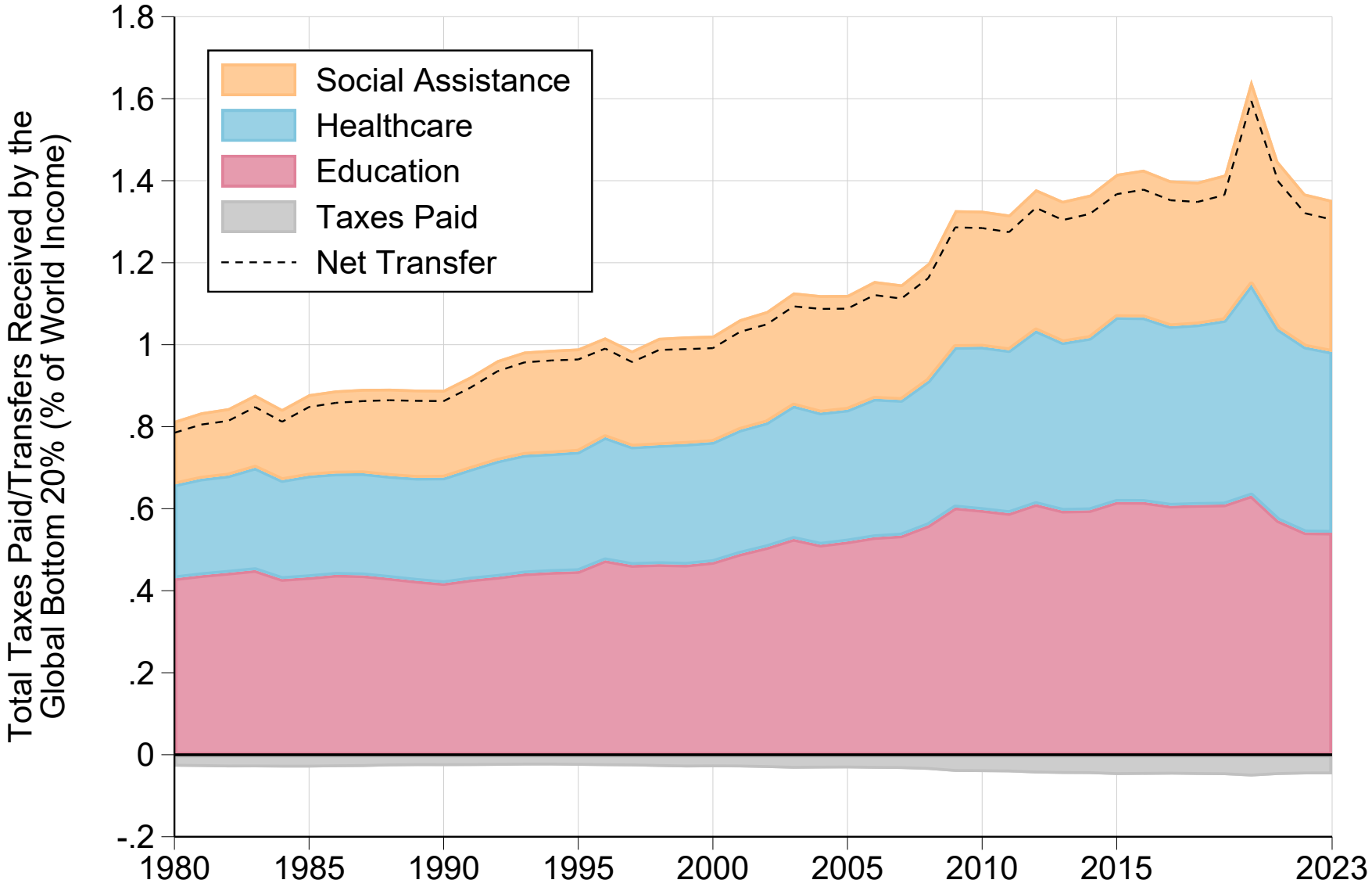
Notes. The figure plots the evolution of government redistribution from 1980 to 2023 by world region. Redistribution is measured as the net government transfer received by the bottom 50%—the sum of social assistance, education, and healthcare transfers minus the taxes that pay for them—expressed as a share of national income. Figures correspond to population-weighted averages of redistribution in each world region. Net transfers received by the bottom 50% vary significantly across regions, from about 3% of national income in Africa and Asia to 9% in the Anglosphere. Redistribution has increased significantly in all world regions except Africa, where it has almost stagnated. Appendix Figure A15 reproduces this figure using specification bounds.

Figure XIV – Predistribution versus Redistribution



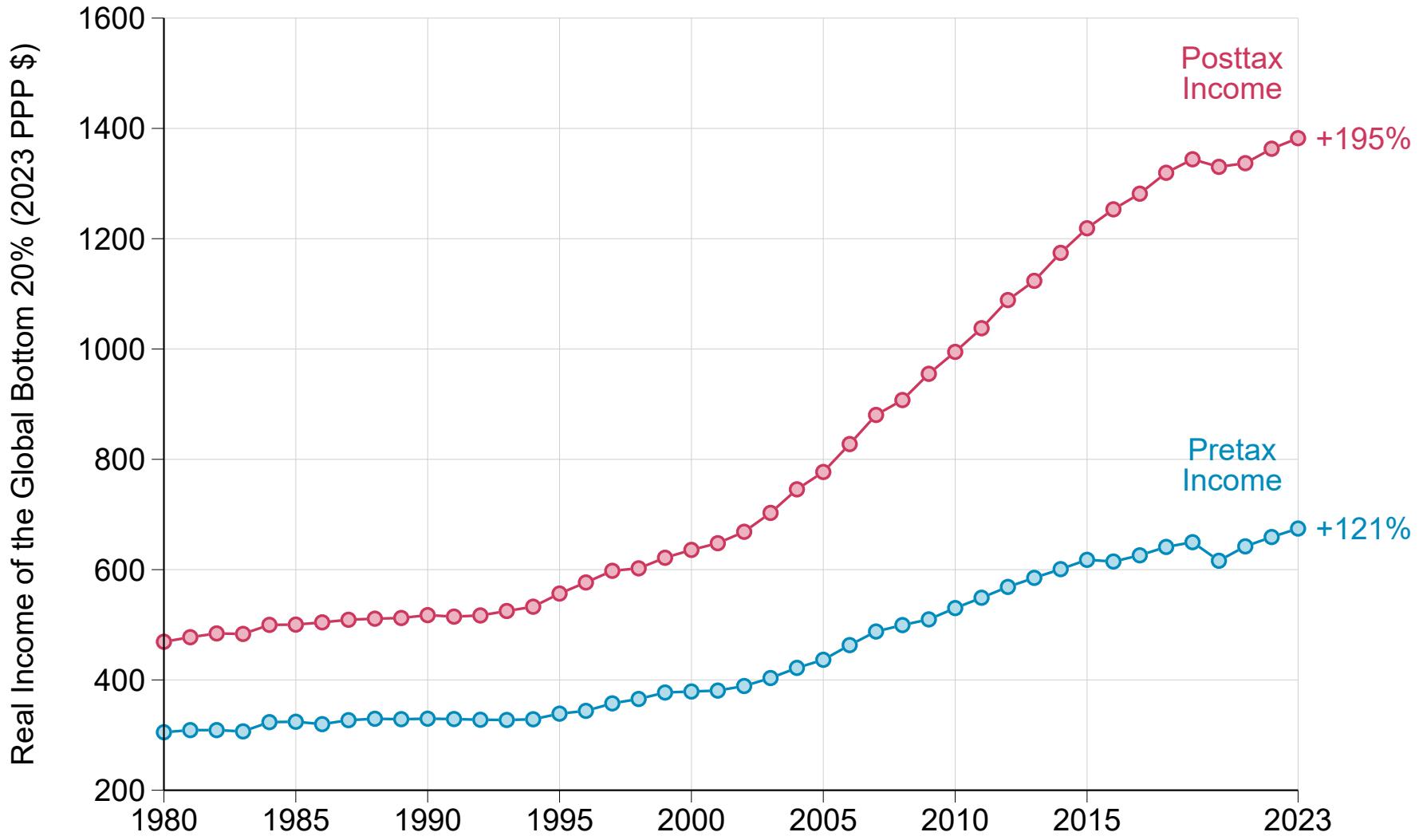
Notes. The figure compares bottom 50% pretax and posttax income shares across countries in 2023. Posttax income equals pretax income, plus social assistance, education, and healthcare transfers, minus the taxes that pay for them. The area of each country's circle is proportional to its population; selected countries' names are depicted. Colors correspond to world regions: Africa, Asia, Latin America, Eastern Europe, and Western Europe and the Anglosphere. Posttax inequality is lower than pretax inequality in all countries. Pretax and posttax inequality are strongly correlated across countries, suggesting that "predistribution" (pretax inequality) plays a more important role than "redistribution" (taxes and transfers) in explaining cross-country inequality differences.

Figure XV – Taxes Paid and Transfers Received by the World's Poorest 20%



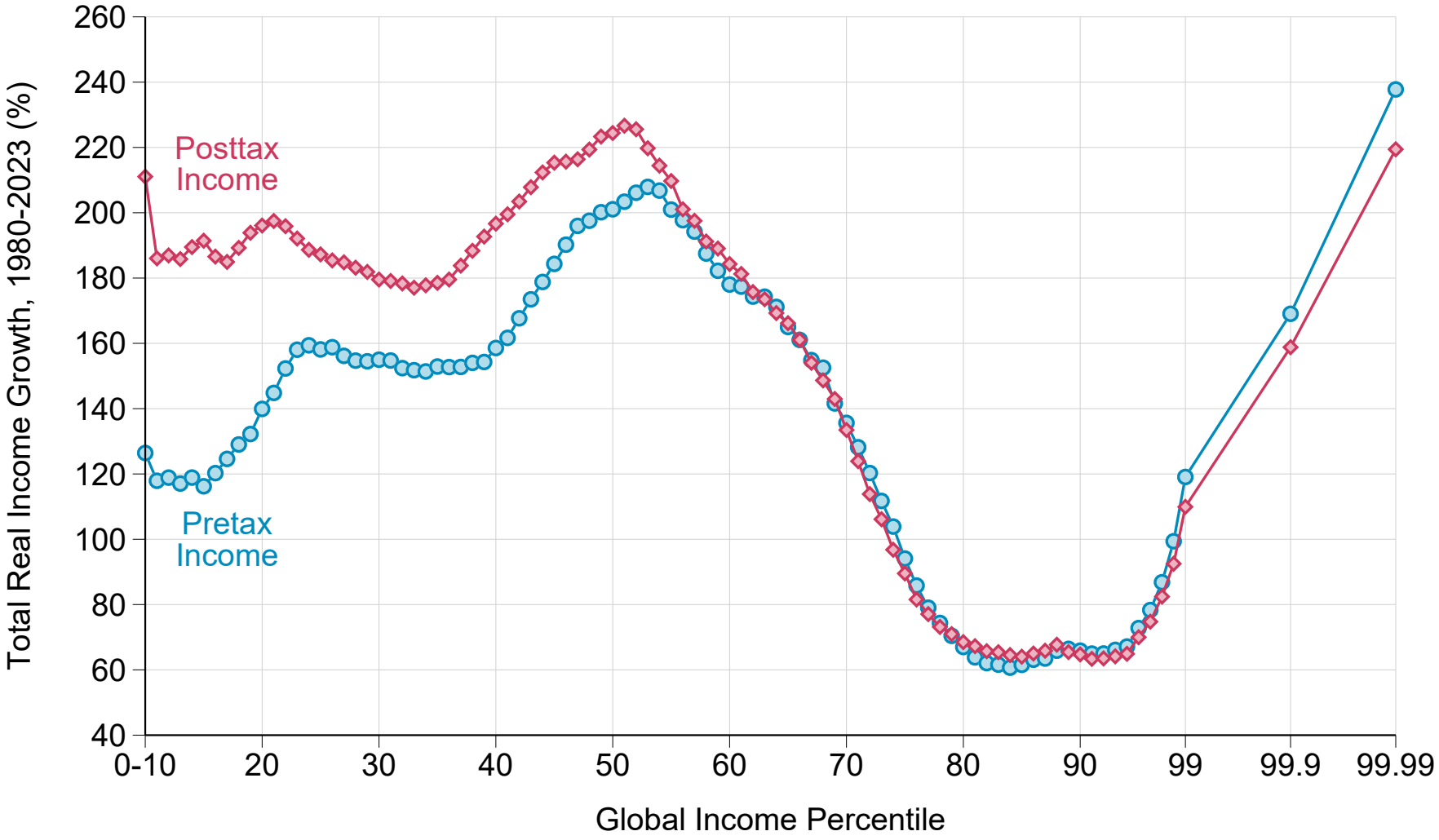
Notes. The figure plots government transfers, taxes paid, and net transfers received by the world's poorest 20% from 1980 to 2023, expressed as a share of global income (the sum of net national incomes across all countries in the world, measured in 2023 PPP USD). Gross transfers received by the global poor in the form of social assistance, education, and healthcare expanded considerably, from about 0.8% to 1.3% of global income. Taxes paid by the world's poorest 20% also increased but remain very small. As a result, the net transfer received by the world's poorest 20% is almost identical to gross transfers and has increased at about the same pace.

Figure XVI – Government Redistribution and Real Income Growth among the World's Poorest 20%



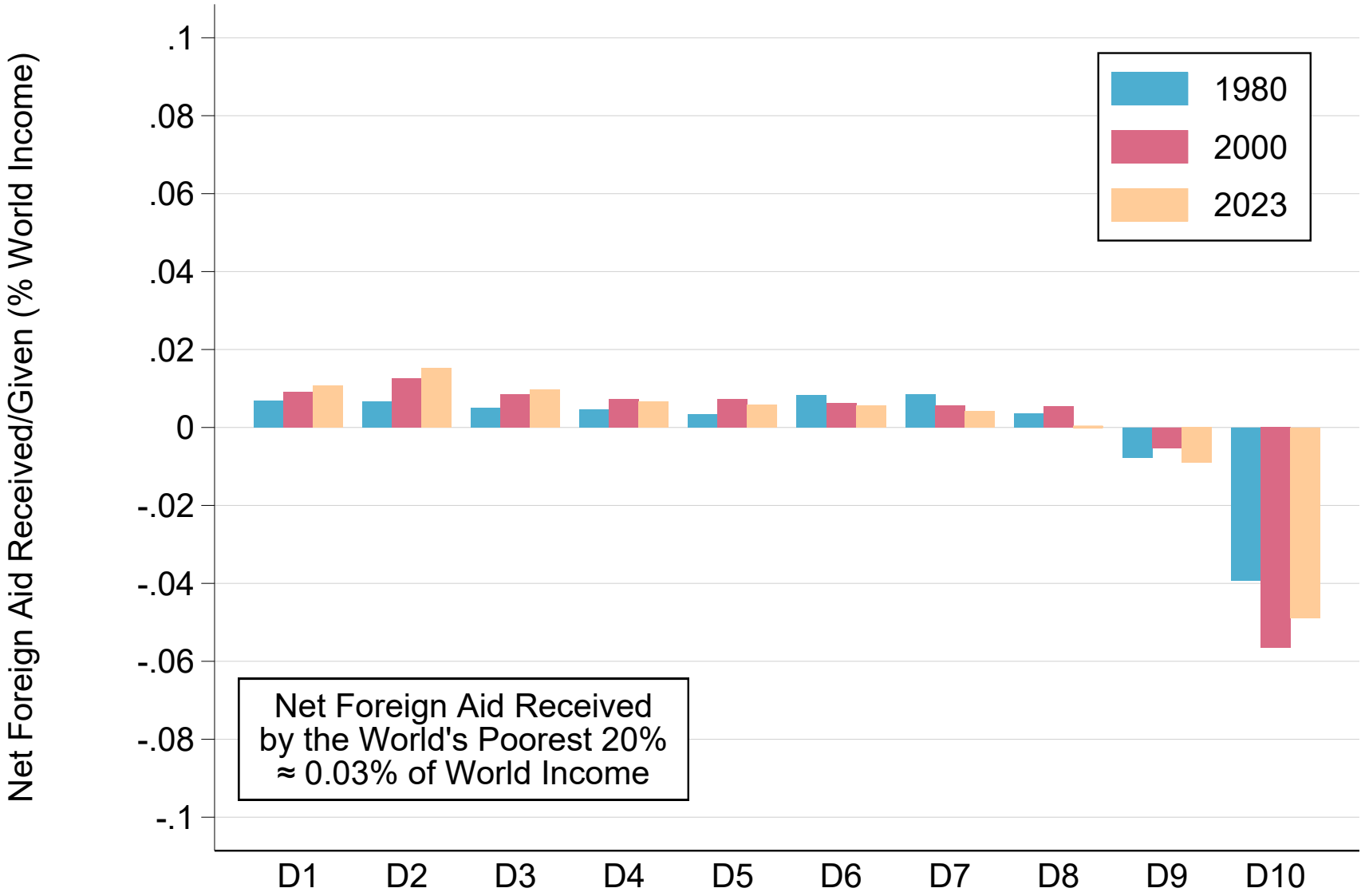
Notes. The figure plots the evolution of the average pretax and posttax income of the world's poorest 20% from 1980 to 2023, expressed in 2023 PPP USD. Posttax income equals pretax income, plus social assistance, education, and healthcare transfers, minus the taxes that pay for them. Pretax income grew by about 120%, while posttax income grew by about 190%. Hence, government redistribution can account for about 40% of real income growth among the world's poorest 20% from 1980 to 2023. Appendix Figure A21 reproduces this figure with specification bounds.

Figure XVII – Government Redistribution and the Distribution of Global Economic Growth, 1980-2023



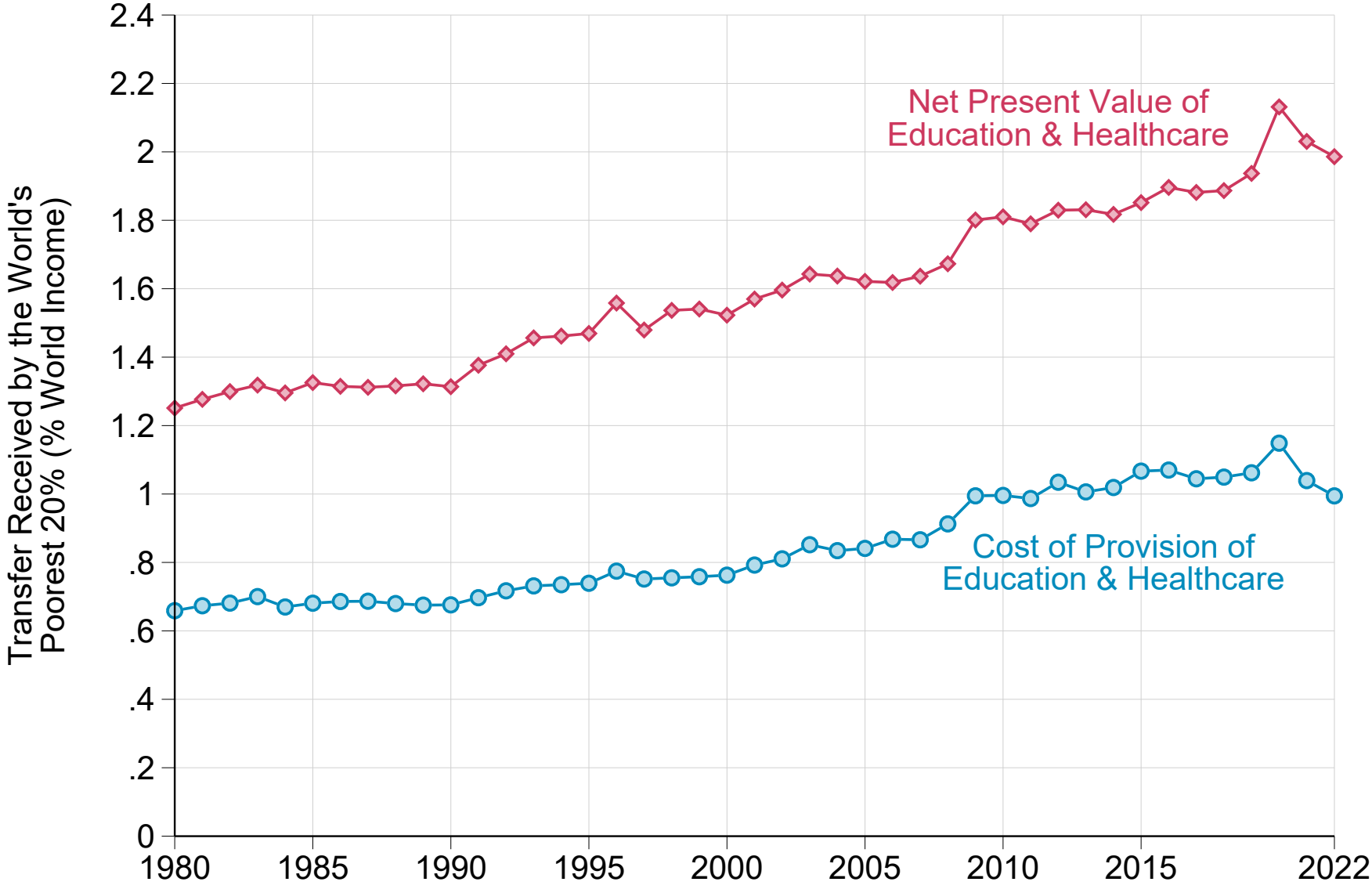
Notes. The figure plots total real income growth by global income percentile from 1980 to 2023, separately for pretax income and posttax income. Posttax income equals pretax income, plus social assistance, education, and healthcare transfers, minus the taxes that pay for them. Posttax income has increased much faster than pretax income at the bottom of the world distribution of income. The average income of the 20th percentile of the global income distribution grew by 140% in terms of pretax income, compared to about 200% in terms of posttax income. Appendix Figure A25 reproduces this figure with specification bounds.

Figure XVIII – The World Distribution of Foreign Aid



Notes. This figure plots net Official Development Assistance received by decile of the world distribution of income in 1980, 2000, and 2023, expressed as a share of global income. Net foreign aid is official development assistance received for social assistance, education, and healthcare (mostly received by low-income countries), minus the taxes paid to finance it (mostly paid by rich countries). Since 1980, the world's richest 20% have been net contributors, while the world's poorest 80% have been net beneficiaries. Aid has become slightly more progressive over time but remains very small in magnitude: in 2023, the world's poorest 10% received a net transfer of less than 0.01% of global income.

Figure XIX – Cost of Provision versus Net Present Value of Public Education and Healthcare Received by the World's Poorest 20%



Notes. This figure plots the evolution of the value of public education and healthcare transfers received by the world's poorest 20% from 1980 to 2023, expressed as a share of global income, depending on whether they are valued at cost of provision (total general government expenditure) or at their net present value (discounted sum of expected additional earnings from attending school and living longer thanks to the education and healthcare systems). The net present value of public education and healthcare received by the global poor is about twice as high as its cost of provision and has risen at about the same pace since 1980.

Table I – The Relative Contributions of Taxes and Transfers to Inequality Reduction

	Top 10% / Bottom 50% Average Income Ratio			Extent of Redistribution: Percent Reduction in Inequality		
	Pretax Income	After Taxes	After Taxes & Transfers	Through Taxes	Through Taxes & Transfers	Tax Share of Redistribution
Africa	19.2	18.8	14.6	1.5%	19.2%	7.8%
Asia	18.2	18.3	14.1	-0.2%	22.0%	-0.8%
Latin America	31.4	31.8	17.6	-1.5%	42.9%	-3.5%
Eastern Europe	12.4	13.1	9.2	-4.7%	26.6%	-17.6%
Western Europe	8.3	8.2	5.2	1.3%	37.5%	3.5%
Anglosphere	15.2	14.6	7.5	4.1%	49.8%	8.3%
World Average	18.6	18.6	13.5	0.2%	25.8%	0.7%

Notes. The table reports estimates of the relative importance of taxes and transfers in reducing inequality by world region. Columns (2) to (4) report the top 10% to bottom 50% income ratio in terms of pretax income, net-of-tax income (pretax income minus taxes financing transfers), and posttax income (pretax income, minus taxes, plus transfers). Columns (5) and (6) report the corresponding percent reduction in inequality (extent of redistribution) generated through taxes and through taxes and transfers combined. Column (7) reports the tax share of redistribution, defined as the ratio of the extent of redistribution through taxes to the extent of redistribution through taxes and transfers. Figures correspond to population-weighted averages of country-level indicators in each world region and across all countries (world average). Taxes reduce inequality much less than transfers in all regions. In the average country, deducting taxes leaves inequality almost unchanged, while transfers reduce inequality by about 25%, implying that taxes account for approximately 0% of overall redistribution. Appendix Table A2 reproduces results on the tax share of redistribution with specification bounds.

Supplementary Online Appendix

Amory Gethin

Matthew Fisher-Post

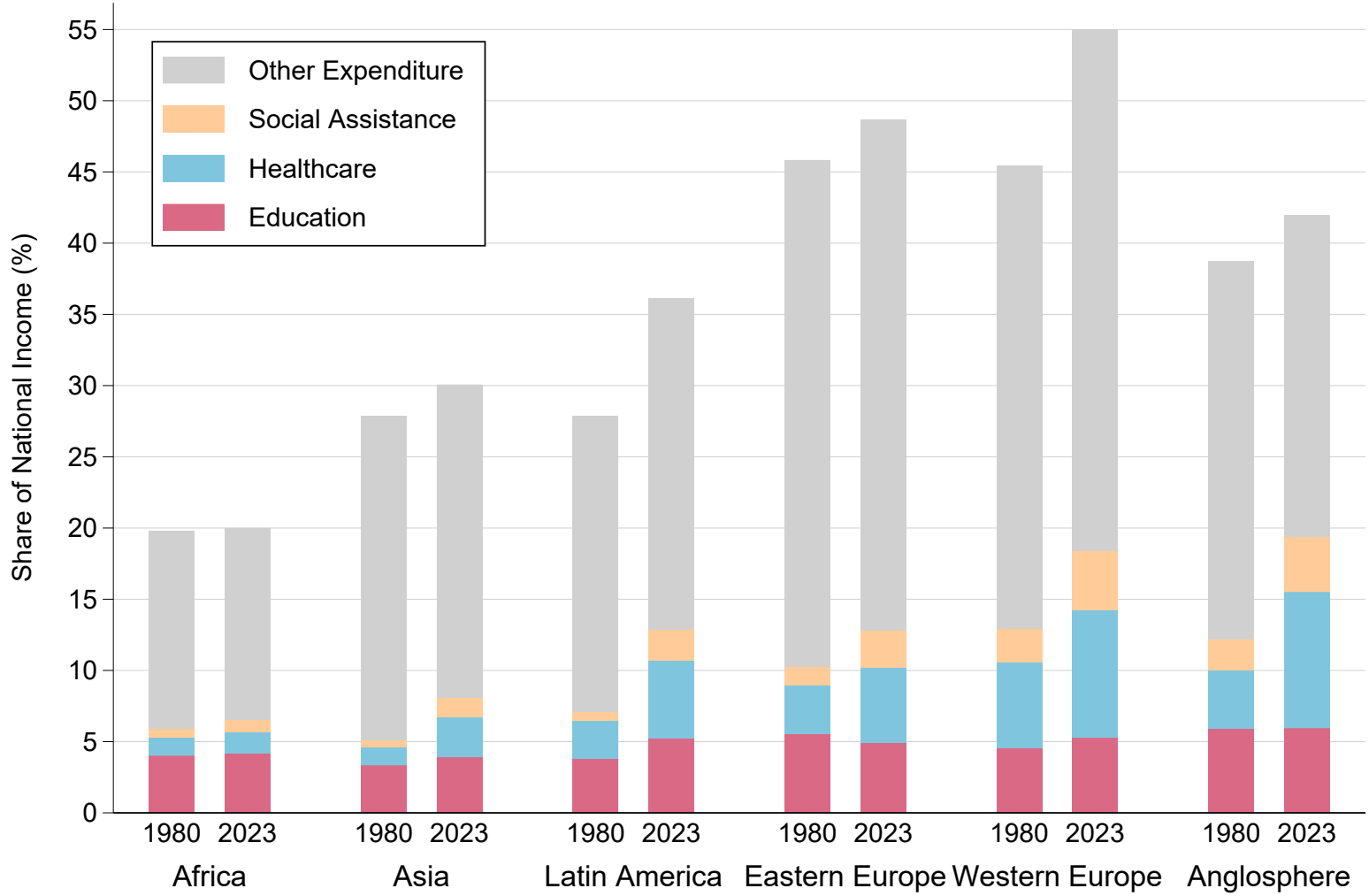
June 2026

This appendix supplements our article "Government Redistribution and Global Poverty Reduction." It contains supplementary figures and tables, as well as additional methodological details.

Contents

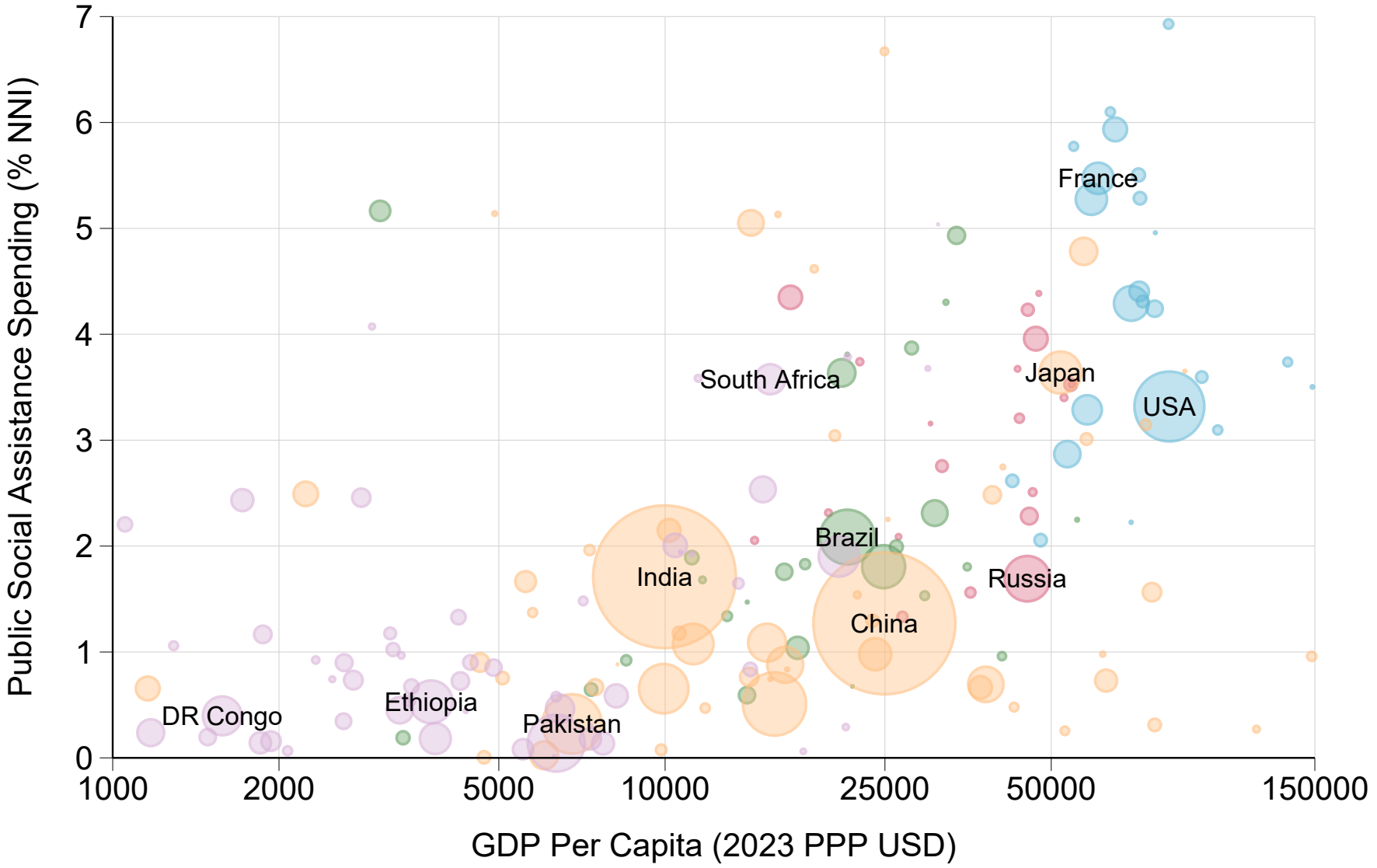
A. Additional Main Figures and Tables

Figure A1 – Government Expenditure by World Region



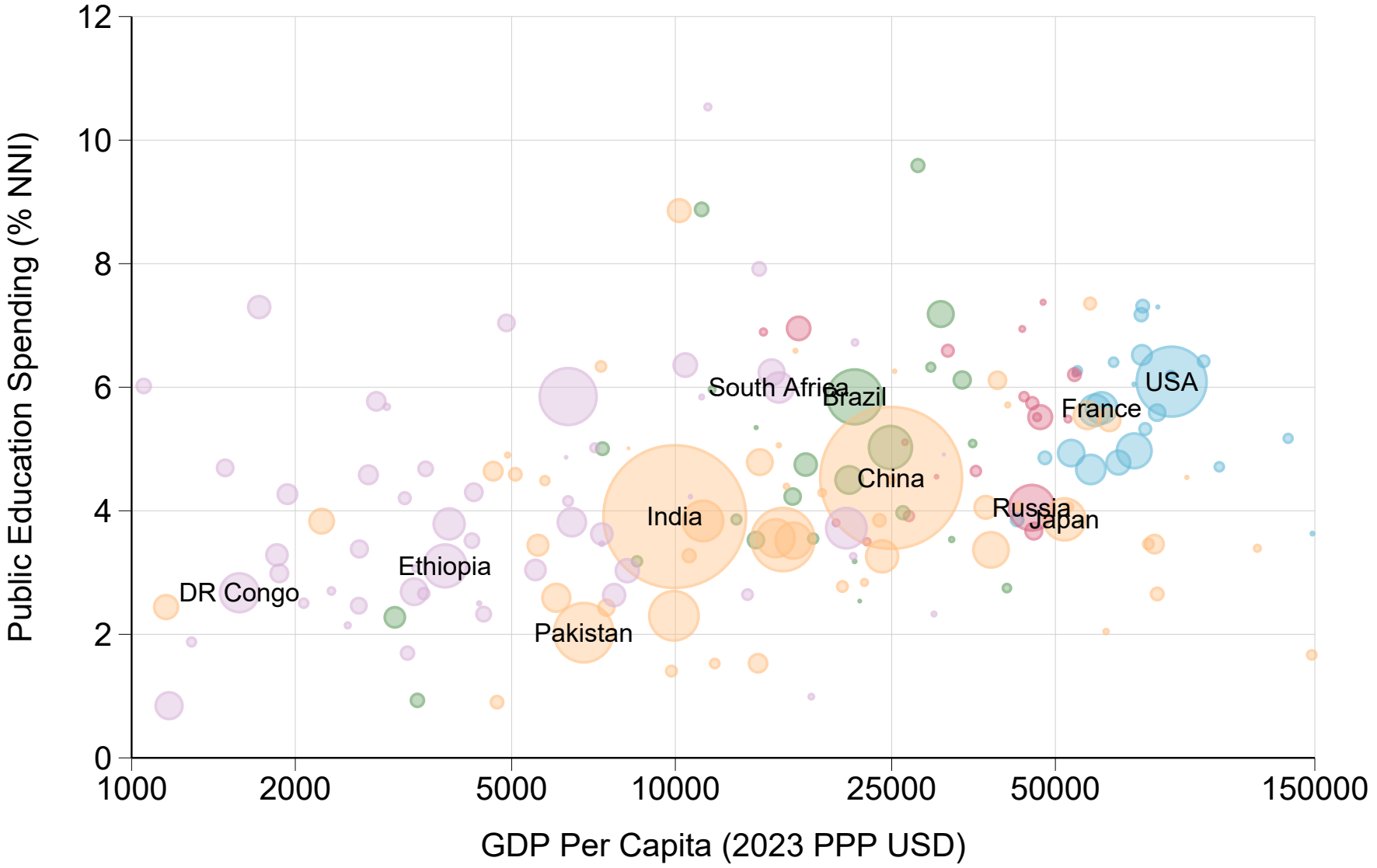
Notes. This figure reproduces Figure II after including all general government expenditure other than social assistance, education, and healthcare, depicted in grey in the figure. Other expenditure includes all other forms of public spending, such as spending on public order and safety, economic affairs, defense, and general administration.

Figure A2 – Social Assistance Spending and Development



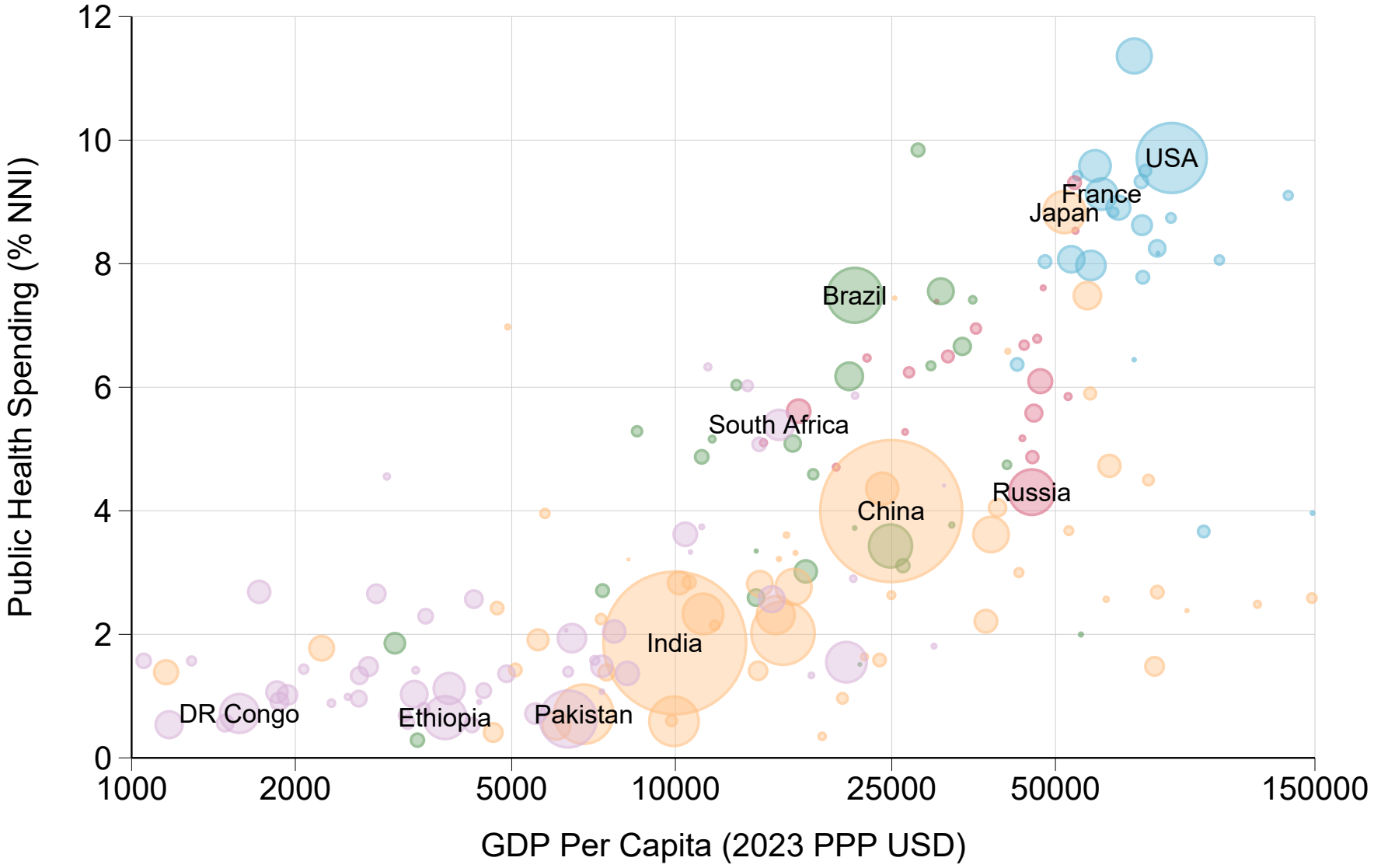
Notes. The figure plots total government expenditure on social assistance, expressed as a share of national income, against GDP per capita in 2023. The area of each country's circle is proportional to its population; selected countries' names are depicted. Colors correspond to world regions: Africa, Asia, Latin America, Eastern Europe, and Western Europe and the Anglosphere. Social assistance spending strongly increases with development.

Figure A3 – Public Education Spending and Development



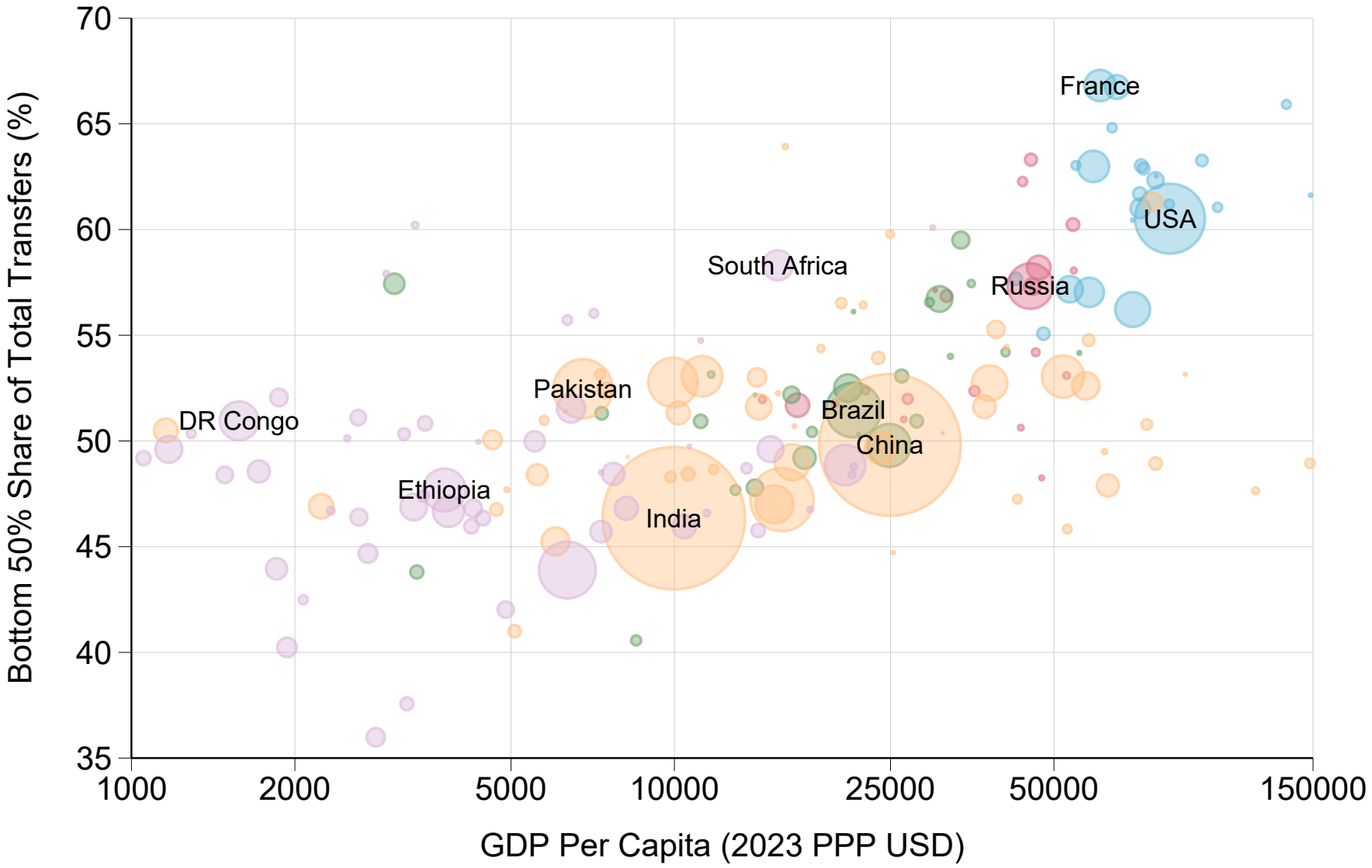
Notes. The figure plots total government expenditure on education, expressed as a share of national income, against GDP per capita in 2023. The area of each country's circle is proportional to its population; selected countries' names are depicted. Colors correspond to world regions: Africa, Asia, Latin America, Eastern Europe, and Western Europe and the Anglosphere. Public education spending modestly increases with development.

Figure A4 – Public Healthcare Spending and Development



Notes. The figure plots total government expenditure on healthcare, expressed as a share of national income, against GDP per capita in 2023. The area of each country's circle is proportional to its population; selected countries' names are depicted. Colors correspond to world regions: Africa, Asia, Latin America, Eastern Europe, and Western Europe and the Anglosphere. Public health spending strongly increases with development.

Figure A5 – Transfer Progressivity and Development: Share of Total Transfers Received by the Bottom 50%

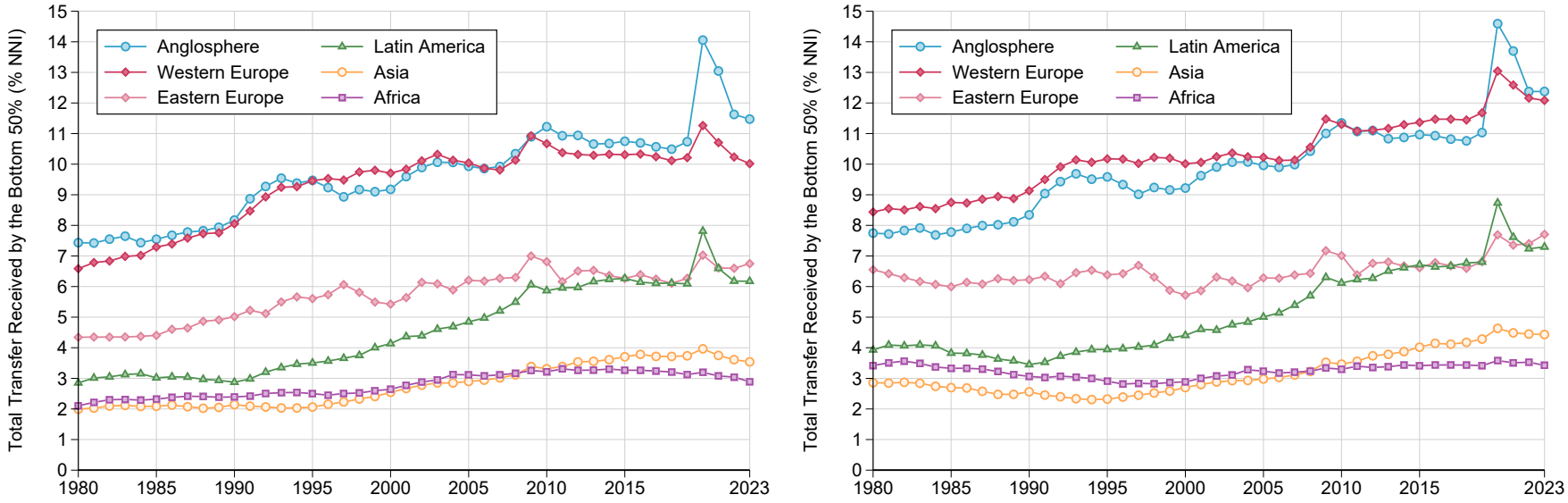


Notes. The figure plots transfer progressivity, measured as the share of social assistance, education, and healthcare transfers received by the bottom 50%, against GDP per capita in 2023. The area of each country's circle is proportional to its population; selected countries' names are depicted. Colors correspond to world regions: Africa, Asia, Latin America, Eastern Europe, and Western Europe and the Anglosphere. Transfer progressivity modestly increases with development: the bottom 50% receive about 45% of transfers in India, compared to 65% in France.

Figure A6 – The Evolution of Transfer Progressivity (Lower and Upper Specification Bounds)

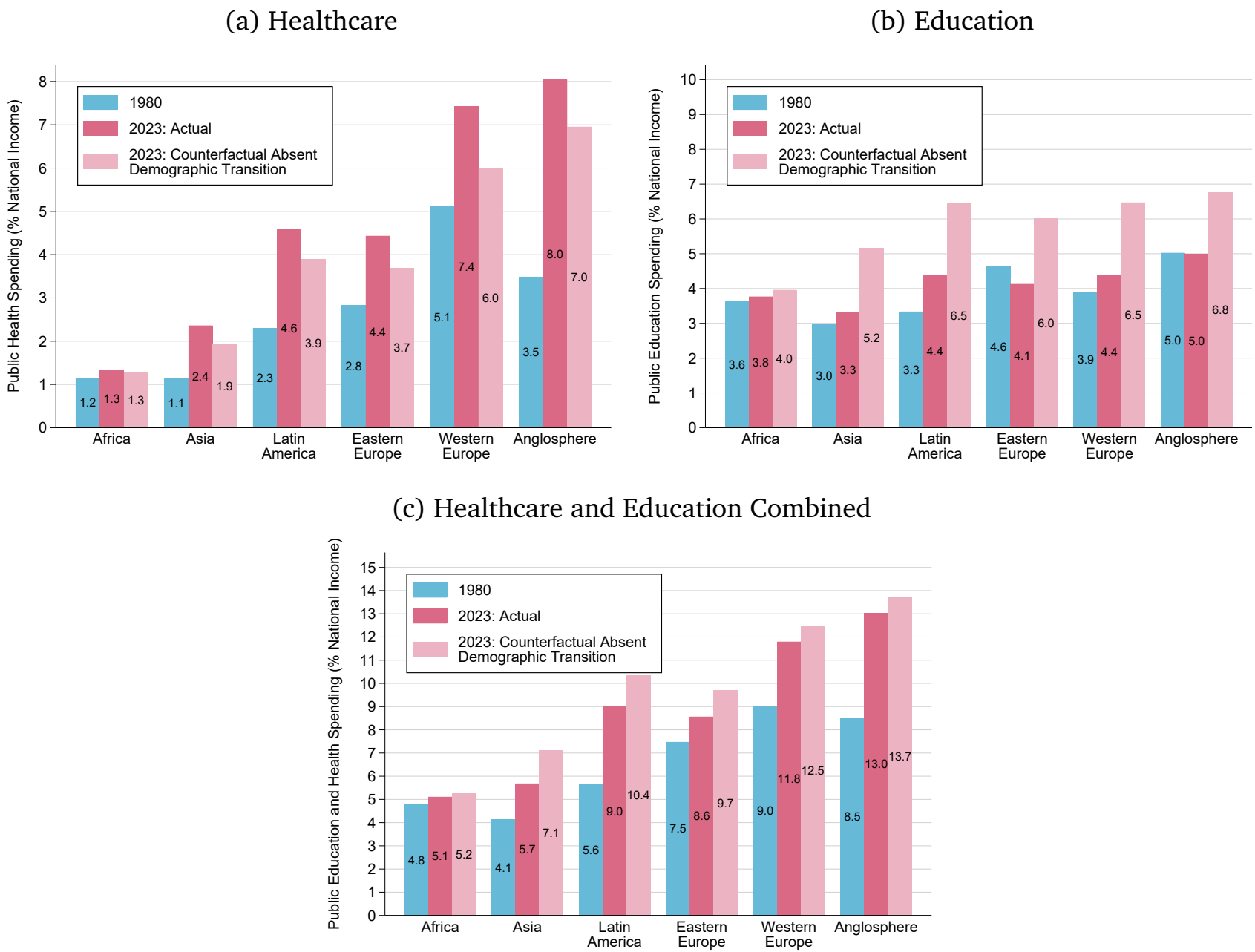
(a) Lower Bound

(b) Upper Bound



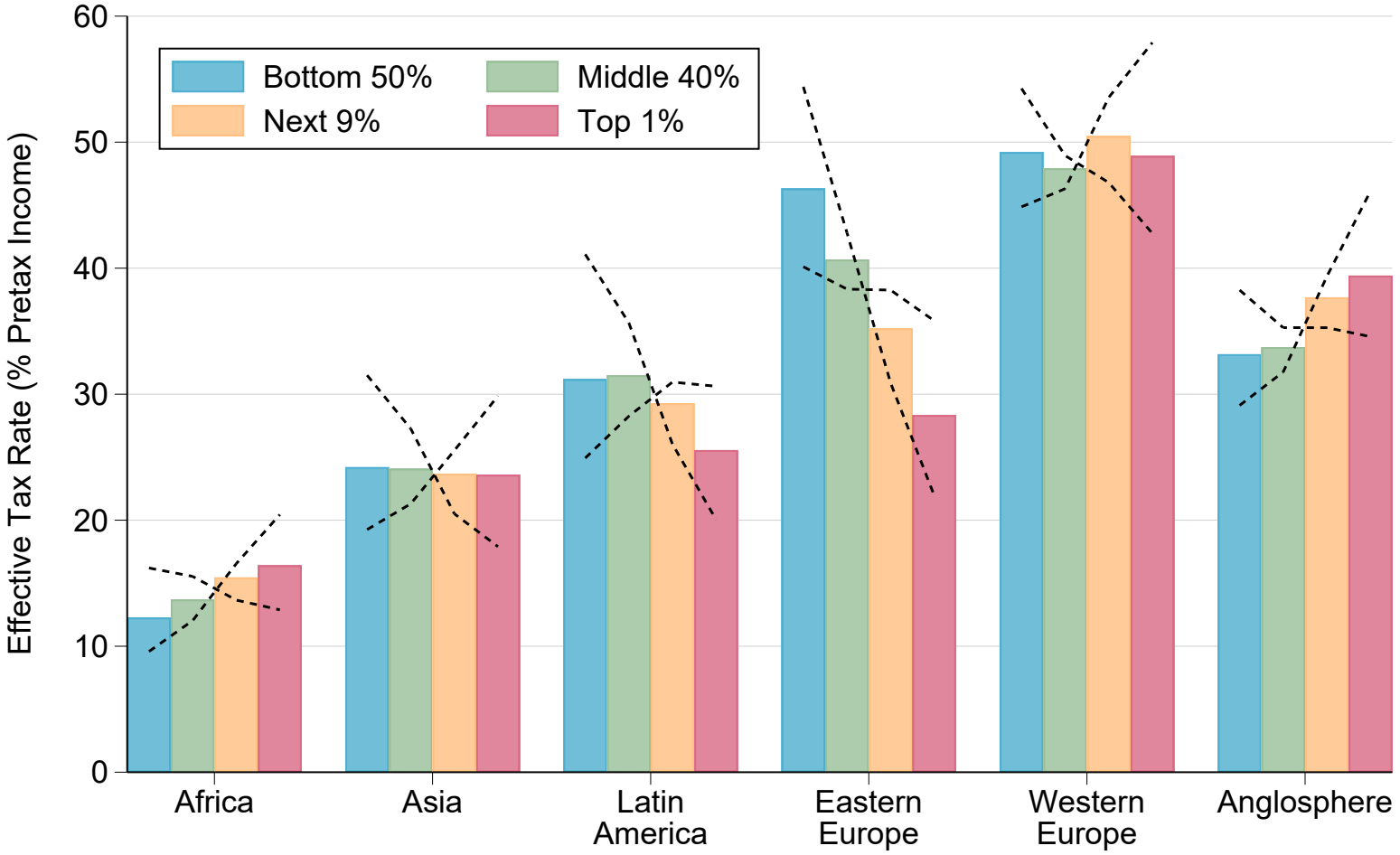
Notes. This figure reproduces Figure VI separately for lower and upper bounds on the progressivity of transfers. Lower- and upper-bound specifications correspond to polar scenarios in which transfer progressivity is assumed to have declined or increased very strongly in each country during periods for which data are missing on transfer progressivity.

Figure A7 – Age-Adjusted Public Education and Healthcare Expenditure by World Region, 1980-2023



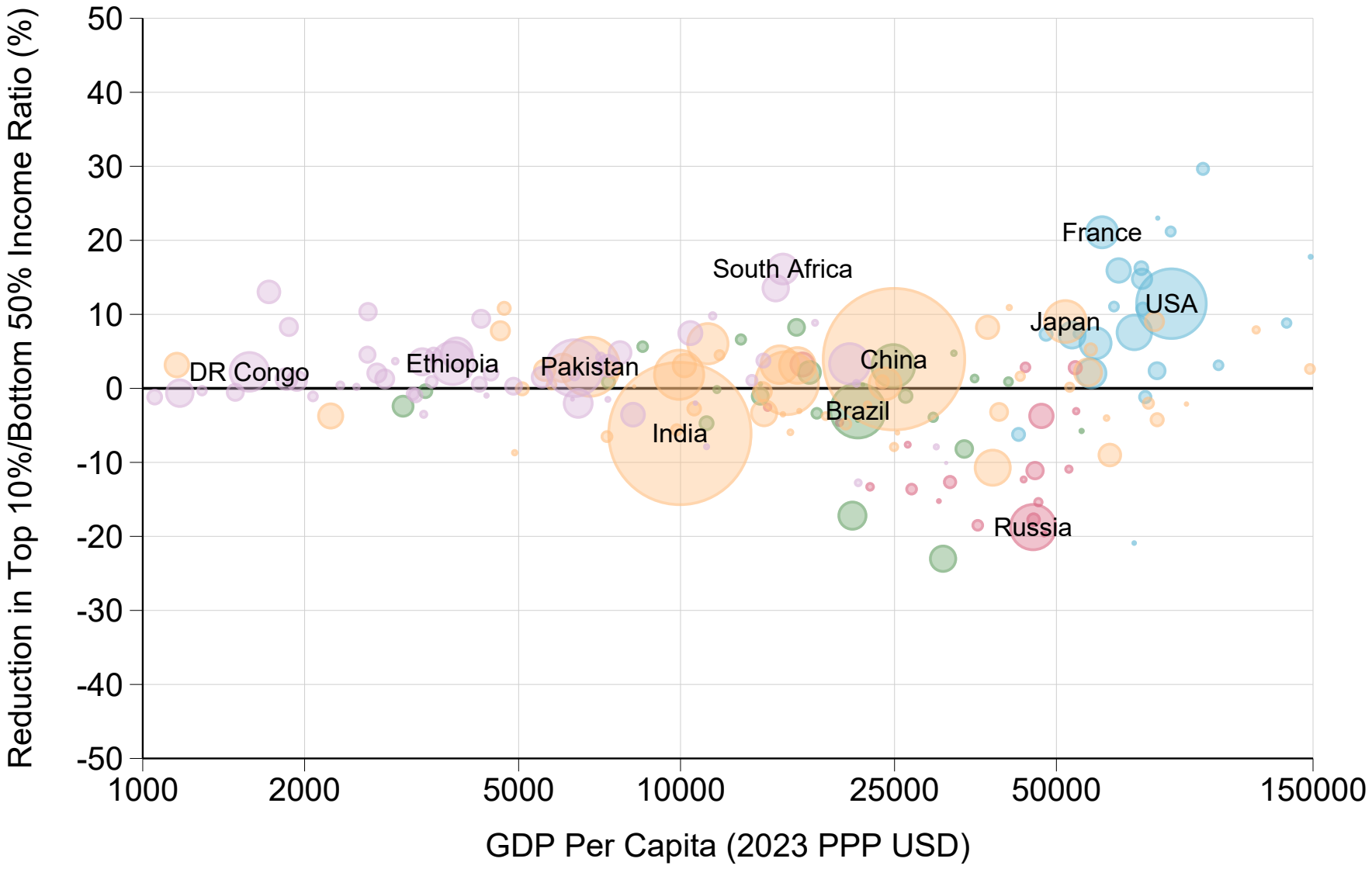
Notes. The figure plots actual public health and education spending by world region in 1980 and 2023, together with estimates of spending levels that would prevail in 2023 if the distribution of the population by age group had remained the same from 1980 to 2023. Panel (a) shows that age-adjusted health spending has risen less than unadjusted spending in all regions except Africa, reflecting population ageing and greater healthcare needs among the elderly population. In contrast, panel (b) shows that age-adjusted education spending has risen faster than unadjusted spending in all regions, reflecting the decline in the share of the young population. Panel (c) shows that the education effect dominates: in all regions, age-adjusted public spending on education and healthcare has increased faster than unadjusted spending.

Figure A8 – Tax Progressivity by World Region: Effective Tax Rates by Pretax Income Group (With Specification Bounds)



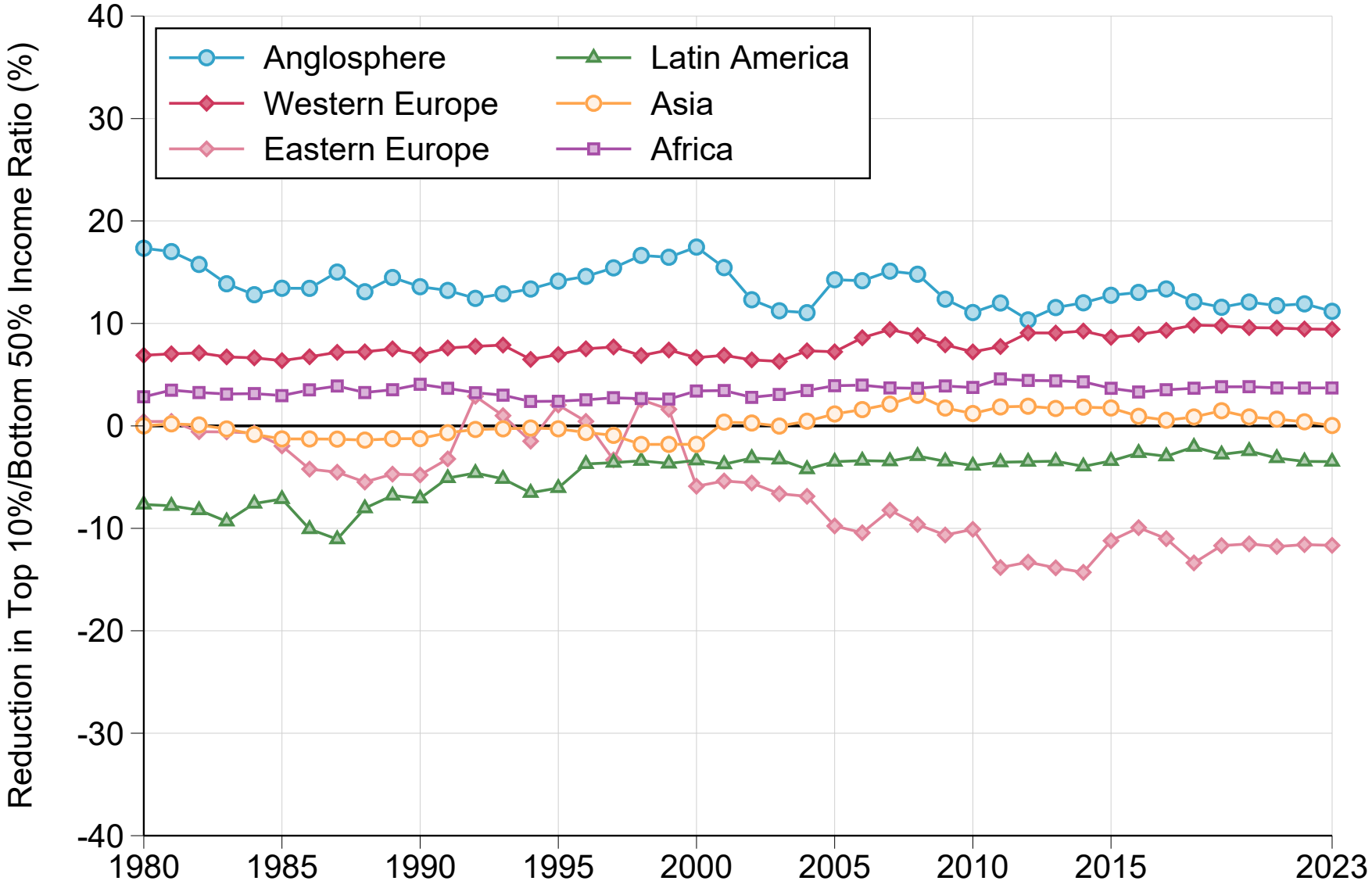
Notes. This figure reproduces Figure VIII after including specification bounds on the progressivity of taxes in each country (depicted as dashed lines). Lower- and upper-bound specifications correspond to polar scenarios in which corporate and indirect taxes are assumed to be very strongly regressive or progressive in every country.

Figure A9 – Tax Progressivity and Development (Excluding Social Contributions)



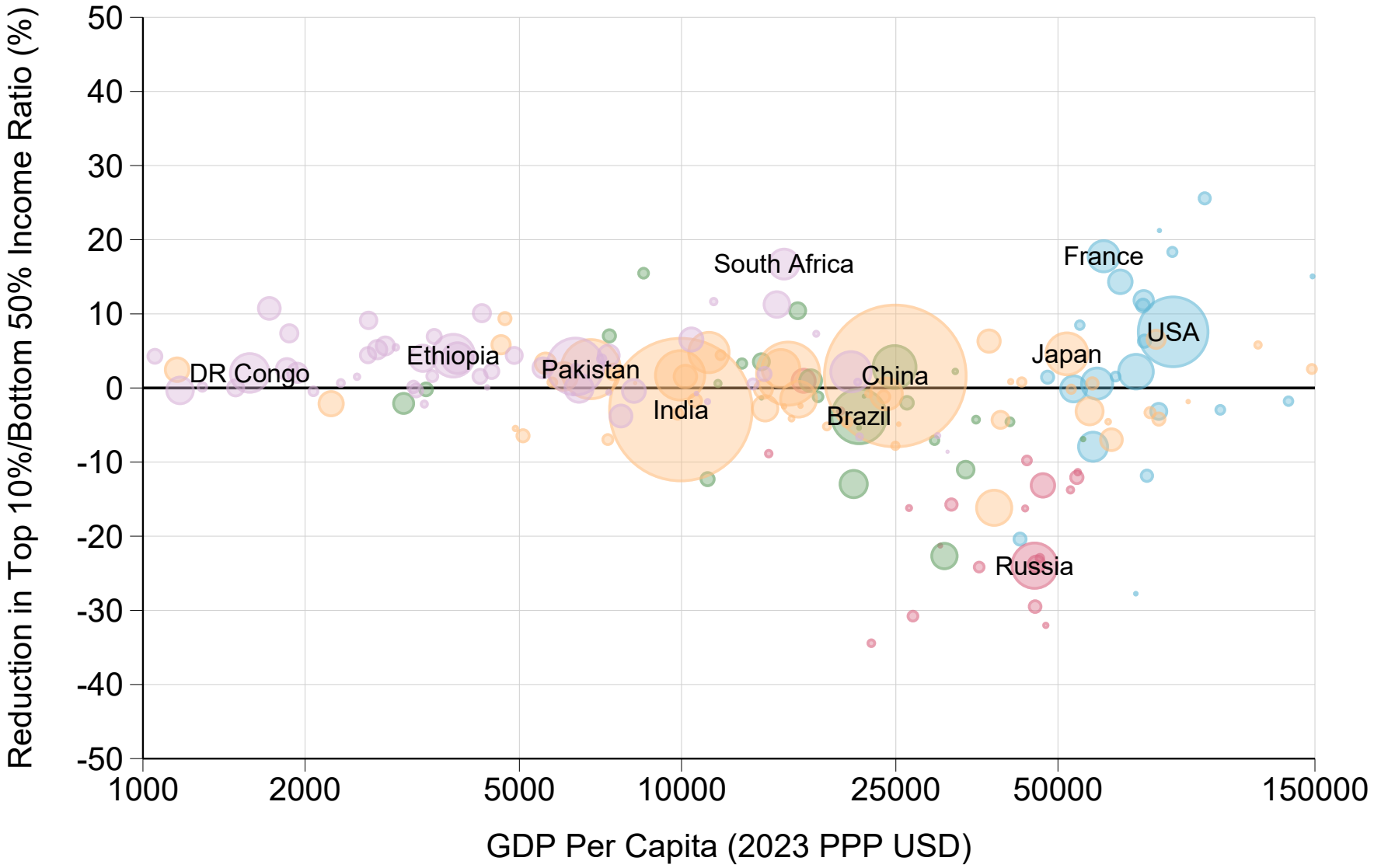
Notes. The figure reproduces Figure IX but excludes social contributions from the analysis.

Figure A10 – The Evolution of Tax Progressivity (Excluding Social Contributions)



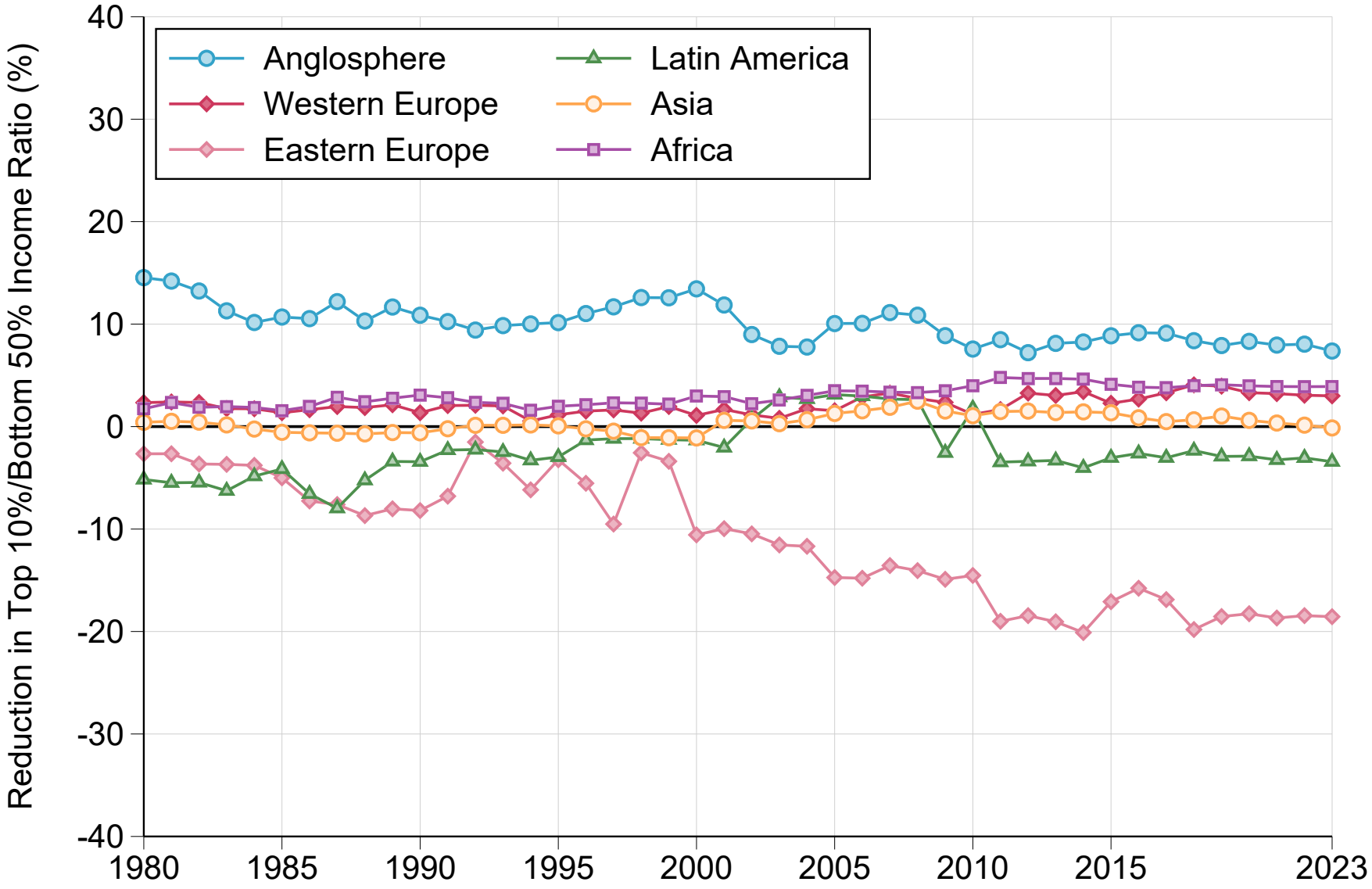
Notes. The figure reproduces Figure X but excludes social contributions from the analysis.

Figure A11 – Tax Progressivity and Development (Normalized Progressivity)



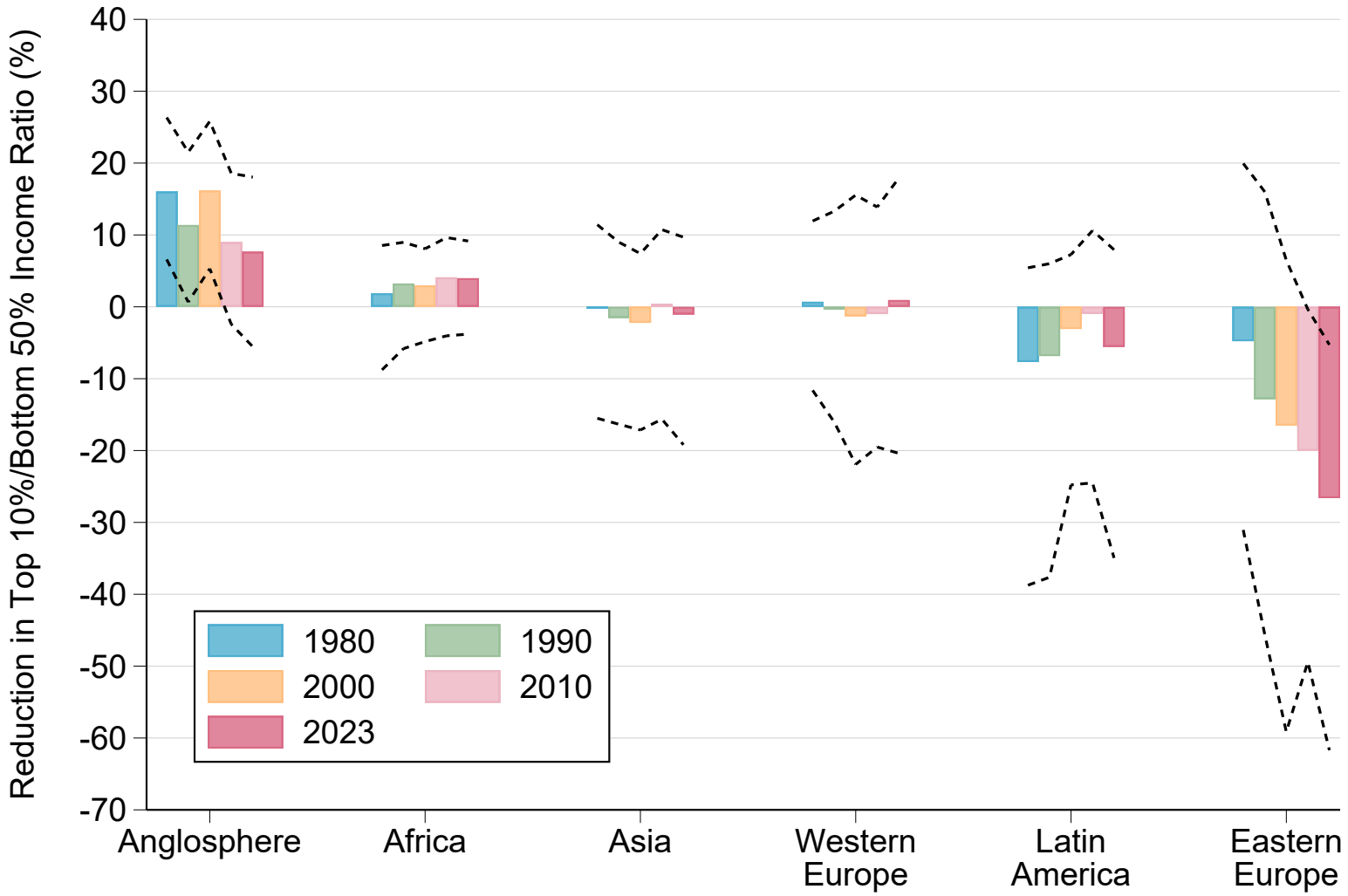
Notes. The figure reproduces Figure IX but uses a measure of normalized tax progressivity in which all countries are assigned a "normalized" distribution (see Appendix B.4).

Figure A12 – The Evolution of Tax Progressivity (Normalized Progressivity)



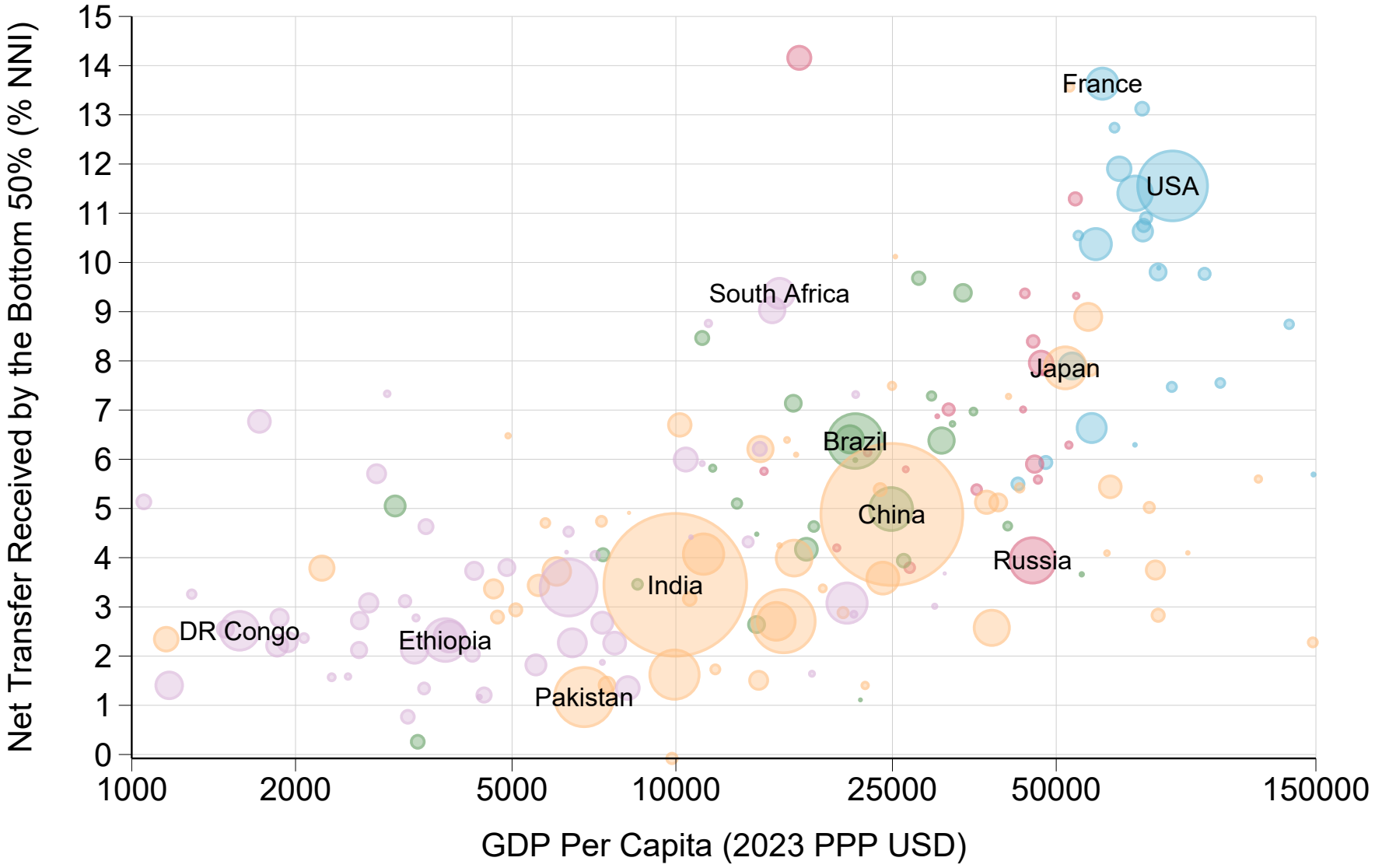
Notes. The figure reproduces Figure X but uses a measure of normalized tax progressivity in which all countries are assigned a "normalized" distribution (see Appendix B.4).

Figure A13 – The Evolution of Tax Progressivity (With Specification Bounds)



Notes. This figure plots the evolution of tax progressivity, as in Figure X, but includes specification bounds on the progressivity of taxes in each country (depicted as dashed lines). Lower- and upper-bound specifications correspond to polar scenarios in which corporate and indirect taxes are assumed to be very strongly regressive or progressive in every country.

Figure A14 – Government Redistribution and Development (Including Other Expenditure)

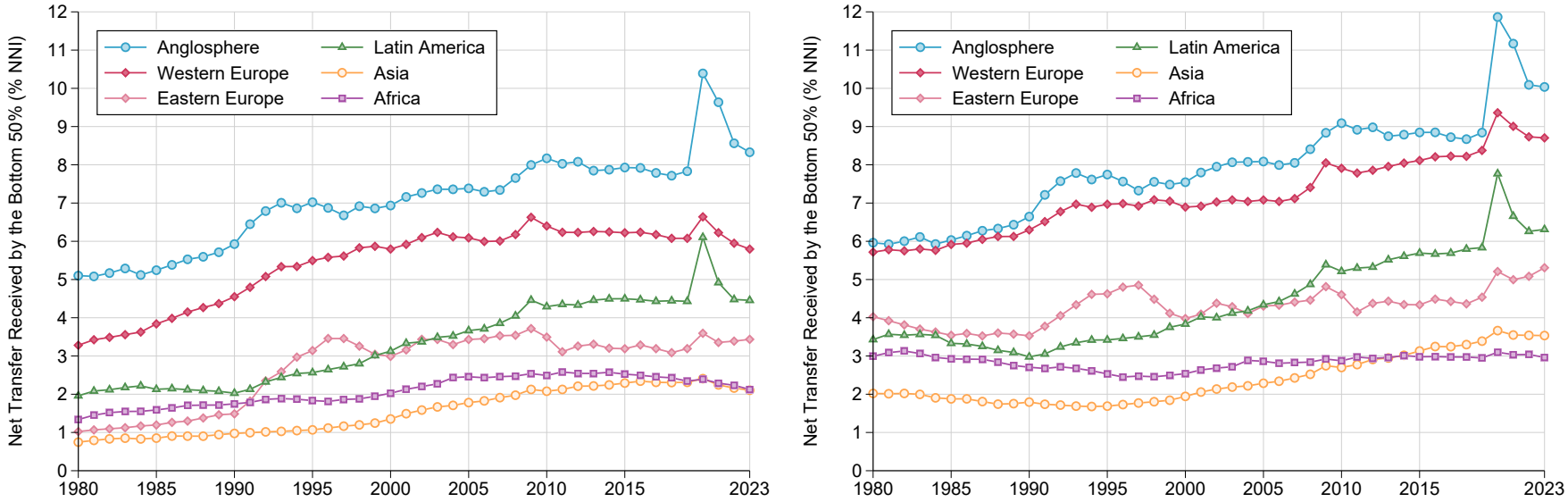


Notes. This figure reproduces Figure XII after including government transfers other than social assistance, education, and healthcare in the analysis. Other government expenditure is distributed proportionally to disposable income in each country, and all taxes are deducted from pretax income to reach posttax income.

Figure A15 – The Evolution of Government Redistribution (Lower and Upper Specification Bounds)

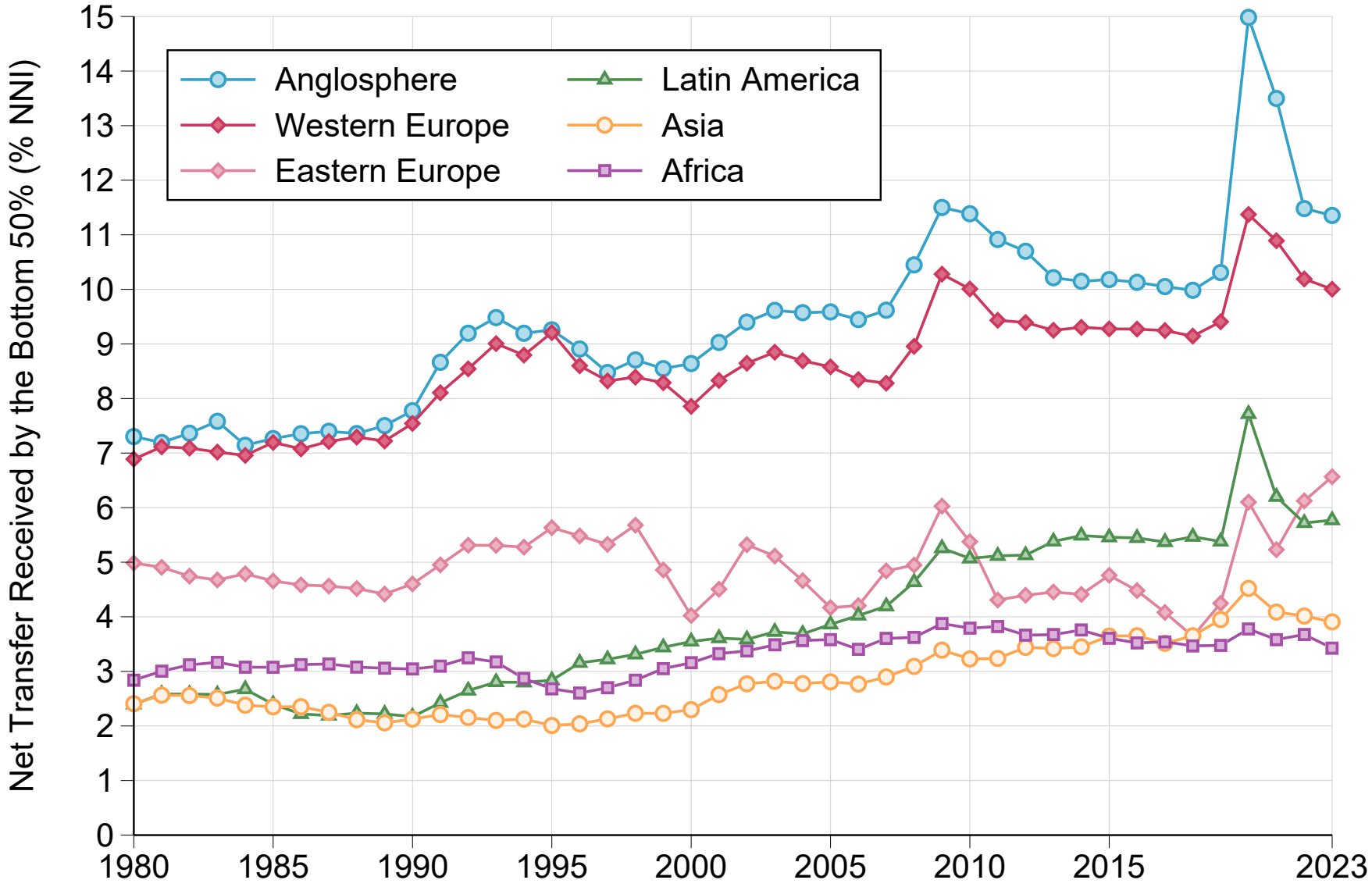
(a) Lower Bound

(b) Upper Bound



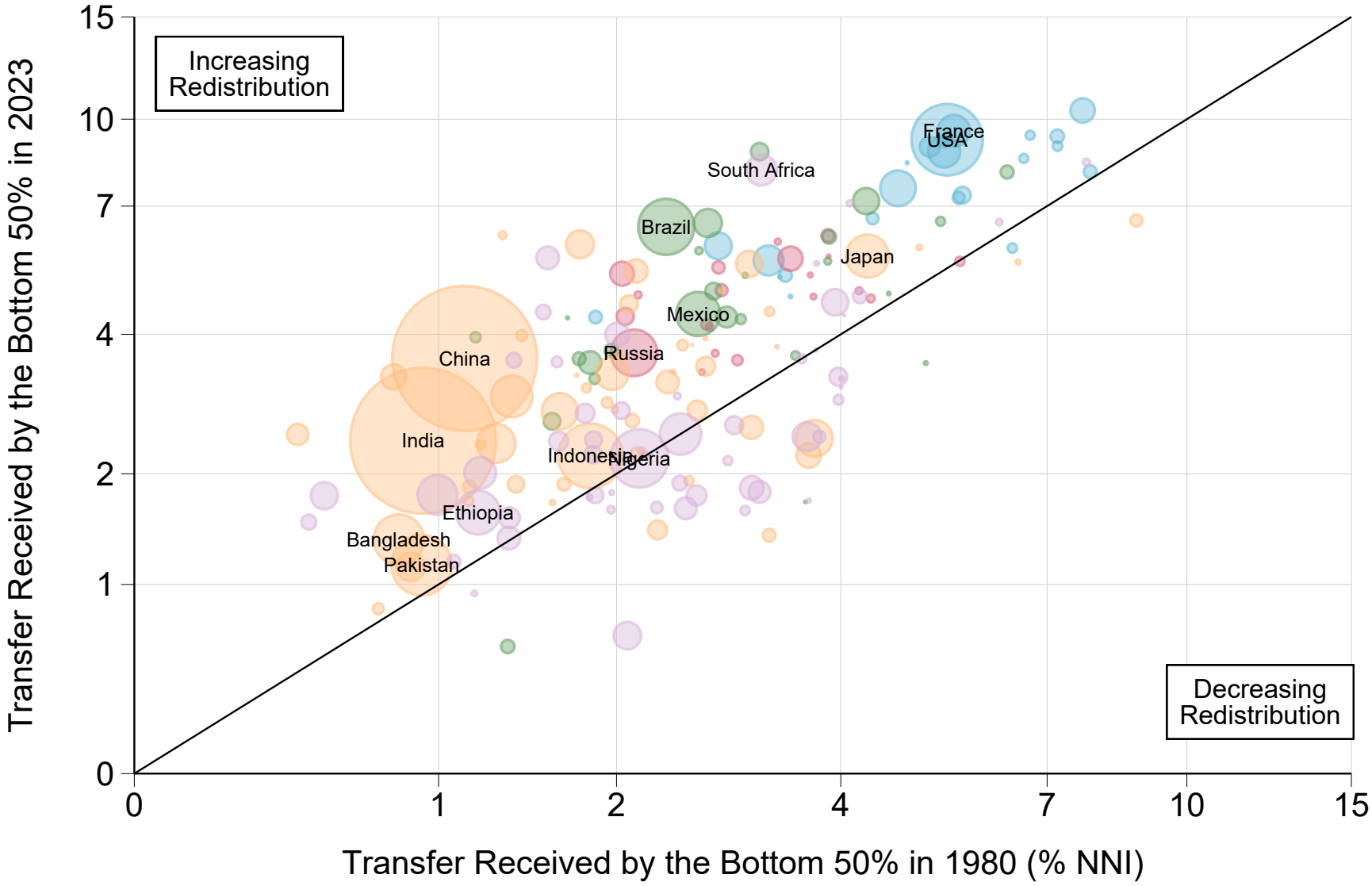
Notes. This figure reproduces Figure XIII separately for lower and upper bounds on the progressivity of taxes and transfers. Lower- and upper-bound specifications correspond to polar scenarios in which transfer progressivity is assumed to have declined or increased very strongly in each country during periods for which data are missing on transfer progressivity, and corporate and indirect taxes are assumed to be very strongly regressive or progressive in every country.

Figure A16 – The Evolution of Government Redistribution (Including Other Expenditure)



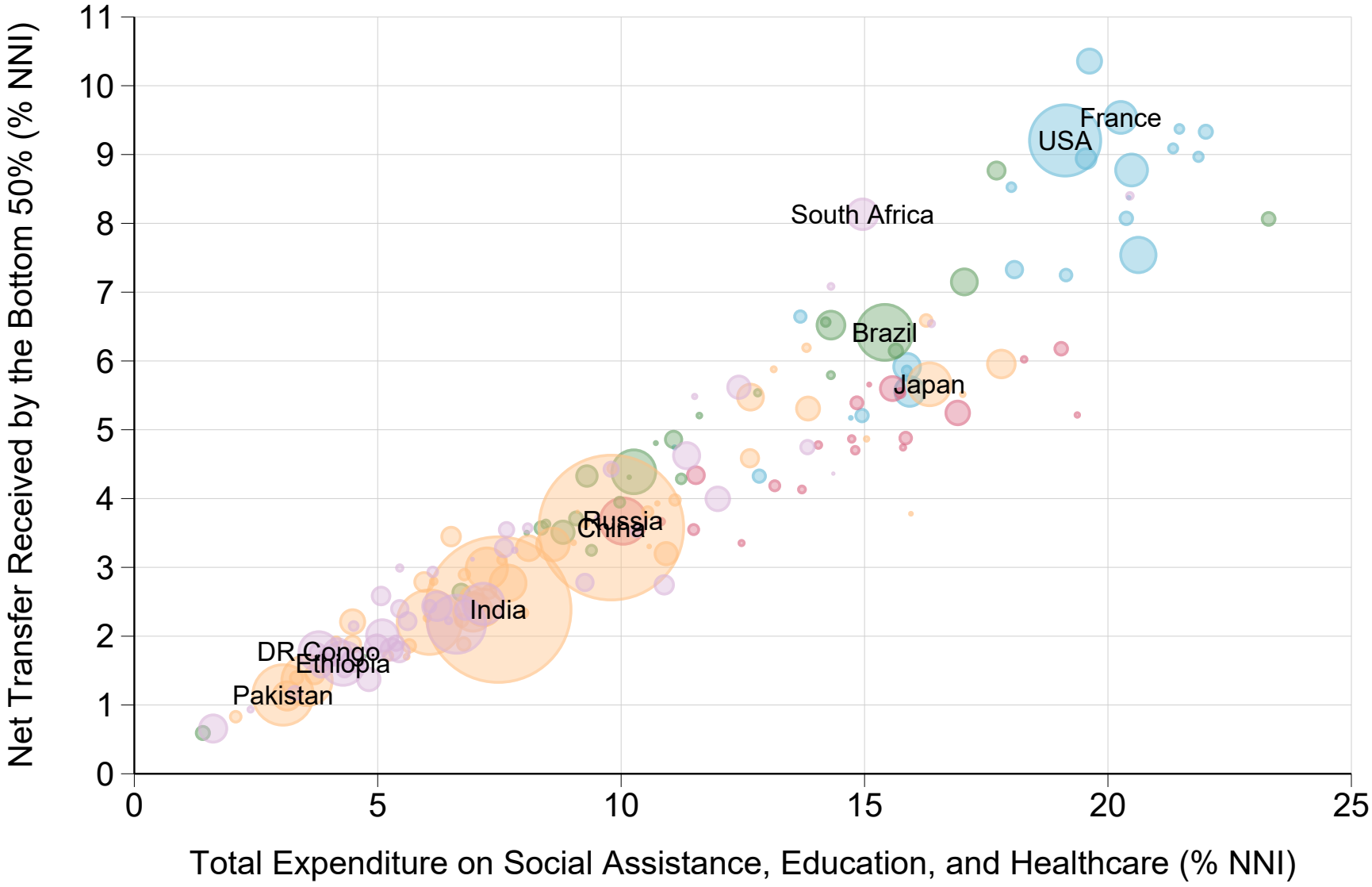
Notes. This figure reproduces Figure XIII after including government transfers other than social assistance, education, and healthcare in the analysis. Other government expenditure is distributed proportionally to disposable income in each country, and all taxes are deducted from pretax income to reach posttax income.

Figure A17 – Net Transfer Received by the Bottom 50%, 1980 versus 2023 (% of National Income)



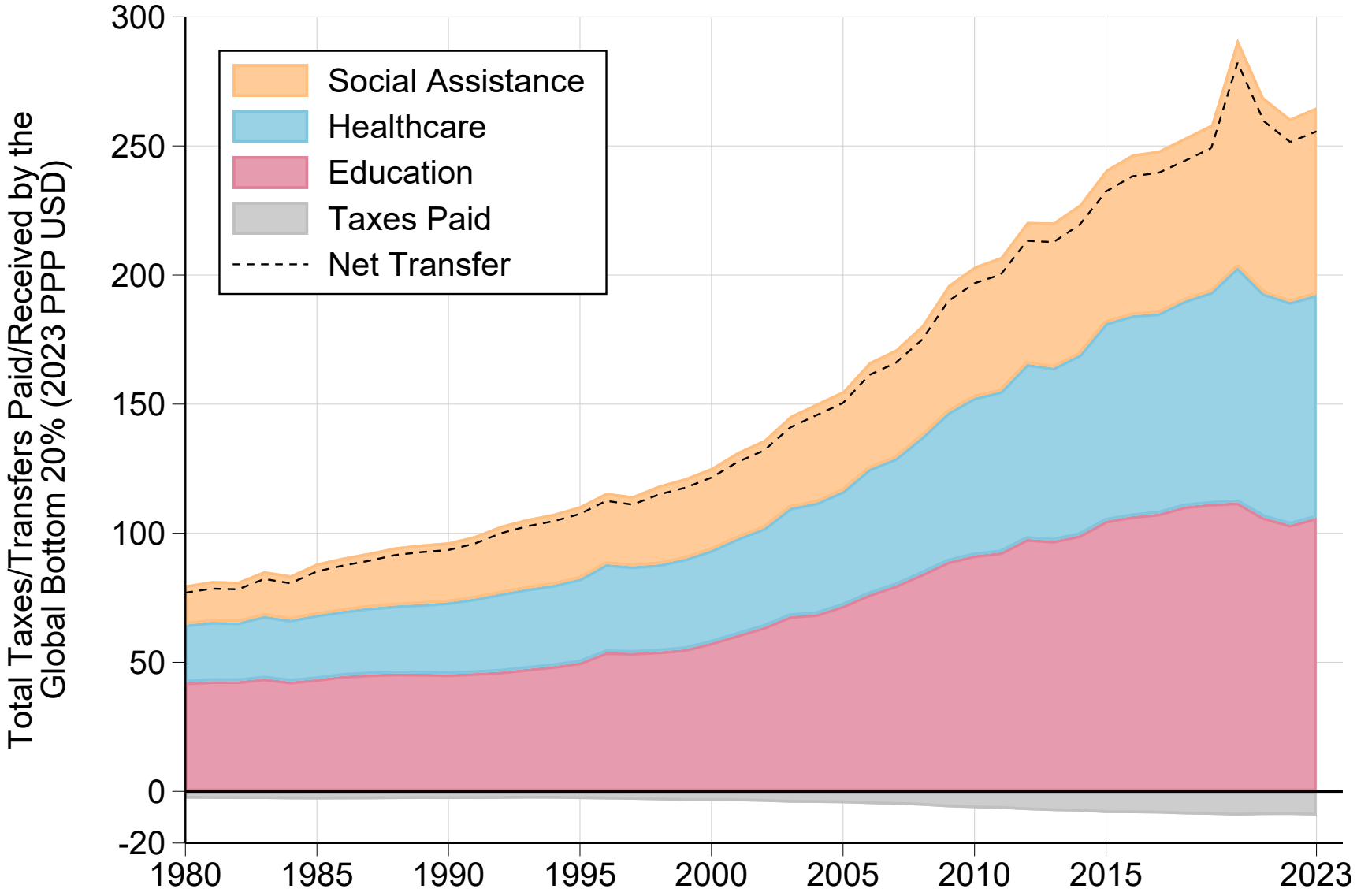
Notes. This figure plots redistribution to the bottom 50% across countries in 1980 (x-axis) and 2023 (y-axis). Redistribution is measured as the net government transfer received by the bottom 50%—the sum of social assistance, education, and healthcare transfers minus the taxes that pay for them—expressed as a share of national income. The area of each country's circle is proportional to its population; selected countries' names are depicted. Colors correspond to world regions: Africa, Asia, Latin America, Eastern Europe, and Western Europe and the Anglosphere. Redistribution has increased in most countries in the world: the majority of countries are above the 45-degree line.

Figure A18 – Government Redistribution versus Aggregate Transfers



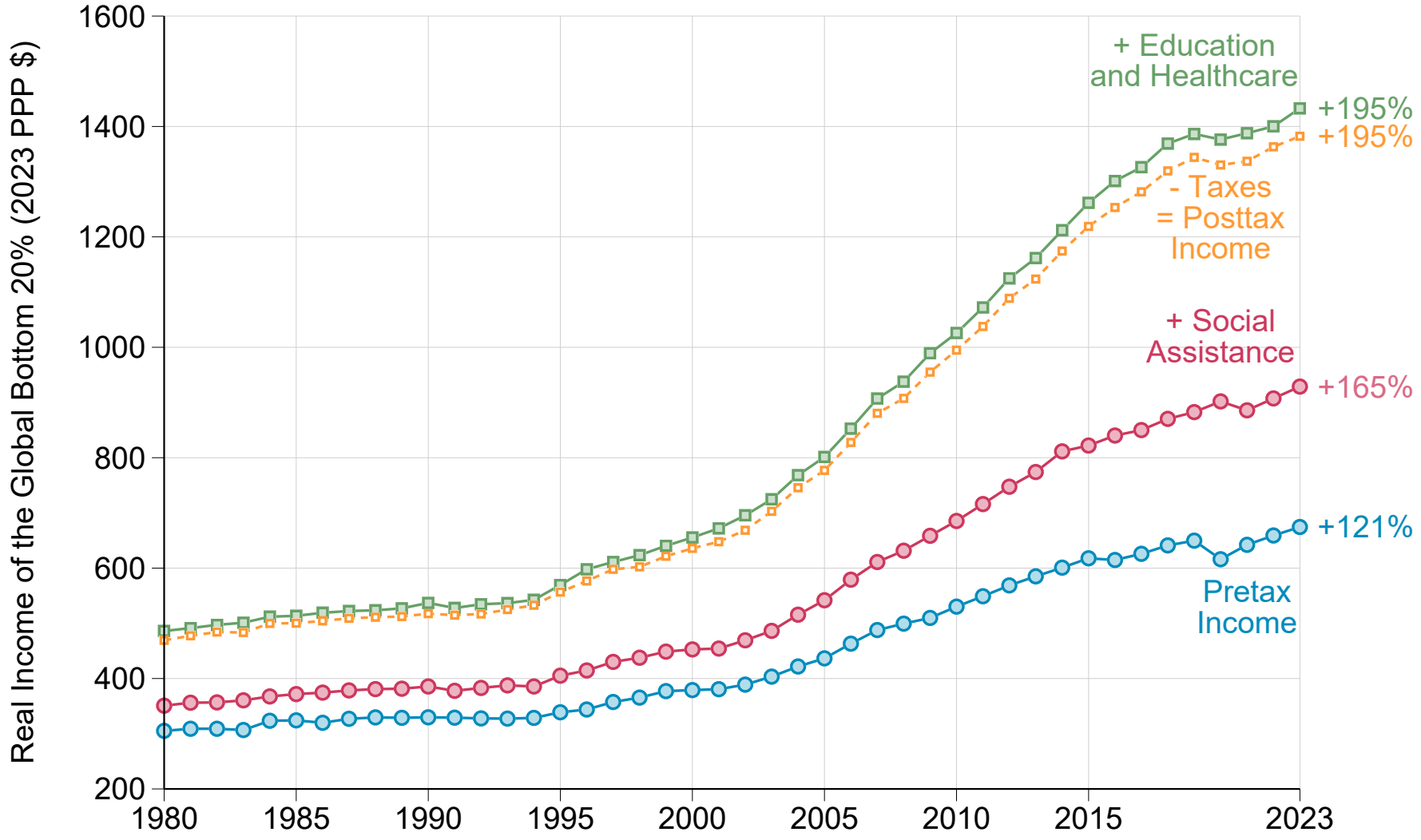
Notes. This figure plots total general government expenditure on social assistance, education, and healthcare against net redistribution to the bottom 50%, both expressed as a share of national income, across countries in 2023. The area of each country's circle is proportional to its population; selected countries' names are depicted. Colors correspond to world regions: Africa, Asia, Latin America, Eastern Europe, and Western Europe and the Anglosphere. Net redistribution and total government expenditure are strongly correlated across countries, suggesting that the size of the welfare state is the dominant driver of cross-country variations in redistribution.

Figure A19 – Taxes Paid and Transfers Received by the World's Poorest 20% (Real 2023 PPP USD)



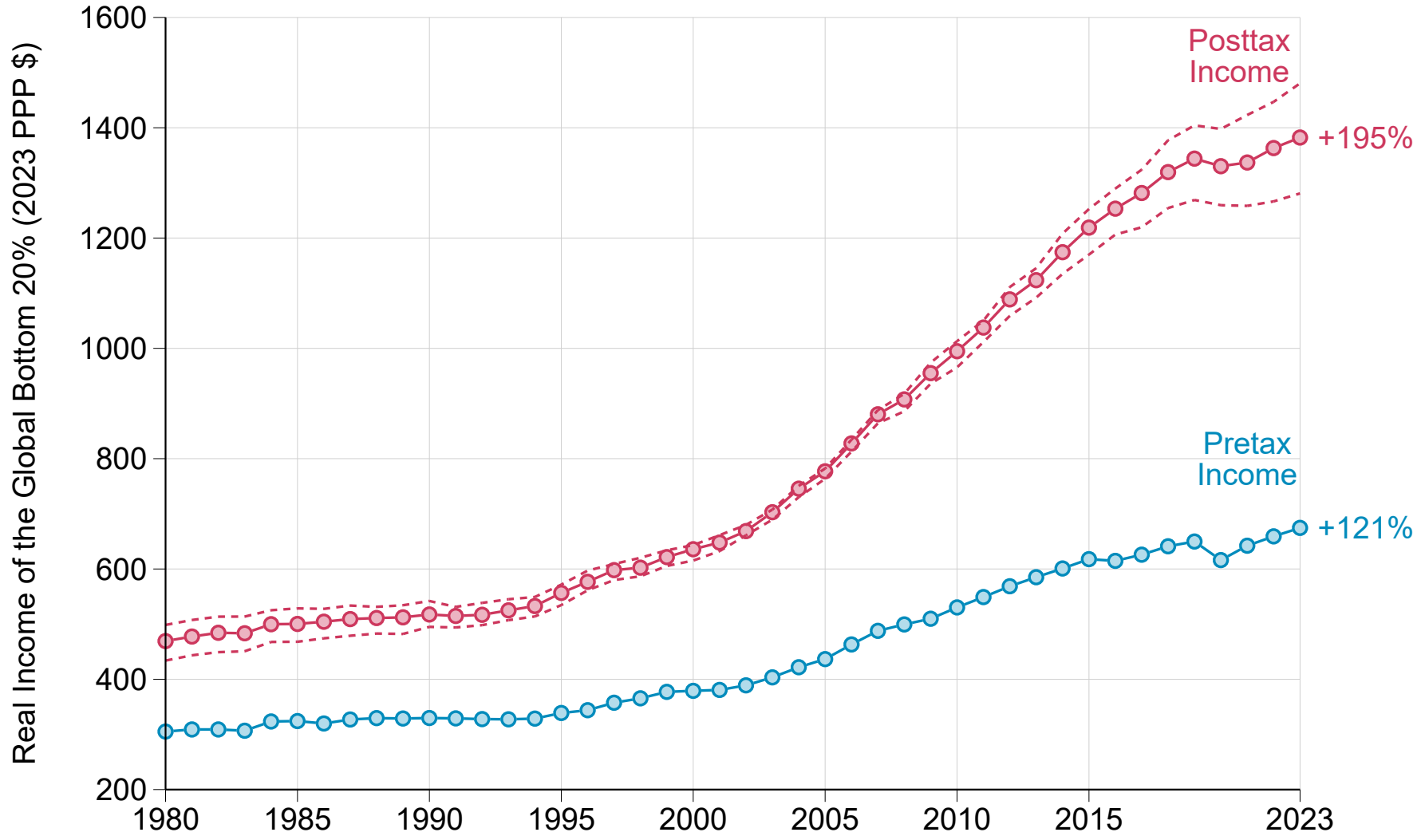
Notes. This figure reproduces Figure XV but depicts taxes paid and transfers received by the world's poorest 20% in 2023 real PPP USD instead of as a share of global income.

Figure A20 – Government Redistribution and Real Income Growth among the World's Poorest 20% (Decomposed)



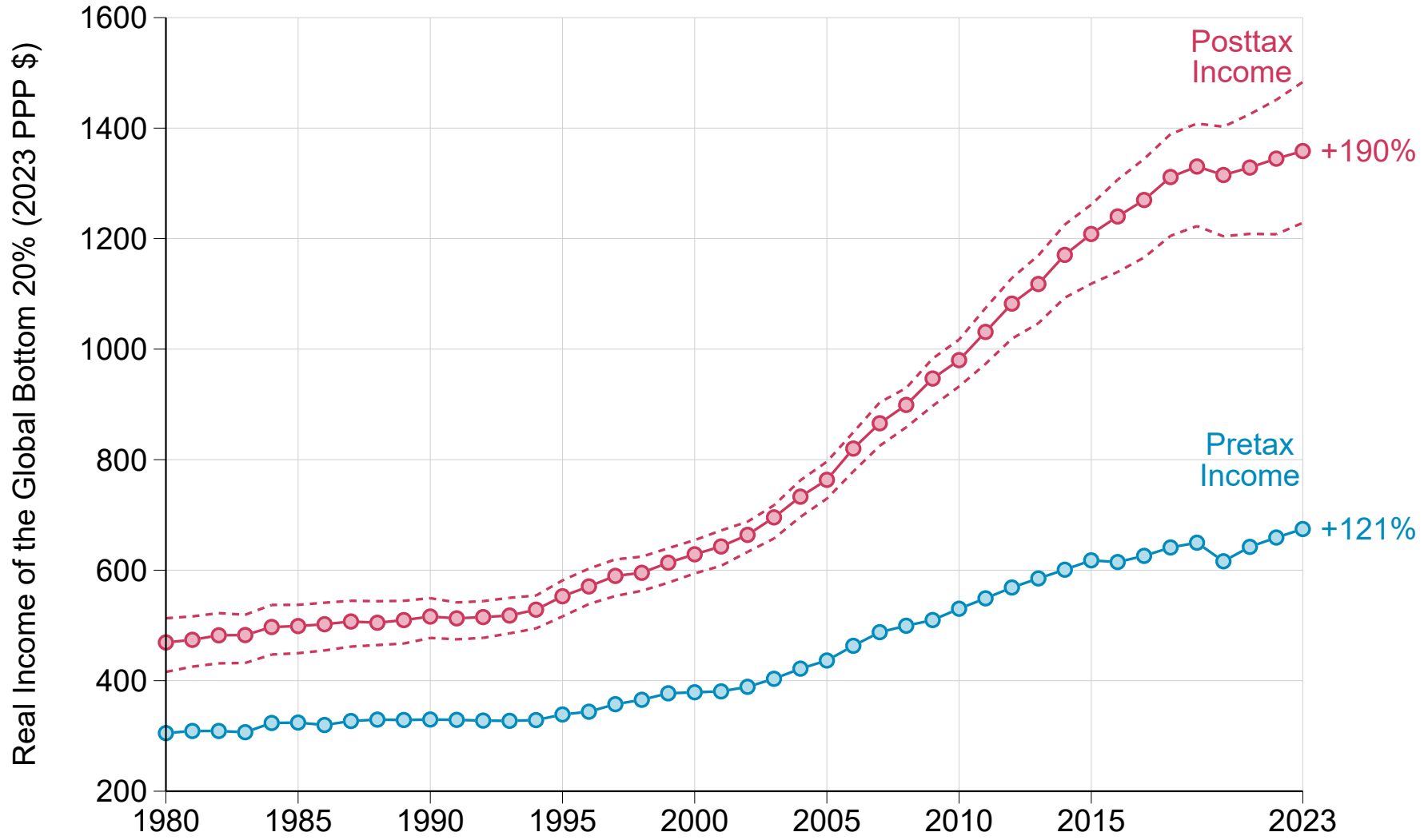
Notes. This figure reproduces Figure XVI but further decomposes the results into the relative contributions of taxes and transfers. The average income of the world's poorest 20% increased by about 120% in terms of pretax income, 160% in terms of pretax income plus social assistance transfers, 190% in terms of pretax income plus all transfers, and 190% in terms of posttax income.

Figure A21 – Government Redistribution and Real Income Growth among the World's Poorest 20%
(With Specification Bounds)



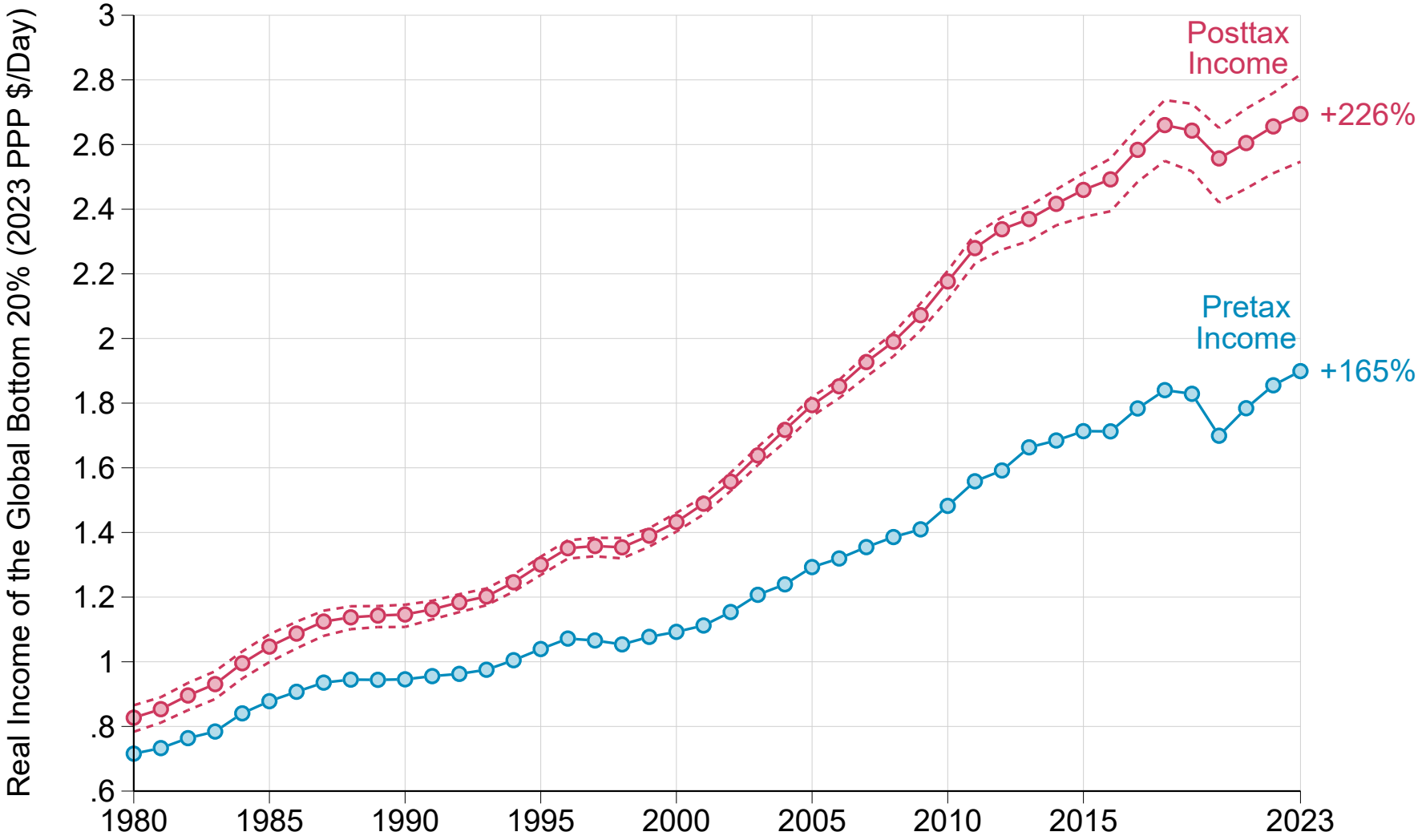
Notes. This figure reproduces Figure XVI after including specification bounds on the progressivity of taxes and transfers in each country (depicted as dashed lines). Lower- and upper-bound specifications correspond to polar scenarios in which transfer progressivity is assumed to have declined or increased very strongly in each country during periods for which data are missing on transfer progressivity, and corporate and indirect taxes are assumed to be very strongly regressive or progressive in every country.

Figure A22 – Government Redistribution and Real Income Growth among the World's Poorest 20%
(Including Other Expenditure)



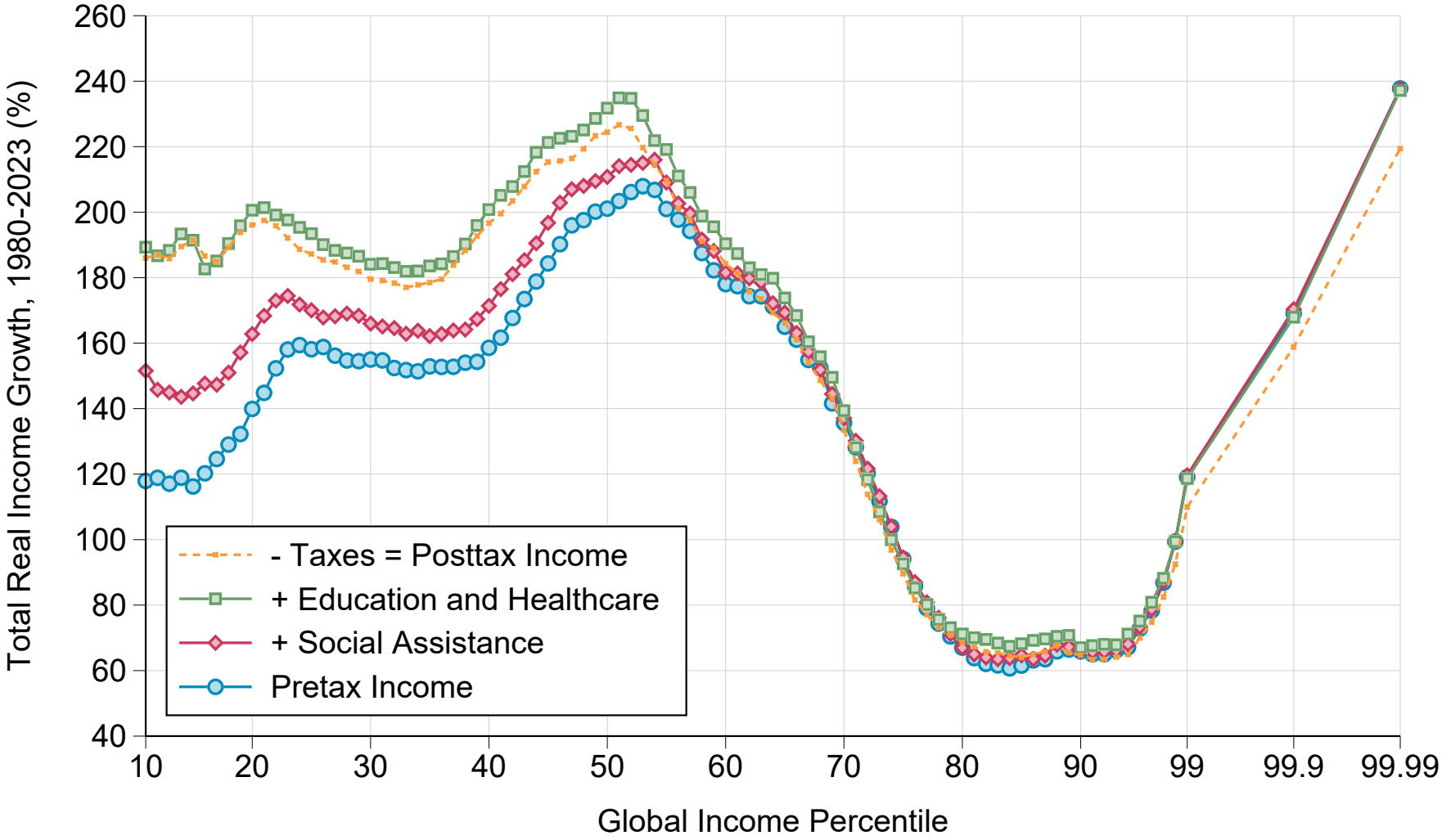
Notes. This figure reproduces Figure XVI after including government transfers other than social assistance, education, and healthcare in the analysis, and also includes specification bounds on the progressivity of taxes and transfers in each country (depicted as dashed lines). Other government expenditure is distributed proportionally to disposable income in each country, and all taxes are deducted from pretax income to reach posttax income. Lower- and upper-bound specifications correspond to polar scenarios in which transfer progressivity is assumed to have declined or increased very strongly in each country during periods for which data are missing on transfer progressivity, and corporate and indirect taxes are assumed to be very strongly regressive or progressive in every country.

Figure A23 – Government Redistribution and Real Income Growth among the World's Poorest 20%
(World Bank Income Distribution Data)



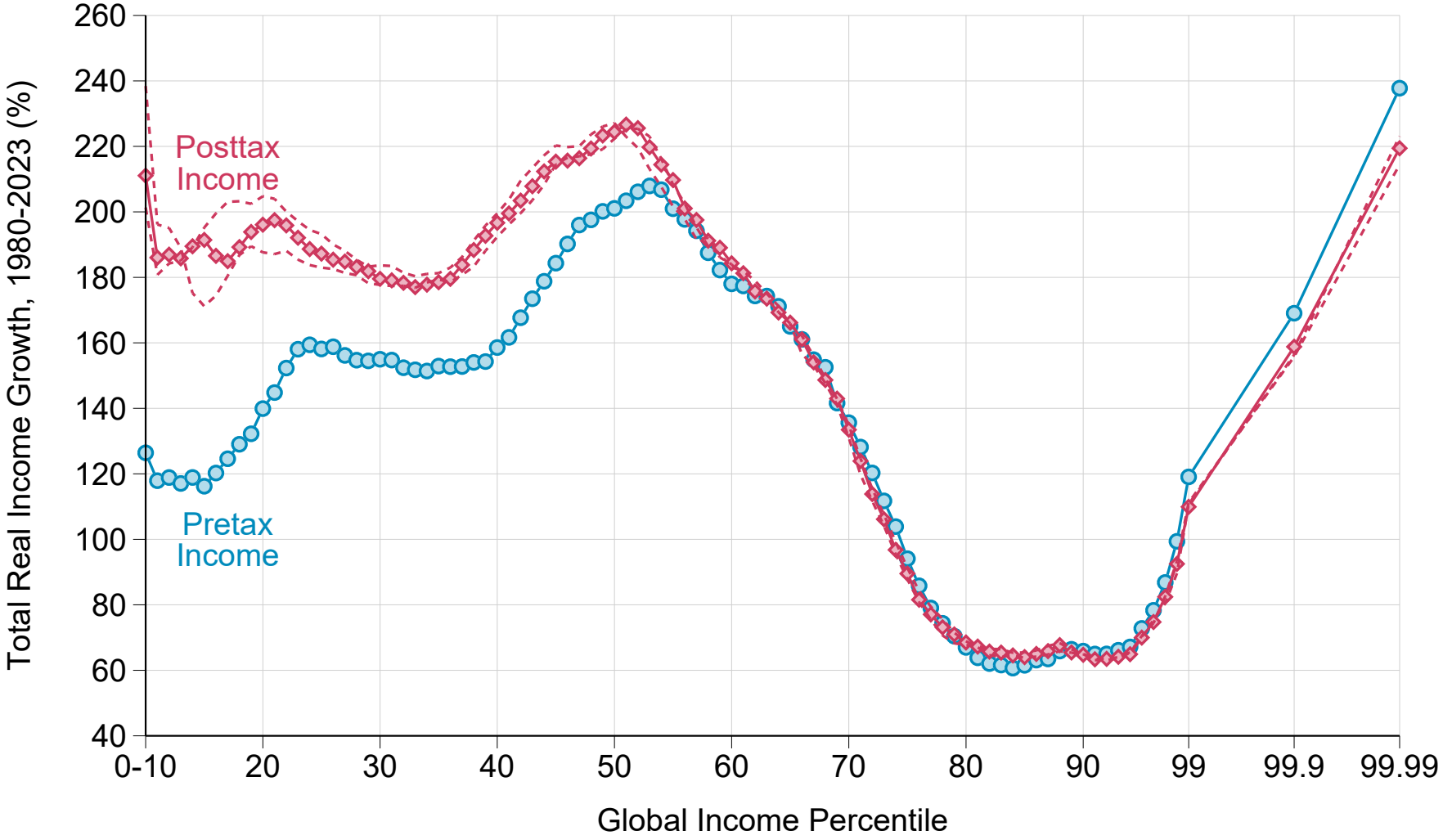
Notes. This figure reproduces Figure XVI but uses World Bank consumption and income distribution data instead of the World Inequality Database to construct estimates of the world distribution of income. Specification bounds are depicted as dashed lines. Lower- and upper-bound specifications correspond to polar scenarios in which transfer progressivity is assumed to have declined or increased very strongly in each country during periods for which data are missing on transfer progressivity, and corporate and indirect taxes are assumed to be very strongly regressive or progressive in every country.

Figure A24 – Government Redistribution and the Distribution of Global Economic Growth (Decomposed)



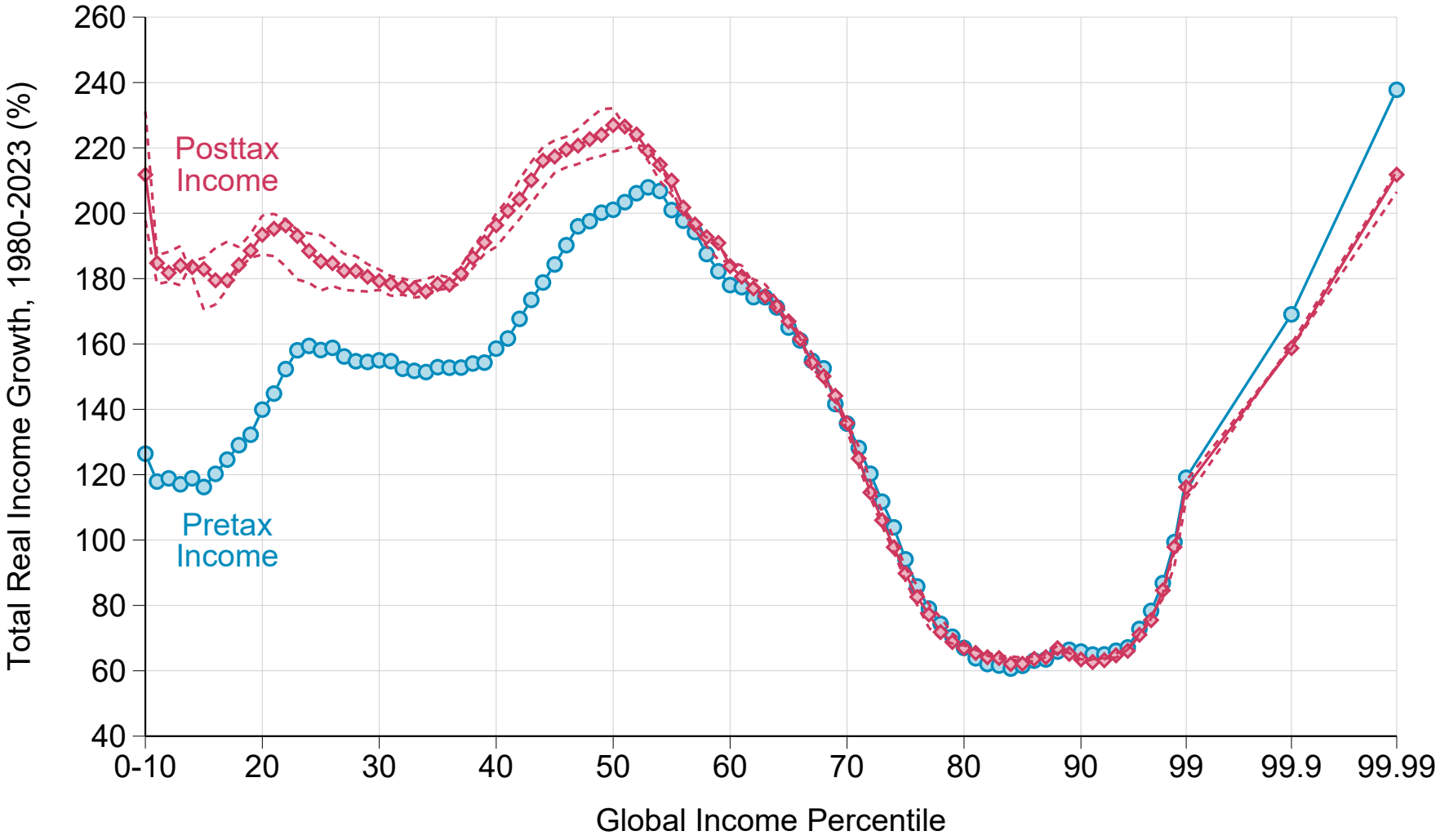
Notes. This figure reproduces Figure XVII but further decomposes the results into the relative contributions of taxes and transfers. The average income of the 20th percentile of the global income distribution grew by about 140% in terms of pretax income, 160% in terms of pretax income plus social assistance transfers, 200% in terms of pretax income plus all transfers, and 200% in terms of posttax income.

Figure A25 – Government Redistribution and the Distribution of Global Economic Growth, 1980-2023
(With Specification Bounds)



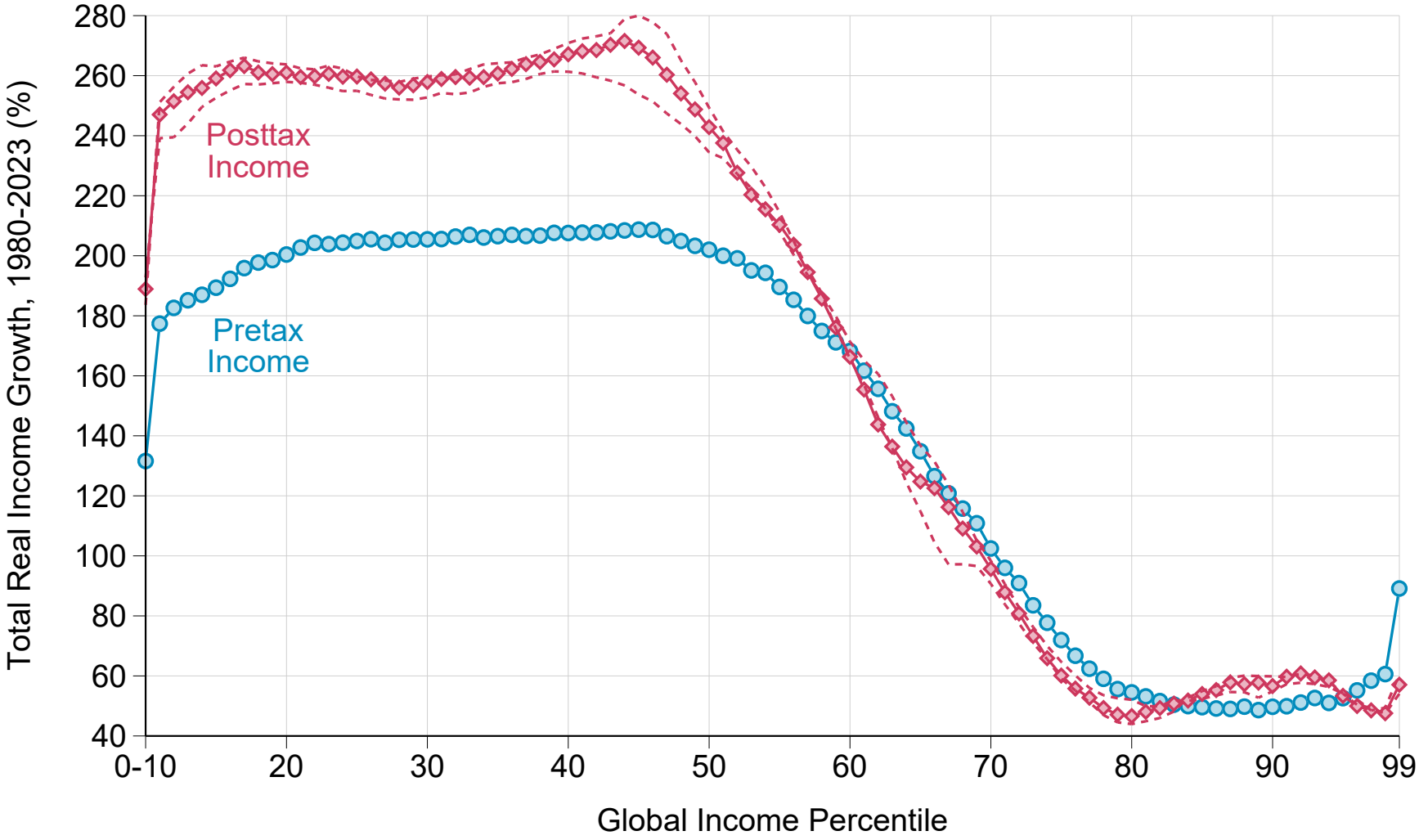
Notes. This figure reproduces Figure XVII after including specification bounds on the progressivity of taxes and transfers in each country (depicted as dashed lines). Lower- and upper-bound specifications correspond to polar scenarios in which transfer progressivity is assumed to have declined or increased very strongly in each country during periods for which data are missing on transfer progressivity, and corporate and indirect taxes are assumed to be very strongly regressive or progressive in every country.

Figure A26 – Government Redistribution and the Distribution of Global Economic Growth
(Including Other Expenditure)



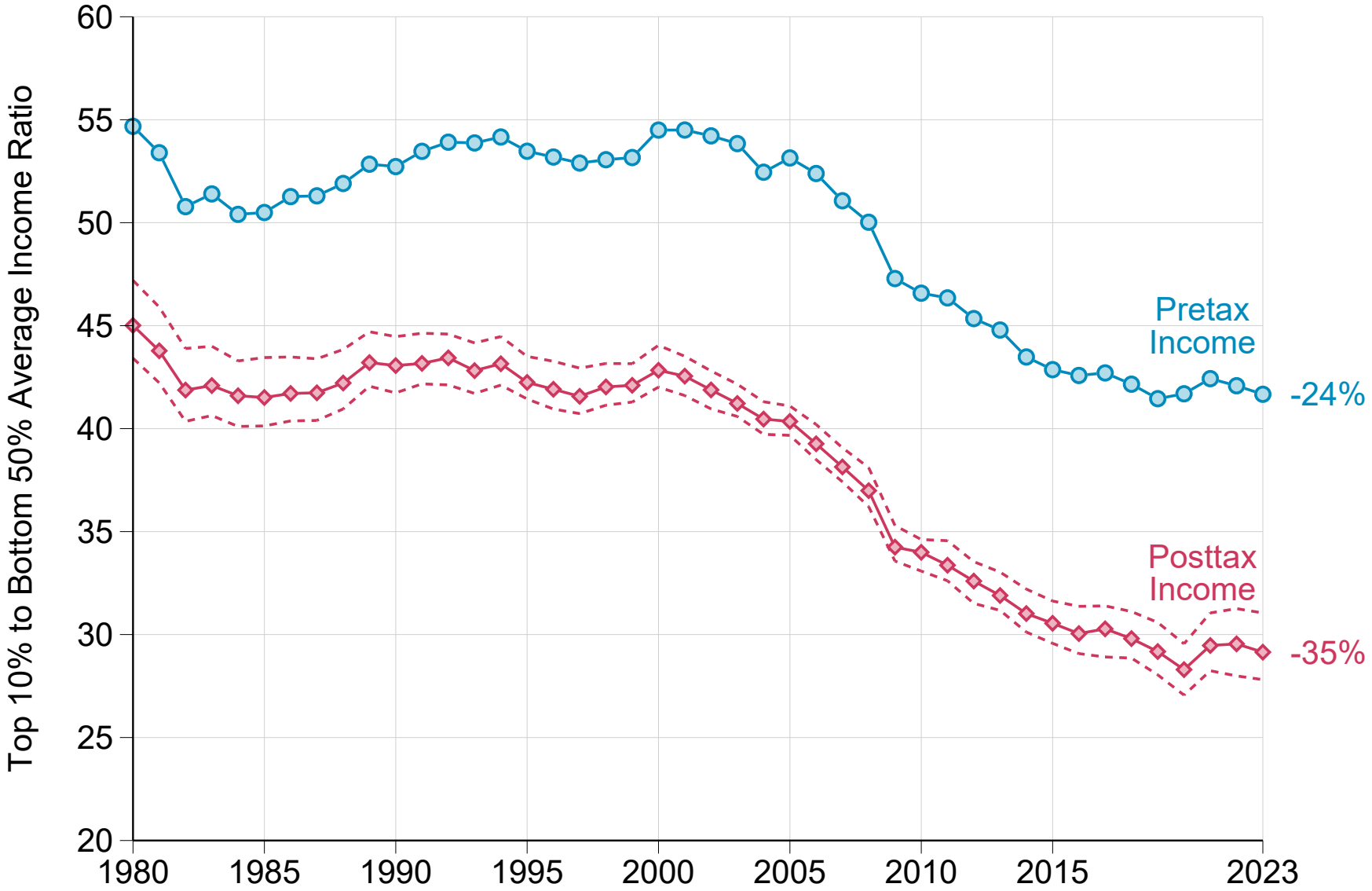
Notes. This figure reproduces Figure XVII after including government transfers other than social assistance, education, and healthcare in the analysis, and also includes specification bounds on the progressivity of taxes and transfers in each country (depicted as dashed lines). Other government expenditure is distributed proportionally to disposable income in each country, and all taxes are deducted from pretax income to reach posttax income. Lower- and upper-bound specifications correspond to polar scenarios in which transfer progressivity is assumed to have declined or increased very strongly in each country during periods for which data are missing on transfer progressivity, and corporate and indirect taxes are assumed to be very strongly regressive or progressive in every country.

Figure A27 – Government Redistribution and the Distribution of Global Economic Growth
(World Bank Income Distribution Data)



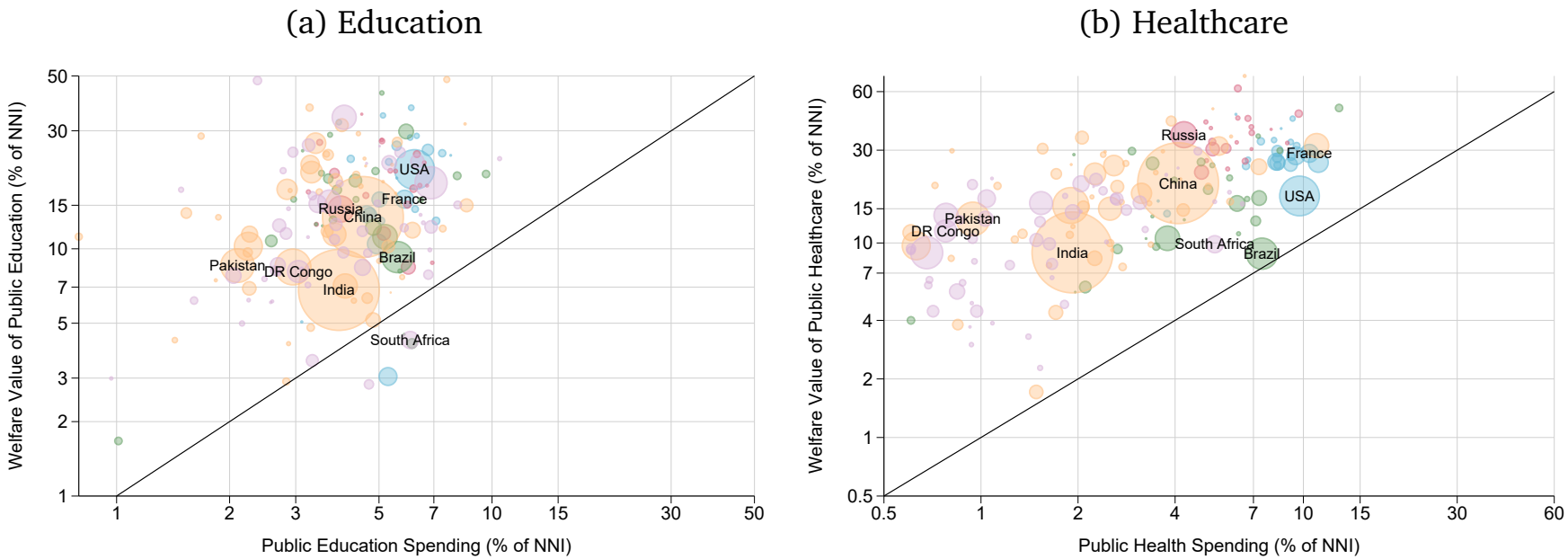
Notes. This figure reproduces Figure XVII but uses World Bank consumption and income distribution data instead of the World Inequality Database to construct estimates of the world distribution of income. Specification bounds are depicted as dashed lines. Lower- and upper-bound specifications correspond to polar scenarios in which transfer progressivity is assumed to have declined or increased very strongly in each country during periods for which data are missing on transfer progressivity, and corporate and indirect taxes are assumed to be very strongly regressive or progressive in every country.

Figure A28 – Government Redistribution and Global Inequality, 1980-2023



Notes. This figure plots the evolution of worldwide pretax and posttax income inequality, measured as the global top 10% to bottom 50% income ratio, from 1980 to 2023. Specification bounds are depicted as dashed lines. Lower- and upper-bound specifications correspond to polar scenarios in which transfer progressivity is assumed to have declined or increased very strongly in each country during periods for which data are missing on transfer progressivity, and corporate and indirect taxes are assumed to be very strongly regressive or progressive in every country. Global pretax inequality declined by about 25%, while global posttax inequality declined by about 35%.

Figure A29 – Cost of Provision versus Net Present Value of Public Education and Healthcare



Notes. The figure plots the value of public education (panel a) and public healthcare (panel b) provided in each country, expressed as a share of national income, depending on whether they are valued at cost of provision (x-axis) or at their net present value (y-axis). The net present value of public education is the discounted value of economic returns from expected years of schooling enabled by the education system. The net present value of public healthcare is the discounted value of additional years of life expectancy enabled by the healthcare system. The area of each country's circle is proportional to its population; selected countries' names are depicted. Colors correspond to world regions: Africa, Asia, Latin America, Eastern Europe, and Western Europe and the Anglosphere. The net present values of public education and healthcare are higher than their cost of provision for countries above the 45-degree line; they fall below cost of provision for countries below the 45-degree line. In most countries, the net present values of education and healthcare significantly exceed their cost of provision.

Table A1 – The Relative Contributions of Taxes and Transfers to Inequality Reduction: Decomposition by Type of Tax and Transfer

	World Average	Anglosphere	Western Europe	Eastern Europe	Latin America	Asia	Africa
Personal Income Taxes	4.3%	13.1%	14.1%	3.7%	4.6%	3.1%	3.0%
Corporate Taxes	5.2%	3.7%	4.6%	5.0%	5.0%	5.8%	4.1%
Property & Wealth Taxes	0.6%	2.9%	1.9%	0.8%	0.6%	0.4%	0.0%
Indirect Taxes	-11.5%	-12.7%	-16.9%	-23.8%	-18.2%	-11.5%	-4.4%
Social Contributions	-1.5%	-3.7%	-7.6%	-7.4%	-1.3%	-1.0%	0.2%
All Taxes	1.0%	11.2%	9.4%	-11.7%	-4.8%	0.0%	3.7%
Social Assistance	6.8%	16.2%	12.0%	7.7%	14.0%	5.4%	3.8%
Education	12.9%	17.7%	14.3%	14.1%	21.8%	11.3%	11.8%
Healthcare	9.8%	26.2%	15.7%	10.6%	20.0%	7.7%	5.3%
All Transfers	22.9%	42.1%	32.2%	25.1%	38.8%	19.8%	16.8%

Notes. The table reports the percent reduction in the top 10% to bottom 50% income ratio obtained after deducting specific taxes from or adding specific government transfers to pretax income by world region. For instance, the top row reports the percent reduction in inequality resulting from deducting personal income taxes from individual pretax incomes. In the average country, deducting personal income taxes reduces inequality by 4%, while adding social assistance transfers reduces inequality by 7%. Figures correspond to population-weighted averages of country-level indicators in each world region and across all countries (world average).

Table A2 – The Relative Contributions of Taxes and Transfers to Inequality Reduction (With Specification Bounds)

	Tax Share of Redistribution		
	Lower Bound	Benchmark	Upper Bound
Africa	-5.3%	7.8%	15.1%
Asia	-25.7%	-0.8%	10.8%
Latin America	-28.1%	-3.5%	8.0%
Eastern Europe	-50.0%	-17.6%	0.2%
Western Europe	-11.9%	3.5%	14.1%
Anglosphere	-4.1%	8.3%	17.4%
World Average	-20.3%	0.7%	11.5%

Notes. This table reproduces results on the tax share of redistribution by world region as in Table I but also includes results for lower and upper bounds on tax progressivity. Lower- and upper-bound specifications correspond to polar scenarios in which corporate and indirect taxes are assumed to be very strongly regressive or progressive in every country. In the average country, taxes account for between about -20% and 15% of redistribution depending on the specification.

B. Additional Methodological Details

B.1. Government Expenditure Aggregates

This section presents the methodology used to construct our new database on the level and composition of general government expenditure from 1980 to 2023.

Data Sources. We collect data from about twenty publicly available sources.

Data on general government expenditure and its composition by function of government come from eight sources:

1. IMF historical government revenue and expenditure series, based on initial data compilation by Mauro et al. (2015) and updates.[19] The data cover total government revenue, total government expenditure, interest paid on public debt, and government primary balance for over 150 countries from 1800 to 2023.

2. IMF series of government expenditure by function.[20] The data cover total expenditure and its breakdown by function (COFOG) for different levels of government, including general government, central government, state government, and local government series.

3. IMF series of government expenditure by function from historical government finance statistics. This data source is comparable to the previous one but covers earlier years.[21]

4. Eurostat series of government expenditure by function, covering the European Union.[22]

5. OECD series of government expenditure by function, covering OECD countries.[23]

6. CEPAL series of government expenditure by function, covering Latin American countries.[24]

7. The SPEED database (Statistics on public expenditures for economic development) maintained by the International Food Policy Research Institute (IFPRI), compiling series of government

[19] https://www.imf.org/external/datamapper/datasets/FPP
[20] https://data.imf.org/?sk=388dfa60-1d26-4ade-b505-a05a558d9a42&sid=1479329334655
[21] https://www.icpsr.umich.edu/web/ICPSR/studies/8624/publications
[22] https://ec.europa.eu/eurostat/data/database
[23] https://stats.oecd.org/Index.aspx?DataSetCode=SNA_TABLE11
[24] https://statistics.cepal.org

expenditure by function from various sources.[25]

8. United Nations series of government final consumption expenditure by function.[26]

Additional data on education and health expenditure come from:

1. The UNESCO UIS statistics, covering series of public education expenditure by level (primary, secondary, tertiary).[27]
2. The UNESCO World Education Report 1991, which provides additional data points for 1980 and 1988 in many countries.
3. Bharti and Yang (2023), covering China and India since 1980.
4. Bharti et al. (2026) covering additional series from country-specific data sources.
5. The World Health Organization, covering health expenditure in almost all countries in the world since 2000 (available from the World Bank's World Development Indicators).
6. Murray, Govindaraj, and Musgrove (1994), covering health spending in almost all countries in the world in 1990.

Additional data on social protection expenditure come from:

1. The Asian Development Bank, covering total social protection expenditure in a number of Asian countries.[28]
2. The CEPAL SOCX database, covering social protection expenditure and its decomposition by type of program in Latin American countries.[29]
3. The OECD SOCX database, covering social protection expenditure and its decomposition by type of program in OECD countries.[30]
4. The World Bank SPEED database, covering social protection expenditure and its decomposition by type of program in selected Eastern European and Central Asian countries.[31]

[25] https://www.ifpri.org/publication/statistics-public-expenditures-economic-development-speed
[26] http://data.un.org/Data.aspx
[27] http://data.uis.unesco.org/
[28] https://spi.adb.org/spidmz/
[29] https://statistics.cepal.org
[30] https://stats.oecd.org/Index.aspx?datasetcode=SOCX_AGG
[31] https://www.worldbank.org/en/programs/speed

5. The World Bank ASPIRE database, covering social protection expenditure and its decomposition by type of program in a number of developing countries.[32]

Total Expenditure. We start by constructing harmonized series of total general government expenditure for all countries.

First, we attribute a "benchmark series" to each country, corresponding to the primary data source used to observe the level of total expenditure. We assign one benchmark source to each country, with the following order of priority: OECD, CEPAL, IMF historical series, other IMF series (general government when available, or the sum of central and local governments, or central government), SPEED, and the World Bank.

Second, we use other sources to extend benchmark series backwards and forwards. For instance, if the OECD covers the 2000-2023 period in a given country while the IMF covers 1980-2023, we extrapolate OECD series backwards using absolute changes in expenditure as a percentage of GDP available from the IMF over the 1980-2000 period. This linking procedure ensures that harmonized series do not have sudden ups and downs due to inconsistencies across sources, while making the best use of available information on annual changes in expenditure from each source. We follow the same order of priority as above.

The coverage of the resulting general government expenditure series is excellent. In the 2020s, all 176 countries are covered by at least one source. In the 1980s, data are extrapolated from more recent years for only two countries.

Education. To estimate harmonized public education expenditure series, we follow the same principles as those used for total expenditure.

First, we attribute a benchmark series by order of priority: general government education expenditure from Eurostat, the OECD, CEPAL, the IMF, and the UNESCO, followed by central government expenditure from the same sources if no general government expenditure series is available. Data for China and India are taken from Bharti and Yang (2023).

Second, we carry these benchmark series backward and forward using other available sources,

[32] https://www.worldbank.org/en/data/datatopics/aspire/indicator-glance

with the same order of priority. To cover the full 1980-2023 period, we make the conservative assumption that education expenditure has remained constant as a share of GDP when no other information is available.

Third, we estimate the breakdown of education expenditure by level (primary, secondary, tertiary). We combine all available data points from the UNESCO, CEPAL, and the IMF, by order of priority. Data for China and India are taken from Bharti and Yang (2023).

The coverage of the resulting education expenditure series is as follows: raw data sources cover 97% of the world's population in the 1980s and 92% in the 2020s. Other data points are extrapolated by carrying forward or backward values from adjacent years. All countries have at least one year of data.

Healthcare. We follow similar steps to estimate harmonized series of public health expenditure. The benchmark series are general government health expenditure from Eurostat, the OECD, CEPAL, the IMF, the WHO, and SPEED, by order of priority. In addition to WHO series available online, which cover the 2000-2023 period, we add historical series from Murray, Govindaraj, and Musgrove (1994), which report estimates of public health expenditure in 153 countries in 1990. We carry these series backward and forward using sources other than the benchmark, as for education. To cover the full 1980-2023 period, we assume that health expenditure has remained constant as a share of GDP when no other information is available.

The coverage of the resulting health expenditure series is as follows: raw data sources cover 87% of the world's population in the 1980s and 98% in the 2020s. Other data points are extrapolated by carrying forward previous or following years.

Social Assistance. We follow similar steps to estimate social assistance expenditure.

First, we construct series on total social protection expenditure, including social insurance and social assistance programs. The benchmark series are general government social protection expenditure from Eurostat, the OECD, CEPAL, and the IMF, followed by central government expenditure from the same sources if no general government expenditure series is available. For countries with no data from any of these sources, we use estimates from the World Bank's

ASPIRE database, the United Nations' government final consumption expenditure series, the SPEED database, or the Asian Development Bank, depending on which of these sources is available and most consistent. We carry these series backward and forward using sources other than the benchmark, as for education and health. To cover the full 1980-2023 period, we assume that social protection expenditure has remained constant as a share of GDP when no other information is available.

Second, we split social protection expenditure into social insurance and social assistance. For consistency, we only use one source by country: the OECD SOCX database, the CEPAL SOCX database, and the World Bank ASPIRE database, by order of priority. For the 41 countries with data from none of these sources, we use regional averages across countries with available data. To cover the full 1980-2023 period, we assume that this share has remained constant when no data are available.

The coverage of the resulting social protection expenditure series is as follows: raw data sources cover 89% of the world's population in the 1980s and 75% in the 2020s. Other data points are extrapolated by carrying forward previous or following years, except for ten countries for which we use regional averages (1% of the world's population).

B.2. Distribution of Transfers

B.2.1. Social Assistance

To distribute social assistance expenditure, we combine data from four sources.

Data on the United States from 1980 to 2023 come from Piketty, Saez, and Zucman (2018) and updates.

Data on 43 additional countries come from the EU-SILC and the Luxembourg Income Study, both of which contain microdata information on social assistance transfers received at the household level for about 760 surveys.

Data from the World Bank's ASPIRE database cover 96 additional countries. The data cover benefits incidence curves for total social assistance transfers received by income or consumption quintile. Almost all data points come from surveys fielded in the 2010s.

Data from the CEQ database allow us to cover three additional countries. The database reports information on the share of social assistance transfers received by decile.

B.2.2. Education

To estimate the distributional incidence of public education, we construct a new survey microdatabase on inequality in access to schooling worldwide. The database covers nationally representative information on the following variables: household and individual identifiers, age, gender, school attendance, and household consumption or disposable income. The surveys are assembled from four sets of sources.

The first data source is the World Bank's I2D2 database. Since the 1990s, the World Bank has made considerable efforts to assemble and harmonize nearly all living standards surveys ever fielded in the world (such as the CPS in the U.S., PNAD in Brazil, or SUSENAS in Indonesia). The resulting database, which we were able to access at the World Bank, contains approximately 1,000 surveys fielded in 156 countries over the 1980-2017 period.

The second data source is the World Bank's Global Monitoring Database. It is the direct successor of I2D2, which was discontinued at the end of the 2010s. It compiles over 4,200 microfiles, bringing together surveys fielded in 170 countries over the 1980-2023 period. There is some overlap between the I2D2 and GMD, although imperfect (some historical surveys are in I2D2 but not in GMD). When both sources cover a given country-year, we give priority to GMD.

The third data source consists in country-specific surveys, which we use to complement the I2D2 and GMD (and in some cases to improve the coding of variables in surveys already covered by these two sources). We collected raw survey data files from international or country-specific data portals, and harmonized them to cover the variables outlined above. We were able to do so for 51 countries covered over the 1981-2023 period: Brazil, China, the Democratic Republic of the Congo, Egypt, Ethiopia, Ghana, Indonesia, India, Iraq, Jordan, Mexico, Nepal, Nigeria, Pakistan, Palestine, Russia, South Africa, Tanzania, Thailand, the United States, and the 31 countries covered by the European Union Statistics on Income and Living Conditions survey (EU-SILC).

Finally, we use about 700 additional surveys fielded in 36 countries available from the Luxem-

bourg Income Study (LIS). These surveys are particularly useful to cover the historical period in middle- and high-income countries.

B.2.3. Healthcare

To estimate the distributional incidence of healthcare, we rely on surveys reporting information on individuals' use of the healthcare system. We combine data from three sources.

The first source is the CEQ database. This database compiles data from country-specific studies following a comparable methodology to estimate the distributional incidence of taxes and transfers. Most of these studies allocate public healthcare expenditure by relying on surveys providing information on household members' frequency of use of the healthcare system (typically the number of visits to a doctor in the past month: see Lustig, 2018). This indicator is then aggregated by per-capita household disposable income decile. We use this database to cover 20 countries.

The second data source consists of country-specific surveys covering similar information on actual use of the healthcare system. We collect and harmonize surveys from country-specific data portals for the Democratic Republic of the Congo, Ethiopia, Indonesia, Nigeria, Pakistan, Russia, South Africa, and Tanzania. These surveys ask household members whether they had a medical problem in the past month, and whether they saw a healthcare provider when they did. The question is slightly different for Russia, asking about the total number of visits to a doctor in the past year. We complement these surveys with the 2016 Life in Transition Survey (LITS), covering 34 Eastern European and Central Asian countries, which provides information on whether respondents received publicly provided medical care in the past 12 months.

The third data source is the World Health Survey, which was fielded by the WHO around 2003. Similarly to other surveys, the WHS asks whether the household member needed healthcare in the past month, and whether they received healthcare when they needed it. We use this survey to cover 53 additional low- and middle-income countries.

Combining these sources, we calculate the total number of visits made to a healthcare provider by per-capita household income or consumption decile. We then distribute healthcare expenditure proportionally to this measure of intensity of use of the healthcare system.

B.2.4. Taxes Financing Education, Healthcare, and Social Assistance

In our benchmark specification, we add social assistance, education, and healthcare to individual incomes and only deduct the taxes that pay for them. We account for the fact that some countries finance public healthcare through social contributions, while others finance it through general taxation. We assume that education and social assistance are financed through general taxation, but we investigate the sensitivity of our results to financing basic education through property taxes, as is the case in a handful of countries such as the United States.

Healthcare. We identify the tax instruments financing public healthcare using data from the World Health Organization. The WHO System of Health Accounts distinguishes between two types of public healthcare systems: those primarily financed by general taxation ("Government Schemes") and those primarily financed by mandatory contributions ("Social Health Insurance Schemes"). The WHO Global Health Expenditure Database provides public health spending disaggregated into these two types of schemes for 195 countries from 2000 to 2024. We assume that Government Schemes are paid for by individuals in proportion to all taxes excluding social contributions, while Social Health Insurance Schemes are paid for by individuals in proportion to social contributions. Government Schemes are the dominant financing mechanism: they represented 75% of public health expenditure in the average country and more than 50% of expenditure in 136 countries in 2023. Nonetheless, some European countries heavily rely on social contributions to finance their healthcare system, notably France, where Social Health Insurance Schemes represent over 90% of public health spending. Social contributions tend to be slightly more regressive than all other taxes combined. Hence, this adjustment marginally reduces overall estimates of redistribution in these countries.

Education. To the best of our knowledge, the majority of countries in the world finance their public education systems primarily through general taxation. However, there are some exceptions, such as the United States that partly finances basic education through property taxes, or Ghana that finances a small fraction of education through VAT (see Angel-Urdinola and Jeon, 2026 for insightful

examples). Unfortunately, no database exists on the structure of public education financing systems. For simplicity and comparability, we thus assume that all public education spending is financed by general taxation in each country. However, we investigate the sensitivity of our results to alternative assumptions below.

Social Assistance. Social assistance transfers are almost never financed by a specific tax: to the best of our knowledge, they are financed by the central government and enter the general budget in almost all countries in the world. As for education, we thus assume that social assistance is paid for by individuals in proportion to all taxes excluding social contributions.

Implications. Figure B13 shows the implications of financing mechanisms for the measurement of redistribution by comparing estimates of the net transfer received by the bottom 50% before and after accounting for potential heterogeneity in financing mechanisms.

Panel (a) compares the net education transfer estimated depending on whether one assumes that the public education system is financed by general taxation (all taxes excluding social contributions, x-axis) versus a mix of property taxes and general taxation (all property taxes, plus general taxation when property taxes are not large enough to cover public education expenditure, y-axis). The latter specification amounts to making the polar assumption that property taxes are entirely used to finance public education, while general taxation is only used to finance the remaining spending need. As shown in the figure, assuming that some public education spending is financed by property taxes makes very little difference to our estimates of the net education transfer received by the bottom 50% and its variation across countries.

Panel (b) turns to healthcare by comparing the net health transfer estimated depending on whether one assumes that the public healthcare system is entirely financed by general taxation (all taxes excluding social contributions, x-axis) versus a mix of general taxation and social contributions as reported in the World Health Organization health accounts. As for education, accounting for the fact that some countries finance public healthcare through social contributions makes very little difference. There are a handful of exceptions, however, such as France, where redistribution becomes slightly lower due to the fact that social contributions are typically more regressive than

all other taxes combined.

Overall, all points are very close to the 45-degree line in both panels. Hence, the type of taxes used to finance education and healthcare is second-order for understanding the cross-country and historical variations in redistribution documented in this paper.

B.3. Distribution of Personal Income Taxes

This section provides more details on the methodology used to estimate the distribution of personal income taxes (PIT). Tax units paying PIT are those whose income falls above the PIT exemption threshold. We retrieve these thresholds for more than 90 countries from Jensen (2022) and missing country-years from Bachas et al. (2026). Bachas et al. (2026) impute the exemption threshold in a way that is consistent with the findings of Jensen (2022), who documents that the PIT exemption threshold (expressed as a percentile of the income distribution) strongly falls with per-capita income both across countries and over time.

Starting from the PIT exemption threshold, we simulate personal income tax incidence using statutory rate schedules from the World Tax Indicators (WTI) database (see Peter, Buttrick, and Duncan, 2010). This database provides information on the average and marginal statutory income tax rates at several points of the pretax income distribution: at the average income, then at two, three, and four times that level, and finally the top marginal tax rate. While the WTI covers 189 countries, it does not cover years beyond 2005, so we extend the database with inputs from Strecker (2021) and Vegh and Vuletin (2015) and updates, the latter of which can also be used to corroborate top marginal tax rates from WTI. For the remaining country-years, we retrieve statutory marginal rate schedules from Ernst & Young (2006-23) and PwC (2023) and similar sources online, including national tax authorities' legislative documents. On this basis, we can approximate a continuous schedule of statutory income tax incidence. We assign the statutory tax rate as zero at the exemption threshold K, rising to the top marginal tax rate at *p99.999p100* (the highest generalized percentile recorded in the World Inequality Database), with kink points at the rates observed in WTI. Rates are interpolated linearly between each observed value.

We also distinguish between individualized and joint personal income taxation systems. Some

countries tax married couples together (or allow tax units this option), while others tax individual incomes separately. Joint taxation naturally conforms to the benchmark WID pretax DINA income concept, as these distributions are estimated for "equal-split adults" (where households' total income is split equally among all adult members). However, where PIT systems tax individual incomes, we must transform the WID pretax income distribution from that of "equal-split" adults to that of "individualized" adults. We do this by way of microdata from the International Labour Organization (2020), which compiles labor force surveys fielded in over 100 countries since the 1990s. For countries whose PIT systems are individual but for which no individual income survey microdata exist, we use "nearest-neighbor matching" to simulate the effect, matching the microdata from a selected neighboring country. In this way, we are able to estimate the ratio of individualized income to equal-split income across the distribution and easily move back and forth between equal-split and individualized income distributions.

Finally, we account for the empirical regularity that capital income is taxed at lower rates than labor income in many PIT systems. We also tabulate countries' dividends and capital gains tax rates. While there are nuances within many tax administrations' policies on the taxability of dividends and capital gains, we simplify concepts for tractability: our benchmark concept for the rate of dividend taxation is the rate at which a resident is taxed on dividends from domestic companies. Similarly, our benchmark concept for the rate of capital gains taxation is the rate at which a resident is taxed on gains from selling shares in domestic companies. We also exclude imputed rents, government operating surplus, and indirect taxes from the PIT tax base. Social insurance benefits received are taxed as labor income.

The main takeaway of this microsimulation is that much of capital income is untaxed, or taxed at a lower rate. Taxable income is less than total pretax income (in the DINA sense), and particularly so for top percentiles where capital income is concentrated.

The elements of the PIT system, in this simplified simulation, can be summarized as follows. We estimate the tax rate τ for any g-percentile p and its corresponding income level z:

$$\tau(z)_{PIT} = \sum_{j=1}^{3} \frac{\tau_j z_j}{z}$$

where j refers to three types of PIT taxes (with taxable incomes z_j taxed at rate τ_j): on labor income (employee compensation and mixed income), on dividends, and on capital gains.

After building this statutory rate schedule, we fit its "predicted" revenues to actual PIT revenues observed in Bachas et al. (2026). In this way, we ensure that simulated statutory rates match macroeconomic effective tax rates throughout the distribution.

B.4. Normalized Tax Progressivity

In our main analysis, we summarize the progressivity of taxes as the percent reduction in inequality, measured as the top 10% to bottom 50% average income ratio, before and after deducting taxes from individual incomes:

$$\gamma_\tau = \frac{r_{pre} - r_{net}}{r_{pre}}$$

After some algebra, this "absolute" progressivity statistic γ_τ reduces to:

$$\gamma_\tau = \frac{\overline{ETR}_{p90p100} - \overline{ETR}_{p0p50}}{1 - \overline{ETR}_{p0p50}} \tag{9}$$

Since γ_τ is a function only of the effective tax rate (ETR) profile, it is independent of the pretax inequality ratio r_{pre}. However, it is sensitive to variations in the pretax income distribution *within* the top 10% or bottom 50% shares. To see why, imagine a monotonically increasing ETR profile within the bottom 50% of earners, e.g., from $ETR = 0\%$ at *p0* to $ETR = 10\%$ at *p50*, and a steeply increasing income profile within the same bottom 50% of earners, such that most of the income of the bottom 50% is near *p50*. In this case, the average ETR of the bottom 50% of earners would be close to 10% (the ETR at *p50*). By contrast, if the income distribution were closer to flat within the bottom 50%, the same ETR profile would deliver an average ETR closer to 5%.

To test sensitivity, we normalize pretax income distributions across all countries and years. Following the literature from Kakwani (1977) through Gerber et al. (2020), we assign the arbitrary income distribution $y_p = p^2$, a distribution whose inequality ratio r_{pre} happens to be close to the median value observed in our data. From this normalized pretax distribution, we calculate the

net-of-tax distribution by subtracting taxes according to each country-year's observed ETR profile. Appendix Figures A11 and A12 present the results of this exercise. The results are almost identical to those of Figures IX and X.

B.5. World Bank Income Distribution Data

Our main estimates rely on the World Inequality Database, which reports average pretax incomes by generalized percentile from 1980 to 2023.

We investigate the sensitivity of our results to using World Bank income distribution data instead of the World Inequality Database. The data are available from the World Bank's Poverty and Inequality Platform (PIP) in the form of distributions for selected countries and years. The income concept is either consumption or posttax disposable income per capita, depending on the country. All values are reported in 2017 PPP USD per day.

Unfortunately, although the World Bank regularly reports indicators of global poverty, it does not publish underlying estimates of the world distribution of income. We thus attempt to reconstruct measures of pretax and posttax income ourselves. Starting from available data, we first extrapolate the average income of each country-percentile to missing years using real GDP per capita growth rates. For the 17 countries entirely missing, we use estimates from the World Inequality Database. The resulting database yields trends in global poverty almost identical to those officially reported by the World Bank. We then reconstruct measures of pretax income and posttax income. In the absence of any information on savings, we define pretax income in each country as consumption or disposable income, minus social assistance transfers, plus direct taxes.

Both the levels and trends in global poverty and average incomes at the bottom of the world distribution of income in the WID data differ from those of the World Bank for at least four reasons. First, World Bank estimates mainly focus on consumption, while we focus on income. The difference between consumption and income can be large, with major implications for levels and trends in inequality in some cases (e.g., Chancel et al., 2023). Second, WID estimates are consistent with national income growth rates, while World Bank estimates are based on surveys and do not attempt to bridge the gap between survey and national accounts aggregates. Third, some of the estimates

used in this paper are based on detailed country-specific studies that rely on data sources that may differ from those of the World Bank in a number of countries, including China (Piketty, Yang, and Zucman, 2019), India (Chancel and Piketty, 2019), and Latin America (De Rosa, Flores, and Morgan, 2022). Fourth, we use GDP purchasing power parity conversion factors, while the World Bank only corrects for price differences in household final consumption expenditure. For all these reasons, we view the World Inequality Database as a more adequate source for conducting the particular analysis developed in this paper. A more systematic comparison of these two datasets is left to future research.

B.6. Net Present Value of Public Education and Healthcare

This section provides more details on the data sources and methodology used to estimate the net present value of education and healthcare.

B.6.1. Net Present Value of Education

Framework. There are four levels of education s in the economy: no schooling (0), primary (1), secondary (2), and tertiary education (3). Individuals in country c can go to school for an additional year, delivering a return γ_{cs} to schooling level s when they start working.[33] They discount these future monetary benefits of education at a rate δ, and they receive them every year for 45 years of working life (say, from age 20 to 65).

The net present value of a year of primary education is:

$$NPV_{ctp1} = \sum_{i=t}^{t+45} \frac{(1+\gamma_{c1})y_{cip0} - y_{cip0}}{(1+\delta)^i} = \sum_{i=t}^{t+45} \frac{\gamma_{c1} y_{cip0}}{(1+\delta)^i}$$

In other words, an individual in primary school will receive the average income they would get if they had no schooling (y_{cip0}), multiplied by the return to a year of primary education (γ_{c1}), summed and discounted over the next 45 years ($i \in [t, t+45]$). We make the conservative assumption that

[33]For simplicity, the return to schooling is assumed to be constant over time and by income group. Empirical evidence suggests no systematic long-run trend in returns to schooling around the world: see Montenegro and Patrinos (2021). Evidence on heterogeneity in returns to schooling by income group is scarce but suggests that if anything, returns are larger for low-income earners (e.g., Clay, Lingwall, and Stephens, 2021).

being in school does not generate additional opportunities for reaching the next level (doing so would increase the net present value of education; see Soares, 2019).

Similarly, the net present values of secondary and tertiary education are:

$$NPV_{ctp2} = \sum_{i=t}^{t+45} \frac{\gamma_{c2} y_{cip1}}{(1+\delta)^i}$$

$$NPV_{ctp3} = \sum_{i=t}^{t+45} \frac{\gamma_{c3} y_{cip2}}{(1+\delta)^i}$$

Combining these formulas, the total transfer received by income group p is:

$$g^{\text{educ}}_{ctp} = n_{ctp1} NPV_{ctp1} + n_{ctp2} NPV_{ctp2} + n_{ctp3} NPV_{ctp3}$$

$$g^{\text{educ}}_{ctp} = \sum_{s=1}^{3} n_{ctps} \left(\sum_{i=t}^{t+45} \frac{\gamma_{cs} y_{cip,s-1}}{(1+\delta)^i} \right)$$

with n_{ctps} the number of children in country c at time t belonging to income group p that are enrolled in level s. Finally, let us assume that the economy grows at a constant rate g, so that $y_{cip,s-1} = (1+g) y_{c,i-1,p,s-1}$. The formula becomes:

$$g^{\text{educ}}_{ctp} = \sum_{s=1}^{3} n_{ctps} \left(\sum_{i=t}^{t+45} \frac{(1+g)^i \gamma_{cs} y_{ctp,s-1}}{(1+\delta)^i} \right)$$

Estimation. We estimate this formula by combining data from several sources.

1. n_{ctps} is estimated as $n_{ctps} = n_{cts} \nu_{ctsp} \zeta^{\text{publ}}_{cts}$, with:
   (a) n_{cts} the number of pupils in country c at time t who are at level s. Data are available from the World Bank's World Development Indicators.
   (b) ν_{ctsp} the distribution of these pupils by income group. Data come from the microdatabase constructed in this paper.
   (c) $\zeta^{\text{publ}}_{cts}$ the fraction of pupils enrolled in public schools. Data are from the WDI.
2. γ_{cs} is taken from Gethin (2025). This paper constructs a new microdatabase on education

and individual incomes to produce comparable estimates of the returns to schooling by level in 154 countries (97% of the world's population).

3. y_{ctps} is the income that a given individual can expect to receive depending on their country c, the time period t, the income group of their household p, and schooling level s. We calculate it by combining data from the following sources:

   (a) Data on average pretax income by percentile for the 1980-2023 period come from the World Inequality Database.

   (b) Data on expected income ranks by current percentile are estimated by using intergenerational mobility curves from van der Weide et al. (2024). For instance, an average child in Brazil living in a family belonging to percentile 10 is expected to reach percentile 28 as an adult. This allows us to calculate, for each child, the income they can expect to receive as an adult depending on the income of their family of origin.

   (c) Finally, we let this income vary by education level using estimates of relative incomes by education level from Gethin (2025). For instance, an individual with no schooling receives 37% of the average income in Brazil. We thus assume that a child at percentile 10 can expect to receive 37% of the average income of percentile 28 as an adult. This gives us a complete mapping between the income group of a child attending school at level s and their expected income as an adult y_{ctps}.

4. δ is set at a standard value of 0.05.

Future Income Growth. Estimating the net present value of education at a given point in time requires having a complete mapping of both current and future incomes. For instance, a child ending school in 2023 is expected to receive a net benefit of $\gamma_{cs} y_{c,2023,p,s-1}$ in 2023, $\gamma_{cs} y_{c,2024,p,s-1}$ in 2024, etc. This highlights an important fact: the net present value of education is inherently dependent on future economic growth.

We use projections on the evolution of real GDP per capita in the coming decades. The OECD publishes GDP projections for 47 countries over the 2020-2060 period, covering about 60% of

the world's population. For the remaining countries, we extrapolate GDP per capita to 2060 by assuming that real annual income growth will be similar to that observed over 2000-2023 (bounding annual growth rates between 1% and 5% to avoid extreme outliers). Notice that estimates of the net present value of education in 1980 do not rely much on predictions, since the trajectory of incomes is already observed over 1980-2023. It is for more recent years that estimates of real GDP per capita going up to 2050-2060 are needed. We assume that inequality within countries will remain the same, meaning that the average income of each percentile grows at the same rate. With a complete dataset covering the distribution of income for each country-year over 1980-2060, we can then estimate the net present value of education for the full 1980-2023 period.

B.6.2. Net Present Value of Healthcare

Framework. In the same spirit, we estimate the net present value of public healthcare as the monetary value of additional years of life expectancy enabled by the healthcare system. Let V_{ctp} be the value of a year of life for percentile p in country c at time t. Individuals can expect to live T_{ct} years longer, L_{ct} years of which can be attributable to access to public healthcare. An average individual thus receives every year until their death an average annual life expectancy gain equal to $\frac{L_{ct}}{T_{ct}}$. The net present value of the public healthcare system is then:

$$g^{\text{heal}}_{ctp} = \zeta^{publ} \sum_{i=0}^{T_{ct}} \frac{\frac{V_{cip} L_{ct}}{T_{ct}}}{(1+\delta)^i} \tag{10}$$

ζ^{publ} is the fraction of life expectancy gains explained by public healthcare, proxied as the share of public spending in total healthcare expenditure. T_{ct} is calculated for simplicity as the difference between life expectancy and life expectancy divided by two (e.g., Hammitt and Robinson, 2011). The discount rate δ is set to 5%, as for education.

Finding an accurate measure of the quality of healthcare to estimate L_{ct}, the additional years of life that individuals benefit from thanks to the healthcare system, is the most challenging part of this exercise. Indeed, unlike returns to schooling, which have a clear cardinal (monetary) interpretation, there is no obvious measure of healthcare performance whose units are directly

comparable to cost of provision. Quality-adjusted life expectancy is often taken as a measure of interest (e.g., Cutler et al., 2022), yet this indicator is, on its own, arguably a poor measure of the performance of the healthcare system. Given these limitations, we turn instead to the healthcare access and quality (HAQ) index estimated in the Global Burden of Disease study (GBD, 2022). This indicator ranks healthcare systems from 0 to 100, based on death rates from 32 causes of death that could be avoided by timely and effective medical care. The main advantage of the HAQ index is that it was specifically created by health experts to measure the ability of healthcare systems to cure preventable diseases: it is explicitly a measure of performance. It also has the advantage of covering nearly all countries in the world since 1990. The disadvantage is that it is normalized from 0 to 100, so it has no cardinal interpretation.

To get a cardinal indicator, we re-express the HAQ index in units of life expectancy by first regressing it on life expectancy at birth, and then normalizing it using the coefficient obtained. We run a linear regression of life expectancy on the HAQ index, controlling for log of GDP per capita, years of schooling of the working-age population, and country fixed effects. We then multiply the HAQ index by the coefficient obtained, so as to re-express it in "units of life expectancy." The resulting index ranges from less than 1 (Eritrea) to 34 (Finland), meaning that an average Finn would live 34 years less if there were no healthcare system (including both private and public healthcare) at all.

Although existing estimates are scarce, it is useful to compare this indicator to findings from the literature. Cutler et al. (2022), in particular, use rich data on health outcomes in the United States to derive new measures of healthcare productivity growth over the 1999-2012 period. They find that medical treatment accounts for a total increase in quality-adjusted life expectancy of 1.7 years during this period. Our own estimates using the transformed HAQ index indicate that life expectancy was higher by 36.6 years in the U.S. in 1999 thanks to the healthcare system, compared to 37.9 years in 2012 (notice that this gain in life expectancy corresponds to the effect of the entire health system, both private and public). This represents a 1.3 year increase in life expectancy thanks to medical treatment, slightly lower than the 1.7 year increase found by Cutler et al. (2022). This suggests that the transformed HAQ index provides a good approximation, and if anything

might underestimate progress made in the quality of healthcare in the past decades.

The remaining key parameter to estimate is V_{ctp}, the value of a statistical life year. Ideally, one would like to estimate V_{ctp} for every country and income group in the sample. Unfortunately, such estimates are not available. We thus consider a lower bound: the discounted future income flows that individuals can expect to receive. As discussed by Hammitt and Robinson (2011), this is a lower bound on the value of a statistical life year, since individuals arguably also value additional leisure from living longer. Additional income from living longer is only realized in $T_{ct} - L_{ct}$, when the individual begins to benefit from greater life expectancy, and is received until they die, in T_{ct}. The net present value of the healthcare system becomes:

$$g_{ctp}^{\text{heal}} = \frac{1}{T_{ct}} \zeta^{publ} \sum_{i=T_{ct}-L_{ct}}^{T_{ct}} \frac{y_{cip}}{(1+\delta)^i} \tag{11}$$

with y_{cip} the average income that income group p in country c can expect to receive at time i.

As documented in the existing literature, the concentration of lifetime income is substantially lower than that of current income because of significant income mobility over the life cycle (e.g., Auerbach, Kotlikoff, and Koehler, 2023). In order to estimate the value of healthcare, it is thus necessary to account for the fact that individuals belonging to a given income group are likely to move along the income distribution in the years to come. In the absence of good data on such income mobility patterns, we assume that lifetime income mobility follows a similar transition process as that of intergenerational mobility. We thus use the same income mobility patterns as those used for the valuation of education in the previous section. For instance, an individual at percentile 10 in Brazil can expect to receive the average income of percentile 28 at the time they benefit from greater life expectancy.

B.7. Age-Adjusted Public Education and Health Expenditure

One concern with the accounting analysis presented in this paper is that growing spending on education and healthcare might just reflect the evolution of needs. For instance, health spending might have increased primarily due to population ageing. In this section, we investigate the

sensitivity of our results to age-adjusting public education and health expenditure in each country.

Health. We construct age-adjusted measures of public health spending by combining data on population by age group from the UN World Population Prospects with health spending data from Bruil et al. (2022), who exploit exhaustive administrative records on health payments in the Netherlands to construct estimates of health consumption by age group (see also Morgan and Mueller, 2023 for similar results on a broader set of OECD countries). We define age-adjusted expenditure in 2023 as:

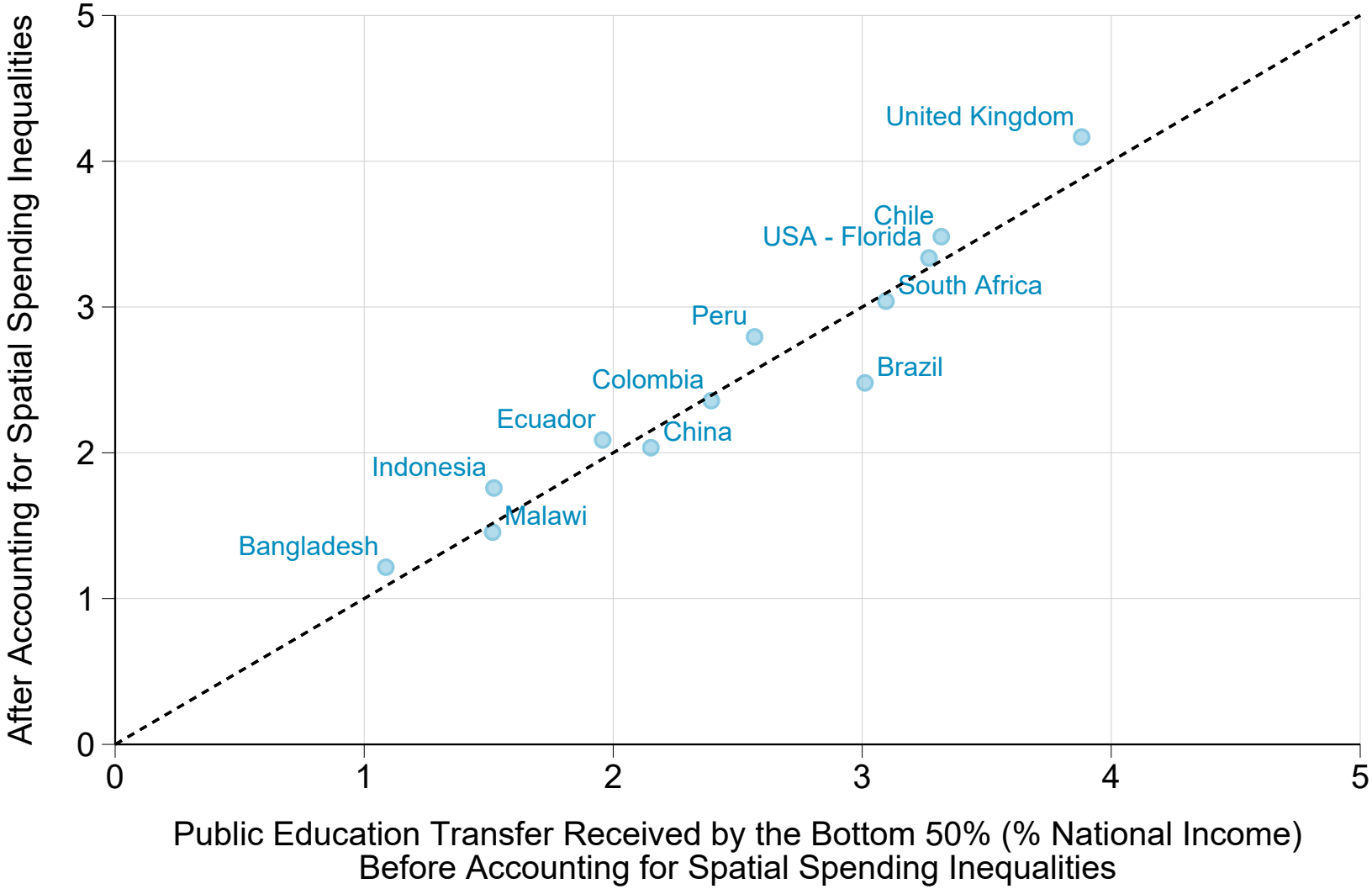
$$G_{adj}^{2023} = \sum_{a} g_a n_a^{1980} G^{2023} \tag{12}$$

where g_a is relative health spending of age group a, n_a^{1980} is the population share of group a in 1980, and G^{2023} is total health expenditure in 2023. In other words, we estimate how much lower or higher health expenditure in 2023 would be if relative health spending by age remained fixed but the distribution of the population by age group were set back to its 1980 value. Data from Bruil et al. (2022) suggest that relative health spending per capita rises from about 1 for adults aged 20-24 to 2 for those aged 60-64 and up to 8 for those aged 80 and over. Hence, 2023 age-adjusted health spending is expected to be significantly lower than unadjusted spending in countries that have undergone significant population ageing since 1980.

Education. In the same spirit, we construct estimates of age-adjusted education expenditure. Given that nearly all education expenditure is devoted to the school-age population, we define age-adjusted public education expenditure as the expenditure that would prevail in 2023 if the fraction of the population aged 5 to 24 had remained the same from 1980 to 2023. This is equivalent to setting $g_a = 1$ for the 5-24 age group and $g_a = 0$ for other age groups. In countries with population ageing, this adjustment will have the opposite effect as for health: reductions in the relative size of the youth population will imply that age-adjusted education expenditure has increased faster than unadjusted spending.

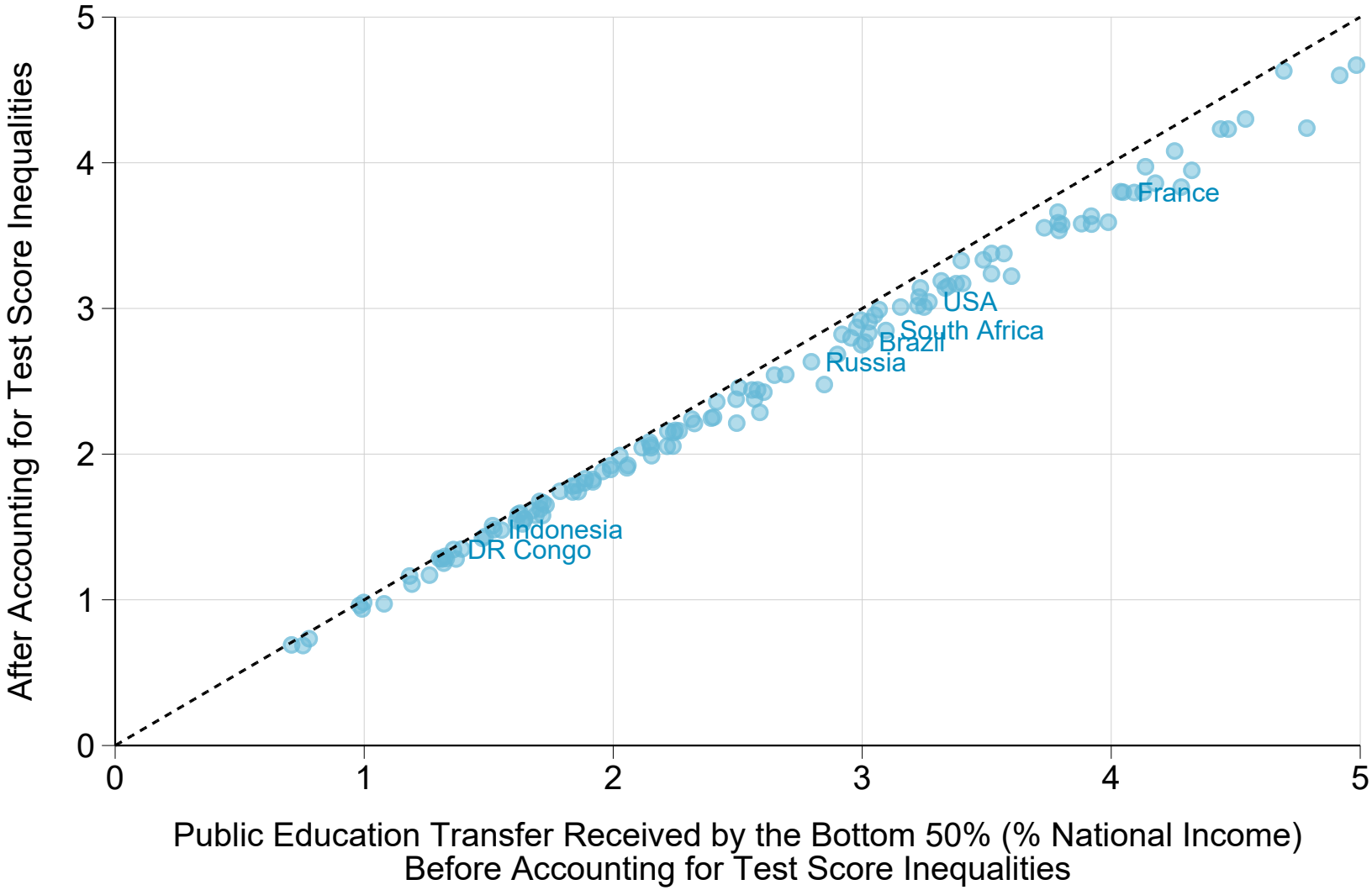
Results. Figure A7 shows the results, comparing the evolution of average unadjusted and age-adjusted spending by country income group from 1980 to 2023. In middle- and high-income countries, age-adjusted health expenditure has increased significantly less than unadjusted expenditure, while age-adjusted education expenditure has increased significantly more. This adjustment is more modest in low- and lower-middle-income countries, which have seen more limited changes in their demographic structure over 1980-2023. Combining education and healthcare, panel (c) of Figure A7 shows that the education effect dominates in middle- and high-income countries: age-adjusted total education and health spending has increased faster than unadjusted spending. Taken together, these results suggest that the demographic transition cannot account for the growth in the value of public services documented in this paper. If anything, adjusting public spending for the evolution of the demographic structure reinforces the magnitude of the rise of redistribution in middle- and high-income countries.

Figure B1 – Accounting for Spatial Spending Inequalities: Education Transfer Received by the Bottom 50% Before Versus After Accounting for Subnational Variations in Education Spending



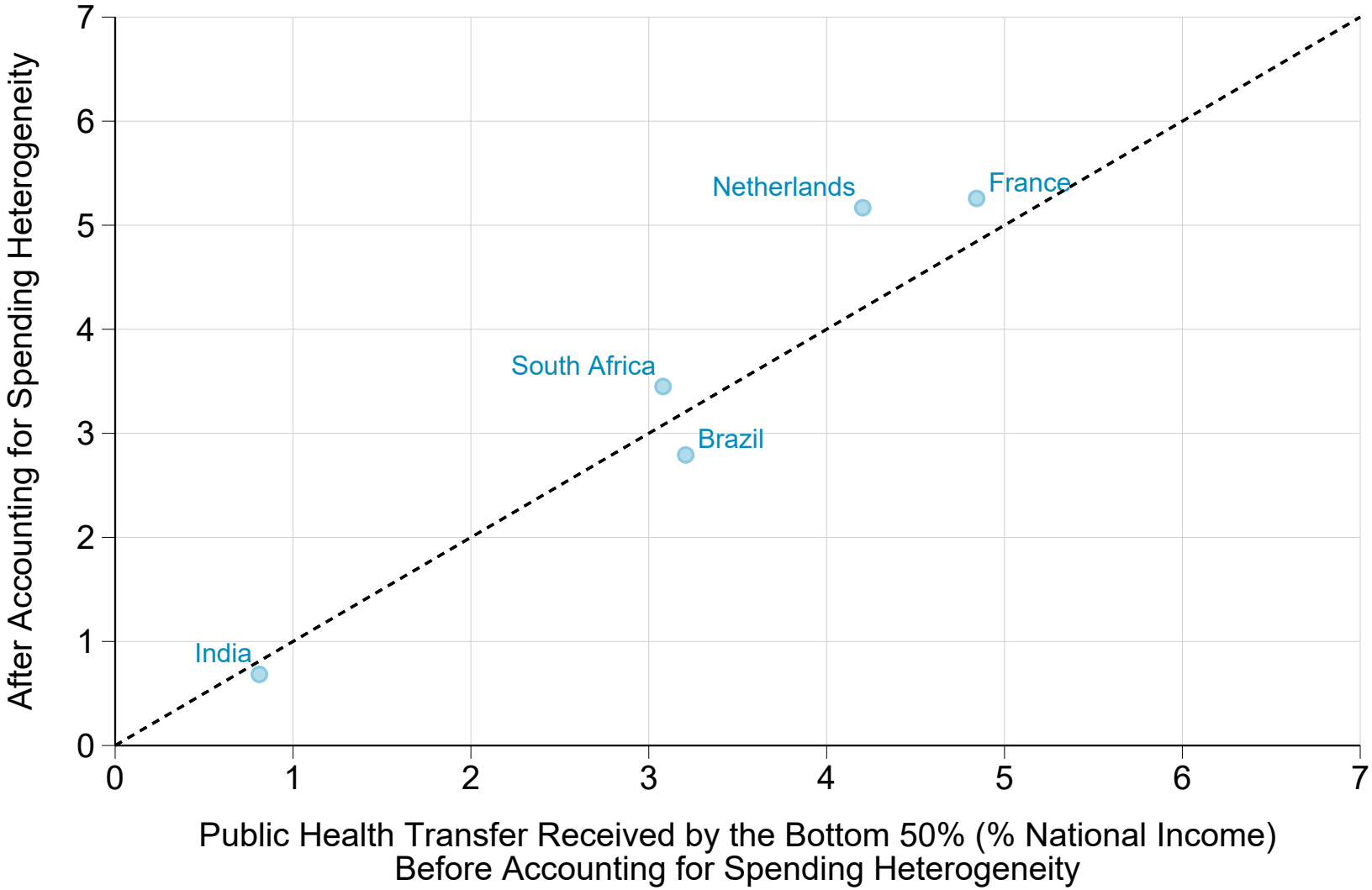
Notes. The figure compares estimates of the share of public education spending received by the bottom 50% before (x-axis) and after (y-axis) accounting for subnational variations in public education spending. Estimates accounting for geographical spending inequalities are derived from existing studies as well as our own computations combining government reports on spending by region with survey microdata. Depending on available data, we account for spending variations across all schools (Florida, South Africa, United Kingdom), districts/municipalities (Bangladesh, Brazil, Chile, Colombia, Ecuador, Peru, Indonesia), or larger regions/provinces/states (other countries). Accounting for spatial inequality in spending makes little difference to overall cross-country variations in education progressivity. Progressivity slightly declines in Brazil, where richer municipalities spend more on public education, while it increases in the United Kingdom, where schools with a larger fraction of low-income students receive slightly larger government funding.

Figure B2 – Accounting for Quality Inequalities: Education Transfer Received by the Bottom 50% Before Versus After Accounting for Test Score Inequalities



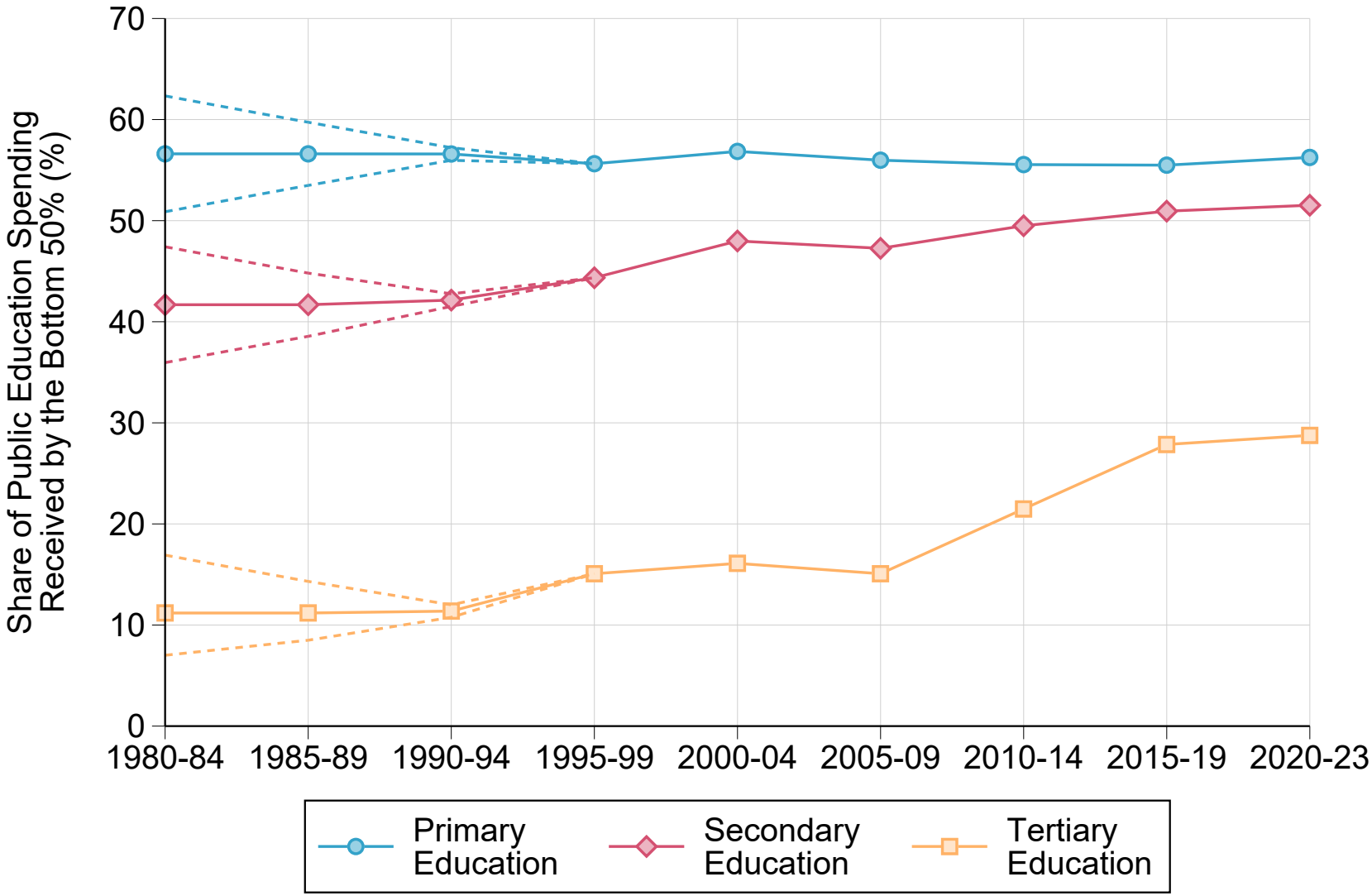
Notes. The figure compares estimates of public education spending received by the bottom 50%, expressed as a share of national income, before (x-axis) and after (y-axis) accounting for test score inequalities. Estimates accounting for test score inequalities are constructed using the World Bank's Global Learning Assessment Database, which compiles test score microdata for most countries in the world and harmonizes them to make them comparable across countries. Estimates accounting for test score inequality are constructed by reducing the transfer received by the bottom 50% in proportion to the gap between the test scores of children from the bottom 50% relative to the average test scores of all children, assuming that the value of a standard deviation of test scores is 15% as usually assumed in the human capital literature (e.g., Angrist et al., 2021). In other words, a child with a test score lower than the average by one standard deviation is assumed to receive an education transfer that is 15% lower. Overall, adjusting education transfers for test score inequality makes little difference for estimating cross-country variations in education progressivity.

Figure B3 – Accounting for Spatial Spending Inequalities: Health Transfer Received by the Bottom 50% Before Versus After Accounting for Spatial Spending Inequalities



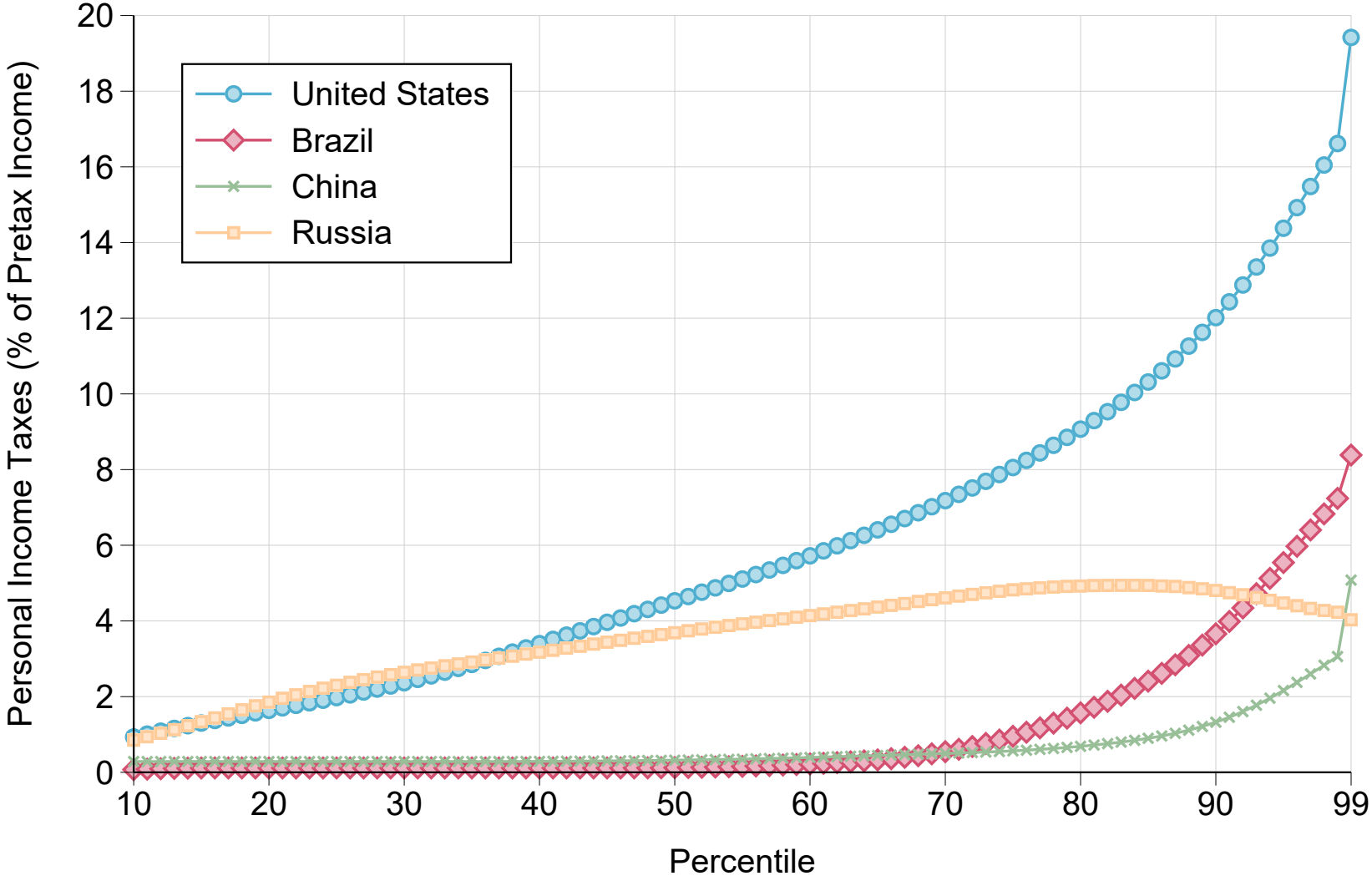
Notes. The figure compares estimates of public health spending received by the bottom 50%, expressed as a share of national income, before (x-axis) and after (y-axis) accounting for spatial health spending inequalities (Brazil, India, South Africa) or for heterogeneous consumption expenditure by income group as reported in administrative health records (France, Netherlands). Estimates accounting for geographical spending inequalities or heterogeneous spending are derived from existing studies (Bozio et al., 2024; Czajka and Gethin, 2025; Germain et al., 2021) or our own computations combining government reports on spending by region with survey microdata. Accounting for spending heterogeneity makes little difference to overall cross-country variations in public healthcare progressivity. Progressivity slightly declines in Brazil, where richer municipalities spend more on public healthcare, while it increases in France and the Netherlands, where simplified measures of healthcare use intensity tend to underestimate the progressivity of health spending in comparison to administrative data.

Figure B4 – Specification Bounds on Transfer Progressivity: Share of Education Spending by Level Received by the Bottom 50% in Indonesia, 1980-2023



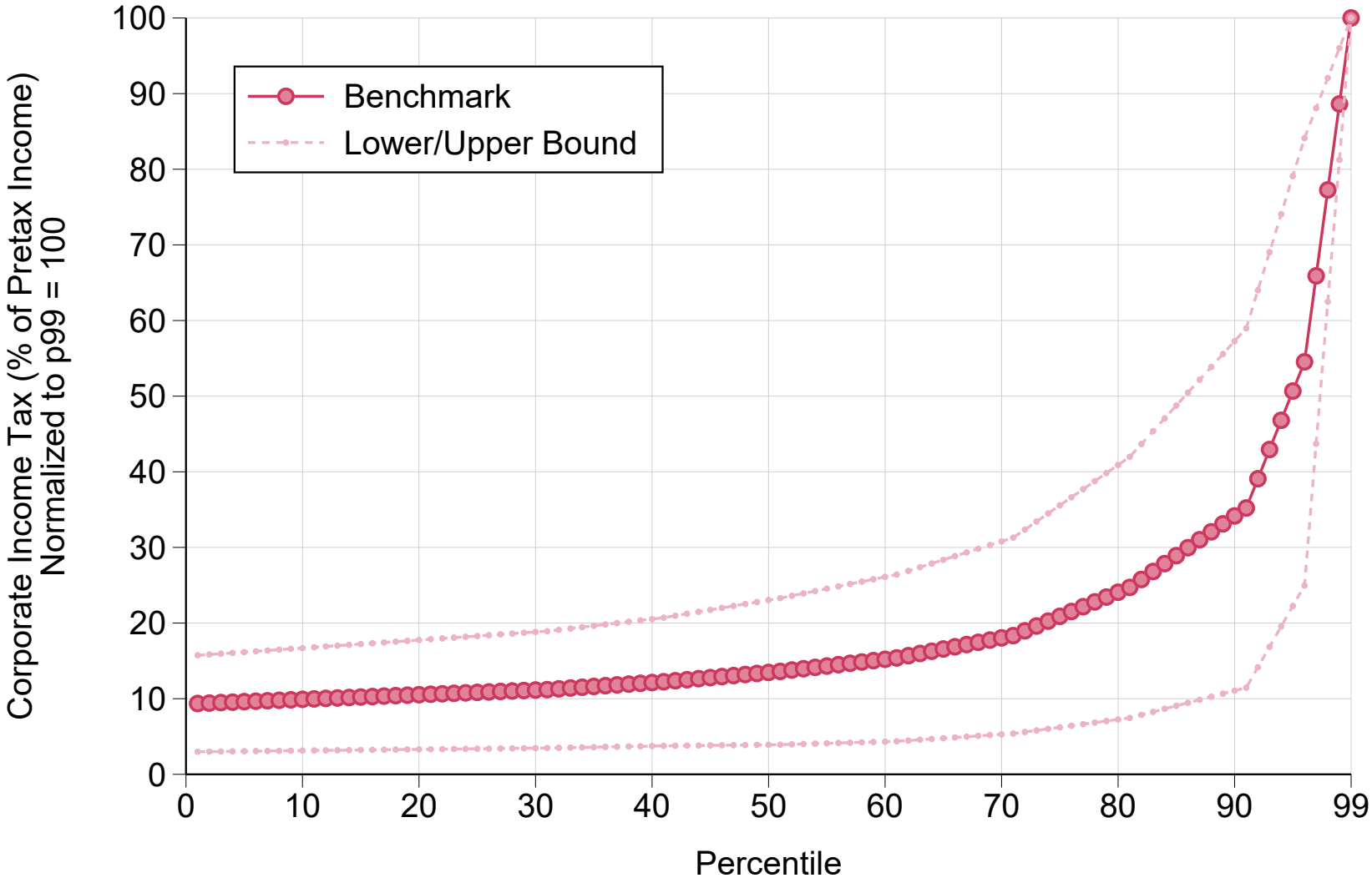
Notes. The figure plots the evolution of the share of primary, secondary, and tertiary education spending received by the bottom 50% in Indonesia, together with specification bounds for the 1980-1993 period over which no survey is available to measure education progressivity. The bottom 50% share of secondary education spending increased from about 40% in 1990-1994 to 50% in 2020-2023. Our benchmark specification assumes that progressivity remained constant over 1980-1989. The specification bounds, depicted as dashed lines, correspond to polar scenarios in which the bottom 50% share of spending is assumed to have increased or decreased by 5 percentage points per decade.

Figure B5 – Tax Incidence Profiles: Personal Income Taxes



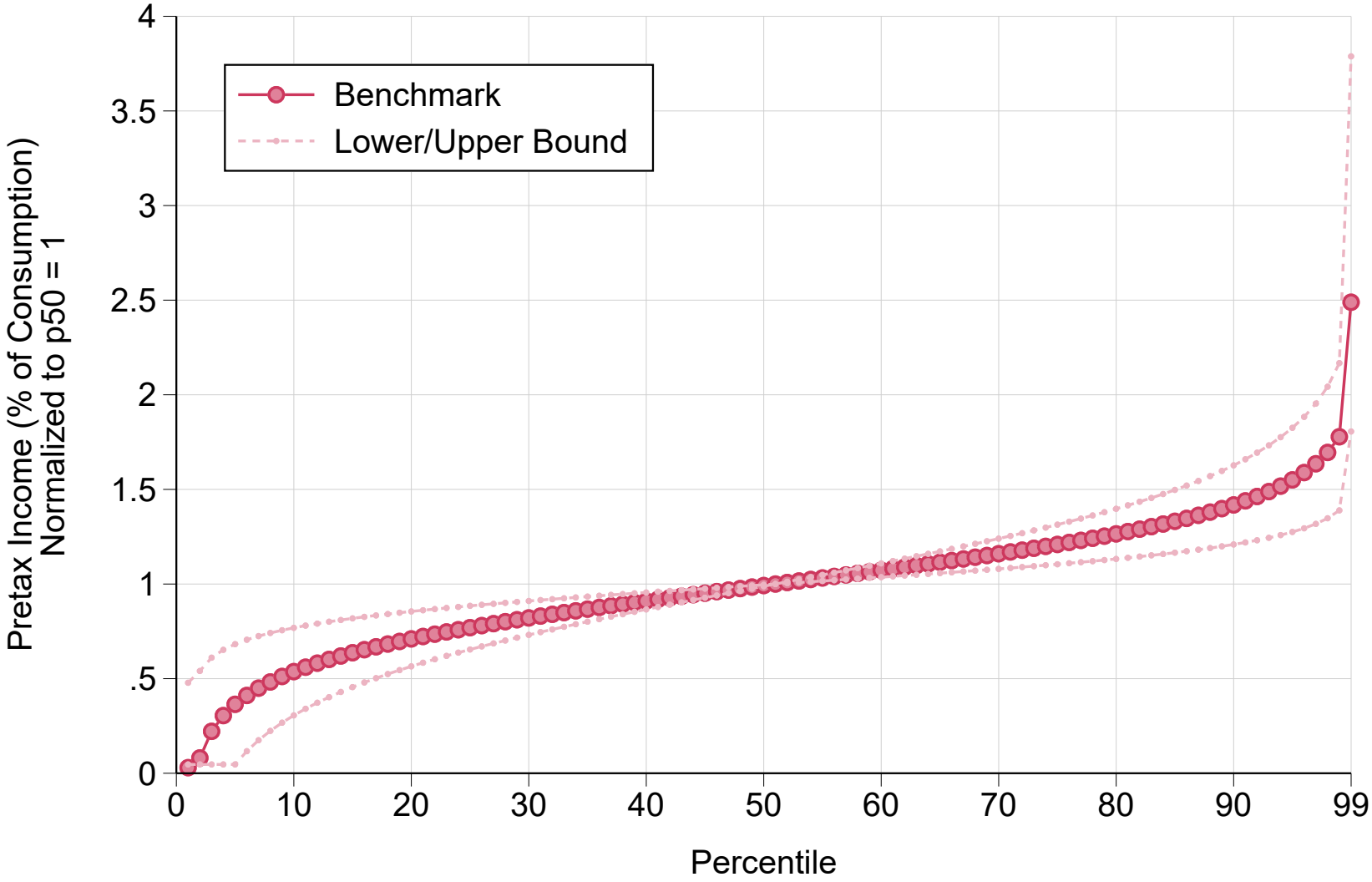
Notes. This figure plots estimates of personal income taxes paid by pretax income group in the United States, Brazil, China, and Russia in 2023. Personal income taxes are larger in Russia than in China, but substantially less progressive in Russia.

Figure B6 – Tax Incidence Profiles: Corporate Income Tax



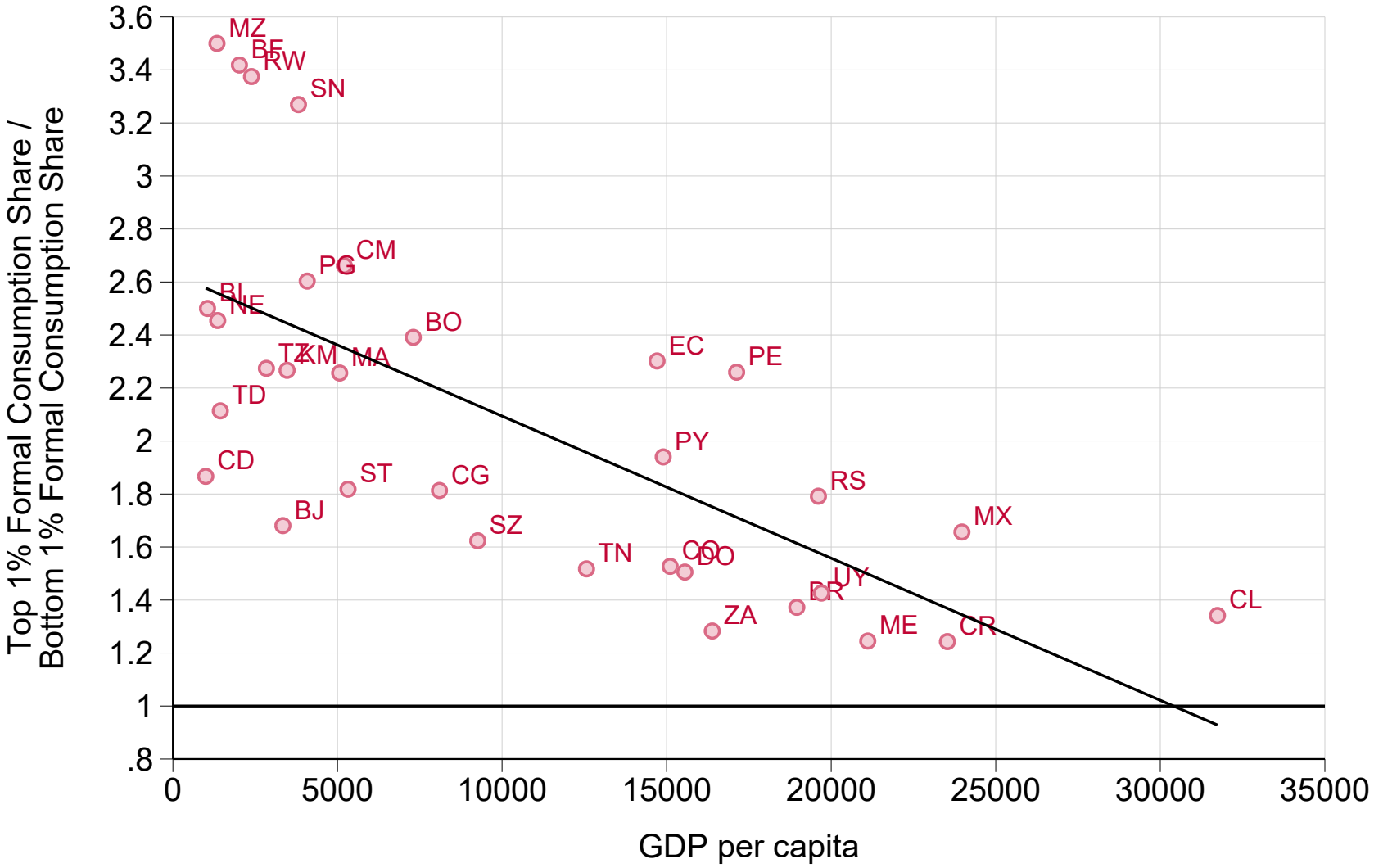
Notes. This figure plots the stylized profile of corporate income tax incidence used to allocate corporate taxes to pretax income groups in our analysis, as well as its corresponding lower and upper specification bounds used for sensitivity analysis. The profile is based on averaging estimates of corporate taxes paid by pretax income group in existing DINA studies covering 42 countries including the Netherlands (Bruil et al., 2022), the United States (Piketty, Saez, and Zucman, 2018), South Africa (Czajka and Gethin, 2025), Brazil (Palomo et al., 2025), Europe (Blanchet, Chancel, and Gethin, 2022), and Latin America (Flores, De Rosa, and Morgan, 2022). The profile is normalized to take a value of 1 for the 99th percentile. Hence, we estimate that the first percentile faces a corporate effective tax rate equal to about 10% of that of the 99th percentile. Lower and upper bounds correspond to average corporate tax incidence by percentile observed in the ten countries with the most regressive and progressive profiles, respectively.

Figure B7 – Tax Incidence Profiles: Indirect Taxes



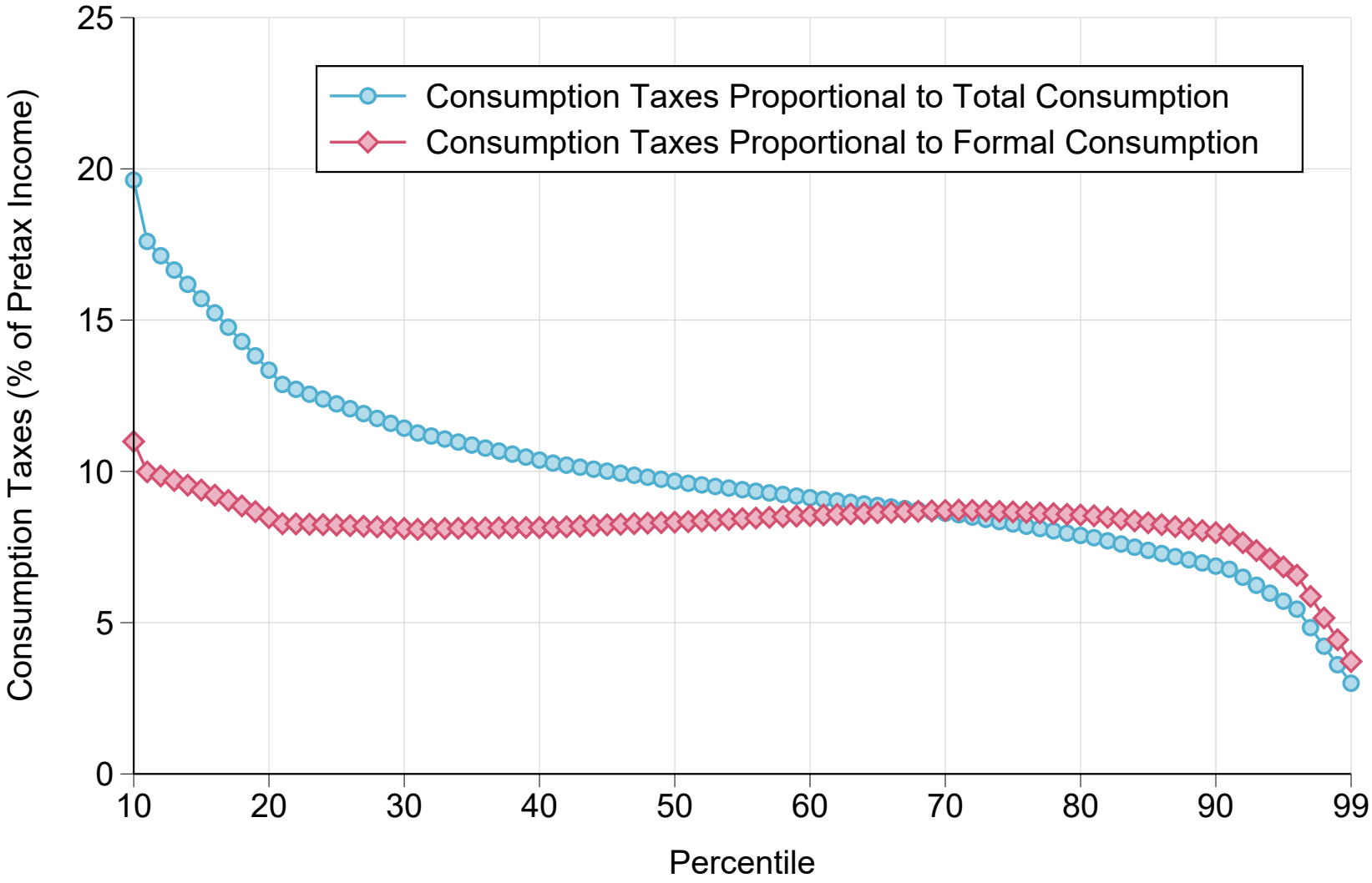
Notes. This figure plots the stylized profile of income-to-consumption ratios used to allocate indirect taxes to pretax income groups in our analysis. It is based on estimates from existing DINA studies, which rely on available surveys to estimate the ratio of income to consumption by income percentile. The profile is normalized to take a value of 1 for the 50th percentile. In our benchmark specification, we estimate that the income-to-consumption ratio is about 2.5 times higher at the 99th percentile than at the 50th percentile. Lower and upper bounds correspond to polar assumptions on income-consumption profiles, based on patterns observed in the ten countries with the steepest and flattest profiles, respectively.

Figure B8 – Tax Incidence Profiles: Informal Consumption Elasticity and Economic Development



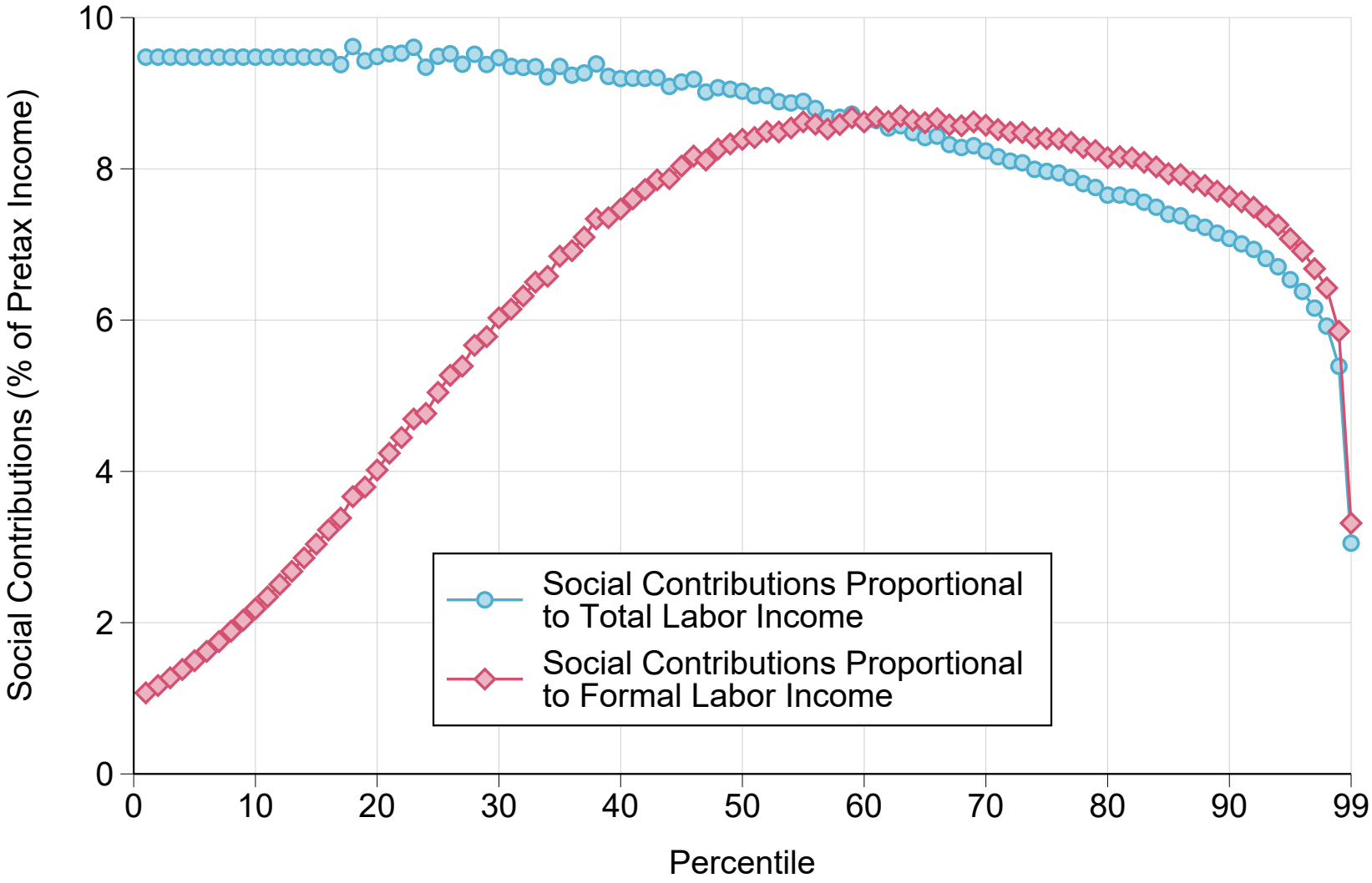
Notes. The figure plots the relationship between GDP per capita, expressed in 2023 PPP USD, and the gap in informal consumption shares between top and bottom income groups as estimated by Bachas, Gadenne, and Jensen (2022). The relationship between the informal share of consumption and total consumption decreases over the course of development: low-income households purchase a relatively larger share of goods and services in informal markets than high-income households, and this slope is larger in low-income countries than in high-income countries.

Figure B9 – Tax Incidence Profiles: Indirect Taxes and Informality in Niger, 2023



Notes. The figure plots estimates of the distributional incidence of indirect taxes in Niger in 2023, before and after accounting for informal consumption. Before accounting for informal consumption, consumption taxes are very regressive because low-income households tend to dissave while high-income households tend to save. After accounting for the fact that low-income households tend to consume more intensively in untaxed informal markets, however, consumption taxes appear to be only mildly regressive.

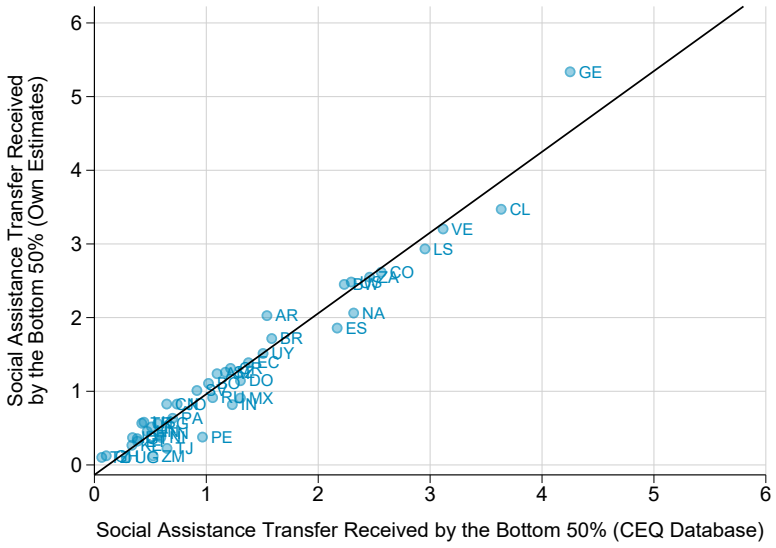
Figure B10 – Tax Incidence Profiles: Social Contributions and Informality in Argentina, 2023



Notes. The figure compares the distributional incidence of social contributions in Argentina in 2023 before and after accounting for the fact that contribution payments vary along the wage distribution. Distributing contributions proportionally to total labor income (blue line) implies a much more regressive profile than when distributing them proportionally to taxable labor income (red line), that is, accounting for the fact that a large share of low-wage earners do not pay social contributions because they work in the informal sector.

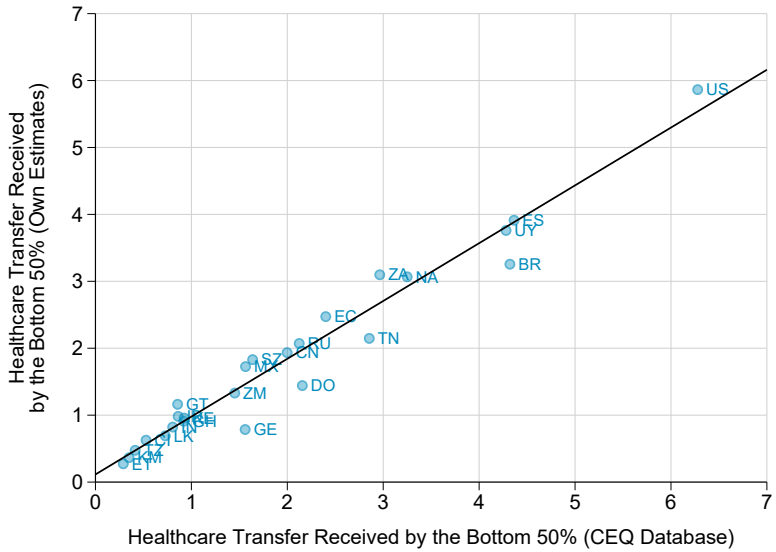
Figure B11 – Validation: Comparison With CEQ Transfer Progressivity

(a) Social Assistance



(b) Education

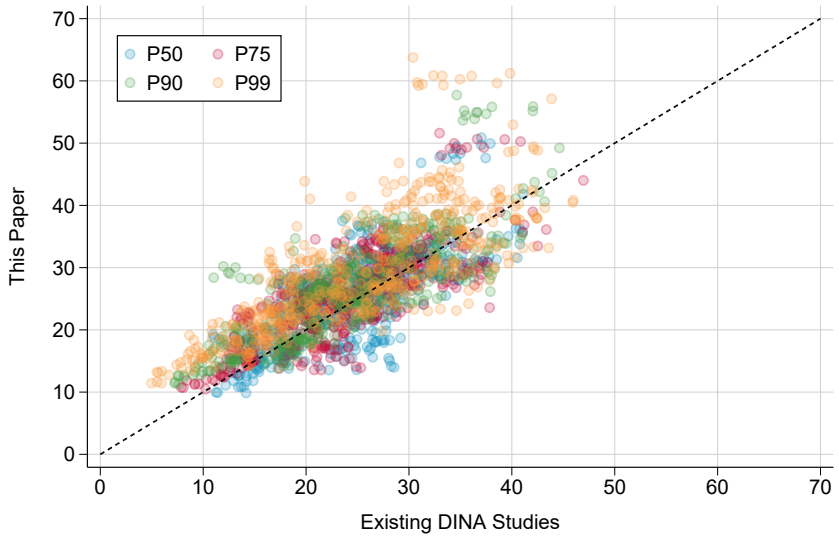
(c) Healthcare



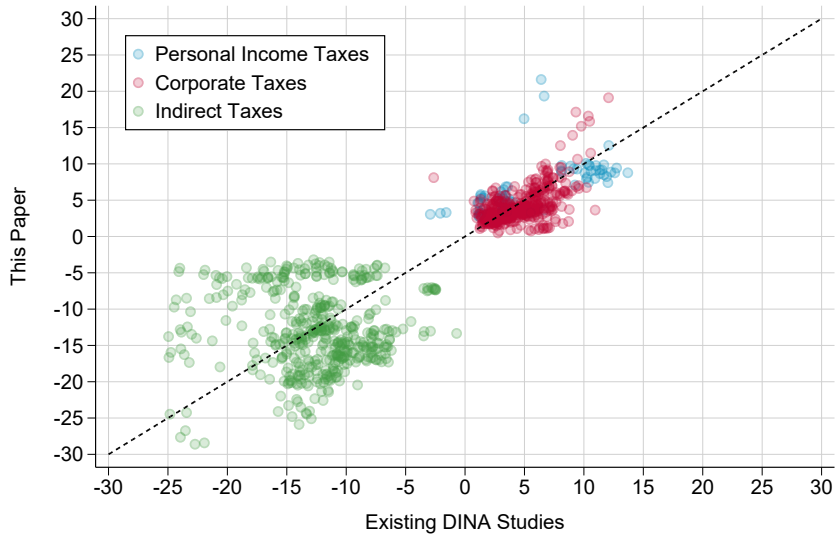
Notes. This figure compares our estimates of social assistance, education, and healthcare transfers received by the bottom 50%, expressed as a share of national income, with those available from the Commitment to Equity Institute (CEQ) database. To make the two figures comparable, we use estimates of the bottom 50% share of transfers from each source and multiply them by total spending as a share of national income recorded in our public spending database. The two estimates are strongly correlated across all three transfers.

Figure B12 – Validation: Comparison With Existing DINA Studies, Overall Tax Progressivity

(a) Comparison of Effective Tax Rates

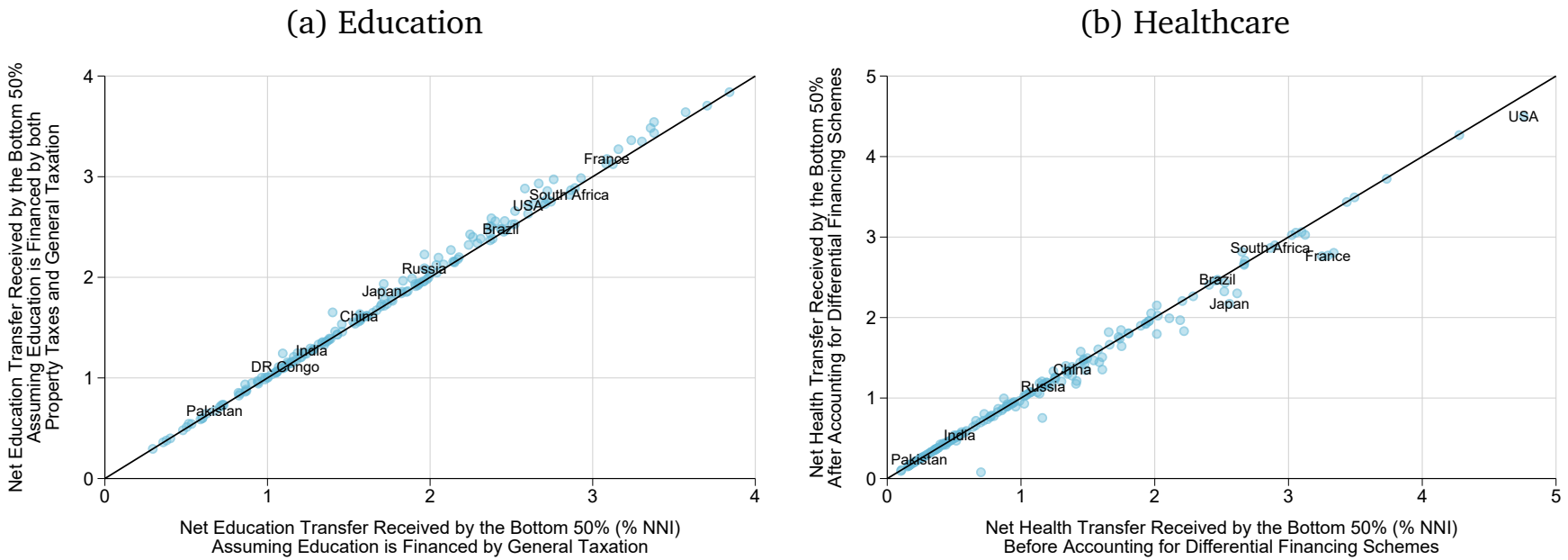


(b) Comparison of Tax Incidence by Type of Tax



Notes. This figure compares our simplified estimates of tax progressivity with estimates available from existing DINA studies covering 42 countries including the Netherlands (Bruil et al., 2022), the United States (Piketty, Saez, and Zucman, 2018), South Africa (Czajka and Gethin, 2025), Brazil (Palomo et al., 2025), Europe (Blanchet, Chancel, and Gethin, 2022), and Latin America (Flores, De Rosa, and Morgan, 2022). Panel (a) compares estimates of taxes paid at the 50th, 75th, 90th, and 99th percentiles of the pretax income distribution as a share of pretax income in existing DINA studies with those estimated in this paper. Each point represents a country-year-percentile. Panel (b) compares estimates of the distributional incidence of personal income taxes, corporate taxes, and indirect taxes in existing DINA studies with those estimated in this paper. Each point represents a country-year, and tax incidence is measured as the percent reduction in the top 10% to bottom 50% average income ratio before and after deducting a given tax from pretax incomes.

Figure B13 – Accounting for Heterogeneity in Education and Healthcare Financing Systems



Notes. The figure plots net public education transfers (panel (a)) and healthcare transfers (panel (b)) received by the bottom 50%, after deducting the taxes that pay for them, under different assumptions about the types of taxes that finance these transfers. Panel (a) compares estimates of the net education transfer depending on whether one assumes that the public education system is financed by general taxation (all taxes excluding social contributions, x-axis) versus a mix of property taxes and general taxation (all property taxes, plus general taxation when property taxes are not large enough to cover public education expenditure, y-axis). Panel (b) compares estimates of the net health transfer depending on whether one assumes that the public healthcare system is financed by general taxation (all taxes excluding social contributions, x-axis) versus a mix of general taxation and social contributions as reported in health accounts available from the World Health Organization. In both cases, accounting for the fact that education and healthcare may be financed by specific types of taxes rather than general taxation makes very little difference to overall estimates of redistribution and their variations across countries.

Table B1 – Data Coverage by Country

	Cumulative World Population (%)	Social Assistance		Education		Healthcare	
		Spending	Progressivity	Spending	Progressivity	Spending	Progressivity
India	17.9%	1980-2023	2004-2011	1980-2023	1983-2017	1980-2023	2003
China	35.5%	1980-2023	2013	1980-2023	1988-2018	1980-2023	2003
USA	39.8%	1980-2023	1980-2019	1980-2023	1980-2023	1980-2023	1980-2019
Indonesia	43.3%	1980-2023	2015-2019	1980-2023	1993-2023	1980-2023	1993-2019
Pakistan	46.3%	1980-2023	2007-2018	1980-2023	1991-2018	1980-2023	1991-2010
Nigeria	49.2%	1980-2023	2010-2018	1980-2023	1993-2018	1980-2023	2010-2018
Brazil	51.8%	1980-2023	1981-2022	1980-2023	1981-2023	1980-2023	2003
Bangladesh	53.9%	1980-2023	2005-2016	1980-2023	2000-2016	1980-2023	2003
Russia	55.7%	1980-2023	2000-2022	1980-2023	2000-2022	1980-2023	2004-2021
Mexico	57.3%	1980-2023	1994-2018	1980-2023	1984-2018	1980-2023	2003
Ethiopia	58.9%	1980-2023	2015-2018	1980-2023	1995-2018	1980-2023	2000-2018
Japan	60.5%	1980-2023	2008-2020	1980-2023	2008-2020	1980-2023	
Philippines	61.9%	1980-2023	2013-2015	1980-2023	2006-2018	1980-2023	2003
Egypt	63.3%	1980-2023	2008	1980-2023	2004-2023	1980-2023	
DR Congo	64.6%	1980-2023	2012	1980-2023	2004-2012	1980-2023	2012
Vietnam	65.9%	1980-2023	2005-2013	1980-2023	2005-2013	1980-2023	2003
Iran	67.0%	1980-2023	2011	1980-2023	2004-2023	1980-2023	2011
Turkey	68.1%	1980-2023	2004-2019	1980-2023	2003-2023	1980-2023	2014
Germany	69.1%	1980-2023	1980-2022	1980-2023	1984-2022	1980-2023	2003
Thailand	70.0%	1980-2023	2006-2019	1980-2023	1988-2023	1980-2023	
United Kingdom	70.9%	1980-2023	1980-2021	1980-2023	1980-2021	1980-2023	2003
France	71.7%	1980-2023	1980-2022	1980-2023	1980-2022	1980-2023	2003
Tanzania	72.6%	1980-2023	2008-2014	1980-2023	1993-2018	1980-2023	1993-2017
South Africa	73.3%	1980-2023	2008-2017	1980-2023	1994-2023	1980-2023	1993-2019
Italy	74.1%	1980-2023	2007-2017	1980-2023	1980-2020	1980-2023	2003
Kenya	74.8%	1980-2023	2005-2015	1980-2023	2005-2015	1980-2023	2003
Myanmar	75.4%	1980-2023	2017	1980-2023	2015-2017	1980-2023	2003

Colombia	76.1%	1980-2023	2008-2023	1980-2023	1996-2023	1980-2023	2010-2014
South Korea	76.7%	1980-2023		1980-2023	2006-2021	1980-2023	
Sudan	77.4%	1980-2023	2009	1980-2023	2009-2014	1980-2023	
Uganda	78.0%	1980-2023	2009-2016	1980-2023	2010-2023	1980-2023	2012-2016
Spain	78.6%	1980-2023	2007-2017	1980-2023	1980-2022	1980-2023	2003
Algeria	79.1%	1980-2023		1980-2023		1980-2023	
Argentina	79.7%	1980-2023	2006-2019	1980-2023	1980-2023	1980-2023	2012-2017
Iraq	80.2%	1980-2023	2006-2012	1980-2023	2006-2012	1980-2023	
Afghanistan	80.8%	1980-2023	2007	1980-2023	2007-2011	1980-2023	
Yemen	81.3%	1980-2023	2005	1980-2023	1998-2014	1980-2023	
Canada	81.7%	1980-2023	1980-2021	1980-2023	1980-2021	1980-2023	
Poland	82.2%	1980-2023	1986-2023	1980-2023	1986-2023	1980-2023	
Ukraine	82.7%	1980-2023	2006-2018	1980-2023	2005-2013	1980-2023	2003
Morocco	83.2%	1980-2023		1980-2023	1991-2013	1980-2023	2003
Angola	83.6%	1980-2023		1980-2023	2000-2018	1980-2023	
Uzbekistan	84.1%	1980-2023	2018	1980-2023	2000-2003	1980-2023	
Malaysia	84.5%	1980-2023	2008-2016	1980-2023		1980-2023	2003
Peru	84.9%	1980-2023	2005-2021	1980-2023	1997-2023	1980-2023	2009-2011
Ghana	85.3%	1980-2023	2005-2016	1980-2023	1987-2017	1980-2023	2003
Mozambique	85.8%	1980-2023		1980-2023	2002-2014	1980-2023	
Saudi Arabia	86.2%	1980-2023		1980-2023		1980-2023	
Madagascar	86.6%	1980-2023		1980-2023	2010-2012	1980-2023	
Cote d'Ivoire	86.9%	1980-2023	2008-2015	1980-2023	2002-2018	1980-2023	2003
Nepal	87.3%	1980-2023	2010	1980-2023	1995-2016	1980-2023	2003
Cameroon	87.7%	1980-2023	2007-2014	1980-2023	2007-2014	1980-2023	
Venezuela	88.0%	1980-2023	2013	1980-2023	1989-2006	1980-2023	2013
Australia	88.3%	1980-2023	1981-2020	1980-2023	2004-2020	1980-2023	
Niger	88.7%	1980-2023	2014	1980-2023	2005-2018	1980-2023	
Mali	89.0%	1980-2023		1980-2023	1994-2018	1980-2023	2003
Syrian Arab Republic	89.3%			1980-2023	1997-2003	1980-2023	
Taiwan	89.5%		1995-2019	1980-2023	1981-2021	1980-2023	

Burkina Faso	89.8%	1980-2023	2003-2018	1980-2023	2009-2018	1980-2023	2003
Sri Lanka	90.1%	1980-2023	2006-2016	1980-2023	2006-2023	1980-2023	2003
Malawi	90.4%	1980-2023	2004-2016	1980-2023	2016-2023	1980-2023	2003
Zambia	90.6%	1980-2023	2010-2015	1980-2023	2010-2015	1980-2023	2003
Kazakhstan	90.9%	1980-2023	2007-2017	1980-2023	2002-2010	1980-2023	2003
Chile	91.1%	1980-2023	1990-2017	1980-2023	1990-2017	1980-2023	2013
Chad	91.4%	1980-2023	2011	1980-2023	2011	1980-2023	2003
Romania	91.6%	1980-2023	1995-2021	1980-2023	1995-2021	1980-2023	
Somalia	91.8%	1980-2023		1980-2023		1980-2023	
Guatemala	92.1%	1980-2023	2006-2014	1980-2023	2000-2011	1980-2023	2003
Netherlands	92.3%	1980-2023	1983-2021	1980-2023	1990-2021	1980-2023	2003
Senegal	92.5%	1980-2023	2011	1980-2023	1995-2018	1980-2023	2003
Ecuador	92.7%	1980-2023	2008-2019	1980-2023	1994-2023	1980-2023	2003
Cambodia	92.9%	1980-2023		1980-2023	1997-2008	1980-2023	
Zimbabwe	93.1%	1980-2023	2007-2019	1980-2023	2007-2023	1980-2023	2003
Guinea	93.3%	1980-2023		1980-2023	2012-2018	1980-2023	
Benin	93.5%	1980-2023		1980-2023	2015-2018	1980-2023	
Rwanda	93.7%	1980-2023	2005-2013	1980-2023	2010-2016	1980-2023	
Burundi	93.8%	1980-2023		1980-2023	1998-2013	1980-2023	
Bolivia	94.0%	1980-2023	2006-2017	1980-2023	1992-2023	1980-2023	2009-2015
Tunisia	94.1%	1980-2023	2010	1980-2023	2005-2015	1980-2023	2003
Belgium	94.3%	1980-2023	1985-2021	1980-2023	1985-2021	1980-2023	2003
Haiti	94.4%	1980-2023	2001	1980-2023	2001-2012	1980-2023	
South Sudan	94.6%		2009	1980-2023	2009-2016	1980-2023	
Jordan	94.7%	1980-2023	2006-2010	1980-2023	2002-2013	1980-2023	2010
Dominican Republic	94.9%	1980-2023	2007-2019	1980-2023	1996-2013	1980-2023	2003
Cuba	95.0%	1980-2023		1980-2023		1980-2023	
Czechia	95.1%	1980-2023	1992-2016	1980-2023	1992-2016	1980-2023	2003
Honduras	95.3%	1980-2023	2008-2017	1980-2023	1991-2023	1980-2023	2011
United Arab Emirates	95.4%	1980-2023		1980-2023		1980-2023	2003
Sweden	95.5%	1980-2023	1980-2021	1980-2023	1980-2021	1980-2023	2003

Portugal	95.7%	1980-2023	2007-2017	1980-2023	2003-2017	1980-2023	2003
Tajikistan	95.8%	1980-2023	2011	1980-2023	1999-2015	1980-2023	2015
Papua New Guinea	95.9%	1980-2023	2009	1980-2023	2009	1980-2023	
Azerbaijan	96.0%	1980-2023	2015	1980-2023	2002-2005	1980-2023	
Greece	96.2%	1980-2023	1995-2021	1980-2023	1995-2021	1980-2023	2003
Hungary	96.3%	1980-2023	1991-2015	1980-2023	1991-2015	1980-2023	
Togo	96.4%	1980-2023	2015	1980-2023	2006-2018	1980-2023	2015
Israel	96.5%	1980-2023	1980-2021	1980-2023	1986-2021	1980-2023	2003
Austria	96.6%	1980-2023	1996-2022	1980-2023	1994-2022	1980-2023	2003
Belarus	96.7%	1980-2023	2008-2019	1980-2023		1980-2023	
Switzerland	96.9%	1980-2023	2000-2022	1980-2023	1992-2022	1980-2023	
Sierra Leone	97.0%	1980-2023	2018	1980-2023	2003-2018	1980-2023	
Lao	97.1%	1980-2023		1980-2023	2002-2018	1980-2023	2003
Hong Kong	97.2%	1980-2023		1980-2023		1980-2023	
Turkmenistan	97.2%			1980-2023		1980-2023	
Libya	97.3%	1980-2023		1980-2023		1980-2023	
Kyrgyzstan	97.4%	1980-2023	2006-2013	1980-2023	2002-2003	1980-2023	
Paraguay	97.5%	1980-2023	1997-2020	1980-2023	1995-2023	1980-2023	2003
Nicaragua	97.6%	1980-2023	2009	1980-2023	1993-2009	1980-2023	2009
Bulgaria	97.7%	1980-2023	2007-2017	1980-2023	2007-2022	1980-2023	
Serbia	97.8%	1980-2023	2006-2022	1980-2023	2006-2022	1980-2023	
El Salvador	97.8%	1980-2023	2008-2014	1980-2023	1991-2023	1980-2023	2011-2017
Republic of the Congo	97.9%	1980-2023	2005	1980-2023	2011	1980-2023	2003
Denmark	98.0%	1980-2023	1992-2022	1980-2023	1987-2022	1980-2023	2003
Singapore	98.1%	1980-2023		1980-2023		1980-2023	
Lebanon	98.1%	1980-2023		1980-2023	2004-2011	1980-2023	
Finland	98.2%	1980-2023	1987-2016	1980-2023	1987-2016	1980-2023	2003
Norway	98.3%	1980-2023	1980-2022	1980-2023	1986-2022	1980-2023	2003
Slovakia	98.3%	1980-2023	1992-2018	1980-2023	1992-2018	1980-2023	2003
Liberia	98.4%	1980-2023	2014-2016	1980-2023	2007-2016	1980-2023	
Palestine	98.5%		2023	1980-2023	1996-2016	1980-2023	

Ireland	98.5%	1980-2023	1987-2021	1980-2023	1994-2021	1980-2023	2003
New Zealand	98.6%	1980-2023		1980-2023		1980-2023	
Central African Republic	98.7%	1980-2023		1980-2023	2008	1980-2023	
Costa Rica	98.7%	1980-2023	2008-2019	1980-2023	1989-2023	1980-2023	2010
Oman	98.8%	1980-2023		1980-2023		1980-2023	
Mauritania	98.9%	1980-2023	2008	1980-2023	2000-2014	1980-2023	2003
Kuwait	98.9%	1980-2023		1980-2023		1980-2023	
Panama	99.0%	1980-2023	2008-2019	1980-2023	1991-2023	1980-2023	2016
Croatia	99.0%	1980-2023	2009-2017	1980-2023	2009-2017	1980-2023	2003
Georgia	99.1%	1980-2023	2009-2022	1980-2023	2005-2023	1980-2023	2003
Eritrea	99.1%			1980-2023		1980-2023	
Mongolia	99.2%	1980-2023	2007-2016	1980-2023	2002-2018	1980-2023	
Uruguay	99.2%	1980-2023	2004-2024	1980-2023	2004-2024	1980-2023	2003
Bosnia and Herzegovina	99.2%	1980-2023	2007-2015	1980-2023	2001-2011	1980-2023	2003
Moldova	99.3%	1980-2023	2010-2018	1980-2023	1998-2023	1980-2023	
Qatar	99.3%	1980-2023		1980-2023		1980-2023	
Namibia	99.3%	1980-2023	2015	1980-2023	2015	1980-2023	2003
Armenia	99.4%	1980-2023	2008-2018	1980-2023	2004-2023	1980-2023	2011
Lithuania	99.4%	1980-2023	2009-2021	1980-2023	2009-2021	1980-2023	
Jamaica	99.5%	1980-2023	2002-2017	1980-2023	1990-2002	1980-2023	
Albania	99.5%	1980-2023	2008-2012	1980-2023	2002-2012	1980-2023	
Gambia	99.5%		1998-2015	1980-2023	1998-2015	1980-2023	
Gabon	99.6%	1980-2023	2005-2017	1980-2023	2005-2017	1980-2023	
Botswana	99.6%	1980-2023	2009-2015	1980-2023	2009-2015	1980-2023	2010
Lesotho	99.6%	1980-2023	2017	1980-2023	2010-2017	1980-2023	2017
Guinea-Bissau	99.6%	1980-2023		1980-2023	2010-2018	1980-2023	
Slovenia	99.7%	1980-2023	1997-2015	1980-2023	1997-2015	1980-2023	2003
Latvia	99.7%	1980-2023	2007-2017	1980-2023	2004-2017	1980-2023	2003
Equatorial Guinea	99.7%	1980-2023		1980-2023		1980-2023	
North Macedonia	99.7%	1980-2023		1980-2023	2005-2008	1980-2023	
Kosovo	99.8%	1980-2023	2006-2013	1980-2023	2009-2017	1980-2023	

Bahrain	99.8%	1980-2023		1980-2023		1980-2023	
Trinidad and Tobago	99.8%	1980-2023		1980-2023		1980-2023	
Timor-Leste	99.8%	1980-2023	2007-2011	1980-2023	2001-2014	1980-2023	
Estonia	99.8%	1980-2023	2000-2016	1980-2023	2000-2016	1980-2023	2003
Cyprus	99.8%	1980-2023	2007-2017	1980-2023	2004-2017	1980-2023	
Mauritius	99.9%	1980-2023	2006-2017	1980-2023	1999-2017	1980-2023	2003
Eswatini	99.9%	1980-2023	2009-2016	1980-2023	2000-2016	1980-2023	2003
Djibouti	99.9%	1980-2023	2012	1980-2023	1996-2017	1980-2023	
Fiji	99.9%	1980-2023	2008-2013	1980-2023	2002-2023	1980-2023	
Comoros	99.9%	1980-2023		1980-2023	2004	1980-2023	2003
Guyana	99.9%	1980-2023		1980-2023	1992-1999	1980-2023	
Bhutan	99.9%	1980-2023	2007	1980-2023	2003-2017	1980-2023	
Luxembourg	99.9%	1980-2023	1985-2023	1980-2023	1985-2023	1980-2023	2003
Montenegro	99.9%	1980-2023	2011-2014	1980-2023		1980-2023	
Suriname	100.0%	1980-2023		1980-2023		1980-2023	
Malta	100.0%	1980-2023	2007-2013	1980-2023		1980-2023	
Maldives	100.0%	1980-2023	2004-2016	1980-2023	1998-2023	1980-2023	
Cabo Verde	100.0%	1980-2023	2007	1980-2023	2007-2015	1980-2023	
Brunei Darussalam	100.0%			1980-2023		1980-2023	
Belize	100.0%	1980-2023	2009	1980-2023		1980-2023	
Iceland	100.0%	1980-2023	2003-2017	1980-2023	2003-2017	1980-2023	
Barbados	100.0%	1980-2023		1980-2023		1980-2023	
Sao Tome and Principe	100.0%	1980-2023		1980-2023	2010-2017	1980-2023	
Seychelles	100.0%	1980-2023		1980-2023		1980-2023	
Tonga	100.0%	1980-2023		1980-2023	2009-2015	1980-2023	