Government Redistribution and Development
Global Estimates of Tax-and-Transfer Progressivity, 1980-2019

Matthew FISHER-POST
Amory GETHIN*

6th October, 2023

Abstract

This article builds and analyzes a new database on the distributional incidence of taxes and transfers in 151 countries from 1980 to 2019. Our estimates allocate the entirety of tax revenue and public expenditure to individuals, combining household surveys, national accounts, government budgets, tax simulators, and existing fiscal incidence studies. We establish five main findings. (1) Tax-and-transfer systems always reduce inequality, but with large variations. (2) About 90% of these variations are driven by transfers, while only 10% come from taxes. (3) Redistribution rises with development, but this is entirely due to transfers; tax progressivity is uncorrelated with per capita income. (4) Redistribution has increased in most world regions, except in Africa and Eastern Europe, where it has stagnated. (5) About 80% of variations in posttax inequality are driven by differences in pretax inequality ("predistribution"), while 20% are driven by the direct effect of taxes and transfers ("redistribution"). Countries with higher redistribution display lower levels of pretax inequality, however, pointing to a potentially large role of redistributive policies in indirectly shaping the distribution of market incomes.

*Matthew Fisher-Post: Paris School of Economics; mfp@psemail.eu.
Amory Gethin: Paris School of Economics; amory.gethin@psemail.eu.
We thank Facundo Alvaredo, Thomas Blanchet, Umberto Cattaneo, Lucas Chancel, Ignacio Flores, Ugo Gentilini, Nicolas Hérault, Wouter Leenders, Sarah Lowder, Theresa Neef, Valeria Nesterenko, Ian Orton, Thomas Piketty, Emmanuel Saez, and Gabriel Zucman for useful comments and suggestions. Carmen Durrer de la Sota and Jasmine Lee provided valuable research assistance. Grants ANR-17-EURE-001 and European Commission Horizon Europe project 101095219.

1. Introduction

Despite a momentous renewal of attention to inequality, even the most recent studies often fail to account for the distributional effects of government taxes and transfers—above all in the developing world. Publicly available inequality statistics generally provide data on the distribution of household disposable income or consumption, with little information on the extent to which government intervention affects poverty and inequality. While significant recent efforts have been made in specific countries, there is a critical lack of cross-country, long-run data on how redistribution in its different forms has evolved in the past decades. As a result, it remains difficult to answer questions as simple as: which countries do the most to reduce income disparities through taxes and transfers? Is redistribution higher than it was forty years ago? Are differences in inequality primarily driven by differences in the distribution of market incomes ("predistribution"), or by differences in tax-and-transfer systems ("redistribution")?

This article makes a first step towards answering these questions. Combining new data sources and methods, we assemble a comprehensive database on the distribution of taxes and transfers in 151 countries since 1980. Our estimates of redistribution account for all forms of taxes and transfers, including personal income taxes, corporate taxes, consumption taxes, local taxes, cash transfers, and public education and health expenditure. We distribute all taxes and transfers using a common methodological framework, Distributional National Accounts (DINA; Blanchet et al., 2021), which ensures that our estimates are comparable across countries and over time, and consistent with national income and government budget aggregates.

In the absence of survey or tax microdata, which largely do not exist for our sample, several methodological innovations allow us to estimate the distributional incidence of taxes and transfers. Tax revenue aggregates, by type of tax, are drawn from Bachas et al. (2022), while pretax income distributions are available from the World Inequality Database (Blanchet et al., 2021). We model the distributional incidence of taxes from a number of parameters on *inter alia* statutory tax schedules, functional income concentrations, and the relative weights of disaggregated tax components, for which we put together data from several sources. Similarly, we complement our new series on total government expenditure, by function, with information on the distributional incidence of social assistance, education, and healthcare, drawing on related work by Gethin (2023). We validate our estimates against those of existing studies where those exist, ensuring that our simplified methodology accurately reproduces results from preexisting work.

Our database reveals five new stylized facts on worldwide fiscal progressivity, in levels and trends. First, tax-and-transfer systems always reduce inequality. One way to measure this is

to compare the top 10% to bottom 50% average income ratio in terms of pretax and posttax income. Taxes and transfers reduce this ratio in all 151 countries in our sample. This effect varies considerably, however, from 15% in the average African country to over 30% in Europe and the United States.

Second, transfers are the dominant driver of this redistributive effect. Taxes appear to have almost no effect on inequality in most regions of the world: low-income households face about the same effective tax rate as high-income households. As a result, removing taxes from individual incomes reduces inequality by about 2% in the average country. In contrast, transfers always strongly reduce inequality, typically by about 20%. Putting these two facts together, we estimate that over 90% of the effect of tax-and-transfer systems on inequality comes from transfers, while less than 10% comes from taxes.

Third, redistribution rises with development, but this is entirely due to transfers. Tax progressivity is uncorrelated with per capita income, despite noticeable regional patterns. For instance, Western European and Anglosphere countries have slightly progressive tax systems, while the distribution of taxes is strongly regressive in Eastern Europe and Latin America, mainly due to the prevalence of high indirect taxes and less progressive personal income taxes. In contrast, the impact of transfers on inequality rises sharply with development: the raw correlation between the total transfer received by the bottom 50% as a share of national income and GDP per capita exceeds 0.6. This finding mainly arises from the fact that high-income countries spend more on cash and in-kind transfers, but can also be explained by their greater reliance on more progressive forms of public spending—in particular social assistance and healthcare. In the average African country, less than 2% of national income is transferred to the poorest 50% of the population in the form of government transfers, compared to over 6% in Europe and the United States.

Fourth, there has been no cross-country convergence in redistribution. The net effect of taxes and transfers on inequality has increased significantly in the average country, from a reduction of approximately 10% in 1980, to 20% in 2019. However, this average figure masks considerable heterogeneity. Redistribution has risen significantly in Western Europe, the Anglosphere, and Latin America, while it has stagnated in Eastern Europe and Africa. The gap in redistribution between low- and high-income countries has remained about the same. Upper-middle-income countries have caught up with high-income countries, but this is mainly due to the rise of fiscal progressivity in China.

Fifth, despite large cross-country differences in tax-and-transfer systems, variations in inequality are primarily driven by differences in pretax inequality ("predistribution") rather than by variations in taxes and transfers ("redistribution"). In line with existing work focusing on

Europe and the United States (Blanchet, Chancel, and Gethin, 2022; Bozio et al., 2022), we find that countries displaying the highest levels of pretax inequality also end up displaying the highest levels of posttax inequality. A simple cross-country regression of the bottom 50% posttax income share on the bottom 50% pretax income share yields an R-Squared of over 0.8. By this measure, predistribution accounts for over 80% of cross-country variations in inequality, while redistribution accounts for less than 20%. We do find a strong correlation between predistribution and redistribution, however: countries with more progressive tax-and-transfer systems display lower levels of pretax inequality. This suggests that while the *direct* effect of taxes and transfers explains little of variations in posttax inequality, redistributive policies might still play a much more important role in *indirectly* shaping the distribution of market incomes.

Our work stands at the confluence of two main strands of the literature on inequality and fiscal policy: one that has studied the incidence and impact of taxes and transfers, and another that has aimed to measure inequality in a way consistent with measures of growth and total national income.

In the former, tax incidence analysis maintains an illustrious tradition, from Musgrave (1953), Tax Foundation (1967) and Kakwani (1977) through Lambert (1992), Fullerton and Metcalf (2002) and Saez, Slemrod, and Giertz (2012). The central question of this literature has been to ask on whom the burden of taxation falls. Studies in this line have emphasized context-specific behavioral responses to taxation, and the role of taxes and transfers to equalize income distributions. Few studies have taken comprehensive account of all taxes, all transfers, and all incomes, measuring the movement from pretax to posttax income distributions in a way that is consistent with macroeconomic estimates of national income.

In the latter tradition of inequality measurement, a slew of recent DINA studies have generated worldwide evidence on pretax income inequality levels and trends (see Chancel et al., 2022).[1] Gathered together in the World Inequality Database, these data series represent a scholarly benchmark as the preeminent long-run, worldwide, harmonized estimates of total national income distributions. However, the majority of these income distributions are estimated only pretax[2]—before the operation of government tax and transfer policies—leaving open an important empirical question, on the ability of fiscal policy to impact inequality.

The central contribution of this paper is to close that gap and estimate comprehensive posttax income distributions, worldwide since 1980. As such, our work relates perhaps most directly to

[1]Pretax income is the income that accrues to all earners directly on the marketplace, before taxes and transfers (but after social insurance), with the distribution of income adding to 100% of annual national income in the national accounts. For background and further details on the concept of pretax income and its estimation, refer to Blanchet et al. (2021) and the World Inequality Database.

[2]Several important exceptions are discussed in sections 2.4 and 2.5 below.

the Commitment to Equity initiative (CEQ Institute; see Lustig, 2018 and World Bank, 2022), whose pioneering efforts have made important strides to estimate the incidence of taxes and transfers in the developing world.[3] Our main contribution beyond their work is to cover all countries, all incomes, and all taxes and transfers, as well as the evolution of redistribution over time.

The remainder of this article is organized as follows. Section 2 establishes our methods to estimate worldwide fiscal progressivity since 1980, and demonstrates the robustness of the approach. Section 3 presents our analysis and the main findings that emerge. Section 4 concludes.

2. Data and Methodology

This section covers the methodology used to build our new database on government redistribution worldwide. Section 2.1 covers general methodological principles. Section 2.2 outlines the data sources used for the distribution of pretax income and government revenue and expenditure aggregates. It also presents our core "calibration" and "validation" database on government redistribution in 45 countries, compiled from seven studies following the DINA framework—which we use to inform and to test several distributional incidence assumptions. Section 2.3 describes the methodology used to allocate taxes and transfers. Finally, section 2.4 investigates the ability of our methodology to reproduce estimates from seven existing DINA studies.

2.1. Conceptual Framework

Concepts Our methodology follows the distributional national accounts (DINA) framework (Blanchet et al., 2021; Piketty, Saez, and Zucman, 2018), which offers a foundation to estimate the distribution of income, taxes, and transfers in a way that is consistent with national accounting principles (UN SNA, 2008). Unlike previous approaches to the measurement of inequality, the DINA methodology distributes all income flows to all individuals, as well as all types of taxes paid and transfers received, to arrive at both pretax and posttax income distributions that match 100% of national income.

The DINA approach generally establishes three income concepts: factor national income, pretax national income, and posttax national income, all of which add up to net national income. Factor

[3] CEQ studies generally do not precede the year 2010, and usually cover but one year per country. Equity income from ownership of corporations, as well as corporate income taxes, are usually excluded from this framework.

national income refers to market income flows deriving from labor and capital, before any form of government intervention.[4] 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. It is equal to factor income, minus social contributions paid, plus social insurance benefits received. Finally, posttax national income corresponds to income after the operation of the tax-and-transfer system. All taxes are allocated and removed from individual pretax incomes, including personal income taxes, corporate taxes, property and wealth taxes, and indirect taxes. Similarly, moving from pretax to posttax national income implies distributing the entirety of general government expenditure, including cash transfers, in-kind benefits (e.g., healthcare), and collective government expenditure (e.g., public order and safety).

Objective We focus on measures of government redistribution that compare the distribution of pretax national income to that of posttax national income.[5] Starting with data on the distribution of pretax income z, we aim to measure the distribution of taxes $T(z)$ and government transfers $G(z)$, so as to reach posttax income y:

$$y = z - T(z) + G(z) \tag{1}$$

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

2.2. Data Sources

Data on Pretax Income Distributions Our starting point on the distribution of pretax national income is the World Inequality Database, which covers 174 countries over the 1980-2019 period. The database was constructed by compiling estimates from existing DINA studies, which have

[4] It can be expressed net or gross of indirect taxes on production. It involves allocating incomes usually observed in surveys and tax data, such as compensation of employees and dividends, but also income flows only received indirectly by households, such as imputed rents or the retained earnings of corporations, which are also part of net national income.

[5] As in the existing studies that apply the DINA framework, we prefer to measure the distance between pretax income and posttax income, rather than between factor income and posttax 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). Furthermore, even if social insurance contributions do resemble a tax—as a *compulsory* levy, *unrequited* at the time of payment—social insurance benefits resemble less of a redistributive transfer, and rather may be considered as deferred compensation, similar to any private-sector pension or annuity.

been systematically harmonized and combined to yield comparable distributional statistics (see Chancel and Piketty, 2021). For each country-year, the data cover pretax income thresholds and averages for 127 generalized percentiles (g-percentiles), corresponding to each percentile within the bottom 99% (*p0p1* through *p98p99*), followed by a more detailed decomposition of incomes within the top 1%. By construction, following the DINA framework, average income is consistent with net national income, as recorded in the World Inequality Database (see Blanchet and Chancel, 2016; UN SNA, 2008). The database also provides information on the share of pretax income coming from capital income and labor income, for each g-percentile (Blanchet, 2022). This decomposition is consistent with aggregate factor income shares estimated in Bachas et al. (2022).

Data on Tax Revenue Aggregates To study the distribution of taxes paid by individuals, we first need to know the magnitude and composition of government revenue. We rely on aggregate tax revenue series recently constructed by Bachas et al. (2022), who combine national accounts data with government revenue statistics to estimate the evolution of macroeconomic tax rates in more than 150 countries since 1965. Their database provides information on total tax revenue as a share of national income, disaggregated into six categories: 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).

Data on Public Expenditure Aggregates To study the distribution of transfers, we similarly need to know the magnitude and composition of government expenditures. We use data from Gethin (2023), who estimates harmonized series on the level and composition of general government expenditure by function of government (COFOG). The database provides information on government expenditure on social protection, education, healthcare, and other public spending in about 170 countries since 1980. Social protection is itself disaggregated into social insurance (pension and unemployment benefits) and social assistance.

Data for Validation Having compiled data on pretax income inequality and disaggregated government revenue and expenditure, we need to estimate the distributional incidence of taxes and transfers in each country-year for which the above aggregates are observed. We start by collecting data on the incidence of taxes and transfers in countries for which detailed, high-quality estimates are available from existing DINA studies. Table 1 provides information on the data collected from these studies: in total, the database covers 657 country-years over 45 countries, with significant time and geographical variation. From each study, we collect

information on tax and transfer incidence profiles, that is, the share of taxes paid and transfers received by pretax income generalized percentile.

Taken together, the fiscal incidence data from these studies provides unique insights into variations in tax-and-transfer progressivity over time and space. We use these different estimates for validation of our estimates, as discussed further in section 2.4 below.

2.3. Distribution of Taxes and Transfers

Each tax and transfer, for each country-year, has a unique distributional profile. We now discuss the distributional estimates for each type of tax and transfer in turn. To introduce our method, consider the following equation:

$$T_i = \int_{p \geq K}^{p100} \tau_i(z)\, dz \tag{2}$$

For each type of tax and overall, the aggregate revenue received by the government is equivalent to the sum of taxes paid by all tax units, or the definite integral of effective tax rates applied to incomes over the distribution. The function $\tau_i(z)$ gives the taxes of type i paid by pretax income z, for each g-percentile p. The equivalent is true for transfers (negative taxes). By construction, our estimates always match revenue and expenditure totals T_i on aggregate. Our goal is to estimate the shape of $\tau_i(z)$ over the income distribution, for each type of tax and transfer i.

Personal Income Taxes For personal income taxes (PIT), only taxpayers with income above the PIT exemption threshold K pay any taxes. We estimate K for all country-years from Bachas et al. (2022) and Jensen (2022). Above the PIT exemption threshold, we simulate 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 average income (where taxable income equals per capita national income), then at two and three and four times that level, and finally the top marginal tax rate. We complement the WTI with inputs from Strecker (2021) and Vegh and Vuletin (2015) and online sources. From this basis, we can approximate a continuous schedule of statutory personal income tax rates.

Drawing on additional data sources (see Appendix A), we also make three critical distinctions: (1) between countries whose PIT systems tax married couples' joint income vs. those that only tax individual incomes; (2) between countries whose PIT systems tax capital income differently from labor income, noting differential rates on dividends and on capital gains; and (3) between

the pretax and *taxable* income distributions (since (1) and (2) may occasion some re-ranking).

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

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

Where j refers to PIT on labor income (employee compensation and mixed income), dividend income, and capital gains (with taxable incomes z_j taxed at rate τ_j).

After modeling this statutory PIT schedule, we fit its "predicted" revenues proportionally to actual revenues observed in Bachas et al. (2022) and corresponding to T_{PIT} in equation (2) above.

Corporate Income Taxes Following Blanchet et al. (2021), we allocate the corporate income tax (CIT) proportionally to income from corporate equity. High-quality estimates of corporate equity ownership (and, therefore, corporate income tax burdens) by generalized percentile are available for the Netherlands (Bruil et al., 2022), the United States (Piketty, Saez, and Zucman, 2018), and South Africa (Chatterjee, Czajka, and Gethin, 2021).[6] In our benchmark estimates, in the absence of better information, we thus take the average of the three corresponding tax incidence profiles. We then proportionally scale up the CIT incidence profile in each country-year so as to match total CIT revenue.

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 by far the least significant revenue item, averaging 2% of national income and rarely exceeding 4%. Like 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 (that is, in the same way as corporate taxes).

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 evidence from South Africa and the United States suggesting that the distribution of housing property taxes is relatively flat (Chatterjee, Czajka, and Gethin, 2021; Piketty, Saez, and Zucman, 2018). For other wealth taxes, we use the same corporate tax stylized profile as above.

[6] See Appendix Figure A1, which plots these three profiles by generalized percentile.

The data source for total property and wealth tax revenue is Bachas et al. (2022), while we use the OECD tax database (OECD, 2022) to decompose these taxes into housing property, business property, and other taxes on wealth. For countries and years missing in the OECD database, we assume that 50% of property and wealth taxes fall on residential property, while 50% fall on business property and net wealth.

Indirect and Other Taxes As in Blanchet et al. (2021), we assume that indirect taxes are paid by consumers, but we also account for the fact that part of consumption goes untaxed because it is made in the informal sector. First, we estimate income-to-consumption ratios along the income distribution. Second, we estimate the share of informal consumption in total consumption by generalized percentile.

For the first step, our benchmark scenario assumes that the income-to-consumption ratio is logit-shaped and about two times higher for the 99^{th} percentile than for the median (see Appendix Figure A2). This is in line with evidence from Chancel et al. (2023), who combine data on income-consumption ratios by pretax income percentile from a number of studies and show that this profile provides a good approximation of the typical empirical profile observed.

For the second step, we account for the fact that low-income households tend to purchase goods in informal markets to a greater extent than high-income households. This implies that a greater fraction of their consumption goes untaxed, especially in low-income countries where informality is high. Here, we draw on recent empirical evidence by Bachas, Gadenne, and Jensen (2022), who estimate the share of consumption made in informal markets, by income percentile, in a sample of developing countries. Informality is relatively greater among low-income earners in poor countries than in rich countries.[7] Drawing on this empirical regularity documented in Bachas, Gadenne, and Jensen (2022), 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 depends on the level of economic development:

$$s_{ct}(p) = p \times \theta_{ct} \quad (4)$$

$$\theta_{ct} = \alpha + \beta GDP_{ct} \quad (5)$$

Where GDP_{ct} denotes GDP per capita, expressed in constant 2021 PPP USD. Accounting for informality makes indirect taxes significantly less regressive, in particular in low-income countries, although this effect is generally not sufficiently strong to make them progressive as a share

[7] See Appendix Figure A3.

of income.[8]

Finally, other residual taxes include a number of miscellaneous items, such as user fees, penalties, fines, and poll taxes, which usually represent less than 0.5% of national income. These taxes are generally not conditioned on income or consumption, which implies that their burden is much higher among low-income groups than high-income groups when expressed in proportion of their income. Accordingly, we make the simplifying (and probably conservative) assumption that they are distributed similarly to indirect taxes, that is, in a regressive way.

Social Contributions We also construct estimates of the distribution of social contributions. Social insurance systems are already accounted for in pretax income, so we do not need to deduct social contributions to reach posttax income. However, we still estimate their incidence to arrive at a more comprehensive view of the magnitude and progressivity of the tax system in each country.

We assume that social contributions are paid 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 about 150 countries since the 1990s. For approximately 110 countries, we observe whether individuals paid social contributions, and estimate the propensity to do so along the labor income distribution. Informal work and exemptions are generally 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.[9]

Social Assistance Benefits Social assistance expenditure consists in both cash and in-kind transfers received by households, such as conditional cash transfers and food stamps, as defined in the system of national accounts (see Eurostat, 2019). Note that social assistance excludes social insurance transfers (mainly unemployment and pension benefits), which are already included in our definition of pretax income, as discussed above. Data on aggregate expenditure come from Gethin (2023), who draws on various sources to derive harmonized series on the evolution of spending on social assistance programs around the world.

Data on the incidence of social transfers come from four sources: Piketty, Saez, and Zucman (2018) for the United States, Blanchet, Chancel, and Gethin (2022) for 30 European countries, the World Bank's ASPIRE database for 101 countries (World Bank, 2018), and the database of

[8]Appendix Figure A4 illustrates how accounting for informality changes the progressivity of indirect taxes in Niger, one of the poorest countries in our sample.

[9]Appendix Figure A5 illustrates how accounting for informality and exemptions changes our estimates of the incidence of social contributions, in the context of Argentina in 2019.

the Commitment to Equity Institute for 3 countries (Iran, Togo, and Venezuela; Lustig, 2023). For the 45 countries not covered by any of these sources, our benchmark scenario allocates transfers using the average profile observed in all countries.

Education We consider two alternative scenarios for the distribution of education spending. One option is to allocate education proportionally to posttax disposable income (pretax income, minus direct taxes, plus cash transfers), in line with what was done for DINA studies covering the United States (Piketty, Saez, and Zucman, 2018) and Europe (Blanchet, Chancel, and Gethin, 2022). Another option is to allocate education spending to children attending school in the household. This approach has been adopted by DINA studies covering Latin America (De Rosa, Flores, and Morgan, 2022) and South Africa (Gethin, 2022), among others, as well as by the CEQ institute in a number of studies (Lustig, 2018). Gethin (2023) extends this approach to all countries in the world since 1980, combining data on education spending with a unique set of surveys covering school attendance and household income worldwide.

The school attendance approach has the advantage of allocating education expenditure to individuals actually benefiting from the education system at a given point in time. The main disadvantage is that it can be sensitive to various demographic and compositional factors overestimating the progressivity of education spending. For instance, education spending may appear progressive mainly because low-income households tend to have more children, or because households with children tend to have young parents with lower incomes. Students attending university and living alone may also appear in survey data as a particularly poor household, making tertiary education spending implausibly progressive. There may also be large inequalities in school spending and school quality across geographical areas, which are generally not observed. For all these reasons, while education spending is probably more equally distributed than posttax disposable income, it should also probably be allocated in a more unequal way than the school attendance approach suggests.

In the main results, we thus present series with education spending allocated proportionally to posttax disposable income. We reproduce all findings with the school attendance approach in the appendix, drawing on estimates from Gethin (2023). We view the construction of more precise measures of the distribution of education spending, such as indicators relying on public education transfers that children can expect to receive as a function of their socioeconomic background, as an important target for future research.[10]

[10]See for instance Piketty (2022), Figure 32, documenting large inequalities in public education spending received by French cohorts.

Health and Other Transfers Data on the distributional incidence of healthcare come from Gethin (2023), who mostly relies on series from the CEQ database (Lustig, 2018). In line with other DINA studies, all other government expenditure is distributed proportionally to posttax disposable income, that is, in a distributionally neutral way. This includes spending on transport, public order and safety, administration, defense, and all other types of public goods.

2.4. Comparison With Existing DINA Studies

Our compilation of data from earlier DINA studies covering 45 countries allows us to verify to what extent our simplified methodology provides a good approximation of patterns of fiscal progressivity across countries and over time. If the validation exercise shows that our new estimates match the sample of existing estimates, we can more confidently trust these new estimates outside of that sample.

One major difficulty is that the DINA studies collected for this validation exercise are not always perfectly comparable with one another. Two main issues should be stressed in particular. First, existing DINA studies do not always use the exact same methodology to allocate each type of tax. For instance, Piketty, Saez, and Zucman (2018) distribute business property taxes proportionally to corporate equity, while other DINA studies most often distribute them either proportionally to pretax income or in ways undocumented by the authors. Similarly, the quality of data available to measure the concentration of corporate equity varies tremendously across countries, from exceptionally detailed administrative data in the Netherlands (Bruil et al., 2022) to dividends and employer income reported in surveys in the case of Latin America (Flores, De Rosa, and Morgan, 2022).

Second, and partly because of limitations in data sources available, effective tax rates paid by percentile can be very noisy in a number of existing DINA studies. For instance, Blanchet, Chancel, and Gethin (2022) rely on surveys to measure the distribution of direct taxes, which makes estimates of their progressivity quite noisy from one year to another, especially at the top of the distribution. More importantly, all DINA studies rely on surveys reporting the joint distribution of pretax income and consumption to allocate indirect taxes. Because of the existence of many zero or very low pretax incomes in such surveys, consumption-to-income ratios can easily diverge, making estimates of the distributional incidence of consumption taxes particularly volatile. In South Africa, for instance, the bottom 50% pretax income share is less than 3%, leading effective tax rates as a share of pretax income to diverge towards infinity for most households within this group (Chatterjee, Czajka, and Gethin, 2021).

With these limitations in mind, Figure 1 compares our estimates of the effective tax rates faced

by percentiles *p50*, *p75*, *p90* and *p99* to those of existing DINA studies. With few exceptions, our estimates are clustered along the 45-degree line, suggesting that our simplified approach does a good job at reproducing broad cross-country and time variations in taxes paid by different pretax income groups.

We provide three additional validation exercises in the appendix. First, we compare our measures of absolute progressivity by type of tax to those reported in existing DINA studies (see Appendix Figure A6). The two estimates fall very close to each other in the case of personal income taxes and corporate taxes. However, because of the issue of low pretax incomes highlighted above, the fit of indirect taxes is much more variable. Given well-known challenges at measuring the relationship between income and consumption in surveys (Chancel et al., 2023), whether our smoothed estimates or those of existing DINA studies are more reliable is difficult to say. On average, however, it is reassuring that our measures of the progressivity of indirect taxes falls quite close to average progressivity found in existing work.

Second, we zoom in on effective tax rates paid by income group in specific countries, focusing on DINA studies with the least volatile estimates. Appendix Figures A7, A8, and A9 present this comparison for the United States, the Netherlands, and South Africa, respectively. Although our estimates are not perfect, our simplified methodology reproduces the strong regressivity of taxes in the Netherlands and the relatively more progressive tax systems of the United States and South Africa remarkably well.

In a third validation of our method, we compare our estimates of overall tax progressivity against those of existing studies in each country (see Appendix Figure A10). Progressivity is measured as the percent change in the top 10% to bottom 50% average income ratio obtained when removing taxes from pretax incomes (see section 3.1 for more details on this indicator). Because of issues highlighted above, our estimates of this indicator unsurprisingly do not correlate perfectly with those of existing papers, yet there does appear to be a strong and positive relationship. We view this as additional reassuring evidence that our methodology captures broad cross-country variations in tax systems relatively well.

2.5. Integration of Existing DINA Studies in our Database

Finally, while our estimates accurately capture broad variations in tax and transfer progressivity, existing DINA studies should be considered as of better quality, given that they rely on actual country-specific surveys and tax data to allocate taxes and transfers. We thus replace our series with those of Piketty, Saez, and Zucman (2018) for the United States, Blanchet, Chancel, and Gethin (2022) for Europe, and Flores, De Rosa, and Morgan (2022) for Latin America. Given

the lack of detailed tax and transfer incidence profiles comparable to ours, we only replace series covering total taxes paid by percentile and posttax income distributions (with the exception of the United States, for which we also replace transfers).

European and Latin American series only cover a subset of our period of interest, generally corresponding to the post-2000 period. To ensure time consistency, we thus adjust our 1980-2000 series based on the difference observed between our series and theirs in the first year available. For taxes paid, we rescale effective tax rates paid by generalized percentile based on the ratio of ETRs between the two sources. For posttax inequality series, we rescale the average income of each generalized percentile based on the ratio of average incomes between the two sources.

A last adjustment comes from the fact that Piketty, Saez, and Zucman (2018) and Blanchet, Chancel, and Gethin (2022) allocate education spending proportionally to posttax disposable income, while we allocate it based on school attendance of children in the household, as in Flores, De Rosa, and Morgan (2022). To ensure that the final series are conceptually consistent, we thus remove education distributed proportionally from the European and U.S. series and add back education distributed based on the school attendance approach (taken from Gethin, 2023). For Latin America, we leave the series unchanged, given that education is allocated using a method conceptually similar to ours. Appendix Figures 9 to 18, as well as Appendix Table 2, show that our main findings remain robust to distributing education spending proportionally to posttax disposable income.

3. A Global Perspective on Government Redistribution

This section presents the main results on levels and trends in government redistribution around the world. Section 3.1 presents facts on tax progressivity, while section 3.2 turns to the analysis of transfers and the overall effect of government redistribution on inequality. Finally, section 3.3 investigates the role played by differences in the distribution of pretax incomes ("predistribution") versus taxes and transfers ("redistribution") in explaining cross-country differences in inequality.

3.1. Levels and Trends in Tax Progressivity

3.1.1. A Global Map of Tax Progressivity

Taxes Are Weakly Progressive or Regressive in Most World Regions We start by documenting worldwide differences in the size and structure of taxes. Figure 2 shows the evolution of aggregate tax revenue by world region between 1980 and 2019. For simplicity and tractability, we divide the world in six groups of countries throughout the paper: 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 tax revenue as a share of national income in each country and plot the resulting population-weighted average by world region.

Total taxation has increased in Asia, Latin America, and Western Europe, while it has remained stable in Africa, the Anglosphere, and Eastern Europe. Western Europe and Anglosphere countries stand out as having much larger tax revenue from personal income taxes, while indirect taxes are more widespread in other world regions. Overall, there have not been major changes in the composition of taxes within each region, although there are some exceptions. In Eastern Europe, in particular, corporate tax revenue has declined significantly at the same time as indirect taxation has expanded as a share of national income.

Figure 3 plots the 2019 average effective tax rate (ETR) faced by each percentile of the pretax income distribution in different regions of the world. Throughout this section, we include social contributions in our analysis of tax progressivity (results excluding social contributions are qualitatively similar). Two main results stand out. First, consistently with Figure 2, there are large differences in aggregate tax rates between regions, with macroeconomic tax rates being lowest in Sub-Saharan Africa (10-20%) and highest in Western Europe (over 40%). Second, differences between income groups are small in most regions: nowhere in the world does the average ETR of the top 10% earners exceed that of the bottom 50% by more than 10 percentage points. In Africa, Asia, and Western Europe, taxes paid are essentially flat throughout the income distribution, while they are slightly more progressive at the top in the Anglosphere. Latin America and especially Eastern Europe are the only regions where tax systems are unambiguously regressive. Indeed, Eastern European (and ex-Soviet) countries tend to rely heavily on indirect taxes as a source of revenue (approximately 15% of national income, while closer to 9% in the rest of the world), and have moved toward flat taxation of household income in recent decades.

Taxes Have Little Effect on Inequality in Most Countries Given limited variations in effective tax rates along the income distribution in most regions of the world, one should not expect taxes to play a substantial role in reducing inequality. Figure 4 presents a global map of tax progressivity in 2019, providing a more granular picture on cross-country differences in the distribution of taxes worldwide. We summarize the progressivity of taxes with a simple indicator: the percent difference in inequality, measured as the top 10% to bottom 50% average income ratio, before and after removing taxes from individual incomes:

$$\gamma_\tau = \frac{r_{pre} - r_{net}}{r_{pre}} \tag{6}$$

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 (pretax or net of taxes) of the top 10% richest to that of the bottom 50% poorest individuals in each country-year.

Positive values thus indicate progressive tax systems, while negative values indicate regressive tax systems. As shown in Figure 4, taxes have little effect on inequality: in many countries, they reduce the inequality ratio r by less than 5%. The geographical patterns documented in Figure 3 clearly stand out. Latin American and Eastern Europe countries have strongly regressive tax systems. Western European and Southern African countries display the most progressive tax systems, although the magnitude of the effect is generally small, on the order of 5-15%.

Robustness to Other Indicators A concern with this analysis is that this indicator of tax progressivity may be not be perfectly comparable across countries. In countries with higher pretax inequality, in particular, taxes may appear mechanically more progressive. The overall impact of taxes may also end up being mechanically higher in countries with greater aggregate tax revenue (see discussion in Appendix B). As an alternative to this measure of "absolute" progressivity, we thus consider two other indicators, "relative" and "normalized" progressivity. Relative progressivity corresponds to the percent difference in the effective tax rates of the top 10% and bottom 50% in each country. Normalized progressivity corresponds to absolute progressivity computed over a single, "normalized" distribution, which ensures that it is insensitive to differences in pretax inequality across countries. Maps comparable to Figure 4 are presented for these indicators in Appendix Figures B1 and B2. The results are similar.

3.1.2. Trends in Tax Progressivity Since 1980

Tax Progressivity Has Stagnated in Most World Regions We now turn to documenting trends in tax progressivity worldwide. To start, consider Figures 5 and 6, which plot the level

and composition of taxes paid by percentile in the average country in 1980 and 2019. This figure is constructed by dividing taxes by pretax income for each percentile in each country, and then taking the population-weighted average of this indicator over all countries in the world.

Two results stand out. First, there has been an increase in worldwide taxation, which ranged from 18-22% of income in 1980, and increased to 22-26% by 2019. Second, there has been no clear change in average worldwide tax progressivity since 1980; if anything, tax progressivity has declined. Overall, top-income groups face slightly higher effective tax rates than earners at the middle of the income distribution, because of the particularly progressive nature of personal income and corporate income taxes. Yet taxes are also slightly higher at the very bottom of the distribution, where consumption is high relative to pretax income and the burden of indirect taxes is thus particularly large. While direct taxes have grown (and PIT systems have become slightly more progressive), so have indirect taxes, leading to little change in average tax progressivity.

Figure 7 decomposes this general result geographically by showing the evolution of tax progressivity by world region. Eastern Europe has seen a particularly pronounced and steady decline in progressivity: taxes had more or less no effect on the income distribution in 1990, while they increased inequality by over 25% in 2019. In all other regions, tax progressivity has remained remarkably stable since 1980, mirroring the overall pattern documented in Figures 5 and 6.

There Has Been No Cross-Country Convergence in Effective Tax Rates Increases in average tax rates coupled with differences in progressivity imply that taxation has changed differentially for different income groups. We bring these dynamics into focus at the regional level, charting top 1%, top 10%, and bottom 50% effective tax rates since 1980, by region and on average, in Appendix Figures A11, A12, and A13. Top 1% effective tax rates have declined substantially in the Anglosphere and Eastern Europe. Western Europe has overtaken the Anglosphere as the region that taxes the richest the most, but the gap is even greater among low incomes, which explains why tax progressivity is still higher in the latter. Eastern Europe began the post-Soviet era on a par with Western neighbors for top-income taxation, but since then have reverted toward the global mean. No countries tax their poorest citizens as much as do the countries of Eastern Europe. Africa stands out as the only region with no significant change in taxation at all: on average, effective tax rates have remained low and stable for all income groups. All in all, there is no clear convergence between countries in effective tax rates paid.

3.2. Levels and Trends in Total Government Redistribution

3.2.1. The Distribution of Government Transfers

We now turn to the analysis of transfers, including social assistance, education, healthcare, and other public goods. Figure 8 plots the average share of national income received by the bottom 50%, the middle 40%, and the top 10% in the form of cash and in-kind transfers by world region in 2019. Appendix Figure C1 reproduces this figure with education distributed using the school attendance approach.

The Size of Transfers Varies Substantially Across Regions There are large differences across regions in the amount of transfers received by low-income groups, with total expenditure received by the bottom 50% ranging from about 6% of national income in Africa to 18% in Western Europe. On average, cash transfers, healthcare, education, and other public goods each represent about a quarter of transfers received, but with substantial variations across regions. Redistribution in the form of social assistance is particularly developed in Europe, while public healthcare spending is exceptionally large in the United States (and targeted to the poor lacking private insurance). In Africa and Asia, in-kind transfers represent the bulk of redistribution.

The Progressivity of Transfers Varies Substantially Across Regions The countries of Western Europe and the Anglosphere particularly stand out for both *relative* and *absolute* progressivity. In Latin America, Asia, and Africa, on the other hand, top earners receive a greater share of government transfers than do the bottom 50% of the income distribution. This is mainly the result of our assumption that transfers other than social assistance and healthcare are received proportionally to disposable income, that is, in a very unequal way. Because Latin America, African, and Asian countries spend little on these functions of government, public expenditures appear to be the least progressive in these regions. Even under this conservative assumption on the low progressivity of public goods other than healthcare, however, government transfers are unambiguously progressive.

3.2.2. The Net Impact of Taxes and Transfers on Inequality

Tax-and-Transfer Systems Always Reduce Inequality, But With Large Variations Combining taxes and transfers, our database allows us to provide a global map of government redistribution, in Figure 9. Appendix Figure C2 reproduces this figure with education distributed using the school attendance approach. The "extent of redistribution" is measured as the percent difference

in the top 10% to bottom 50% average income ratio, as in equation (6) above (and in, e.g., Bozio et al., 2022).

Two results stand out. First, tax-and-transfer systems always reduce inequality: the indicator is strictly positive in all countries in the world. Second, there are large variations in the extent of redistribution, ranging in 2019 from less than 10% in several Sub-Saharan countries to over 30% in countries such as the United States, Norway, and South Africa. Overall redistribution follows clear regional patterns, being highest in Northern America and Europe, and lowest in Latin America, Sub-Saharan African (excluding Southern Africa), and Asia.

Figure 10 shows that, in all regions of the world, tax-and-transfer systems mostly redistribute income from the top 10% to the bottom 50%. Appendix Figure C3 reproduces this result with education distributed using the school attendance approach. On net, the middle 40% generally neither benefit nor lose much from the tax-and-transfer system. The net transfer received by the bottom 50% is highest in the Anglosphere and Western Europe, and lowest in Asia and Africa.

Transfers Account for 90% of Redistribution Combining our previous results on the lack of strong tax progressivity and large differences in the size and distributional incidence of transfers, we can expect transfers to be the dominant drivers of redistribution. We formalize this in Table 2, which compares how inequality changes before and after removing taxes and adding transfers to individual incomes. Appendix Table C1 reproduces these findings with education distributed using the school attendance approach. In 2019, the top 10% to bottom 50% income ratio was approximately $r = 18$ in the average country (calculated as the population-weighted average of the indicator across all countries). Removing taxes barely affects inequality, while adding government transfers reduces inequality by over 3 percentage points. By this measure, taxes account for less than 10% of the effect of government redistribution on inequality, while transfers account for over 90%. There are significant variations across regions: the contribution of taxes reaches about 30% in the Anglosphere and Africa, while it is negative in Eastern Europe and Latin America, where taxes increase inequality. Overall, transfers largely dominate taxes in reducing inequality in most countries in the world.

Table 3 provides more detailed results on the redistributive impact of different categories of taxes and transfers.[11] Appendix Table C2 reproduces these findings with education distributed using the school attendance approach. Estimates from existing DINA studies do not allow us to derive such a detailed decomposition, so this table uses our own estimates for Europe and Latin America, which explains why the results differ slightly from those in Table 2. We calculate the progressivity of each type of tax or transfer as the percent reduction in inequality it occasions

[11] See Appendix Table A1 for similar results in 1980.

(as in equation 6 above). For instance, the statistic for personal income taxes γ_{PIT} corresponds to the percent reduction in the top 10% to bottom 50% ratio before and after removing personal income taxes from pretax income. Positive values indicate that the tax or transfer reduces inequality, while negative values indicate that it increases inequality.

The first column displays the results in the average country, taking the population-weighted average of the corresponding indicators across all countries in the world. Personal income taxes and corporate taxes each reduce inequality by about 4%, while indirect taxes increase inequality by about 8%. The effect of property and wealth taxes is negligible.

The effect of transfers on inequality is significantly higher: social assistance and healthcare expenditure each reduce inequality by about 10%. All in all, the progressivity of personal income taxes and corporate taxes thus appears to be more or less cancelled by the regressivity of indirect taxes, leading to a tax system that reduces inequality by only 3% in the average country. Meanwhile, all transfers are strongly progressive, which explains why they play a dominant role in reducing inequality.

Interesting regional variation stands out. Personal income taxes play a key role in reducing inequality in the Anglosphere and Western Europe, while indirect taxes increase inequality most in Europe and Latin America. Social assistance is the most significant driver of redistribution in Europe, while healthcare plays a more important role in Africa.

3.2.3. Trends in Government Redistribution Since 1980

We now present results on the evolution of overall redistribution using two complementary indicators. Figure 11 plots the evolution of the extent of redistribution by world region, measured as the percent reduction in the top 10% to bottom 50% income ratio operated by the tax-and-transfer system. Appendix Figure C4 reproduces this figure with education distributed using the school attendance approach. This figure tells us whether government redistribution reduces inequality more today than in the past. Meanwhile, Figure 12 plots the evolution of the share of national income redistributed to the bottom 50%, which tells us to what extent redistribution increases the incomes of the poorest individuals in each region (see Appendix Figure C5 for similar results with education distributed using the school attendance approach).

Redistribution has increased in most regions. In the average country, the extent of redistribution increased from about 10% to 20% from 1980 to 2019. This average figure hides considerable heterogeneity, with significant increases in redistribution in Western Europe, the Anglosphere, and Asia compared to complete stagnation in Eastern Europe and Africa. The same result extends to the net transfer received by the bottom 50%, which increased from about 2% to

2.5% of national income in the average country but barely changed in Eastern Europe and Africa. Overall, there is no evidence of cross-country convergence in the redistributive power of tax-and-transfer systems.

3.2.4. Government Redistribution Over the Course of Development

We conclude this section with a correlational analysis of the relationship between government redistribution and economic development.

Tax Progressivity Is Uncorrelated With GDP per capita There is little correlation between tax progressivity and per capita income (Figure 13). The raw correlation between tax progressivity and GDP per capita is approximately $\rho = -0.09$. In other words, total taxation increases as countries develop, but there is little progressivity in the increase, and little tax progressivity overall: effective taxation on the poorest rises in parallel to effective taxation on the richest, and started at a similar rate. Overall, the tax system appears to increase or reduce inequality by less than 10%, throughout the vast majority of countries in the world.

Transfer Progressivity Is Positively Correlated With GDP By contrast, low-income households benefit from much greater government transfers in rich countries than in poor countries. Figure 14 plots the share of national income received by the bottom 50% in the form of cash and in-kind transfers (expressed as a share of national income), against GDP per capita.[12] Appendix Figure C6 reproduces this figure with education allocated using the school attendance approach. The raw correlation between the two variables is $\rho = 0.64$. In Anglosphere and Western European countries, the bottom 50% receive 15-20% of national income, versus 2-8% in most African countries. Transfers thus appear to reduce inequality much more in high-income countries than in low-income countries. There are interesting exceptions, however. For instance, the bottom 50% benefit from about the same transfer in South Africa as in China, despite the latter being slightly richer.

This positive relationship between transfers and development is not only driven by the fact that high-income countries have larger governments: high-income countries also provide more progressive transfers. Appendix Figure A14 reproduces Figure 14, but focusing on transfers received by the bottom 50% as a fraction of total public spending. There is a large positive relationship between the two variables. In many African countries, less than 25% of

[12]This figure slightly differs conceptually from the previous one in that it shows the absolute level of spending rather than transfers expressed as a percentage of income. The result would be similar if we were to express transfers received as a share of pretax income.

government expenditure accrues to the bottom 50%, while this share exceeds 40% in nearly all Anglosphere and Western European countries. This result is driven by the fact that high-income countries spend much more on social assistance and healthcare than low-income countries. The bulk of transfers in low-income countries correspond to other forms of public goods, such as administration or public order and safety, which we distribute proportionally to disposable income, that is, in a highly unequal way.

Net Redistribution Is Positively Correlated with GDP Putting these two results together yields Figure 15, which plots GDP per capita versus the percent reduction in the top 10% to bottom 50% income ratio through taxes and transfers (see Appendix Figure C7 for the same figure with education distributed using the school attendance approach). The raw correlation between total tax-and-transfer progressivity and development is $\rho = 0.53$. Outliers exist—where income is low but progressivity high, or vice versa—but the general trend looks more like that of Figure 14 than that of Figure 13. The progressivity of transfers dominates that of taxes, and high-income countries generally redistribute through transfers.

High-income countries thus appear to redistribute significantly more than low-income countries, both today and in 1980. This can be seen more clearly in Appendix Figures A15 and A16, which plot the evolution of total fiscal progressivity and net transfers received by the bottom 50%, respectively, by country income group. High-income countries redistribute more than lower-income countries, and this gap has not changed much over time—if anything, it has widened. Upper middle-income countries have been catching up since the turn of the century, but the effect is almost entirely explained by China's fiscal transformation.[13]

3.3. Predistribution versus Redistribution: A Global Perspective

We conclude this paper with a brief analysis of the relationship between pretax and posttax income inequality. We start by showing that pretax inequality is the dominant driver of cross-country differences in posttax inequality. While tax-and-transfer systems do vary substantially across countries, they do not significantly alter the ranking of which countries are the most or least unequal in the world. Moving beyond this direct effect of taxes and transfers, we then provide suggestive evidence that redistribution may have significant indirect effects on pretax

[13]While China's macroeconomic tax rate (i.e., total public revenue from taxes) hovered near 15% of national income in the 1980s and 1990s, it has since risen to more than 25% of national income. See Bachas et al. (2022) for further discussion on the case of China. Taxes have not become more progressive in China, nor are transfers much more targeted towards the poor than they were pre-2000, but the aggregate revenue of China's government allows it to more effectively transfer a larger share of national income to the poorest.

inequality. Accounting for this indirect effect would potentially lead to putting a much greater weight on redistributive policies in accounting for cross-country differences in inequality.

3.3.1. Pretax Versus Posttax Inequality

We start by comparing the bottom 50% share in terms of pretax national income and posttax national income in all 151 countries in 2019 (see Figure 16, and Appendix Figure C8 for comparable results with education distributed based on school attendance).[14] This comparison provides direct suggestive evidence on the role of pretax inequality ("predistribution") versus taxes and transfers ("redistribution") in shaping the final distribution of income. If posttax inequality is 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 is entirely driven by the distribution of income before taxes and transfers, 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 very strong correlation between pretax and posttax inequality: notwithstanding a few exceptions, the ranking of countries in terms of pretax and posttax income inequality is almost exactly the same. This finding goes in line with previous evidence focusing on Europe and the United States (Blanchet, Chancel, and Gethin, 2022). A useful way of quantifying this relationship is to run a cross-country regression of the posttax bottom 50% income share on the bottom 50% pretax income share in 2019. This regression delivers an R-Squared of over 0.8. By this measure, "predistribution" accounts for over 80% of cross-country variations in income inequality, while "redistribution" accounts for less than 20%.

We extend this analysis to the bottom 50%, top 10%, and top 1% income shares by region in the appendix (see Appendix Figures A18, A19, and A20). The results are similar: regions with the most equal pretax income distributions generally also have the most equal posttax income distributions.

3.3.2. Redistribution Versus Pretax Inequality

A natural limitation of the previous analysis is that redistribution might indirectly affect pretax inequality. For instance, greater investments in social assistance, education, and healthcare may play a key role in generating higher pretax income growth for low-income households. Answering this question rigorously would require data sources and identification strategies that

[14] See also Appendix Figure A17 for comparable results on the top 10% to bottom 50% average income ratio.

go beyond those mobilized in this paper. However, it is still interesting to investigate whether countries redistributing more are also those that display the lowest levels of pretax inequality.

Figure 17 plots the extent of redistribution versus the bottom 50% pretax income share across countries in 2019 (see Appendix Figure C9 for the specification with education distributed based on school attendance).[15] The correlation between the two variables is positive and significant ($\rho = 0.33$): countries with more progressive tax-and-transfer systems display lower levels of pretax inequality on average. There are important exceptions, however, including highly unequal countries with substantial government redistribution (such as the United States and South Africa), but also equal countries with weakly progressive tax-and-transfer systems (such as many Eastern European countries). This modest but positive correlation is again consistent with previous evidence focusing on Europe and the United States (Blanchet, Chancel, and Gethin, 2022).

One concern is that it may be easier to reduce inequality through taxes and transfers in more unequal countries, given that relative incomes at the bottom of the distribution are particularly low in these countries. We thus complement this analysis with a focus on the net transfer received by the bottom 50%, expressed as a share of national income, in Figure 18 (see Appendix Figure C10 for the specification with education distributed based on school attendance). The correlation between this measure of redistribution and the bottom 50% pretax income share is now much higher, reaching $\rho = 0.54$.[16]

The takeaway is that taxes and transfers could well contribute to strongly reducing pretax inequality indirectly. This would potentially lead to putting a much greater weight on redistributive policies in explaining cross-country differences in inequality. There are still important exceptions, however: for instance, South Africa redistributes more than India, yet displays dramatically higher levels of pretax inequality. Similarly, Latin American countries are characterized by high levels of pretax inequality at the same time as quite progressive tax-and-transfer systems. Our analysis suggests that higher redistribution can lead to lower pretax inequality, but this is far from an iron law. Understanding the conditions under which redistributive policies successfully curb income disparities and their exact contribution to cross-country differences in predistribution represents a fruitful avenue for future research.

[15] See also Appendix Figure A21 for comparable results on the top 10% to bottom 50% average income ratio.
[16] See Appendix Figure A22 for comparable results on the top 10% to bottom 50% average income ratio.

4. Conclusion

In this paper, we have constructed new estimates of the distributional incidence of taxes and transfers in 151 countries from 1980 to 2019. Combining data from several sources on tax-and-transfer progressivity, we derived estimates of redistribution that are consistent, comprehensive, and comparable across countries and over time. We showed that our simplified methodology is able to replicate results from existing work remarkably well.

Drawing on this database, we have uncovered a number of new stylized facts on the evolution of fiscal progressivity around the world since 1980. Most strikingly, we have documented that the global profile of taxation was and has remained essentially flat. Anglosphere countries, despite recent well-documented decreases in tax progressivity, remain the countries whose taxes do the most to reduce inequality. Other regions' tax profiles are less progressive—and, in the case of many Latin American and Eastern European countries, even regressive overall.

Because transfers strongly benefit low-income households, however, tax-and-transfer systems always reduce inequality. They do so much more in high-income than in low-income countries, mainly because the former display larger welfare states, but also because they better target government transfers towards low-income households. There has been little cross-country convergence in redistribution. If anything, the gap has only widened: from 1980 to 2019, the share of national income transferred to low-income households increased in Western Europe and the Anglosphere while it stagnated in Africa.

As a result, taxes and transfers have done little to change the global picture of inequality. In a static sense, predistribution matters demonstrably more than redistribution, explaining about 80% of cross-country variations in posttax income inequality. And the consequences of inequality in redistribution across countries are stark: the poorest people, in the poorest countries, benefit less from redistribution and public services than do the poorest in richer countries.

There remains a need to better understand what drives differences in distribution and redistribution, across countries and over time. For any society the optimal levels, composition, and distributional incidence of taxes and transfers must surely depend on a range of factors whose investigation lies beyond the scope of this article. We hope that the new database constructed in this paper—which estimates the levels, composition, and distributional incidence of all taxes and transfers, worldwide since 1980—will contribute to further evidence-based examination of efficiency and equity in fiscal policy.

References

Bachas, Pierre, Matthew H. Fisher-Post, Anders Jensen, and Gabriel Zucman (2022). "Globalization and Factor Income Taxation". NBER Working Paper 29819.

Bachas, Pierre, Lucie Gadenne, and Anders Jensen (2022). "Informality, Consumption Taxes and Redistribution". NBER Working Paper 27429.

Blanchet, Thomas (2022). Personal communication.

Blanchet, Thomas and Lucas Chancel (2016). "National Accounts Series Methodology". World Inequality Lab Working Paper 2016/1.

Blanchet, Thomas, Lucas Chancel, Ignacio Flores, and Marc Morgan (2021). *Distributional National Accounts Guidelines: Methods and Concepts Used in the World Inequality Database*. Tech. rep.

Blanchet, Thomas, Lucas Chancel, and Amory Gethin (2022). "Why Is Europe More Equal Than the United States?" In: *American Economic Journal: Applied Economics* 14.4, pp. 1–40.

Bozio, Antoine, Bertrand Garbinti, Jonathan Goupille-Lebret, Malka Guillot, and Thomas Piketty (2018). "Inequality and Redistribution in France, 1990-2018: Evidence from Post-Tax Distributional National Accounts (DINA)". Working Paper.

– (2022). "Predistribution vs. Redistribution: Evidence from France and the U.S." WID.world Working Paper.

Bruil, Arjan, Céline van Essen, Wouter Leenders, Arjan Lejour, Jan Möhlmann, and Simon Rabaté (2022). "Inequality and Redistribution in the Netherlands". Working Paper.

Chancel, Lucas, Denis Cogneau, Amory Gethin, Alix Myczkowski, and Anne-Sophie Robilliard (2023). "Income inequality in Africa, 1990–2019: Measurement, patterns, determinants". In: *World Development* 163.1, pp. 106–162.

Chancel, Lucas and Thomas Piketty (2021). "Global Income Inequality, 1820–2020: the Persistence and Mutation of Extreme Inequality". In: *Journal of the European Economic Association* 19.6, 3025–3062.

Chancel, Lucas, Thomas Piketty, Emmanuel Saez, and Gabriel Zucman (2022). *World Inequality Report 2022*. Tech. rep.

Chatterjee, Aroop, Léo Czajka, and Amory Gethin (2021). "Can Redistribution Keep Up with Inequality? Evidence from South Africa, 1993-2019". Working Paper.

De Rosa, Mauricio, Ignacio Flores, and Marc Morgan (2022). "More Unequal or Not as Rich? Revisiting the Latin American Exception". Stone Center for Inequality Studies Working Paper Series.

Ernst & Young (2006-23). *Worldwide Personal Tax and Immigration Guides*. URL: https://www.ey.com/en_gl/tax-guides/tax-guide-library-archive.

Eurostat (2019). *Manual on sources and methods for the compilation of COFOG statistics*. Eurostat.
Fisher-Post, Matthew, Nicolas Herault, and Roger Wilkins (2022). "Distributional National Accounts for Australia, 1991-2018". Working Paper.
Flores, Ignacio, Mauricio De Rosa, and Marc Morgan (2022). "More Unequal or Not as Rich? Revisiting the Latin American Exception". Working Paper.
Fullerton, Don and Gilbert E Metcalf (2002). "Tax incidence". In: *Handbook of public economics* 4, pp. 1787–1872.
Gerber, Claudia, Alexander Klemm, Li Liu, and Victor Mylonas (2020). "Income Tax Progressivity: Trends and Implications". In: *Oxford Bulletin of Economics and Statistics* 82.2, pp. 365–386.
Gethin, Amory (2022). "Who Benefits from Public Goods? Evidence from South Africa". Working Paper.
– (2023). "Public Services and Global Poverty Reduction". Unpublished.
International Labour Organization (2020). *ILO modelled estimates database, ILOSTAT [database]*. URL: https://ilostat.ilo.org/data/.
Jensen, Anders (2022). "Employment structure and the rise of the modern tax system". In: *American Economic Review* 112.1, pp. 213–234.
Kakwani, Nanak C (1977). "Measurement of tax progressivity: an international comparison". In: *The Economic Journal* 87.345, pp. 71–80.
Lambert, Peter J (1992). *The distribution and redistribution of income*. Springer.
Lustig, Nora, ed. (2018). *Commitment to Equity Handbook: Estimating the Impact of Fiscal Policy on Inequality and Poverty*. Brookings Institution Press.
– (2023). *Commitment to equity handbook: Estimating the impact of fiscal policy on inequality and poverty*. Brookings Institution Press.
Musgrave, Richard A (1953). "On incidence". In: *Journal of Political Economy* 61.4, pp. 306–323.
OECD (2022). *Revenue Statistics 2022*. OECD.
Peter, Klara Sabirianova, Steve Buttrick, and Denvil Duncan (2010). "Global reform of personal income taxation, 1981-2005: Evidence from 189 countries". In: *National Tax Journal* 63.3, pp. 447–478.
Piketty, Thomas (2022). *A Brief History of Equality*. Harvard University Press.
Piketty, Thomas, Emmanuel Saez, and Gabriel Zucman (2018). "Distributional National Accounts, Methods and Estimates for the United States". In: *The Quarterly Journal of Economics* 133.2, pp. 553–609.
PwC (2023). *Worldwide Tax Summaries*. URL: https://taxsummaries.pwc.com/.
Saez, Emmanuel, Joel Slemrod, and Seth H. Giertz (2012). "The Elasticity of Taxable Income with Respect to Marginal Tax Rates: A Critical Review". In: *Journal of Economic Literature* 50.1, pp. 3–50.

Strecker, Nora (2021). Personal communication.

Tax Foundation (1967). “Tax Burdens and Benefits of Government Expenditure by Income Classes 1961 and 1965”. In: *Research Publication* 9.

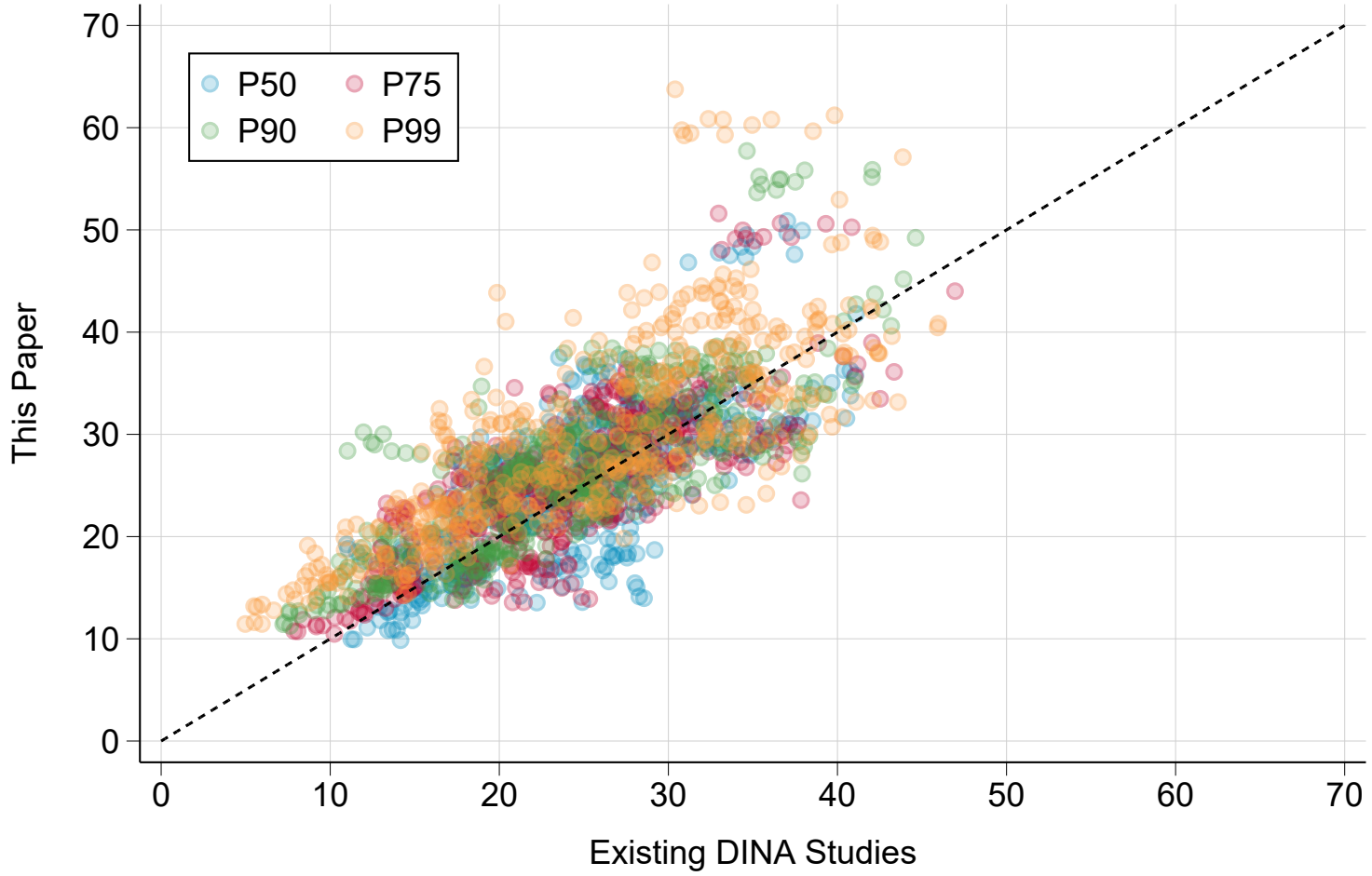
UN SNA (2008). *The System of National Accounts*. United Nations.

Vegh, Carlos A and Guillermo Vuletin (2015). “How is tax policy conducted over the business cycle?” In: *American Economic Journal: Economic Policy* 7.3, pp. 327–370.

World Bank (2018). *The state of social safety nets 2018*.

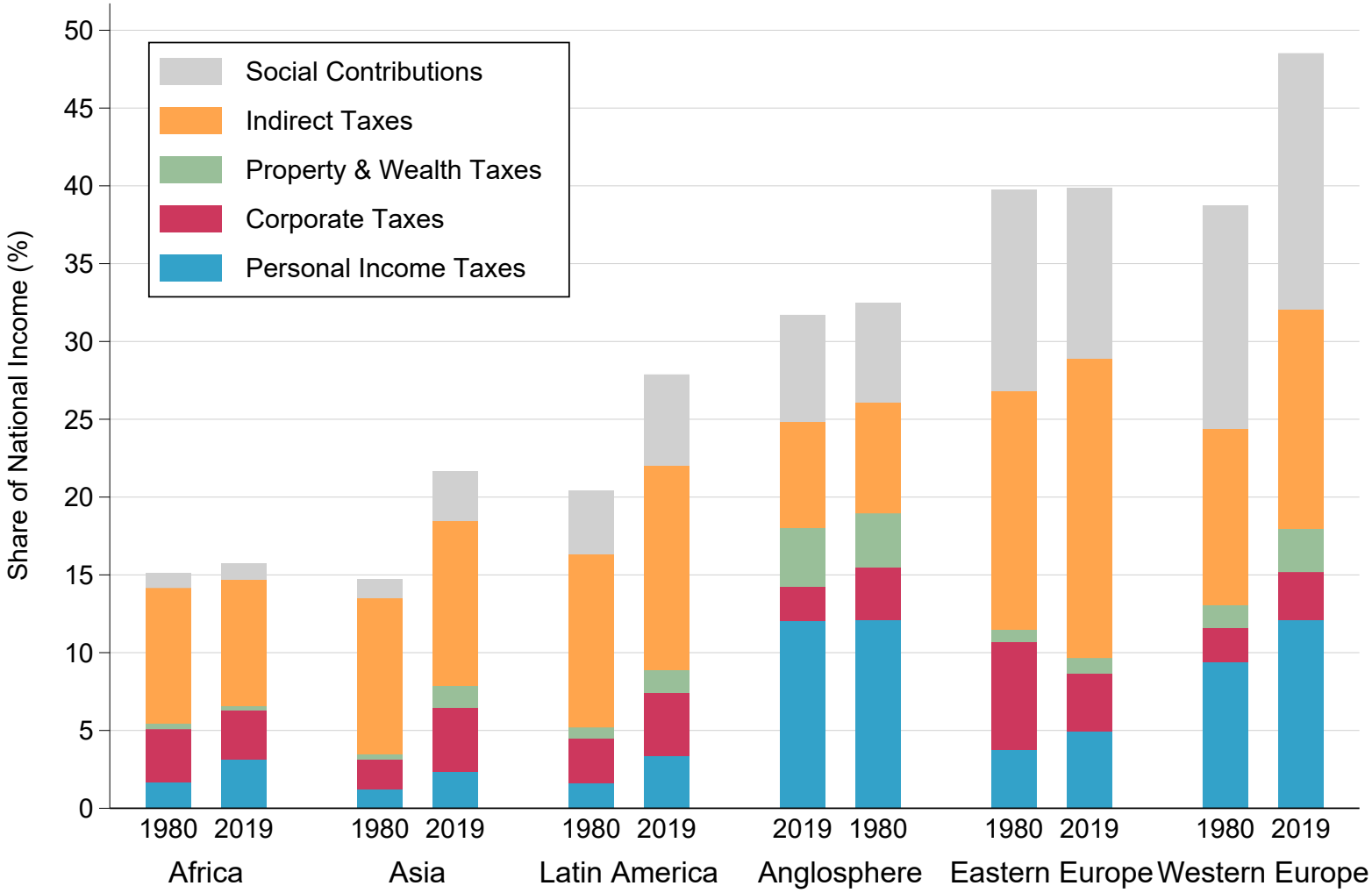
World Bank (2022). *Correcting Course: Poverty and Shared Prosperity 2022*. World Bank.

Figure 1 – Validation: Comparison of Effective Tax Rates to Existing DINA Studies at p50, p75, p90 and p99



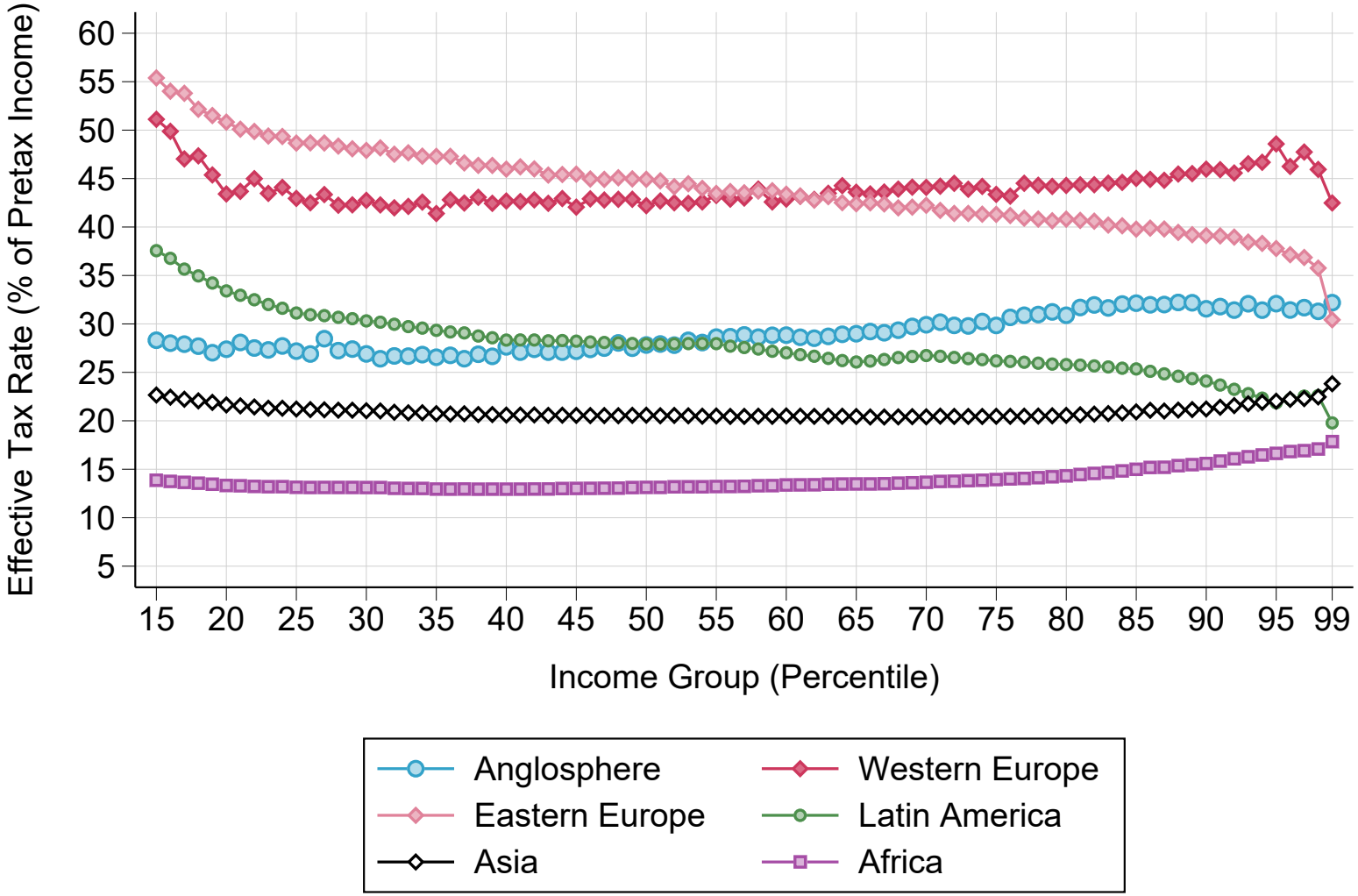
Notes. Axes represent effective tax rate at indicated points along the income distribution.

Figure 2 – Tax Revenue by World Region, 1980-2019



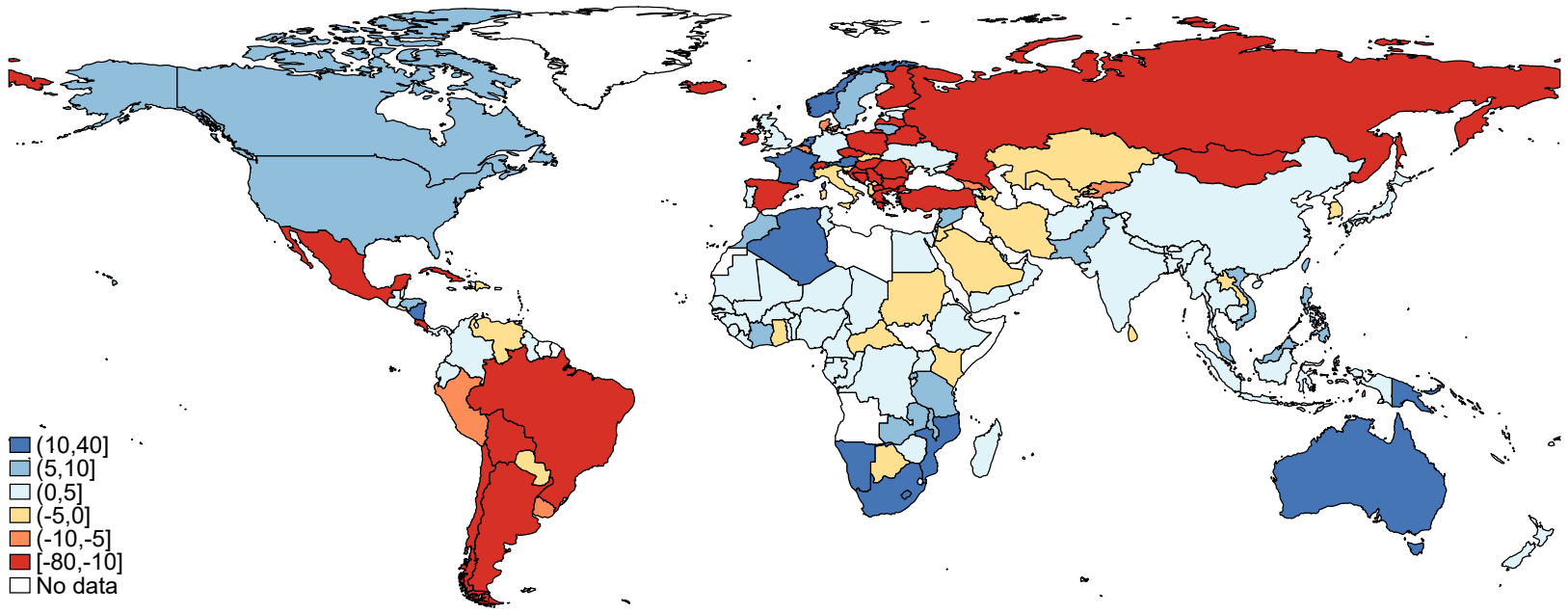
Notes. Population-weighted averages of tax revenue aggregates in each country. Data from Bachas et al. (2022).

Figure 3 – Effective Tax Rate by Income Group and World Region, 2019



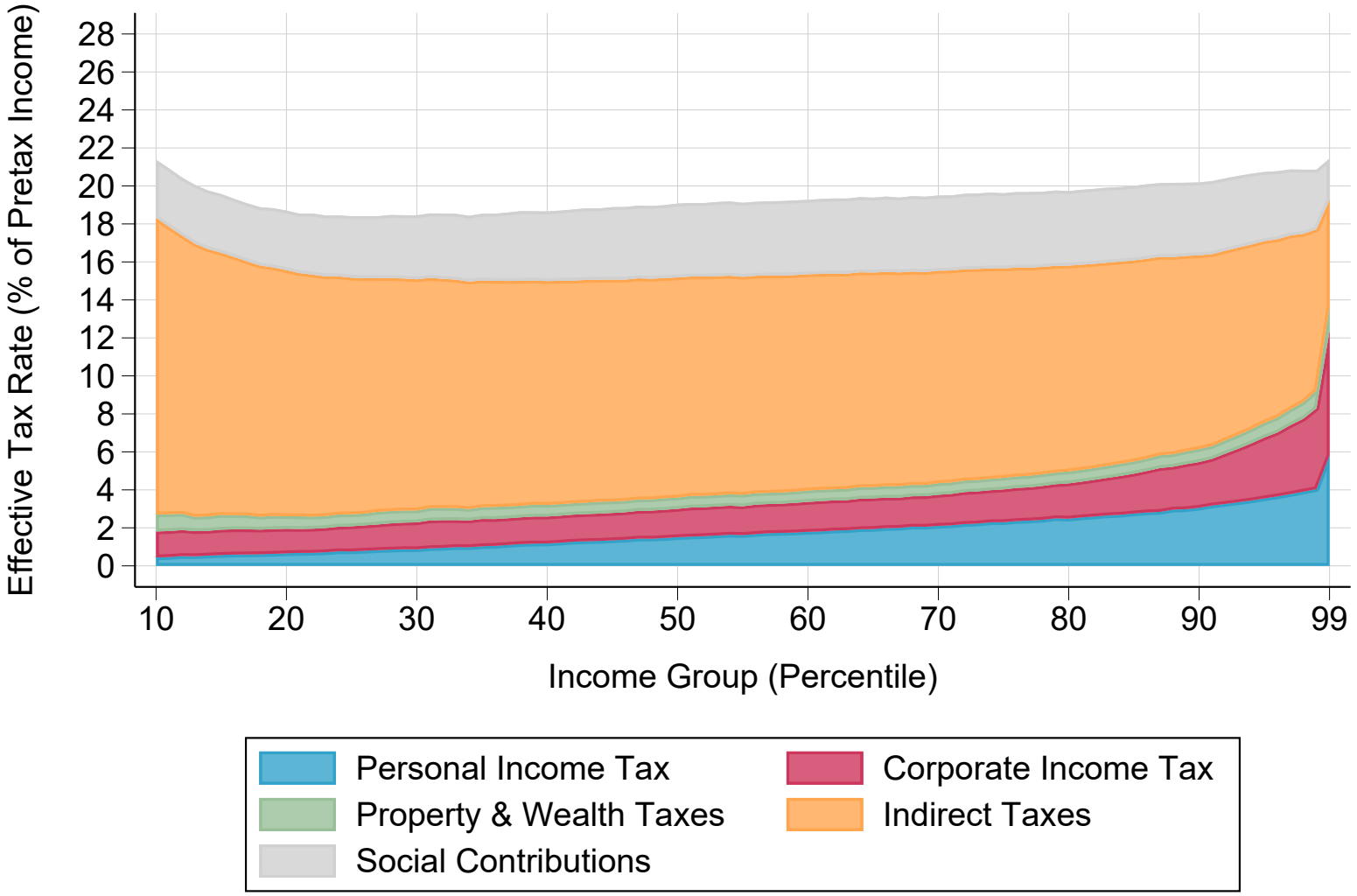
Notes. Population-weighted averages of effective tax rates by percentile in each country. Taxes include social contributions.

Figure 4 – Tax Progressivity Around the World:
Percent Reduction in Top 10% to Bottom 50% Average Income Ratio (Pretax versus Net-of-tax Income)



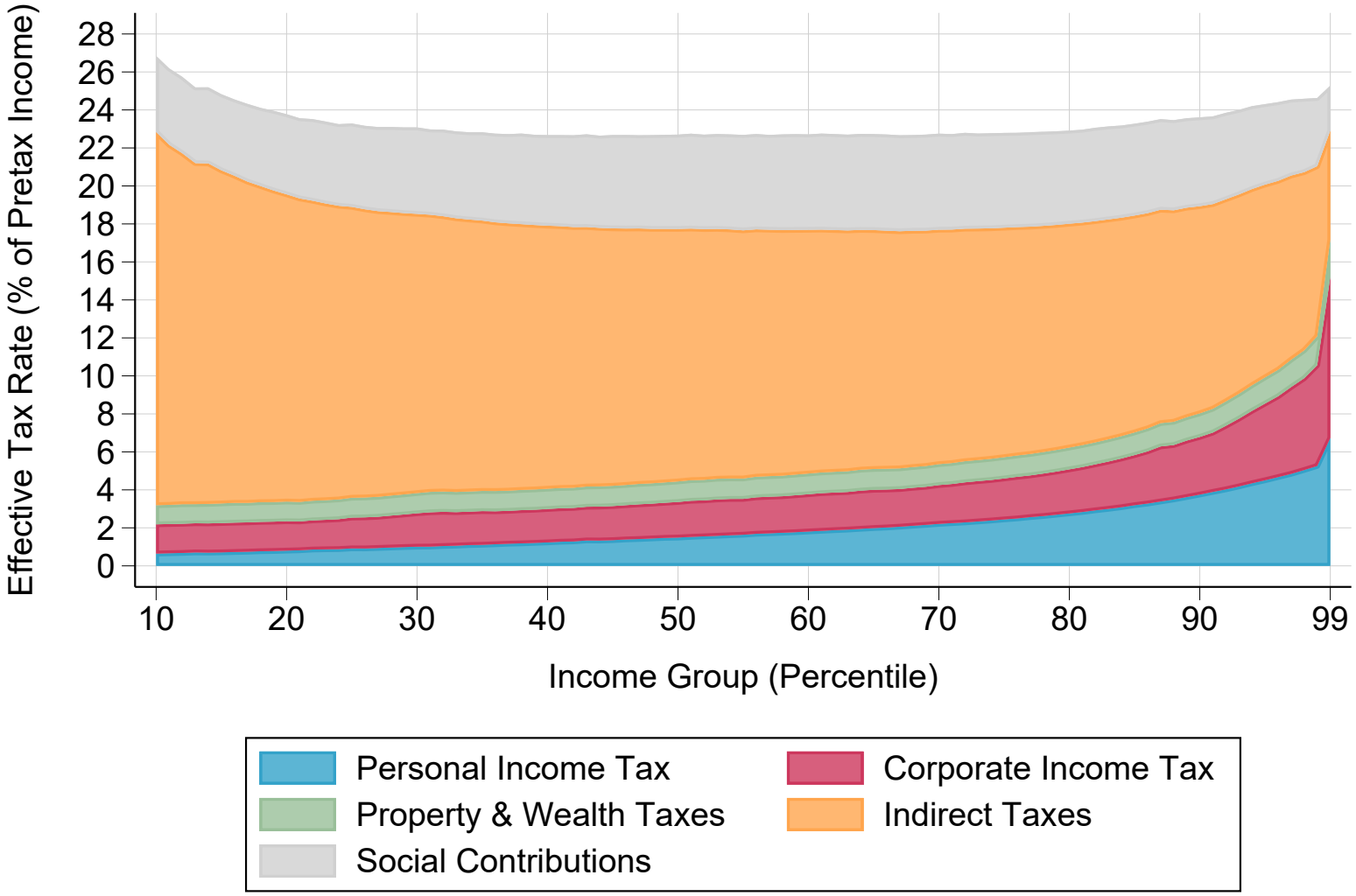
Notes. Net-of-tax income: pretax income minus taxes. Taxes include social contributions.

Figure 5 – Composition of Taxes Paid by Percentile: Global Average, 1980



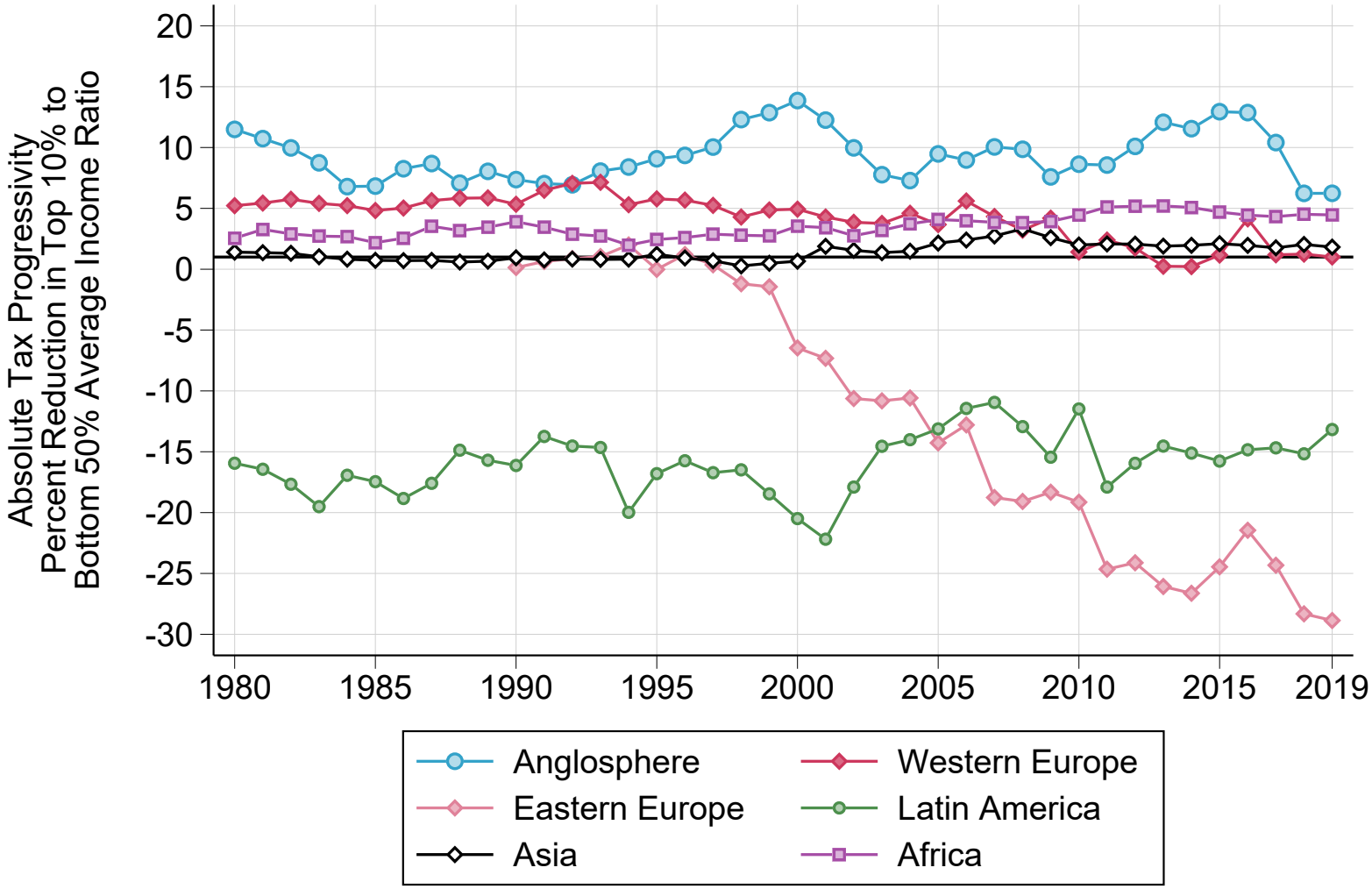
Notes. Population-weighted averages of effective tax rates by percentile in each country.

Figure 6 – Composition of Taxes Paid by Percentile: Global Average, 2019



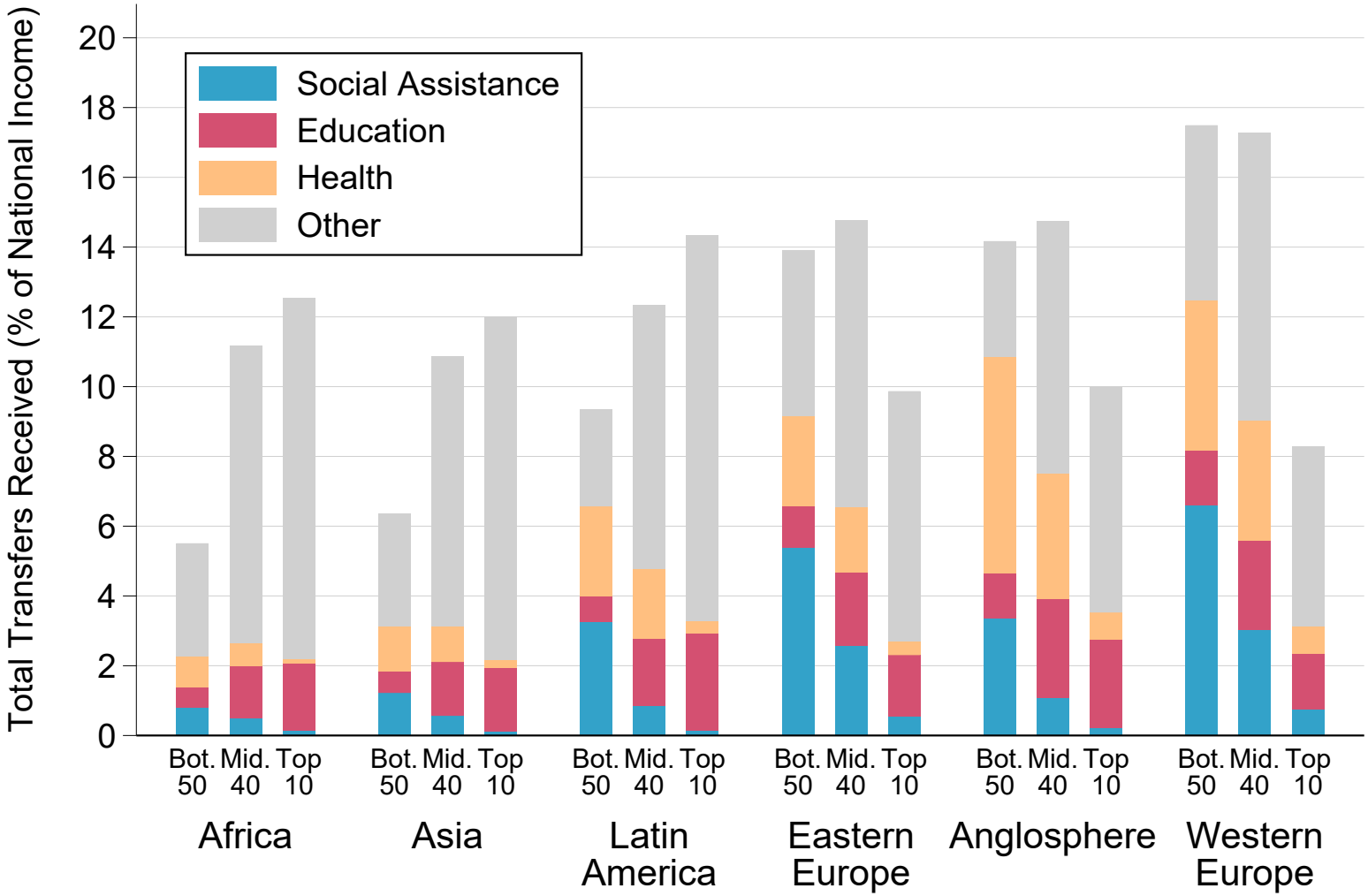
Notes. Population-weighted averages of effective tax rates by percentile in each country.

Figure 7 – Tax Progressivity by World Region, 1980-2019:
Percent Reduction in Top 10% to Bottom 50% Average Income Ratio (Pretax versus Net-of-tax Income)



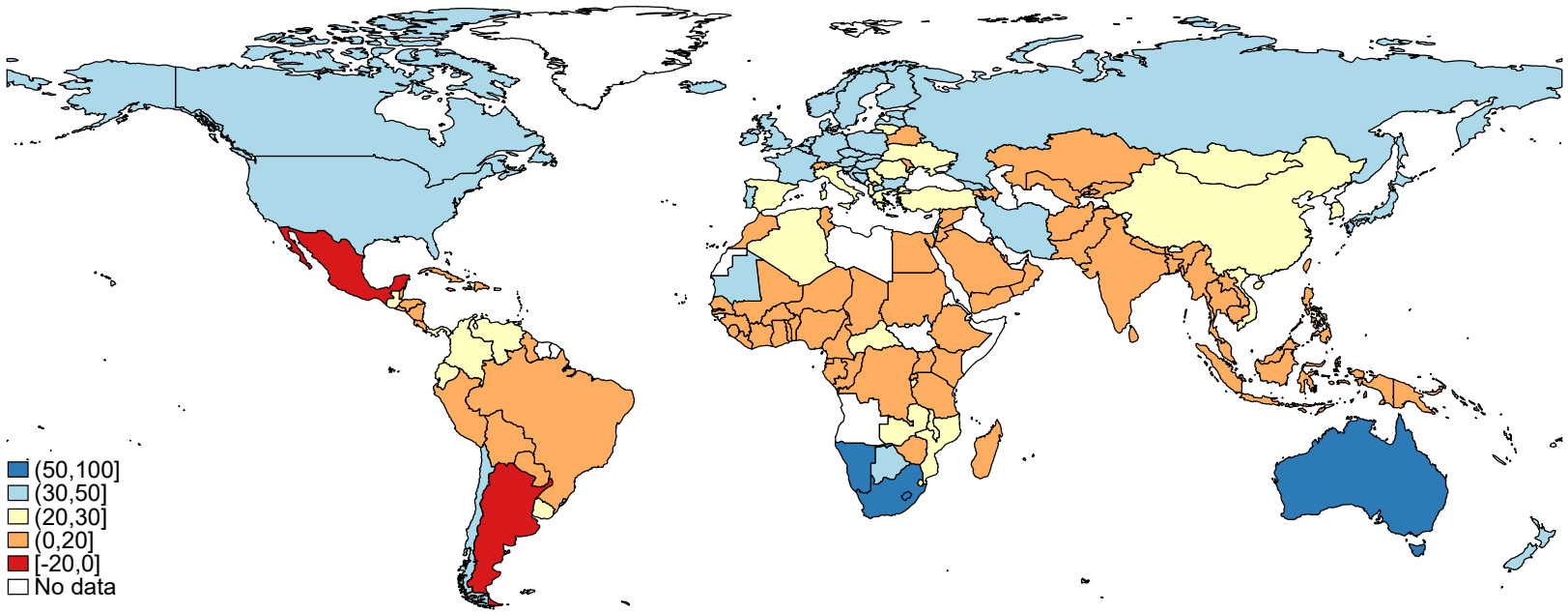
Notes. Net-of-tax income: pretax income minus taxes. Taxes include social contributions. Population-weighted averages of tax progressivity in each country.

Figure 8 – Government Transfers Received by Income Group and World Region, 2019



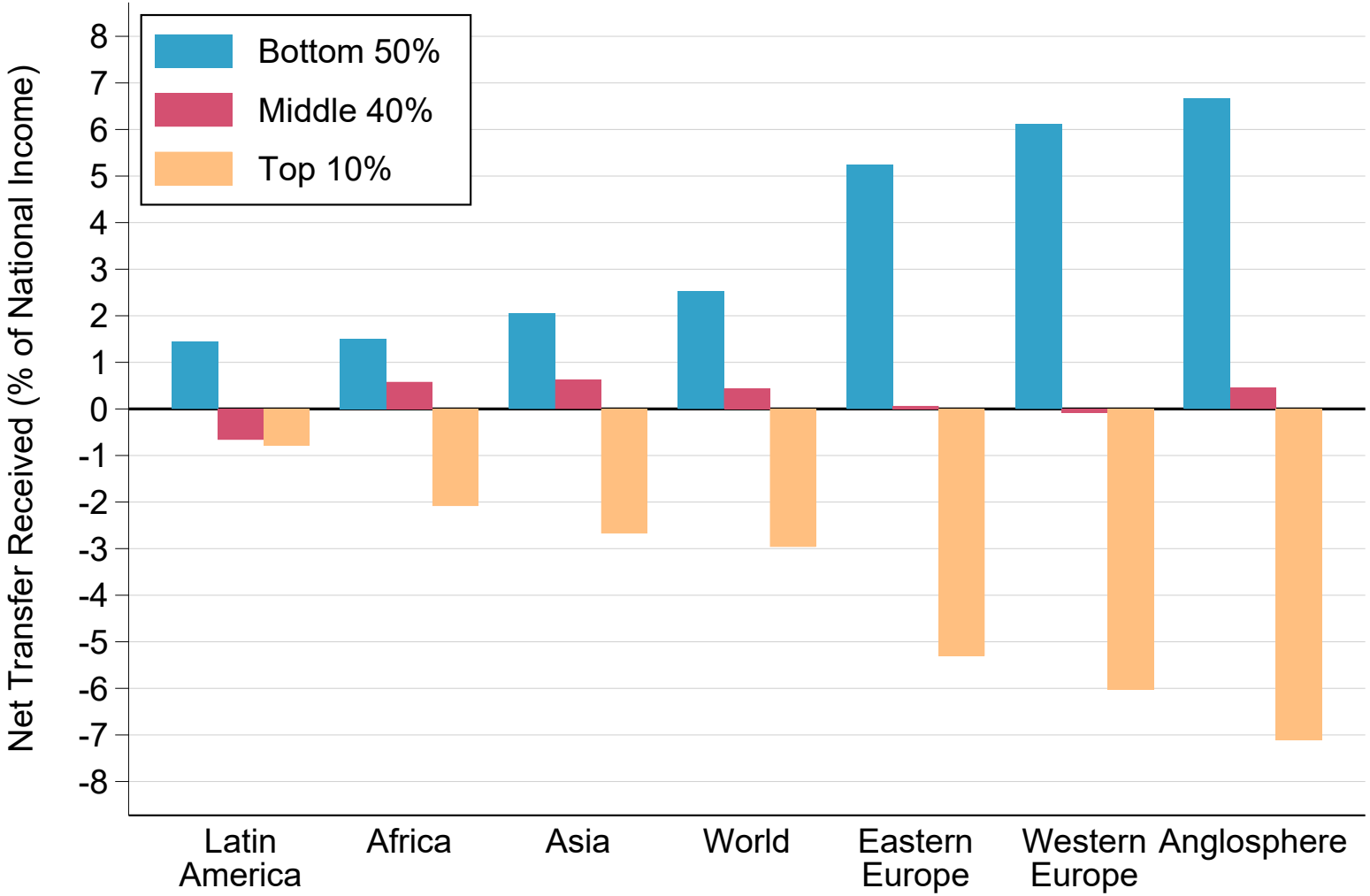
Notes. Population-weighted average of transfers received by income group in each country. Bot. 50: bottom 50% (p0p50); Mid. 40: middle 40% (p50p90); top 10: top 10% (p90p100).

Figure 9 – A Global Map of Redistribution
Percent Reduction in Top 10% to Bottom 50% Income Ratio, Pretax - Posttax



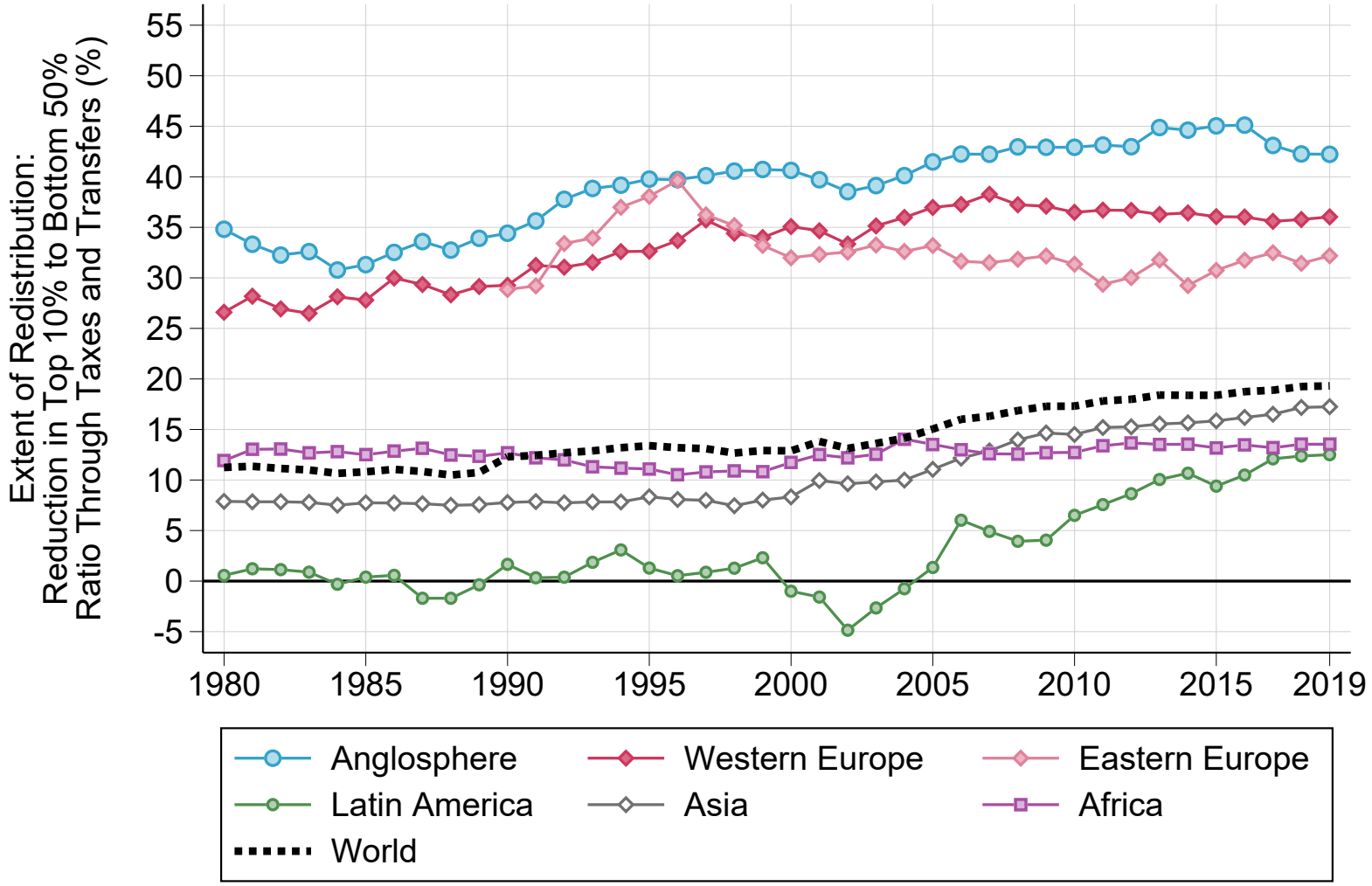
Notes. Posttax income: pretax income, minus all taxes, plus all transfers. Taxes exclude social contributions.

Figure 10 – A Global Map of Redistribution: Net Transfers Operated by the Tax-and-Transfer System Between Pretax Income Groups, 2019



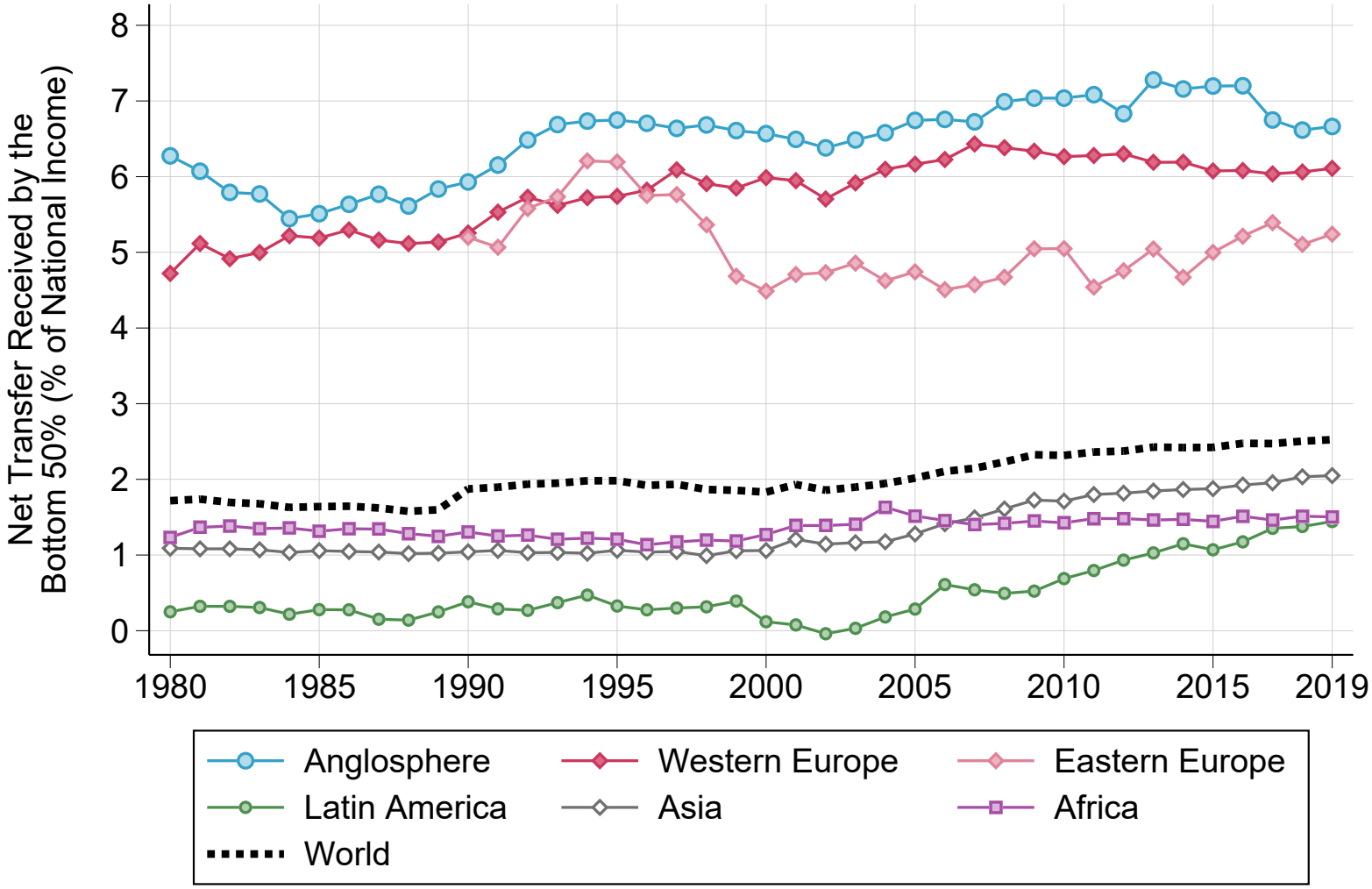
Notes. Net transfer: all transfers received minus all taxes paid, expressed as a share of national income. Taxes exclude social contributions. Population-weighted averages of net transfers received by income group in each country.

Figure 11 – Extent of Redistribution by World Region, 1980-2019:
Percent Reduction in Top 10% to Bottom 50% Income Ratio, Pretax - Posttax



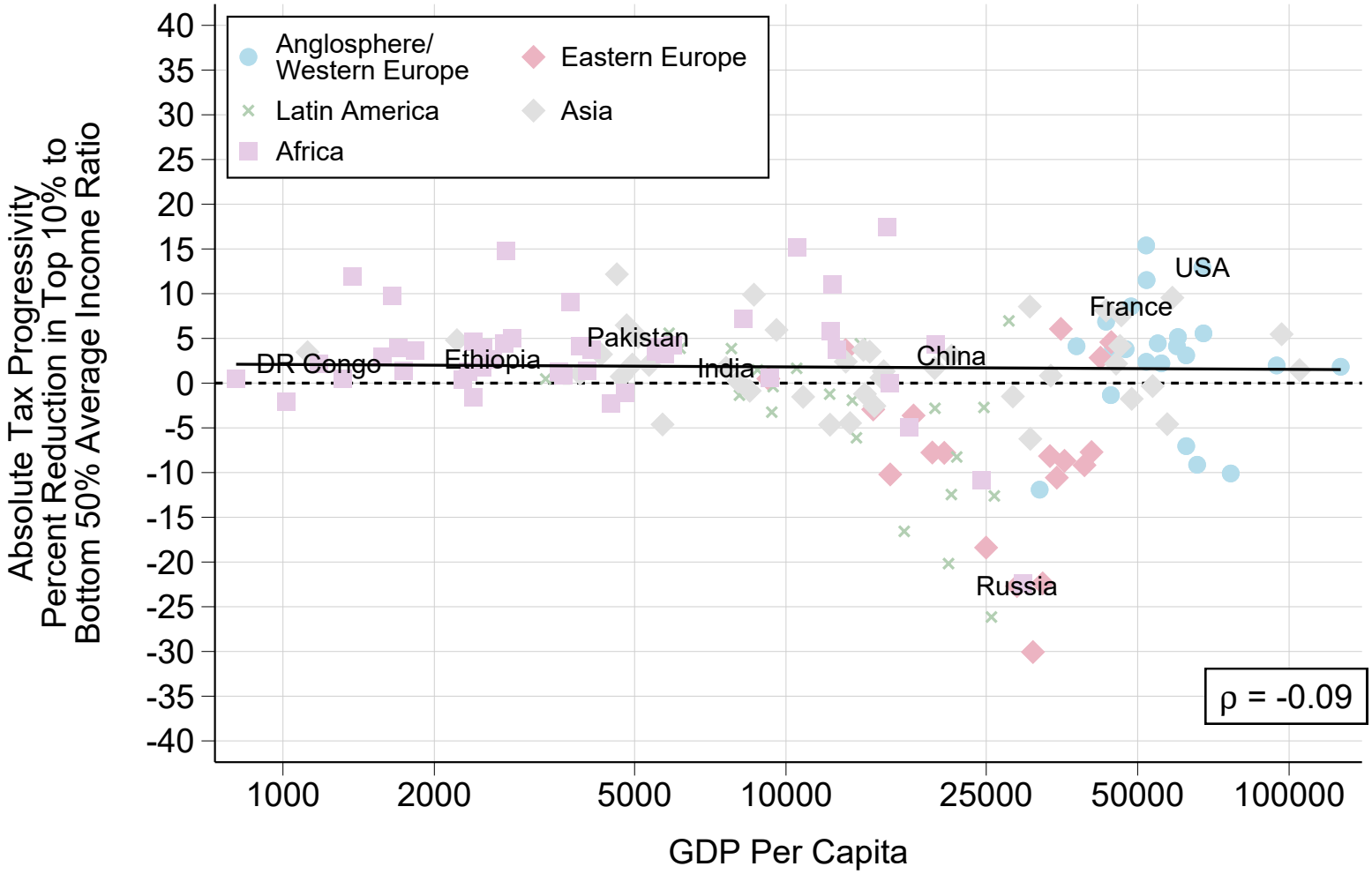
Notes. Population-weighted averages of the extent of redistribution in each country.

Figure 12 – Extent of Redistribution by World Region, 1980-2019:
Net Transfer Received by the Bottom 50% (% of National Income)



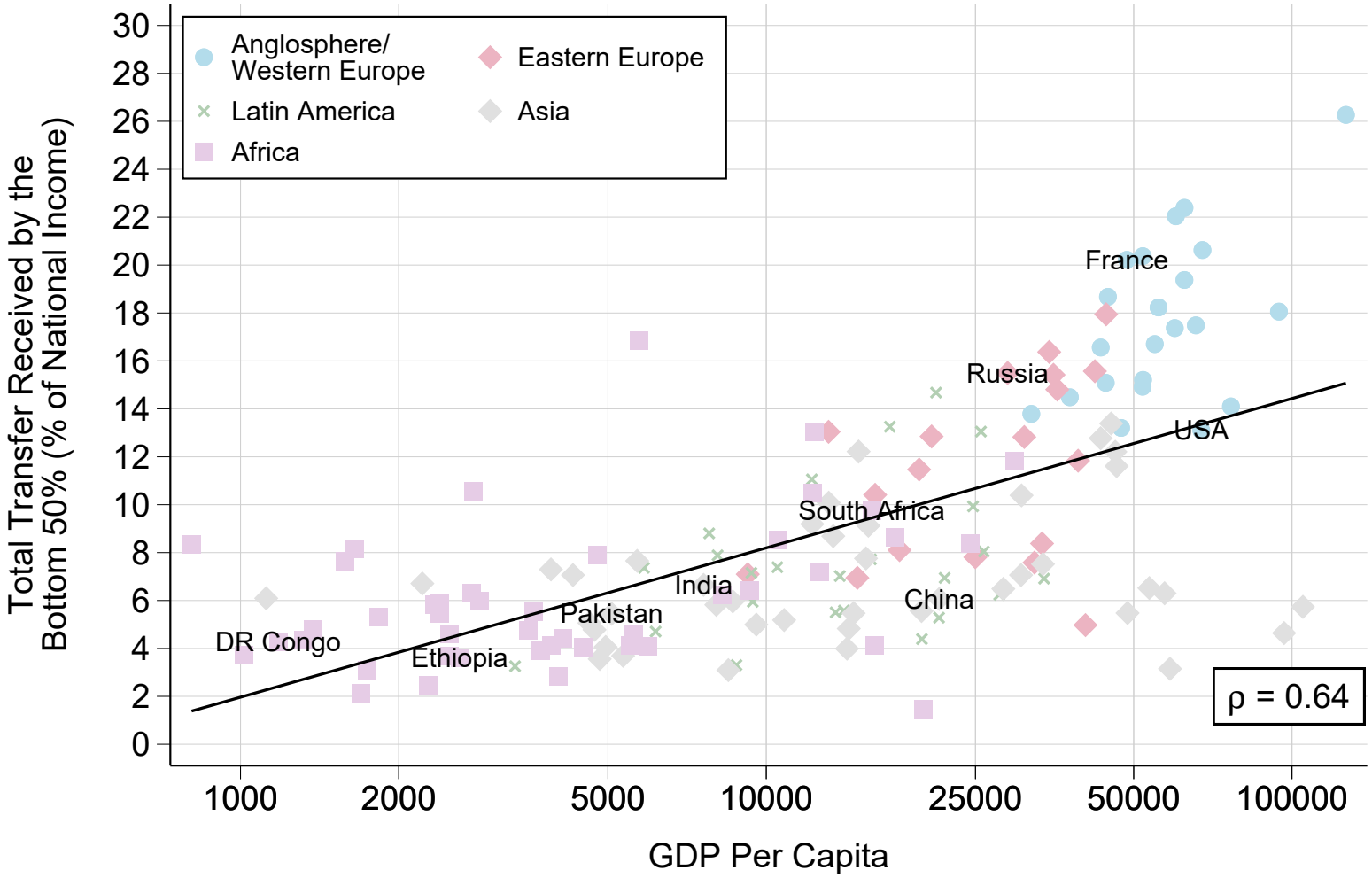
Notes. Net transfer: all transfers received minus all taxes paid, expressed as a share of national income. Population-weighted averages of net transfers received in each country.

Figure 13 – Tax Progressivity Over the Course of Development:
Percent Reduction in Top 10% to Bottom 50% Average Income Ratio (Pretax versus Net-of-tax Income)



Notes. Net-of-tax income: pretax income minus taxes. Taxes exclude social contributions.

Figure 14 – Transfer Progressivity Over the Course of Development:
Total Transfer Received by the Bottom 50% (% of National Income)



Notes. Total transfer received: sum of all transfers received (before paying taxes), expressed as a share of national income.

Figure 15 – Net Redistribution Over the Course of Development:
Percent Reduction in Top 10% to Bottom 50% Income Ratio, Pretax - Posttax

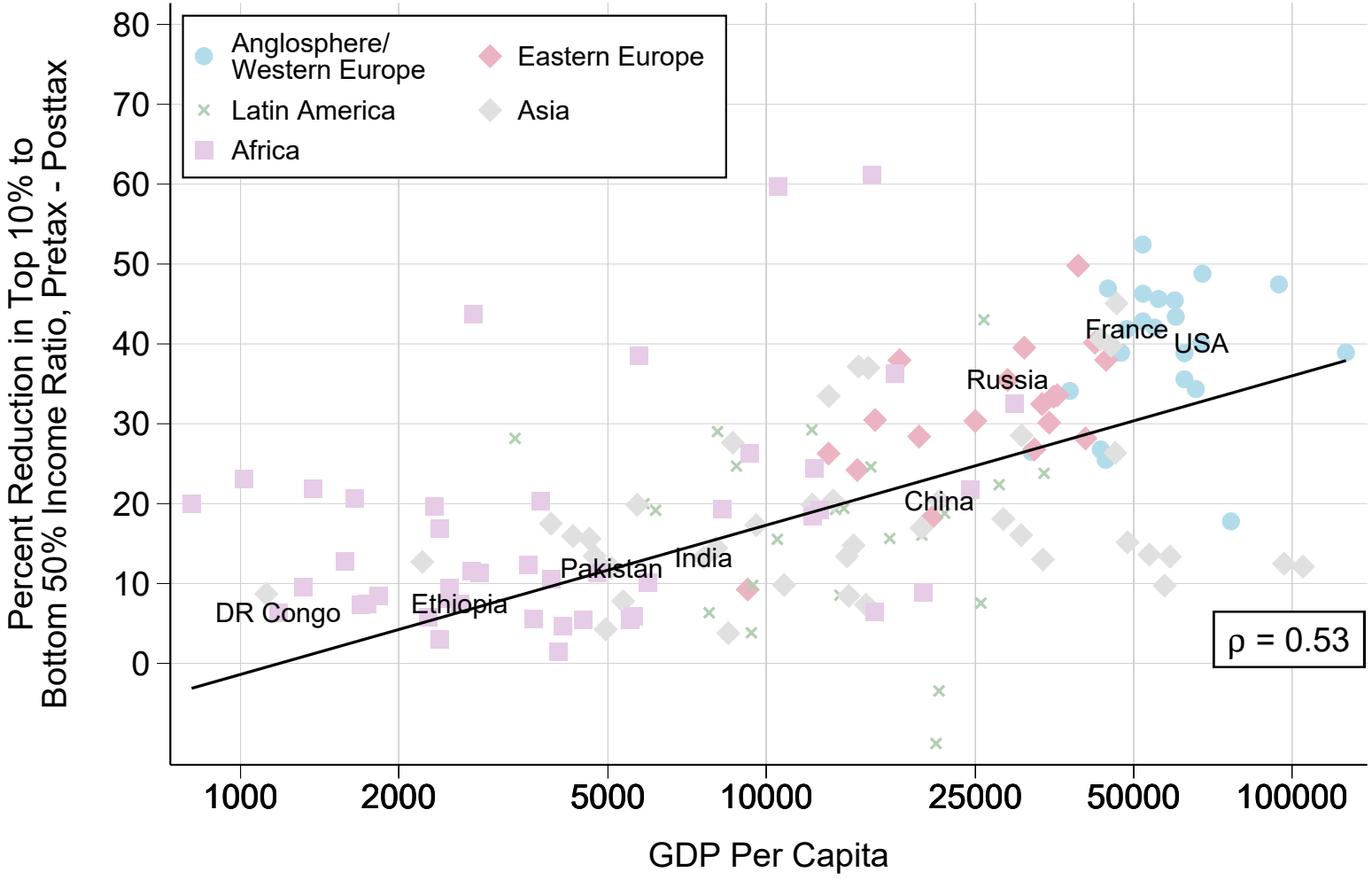


Figure 16 – Predistribution versus Redistribution:
Bottom 50% Pretax versus Posttax National Income Shares by Country, 2019

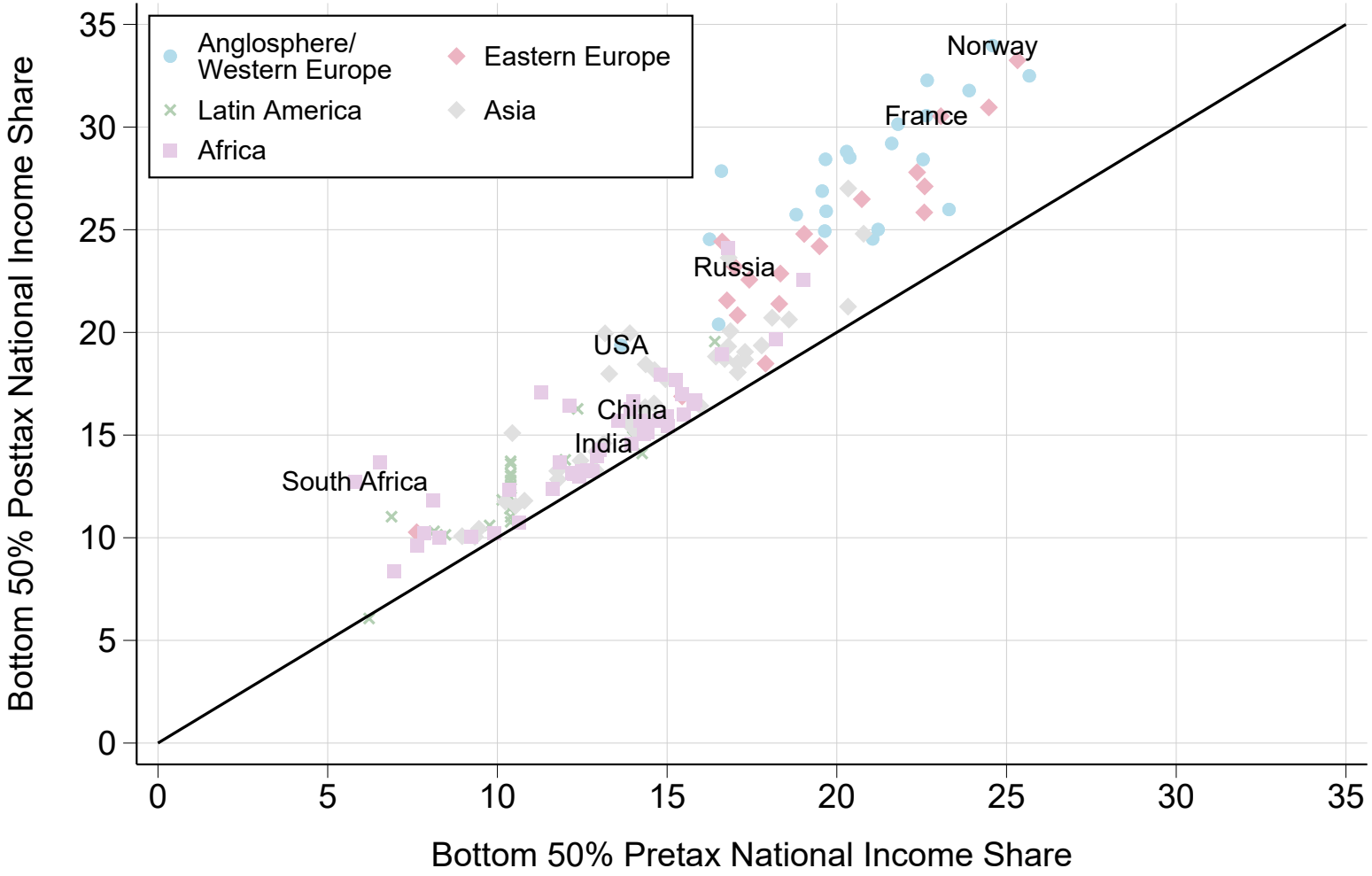


Figure 17 – Predistribution versus Redistribution:
Bottom 50% Pretax Income Share versus Extent of Redistribution, 2019

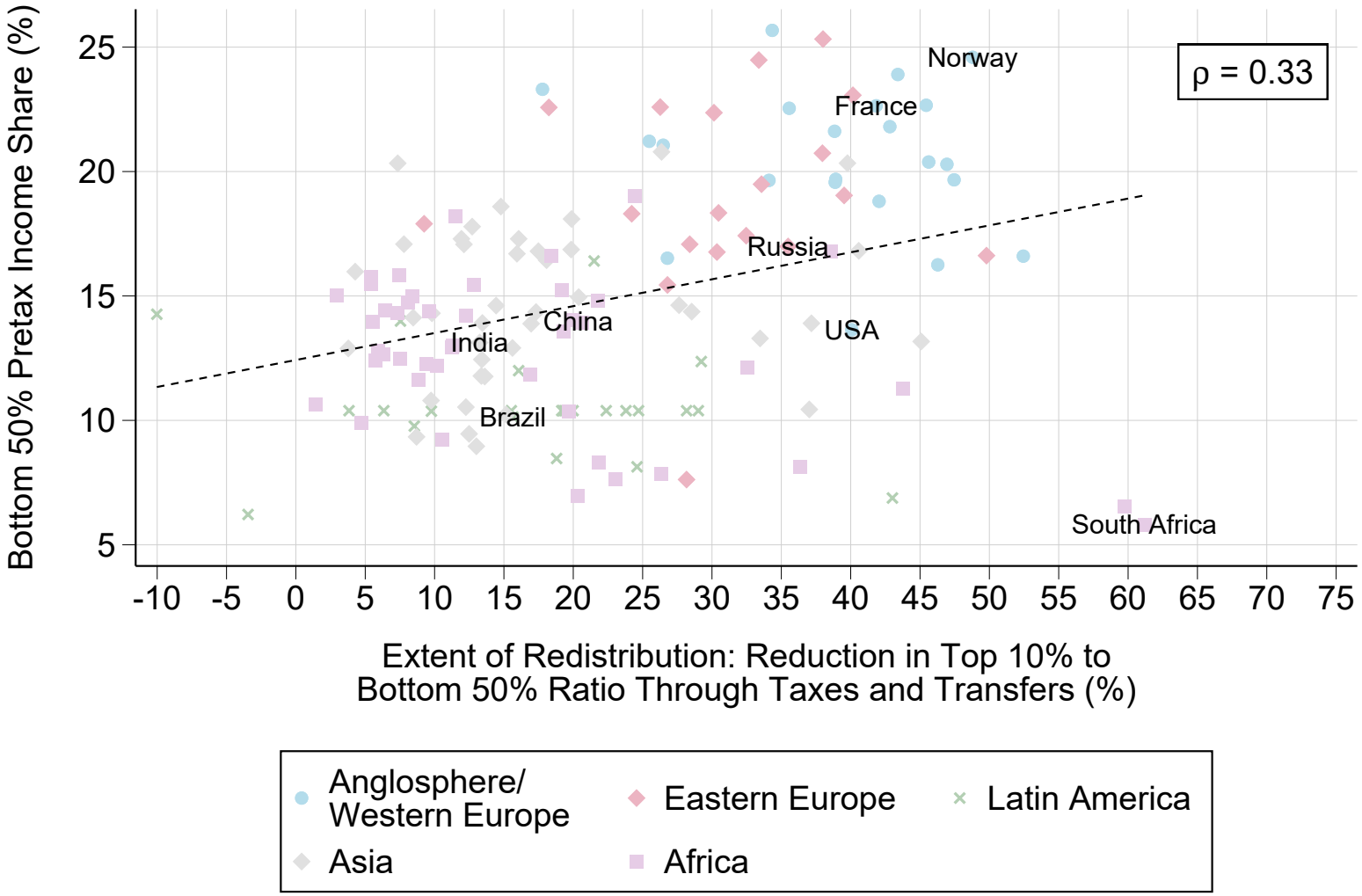


Figure 18 – Predistribution versus Redistribution:
Bottom 50% Pretax Income Share versus Net Transfer Received by the Bottom 50%, 2019

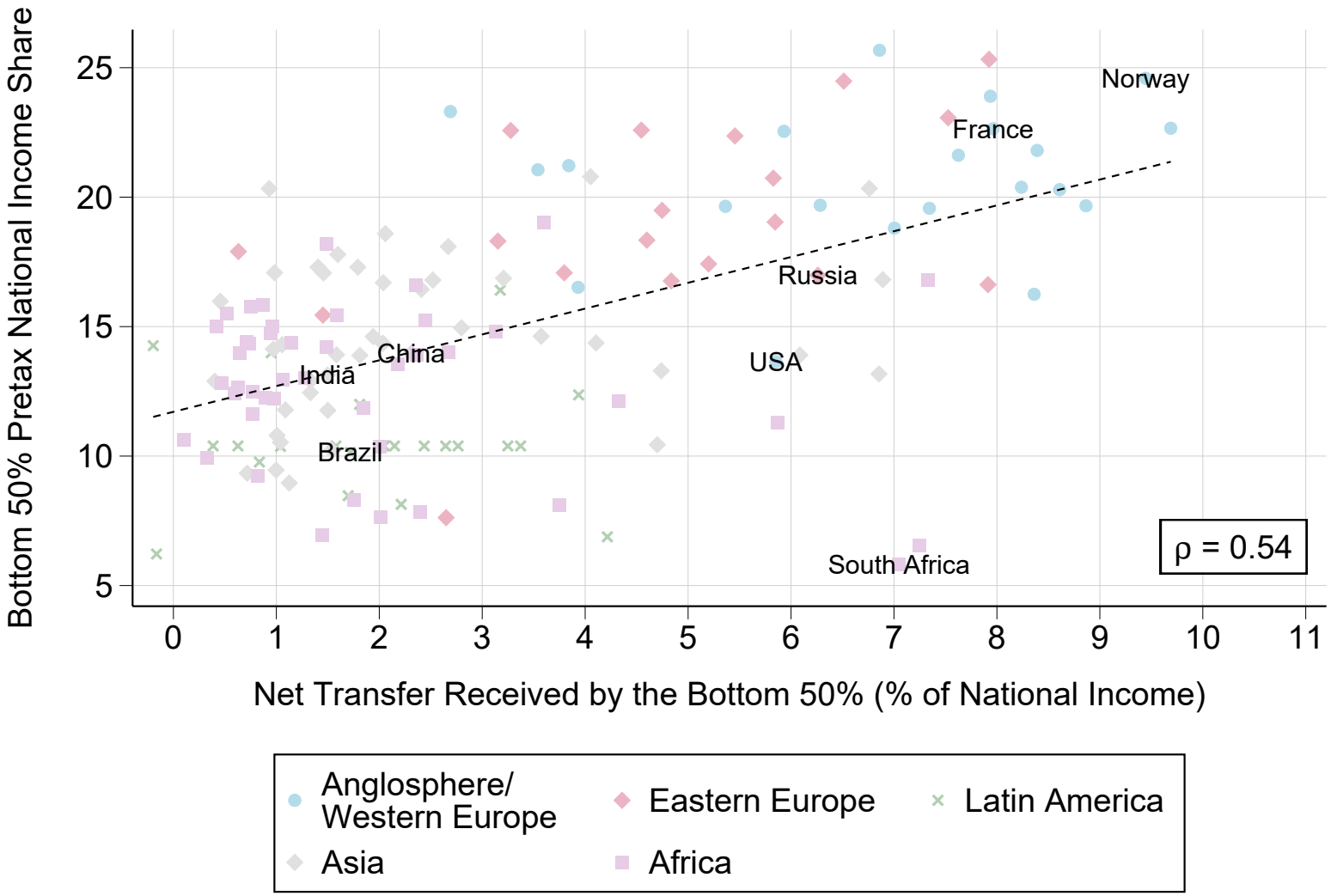


Table 1 – Country and Time Coverage of Fiscal Incidence Estimates in Existing DINA Studies

Study	Countries	Years
Piketty, Saez, and Zucman (2018)	United States of America	1962-2019
Chatterjee, Czajka, and Gethin (2021)	South Africa	1993-2019
Bozio et al. (2018)	France	1990-2018
Fisher-Post, Herault, and Wilkins (2022)	Australia	1991-2018
Bruil et al. (2022)	Netherlands	2016
Flores, De Rosa, and Morgan (2022)	Argentina, Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Mexico, Peru, Uruguay	2000-2020*
Blanchet, Chancel, and Gethin (2022)	Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom	2007-2017*

Notes. * signifies unbalanced panel.

Table 2 – Extent of Redistribution by World Region: the Dominant Role of Transfers

	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	20.0	18.9	16.3	4.2%	13.5%	30.9%
Anglosphere	14.8	13.0	8.6	11.6%	42.2%	27.4%
Asia	17.4	17.0	14.5	2.9%	17.3%	16.6%
Eastern Europe	11.2	13.0	7.6	-13.7%	32.2%	-42.6%
Latin America	31.6	35.0	28.1	-10.6%	12.5%	-84.4%
Western Europe	8.7	8.4	5.6	3.8%	36.0%	10.7%
World Average	18.2	18.0	14.9	1.8%	19.3%	9.3%

Notes. Population-weighted averages of indicators in each country. After taxes: top 10% to bottom 50% average income ratio in terms of net-of-tax income (pretax income minus all taxes). After taxes and transfers: top 10% to bottom 50% average income ratio in terms of posttax income (pretax income minus all taxes plus all transfers). Tax share of redistribution: ratio of extent of redistribution through taxes over extent of redistribution through taxes and transfers. Estimates for Eastern Europe, Western Europe, Latin America, the United Kingdom, and the United States come from existing DINA studies. All other series from this paper. Taxes exclude social contributions.

Table 3 – Extent of Redistribution by World Region: Decomposition by Tax and Transfer, 2019

	World Average	Anglosphere	Western Europe	Eastern Europe	Latin America	Asia	Africa
Personal Income Taxes	4.4%	12.4%	14.0%	3.7%	4.6%	3.1%	3.2%
Corporate Taxes	4.2%	3.7%	3.7%	4.4%	4.0%	4.6%	3.3%
Property & Wealth Taxes	0.6%	0.8%	1.3%	0.6%	0.4%	0.6%	0.0%
Indirect Taxes	-7.7%	-7.3%	-14.7%	-23.4%	-10.2%	-6.9%	-3.3%
Social Contributions	-1.3%	-5.7%	-2.5%	-6.6%	-0.7%	-0.9%	0.2%
All Taxes	3.1%	12.1%	9.5%	-12.3%	0.9%	2.9%	4.2%
Social Assistance	10.4%	16.6%	22.9%	20.7%	23.5%	7.5%	5.5%
Healthcare	10.3%	28.4%	15.8%	11.2%	20.3%	7.5%	6.5%
All Transfers	18.3%	36.7%	33.4%	28.2%	34.7%	14.2%	10.9%

Notes. Population-weighted averages of indicators in each country. The table reports the negative of the percent change in the top 10% to bottom 50% income ratio before and after removing the corresponding tax or adding to corresponding transfer to pretax income. For instance, the top row reports the percent reduction in inequality resulting from removing personal income taxes from individual incomes. Positive values indicate that the corresponding tax or transfer reduces inequality. All series from this paper (existing DINA studies do not provide comparable, detailed decompositions by type of tax).

Appendices

A. Distribution of Personal Income Taxes

In this appendix section, expanding on section 2.3 above, we provide more detail on methods and data used to estimate the distribution of personal income taxes.

In the case of the personal income tax (PIT), the only tax units that pay any PIT are those whose income places them above the personal income tax exemption threshold. We retrieve these exemption thresholds for more than 90 countries from Jensen (2022), and retrieve the missing country-years from Bachas et al. (2022). Bachas et al. (2022) impute the exemption threshold for country-years missing from Jensen (2022) in a way that is consistent with the findings of the latter study, which discovered that the PIT exemption threshold (expressed as a percentile of the income distribution) falls with rising per capita income, across countries and over time.

Starting from the PIT exemption threshold, we simulate the structure of personal income tax incidence using statutory rate schedules from the World Tax Indicators (WTI) database (see Peter, Buttrick, and Duncan, 2010). This database parameterizes the progressivity of the income tax structure. It observes the average and marginal statutory income tax rates at several levels of the pretax income distribution: at average income, then at two and three and four times that level, and finally the top marginal tax rate. While the WTI covers 189 countries, it does not observe years beyond 2005, so we extend the database with inputs from Strecker (2021) and Vegh and Vuletin (2015, updated 2019), the latter of which can also be used to corroborate top marginal tax rates from WTI. For the remaining country-years (and to check robustness) we retrieve statutory (marginal) rates schedules from Ernst & Young (2006-23) and PwC (2023) and similar sources online, including national tax authorities' legislative documents and independent scholarly accounts. From 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 g-percentile), with kink points at the rates observed in WTI. Rates are interpolated linearly between each observed value.

Note that we also distinguish between individualized and joint personal income taxation systems: Some countries tax married couples together (or allow tax units this option), and some countries tax individual incomes separately. The former, joint taxation, conforms naturally 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.[17] We do this by way of microdata from the International Labour Organization (2020), whose universe of labor force survey microdata represents more than 100 countries since the 1990s. For countries whose PIT systems are individual but for which no (household-identified, individual) income survey microdata exists, we use "nearest-neighbor matching" to simulate the effect, matching the microdata from a handpicked neighboring country. For tractability and reliability of the estimate, we implicitly assume a generalized country fixed-effect [rather than by country and year, i.e., we do not allow each country's distribution-wide correlations between individualized and equal-split incomes to vary over time] and only use the latest-year survey.[18] In this way, we are able to estimate the ratio of individualized income to equal-split income, across the g-percentile distribution, and to easily move back-and-forth between equal-split and individualized income distributions.

After we assign taxes to individuals, we can transform the taxes paid by each household—from an effective rate on individualized income, to an effective rate on equal-split income. For example, for a married couple in an individualized tax system, earning two different levels of income and being taxed at two different rates, this transformation adds up both the incomes earned and the taxes paid by the couple, then divides these by two for the uniform effective rate on their (identical, by construction) equal-split incomes. For countries whose PIT system is on individuals' incomes rather than taxing married couples jointly, this ILO-microdata transformation effectively moves an individualized income tax schedule onto the equal-split income distribution, with effective tax rates transformed accordingly.

Finally, we account for the empirical regularity that capital income is taxed less than labor income in PIT systems worldwide.[19] For each country for which we observe tax revenue aggregates (and statutory PIT rates on taxable income), we also tabulate the country's tax rates toward dividends and capital gains. While there are nuances within many tax administrations' policies on the taxability of dividends and capital gains [and other types of capital incomes], we simplify concepts for tractability on tax rates and tax bases in a DINA framework: Our benchmark concept for the rate of dividend taxation is the rate at which a resident is taxed on

[17] Note that individualized income distributions are more unequal than equal-split income distributions. This is so by construction among top earners (only if all top earners were married to each other would their equal-split incomes equal their individualized incomes), and generally true throughout the distribution. The left tail of the individualized distribution contains many more observations with zero incomes (non-working spouses).

[18] It is true that labor force participation—including among spouses—and assortative matching of high-income earners may change over time, but it is also true that this survey data is not the most reliable source to capture the entire effect, as it has little to say about capital income nor about household enterprise. In detailed DINA studies of the United States and France, the disparity between individualized and equal-split distributions has remained relatively stable over the past 40 years.

[19] Globally, we find that only 36% of corporate operating surplus (profits) is distributed in the form of dividends.

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. In the latter case, we also acknowledge reduced rates, or exemptions on short- vs. long-term capital gains, or other nuances in the treatment of this type of income.

These are not the only types of capital income that are taxed by PIT systems, but in our view they are the most significant and telling. Among other types of capital income that may be subject to tax in a PIT system: Mixed income comprises a capital share and a labor share; however, in most countries *all* self-employment income is taxed similarly to labor income from salaries and wages. Beyond that, many PIT systems cover (capital) income from rentals, from interest, from royalties, etc. It is perhaps worth noting that, from a DINA perspective, these are not in the "primary generation of income" account and would actually be double-counting part of national income if they were counted as individual's income without subtracting the corresponding part from, e.g., corporate profits (which indeed they would be in any fiscal system). In this sense, it seems reasonable to leave our simplified PIT simulation as taxing distributed (dividend) and undistributed (capital gain) corporate profits, with these two elements (summing to total corporate profits in the national accounts) also serving as a proxy for the tax treatment of other capital incomes. In any case, the tax treatment of interest, rents and royalties is usually very similar to that of dividends and capital gains. In our view, dividends and capital gains taxation represent emblematic proxies which together serve to cover what is *taxable* in pretax DINA capital incomes.

To assign dividend and capital gains rates that vary by country allows us a treatment of capital incomes under PIT systems that matches the rigor of the above-mentioned statutory rates on labor (salary, wage, and self-employment) income. The upshot is that much of capital income is untaxed, or taxed at a lower rate.Taxable income (in this concept) is less than total pretax income (in the DINA sense), and particularly so for the top g-percentiles where capital income is concentrated. Among DINA income concepts, we also exclude from the PIT tax base: imputed rent, government operating surplus, and indirect taxes. Social insurance benefits received are taxed as (deferred) labor income.

The elements of the PIT system, in this simplified simulation, can be summarized as follows, to 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):

- labor income (employee compensation and mixed income[20]);
- dividend income (distributed corporate profits); and
- capital gains income (undistributed corporate profits).

After building this statutory rate schedule, we fit its "predicted" revenues to actual PIT revenues received, observed in Bachas et al. (2022) and corresponding to T_{PIT} in equation (2) above. In this way, we simulate statutory rates in order to estimate effective tax rates throughout the distribution. It is important to note that the "predicted" statutory rates above do not match—but rather are proportional to—the effective rates we estimate. This mismatch between statutory and effective rates is to be expected, and can be true for a number of reasons that we do not observe in aggregate data (e.g., tax evasion or avoidance; unobserved deductions, allowances, exemptions and tax breaks that vary with income; differences within the rate schedule according to different types of [non-]taxable income, etc.).

Since we do not necessarily observe all the nuances by which an effective tax rate may differ from the statutory rate (even if we think that we have captured the main drivers above), we are *almost* forced to assume that the effective rate schedule retrieved from our statutory rate schedule is the correct one (i.e., that the "true" effective rate schedule is proportional to our estimated statutory rate schedule)—and holds as valid for the distribution of personal income tax rates along the pretax income distribution.

However, we do not have to leave this as an assumption, and can instead test its robustness (as a goodness-of-fit) against the existing DINA studies mentioned above. For reference, see Appendix Figure A23 to compare the time series of US personal income tax rates between the benchmark estimates of Piketty, Saez, and Zucman (2018) and those of the present simulation—comparing the benchmark to our simulation at each of three representative points on the income distribution: p50, p90, and p99. As can be readily seen in the graph, the fit is excellent, and our simulated effective PIT rates rarely differ by more than half of a percentage point, matching on both levels and trends.

Given the goodness-of-fit of our simulation against the training sample of microdata-founded (DINA) estimates of PIT incidence, we are confident to extend our estimates to the worldwide sample of countries for whom we have collected precise data on the set of parameters listed above (the minimum from which we can estimate PIT incidence, as discussed here).

[20] All of self-employment (*viz.* mixed) income is treated as labor income, for the purposes of this PIT simulation—as is the case in most PIT systems.

B. Measures of Fiscal Progressivity

In our main analysis, we summarize the progressivity of taxes (and/or transfers) with the percent difference in inequality, measured as the top 10% to bottom 50% average income ratio, before and after removing taxes from (and/or adding transfers to) individual incomes. This is equation (6):

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

After some algebra, this absolute progressivity statistic γ_τ—the redistribution ratio representing the percent reduction in inequality from fiscal policy—reduces to:[21]

$$\gamma_\tau = \frac{\overline{ETR}_{p90p100} - \overline{ETR}_{p0p50}}{1 - \overline{ETR}_{p0p50}} \tag{7}$$

Since γ_τ is a function only of the ETR profile (i.e., of the bracket average ETRs at the top and bottom of the income distribution), it is independent of the pretax inequality ratio r_{pre}. For the same ETR profile, γ_τ highlights the same percentage of redistribution, regardless of the overall level of inequality.

We note, however, that the "naive" γ_τ of equations (6) and (7) is sensitive to variations in the pretax income distribution *within* the top 10% or bottom 50% shares, i.e., different distributions of *p90p100* or *p0p50* incomes that would still deliver the same *average* income for the top 10% or bottom 50% shares, respectively.

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%

[21] To arrive at equation (7), we put r_{net} in terms of r_{pre} and plug into equation (6):

$$r_{net} = \frac{\bar{y}^{net}_{p90p100}}{\bar{y}^{net}_{p0p50}} = \frac{\bar{y}^{pre}_{p90p100} - \bar{y}^{pre}_{p90p100} \cdot \overline{ETR}_{p90p100}}{\bar{y}^{pre}_{p0p50} - \bar{y}^{pre}_{p0p50} \cdot \overline{ETR}_{p0p50}} = \frac{\bar{y}^{pre}_{p90p100}(1 - \overline{ETR}_{p90p100})}{\bar{y}^{pre}_{p0p50}(1 - \overline{ETR}_{p0p50})} = r_{pre} \cdot \frac{1 - \overline{ETR}_{p90p100}}{1 - \overline{ETR}_{p0p50}}$$

$$\gamma_\tau = \frac{r_{pre} - r_{pre} \cdot \frac{1 - \overline{ETR}_{p90p100}}{1 - \overline{ETR}_{p0p50}}}{r_{pre}} = 1 - \frac{1 - \overline{ETR}_{p90p100}}{1 - \overline{ETR}_{p0p50}} = \frac{(1 - \overline{ETR}_{p0p50}) - (1 - \overline{ETR}_{p90p100})}{1 - \overline{ETR}_{p0p50}}$$

(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%. The redistribution ratio would be higher in latter case (where the average ETR of the bottom 50% is lower). The same idea holds for the top of the distribution *p90p100*. Intuitively, we would prefer a progressivity statistic that delivers the same results when applying a given ETR profile to any pretax income distribution—and even robust to distributional variance within *p0p50* or *p90p100* (at the same $\bar{y}_{p0p50}$ and $\bar{y}_{p90p100}$).

To test sensitivity and resolve this potential source of bias, we normalize pretax income distributions across all countries and years. Following the literature from Kakwani (1977) through Gerber et al. (2020), we assign as constant 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, as always, by subtracting taxes according to each country-year's observed ETR profile. Results of this exercise, in Figure B2, are visibly similar to those of the earlier Figure 4 (above).

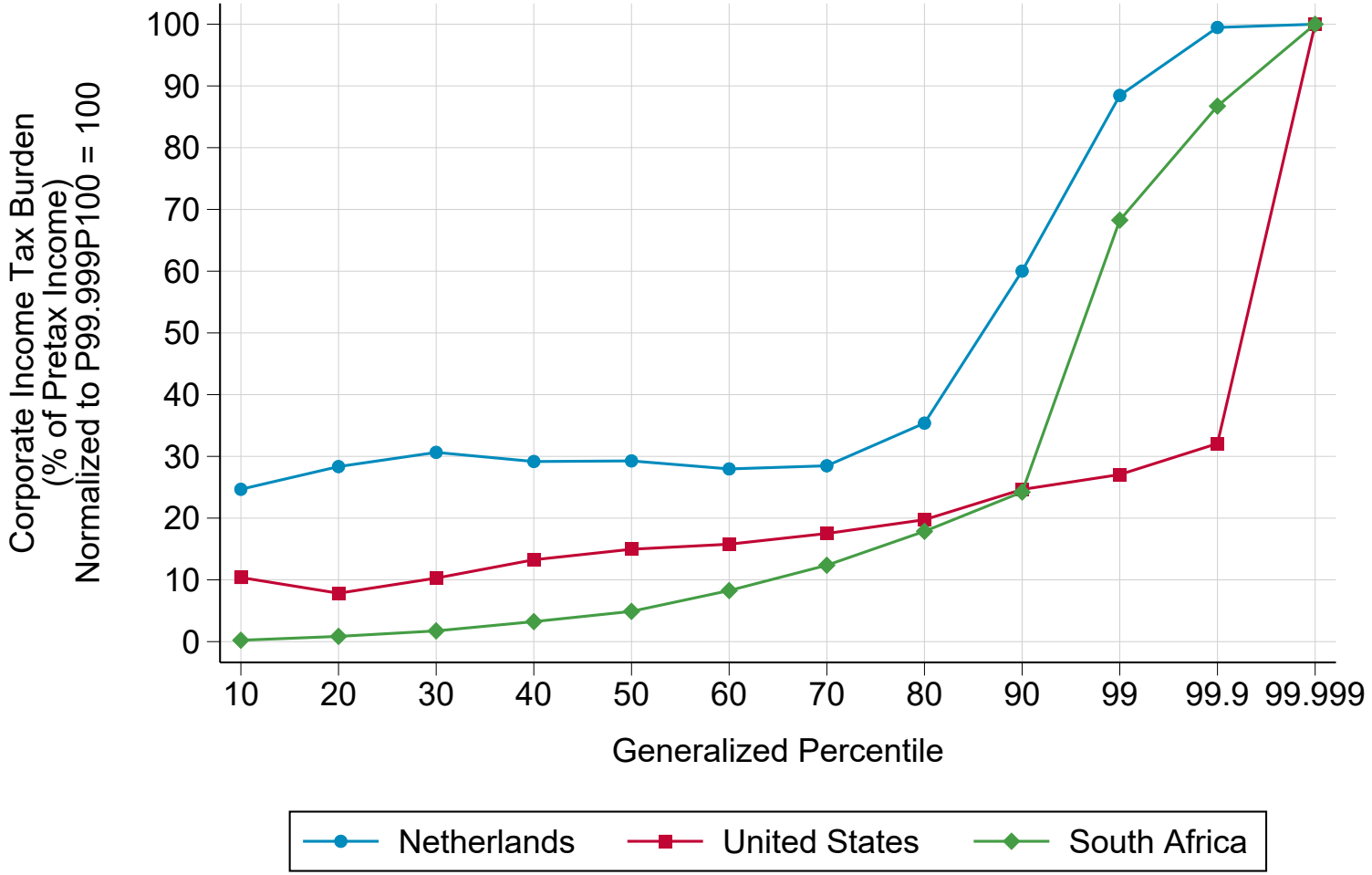
In this way, we generate a statistic that is independent of all variation in pretax income distributions, while still capturing qualities of both relative and absolute progressivity.

By *relative* progressivity, we refer to the comparison of the ETR on top 10 percent earners vs. on bottom 50 percent earners (expressed as the percent difference $\frac{\overline{ETR}_{p90p100} - \overline{ETR}_{p0p50}}{\overline{ETR}_{p0p50}}$, visible in, e.g., Figure B1). A higher ratio between the two would be more progressive, by construction. Other, similar measures of relative progressivity could include the regression coefficient (slope) of the tax rate profile (see Peter, Buttrick, and Duncan, 2010, and section 2.4 above)—but of course one would also want to know the y-axis intercept and not only the slope of the profile. These measures, then, while relatively informative, do not necessarily account for the total level of taxation.

With an *absolute* progressivity statistic, we do account for the total level of taxation. If the slope of the ETR profile is greater than (less than) zero, an increase in total taxation is an increase (decrease) in absolute progressivity, even with no change in the slope of the ETR profile (see Kakwani, 1977). For this reason, our benchmark measure of fiscal progressivity is the one in equations (6) and (7) above.

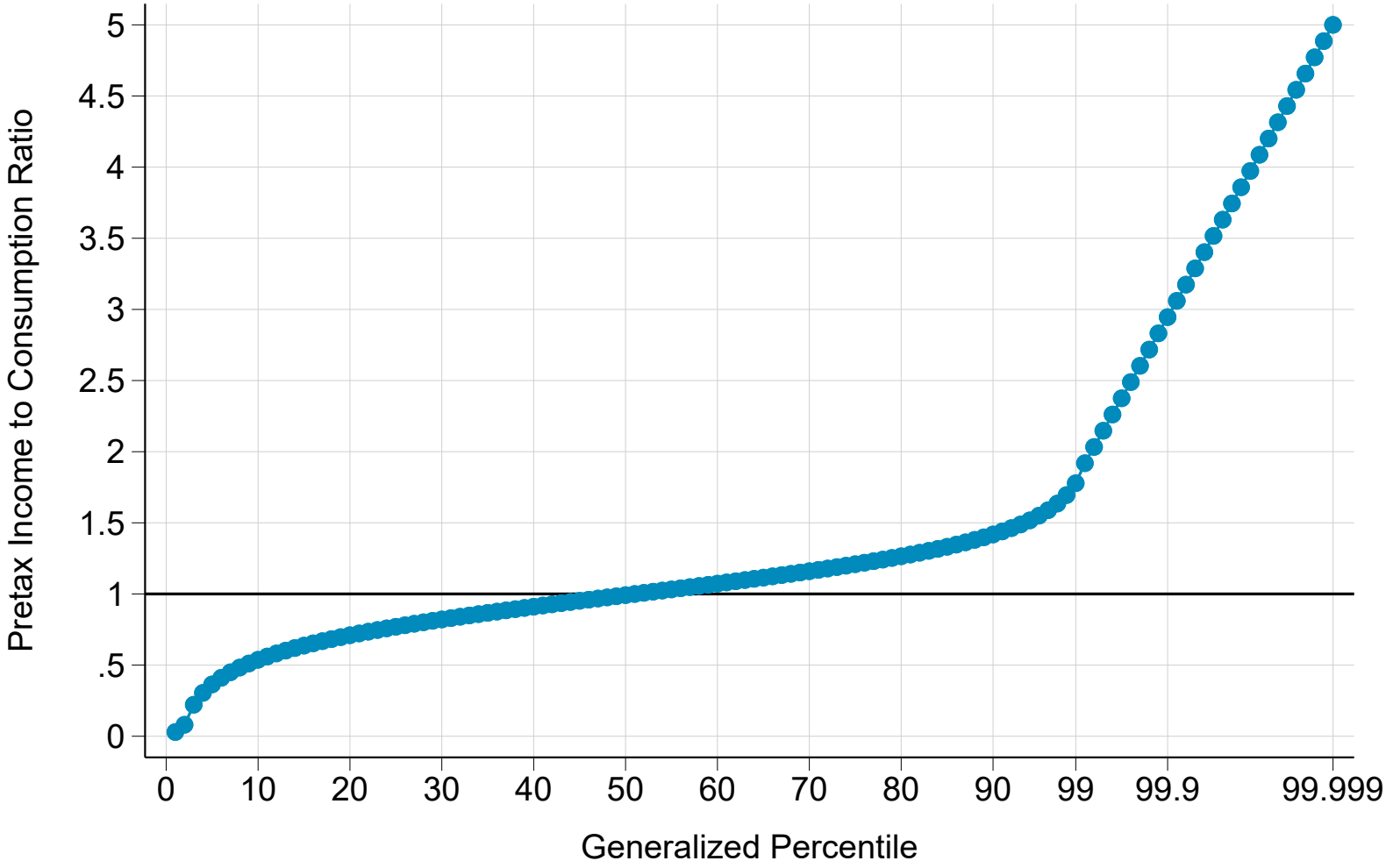
A. Additional Figures and Tables

Figure A1 – Corporate Income Tax: Selected Estimates of Corporate Income Tax Progressivity



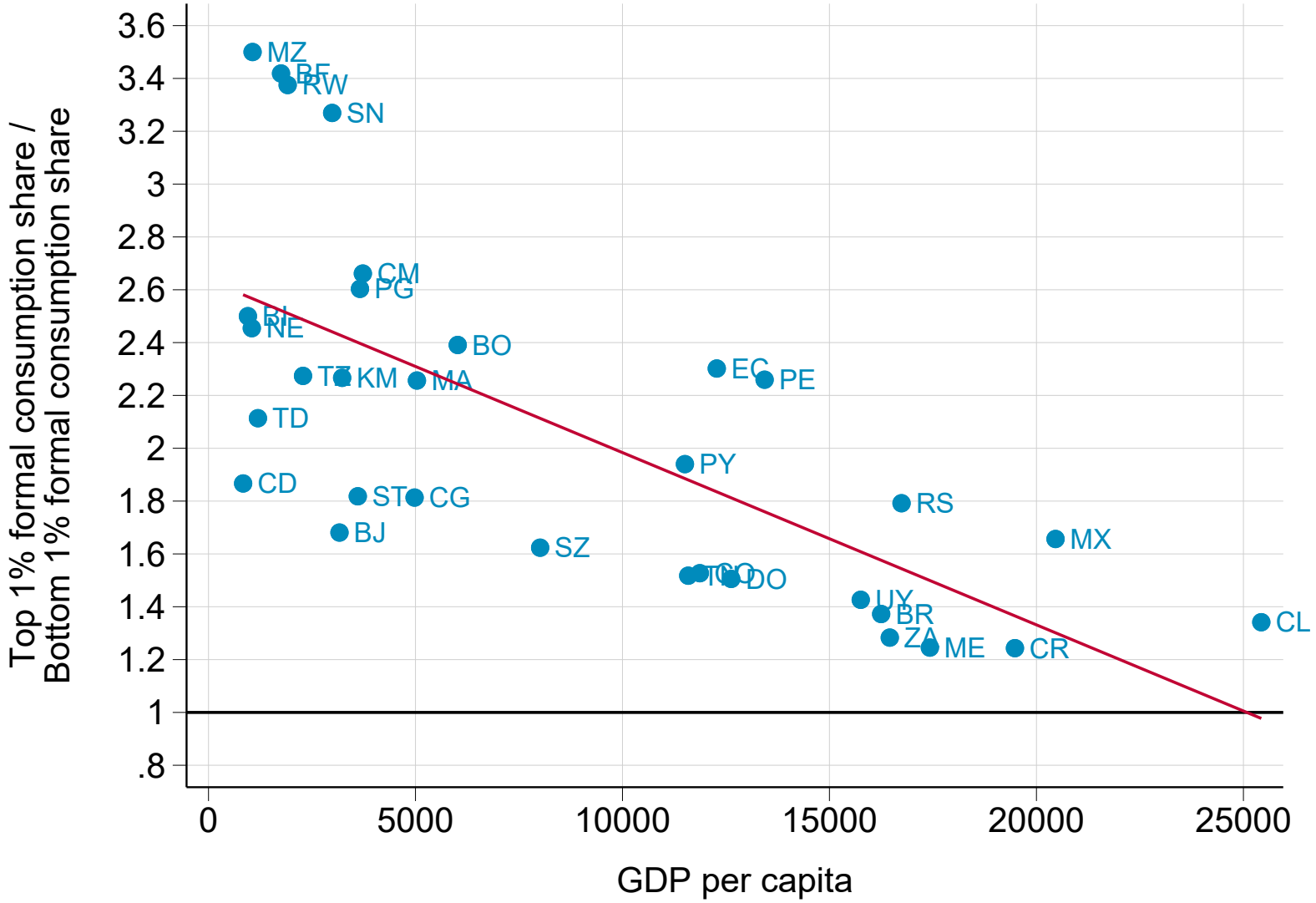
Notes. Netherlands: data from Bruil et al. (2022), 2016. United States: data from Piketty, Saez, and Zucman (2018), 2019. South Africa: data from Chatterjee, Czajka, and Gethin (2021), 2010-2019 average.

Figure A2 – Distributional Incidence Profiles: Income to Consumption Ratio



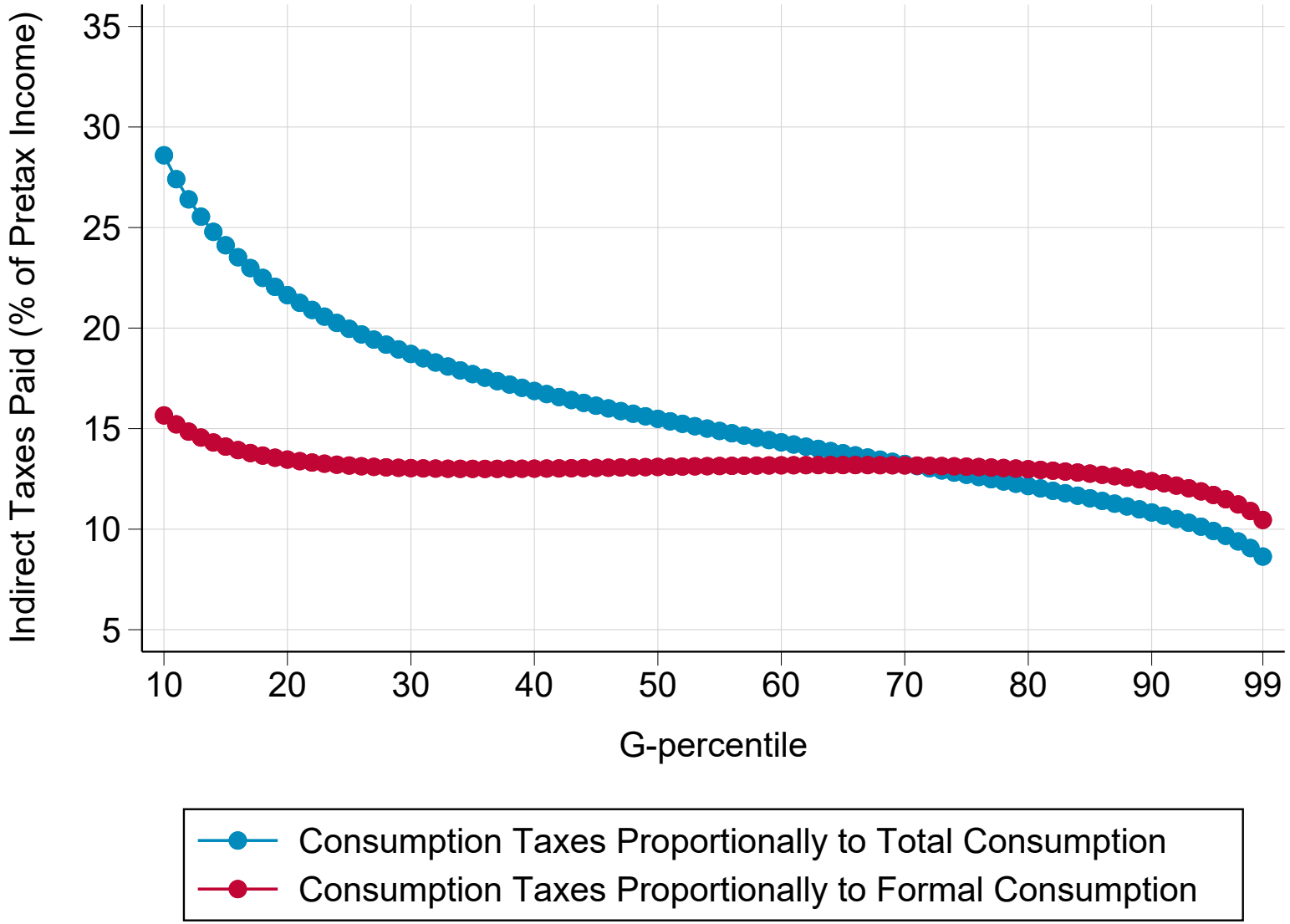
Notes. Authors' elaboration. The figure plots the stylized profile used to estimate consumption from pretax income in each country. See Chancel et al. (2023) for more details.

Figure A3 – Informal Consumption Elasticity and Economic Development



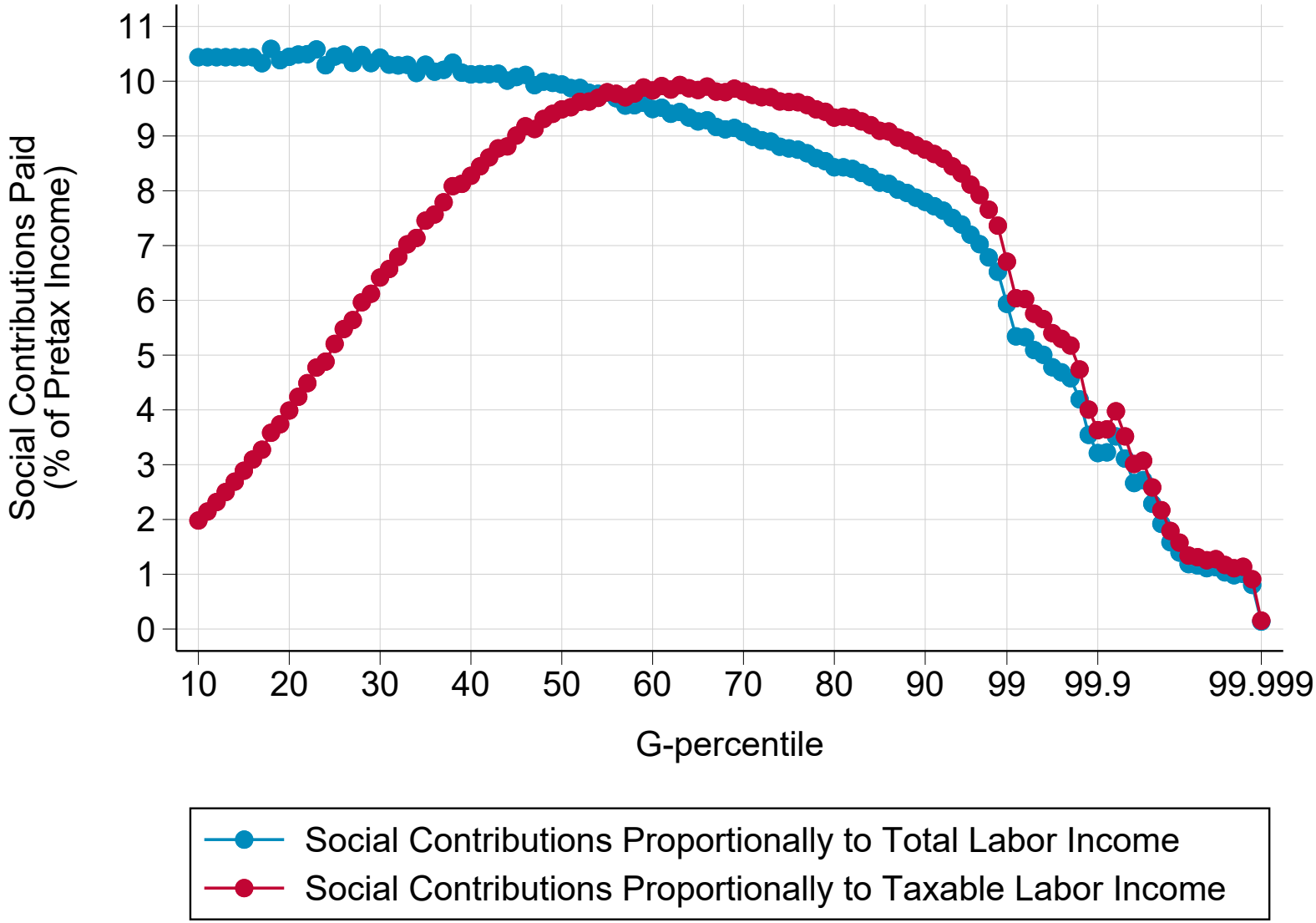
Notes. Authors' elaboration combining data from the World Inequality Database (GDP per capita) and Bachas, Gadenne, and Jensen, 2022 (informality). The figure plots the relationship between GDP per capita expressed in 2021 PPP USD and the gap in informal consumption between top and bottom income groups. In poorer countries, low-income households purchase more goods and services in informal markets than high-income households to a greater extent than in high-income countries.

Figure A4 – Incidence of Indirect Taxes and Informality: Niger, 2019



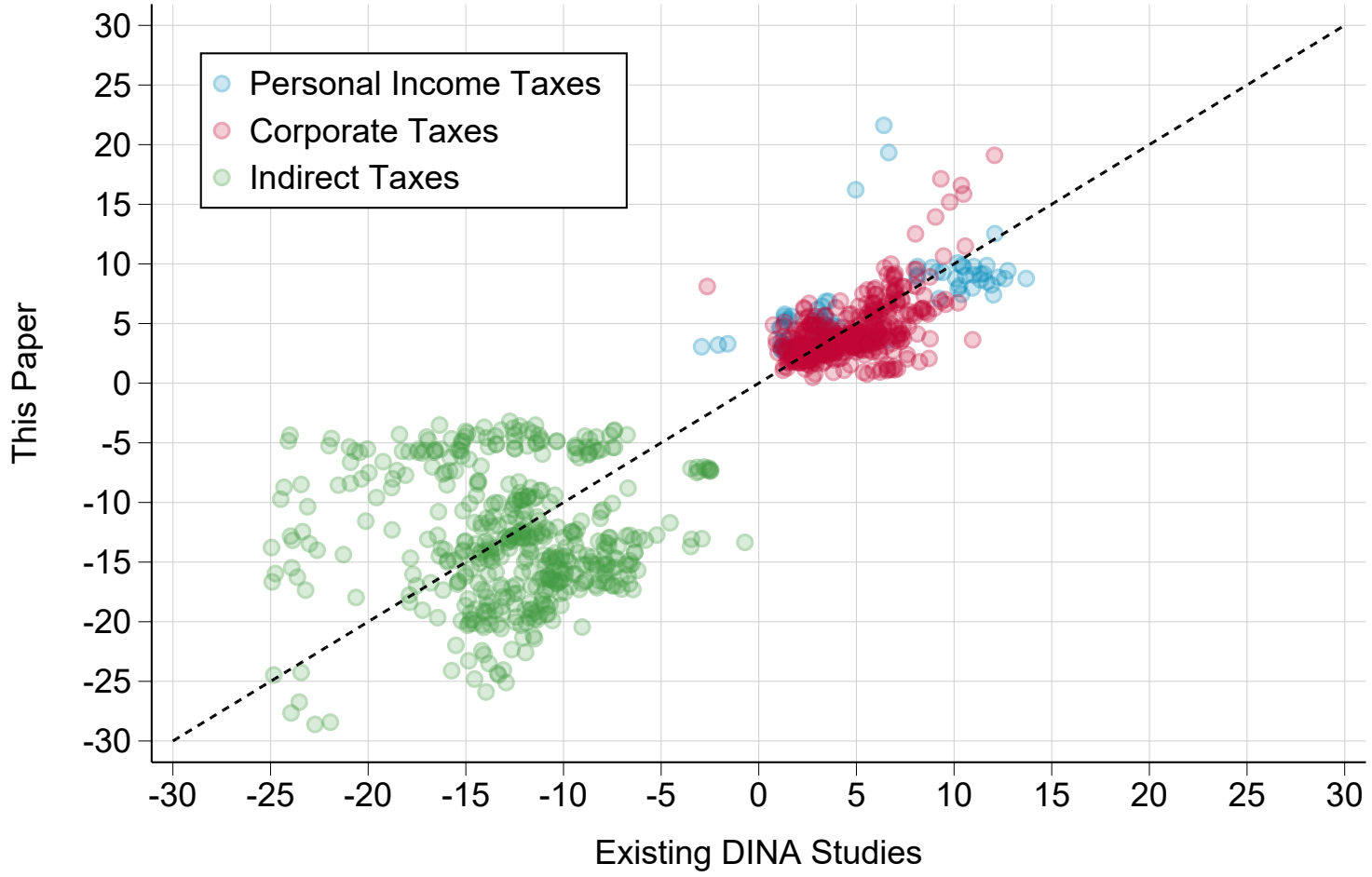
Notes. Authors' elaboration. The figure plots estimates of the distributional incidence of indirect taxes in Niger in 2019, before and after accounting for informal consumption. Before accounting for informal consumption, consumption taxes are very regressive, because low-income households tend to dissave, while high-income households display large positive savings. After accounting for the fact that low-income households tend to more intensively consume in informal markets, however, consumption taxes appear to only be mildly regressive.

Figure A5 – Incidence of Social Contributions and Informality: Argentina, 2019



Notes. Authors' elaboration. The figure compares the distributional incidence of social contributions in Argentina before and after accounting for the fact that contribution payments different alongside 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.

Figure A6 – Validation: Comparison of Distributional Tax Incidence, by Type of Tax



Notes. Axes represent tax progressivity summary statistic γ_τ.

Figure A7 – Validation: United States
Level and Composition of Taxes Paid by Generalized Percentile

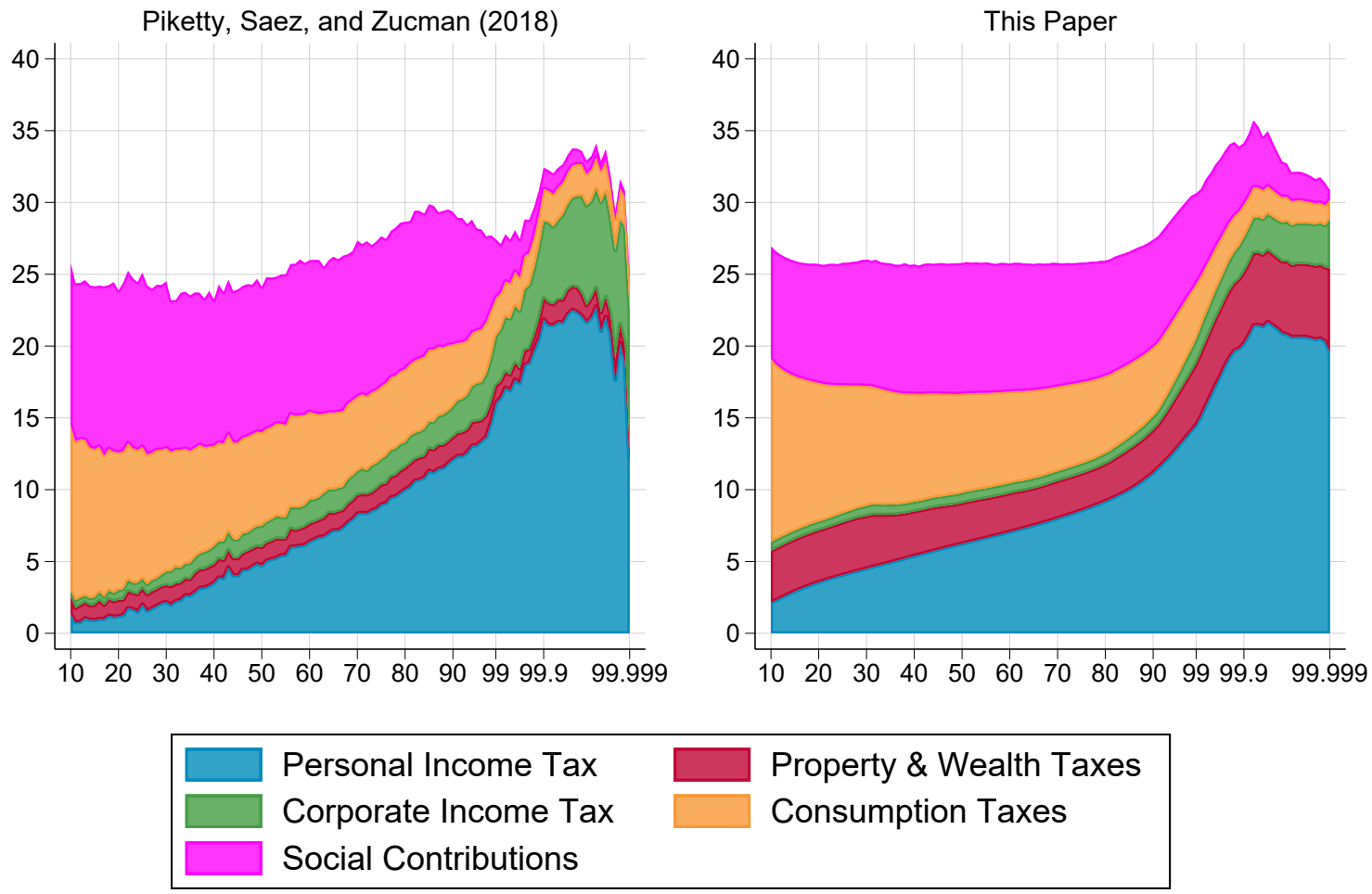


Figure A8 – Validation: Netherlands
Level and Composition of Taxes Paid by Generalized Percentile

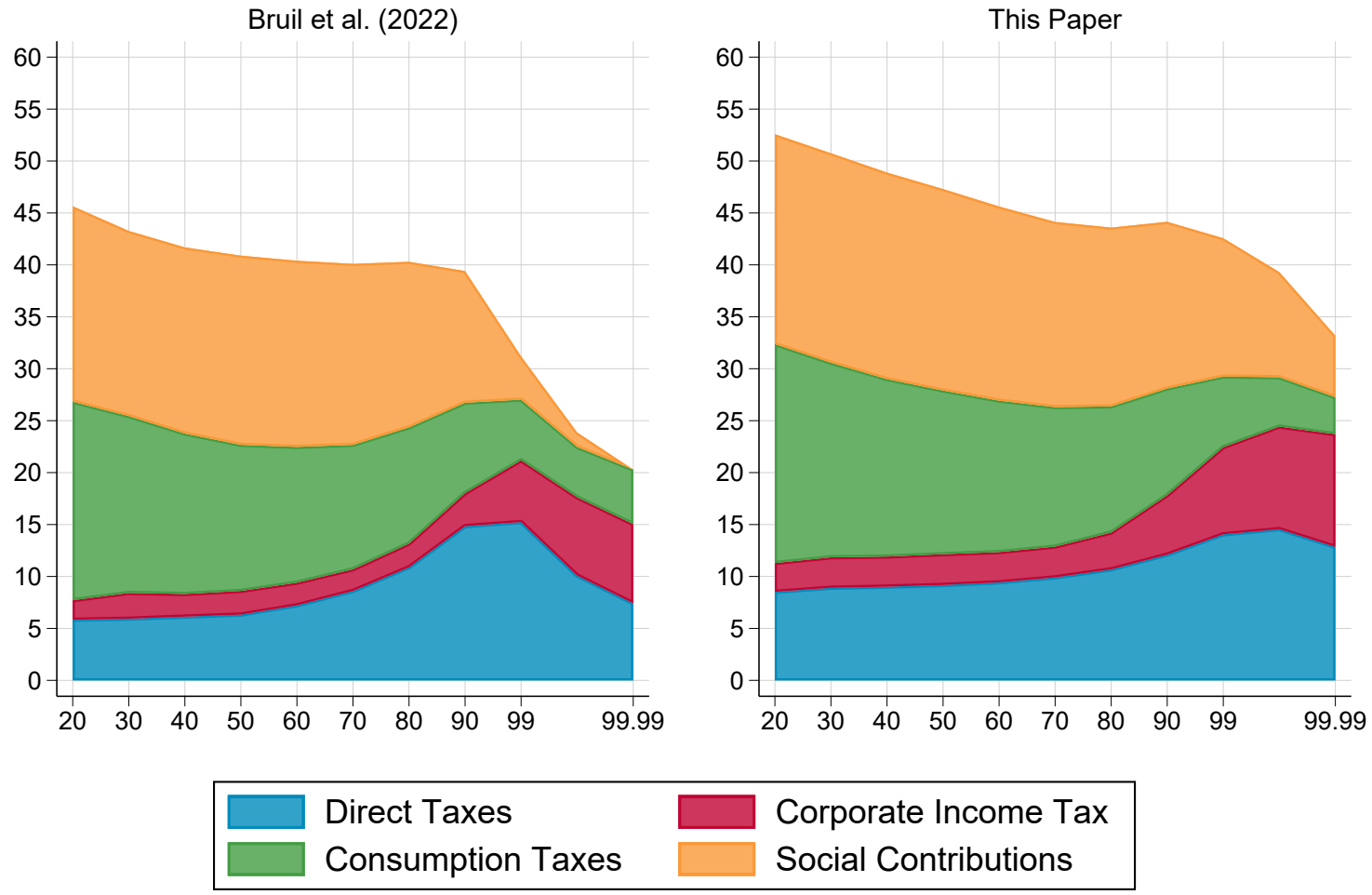


Figure A9 – Validation: South Africa, 2019
Level and Composition of Taxes Paid by Generalized Percentile

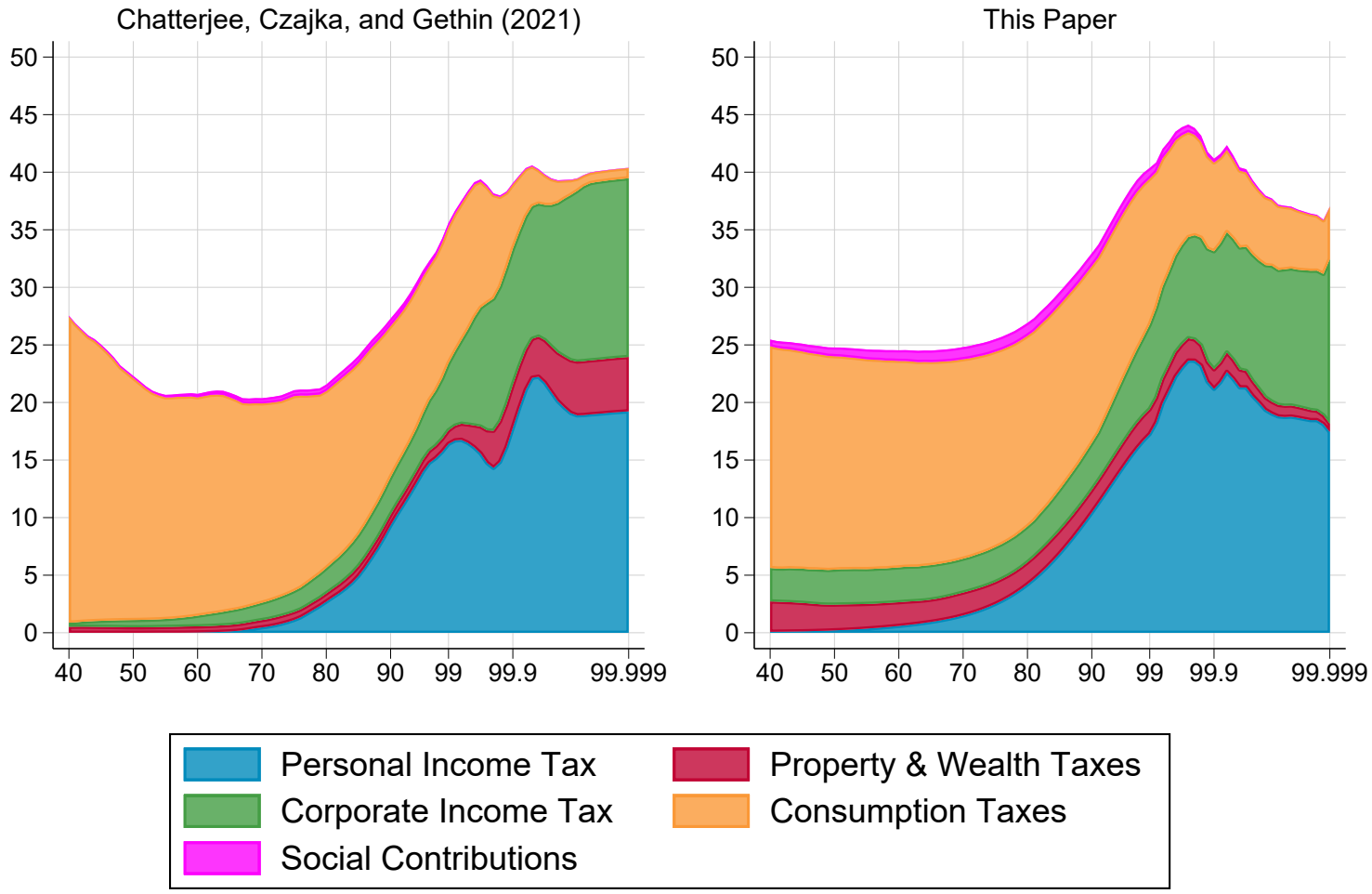
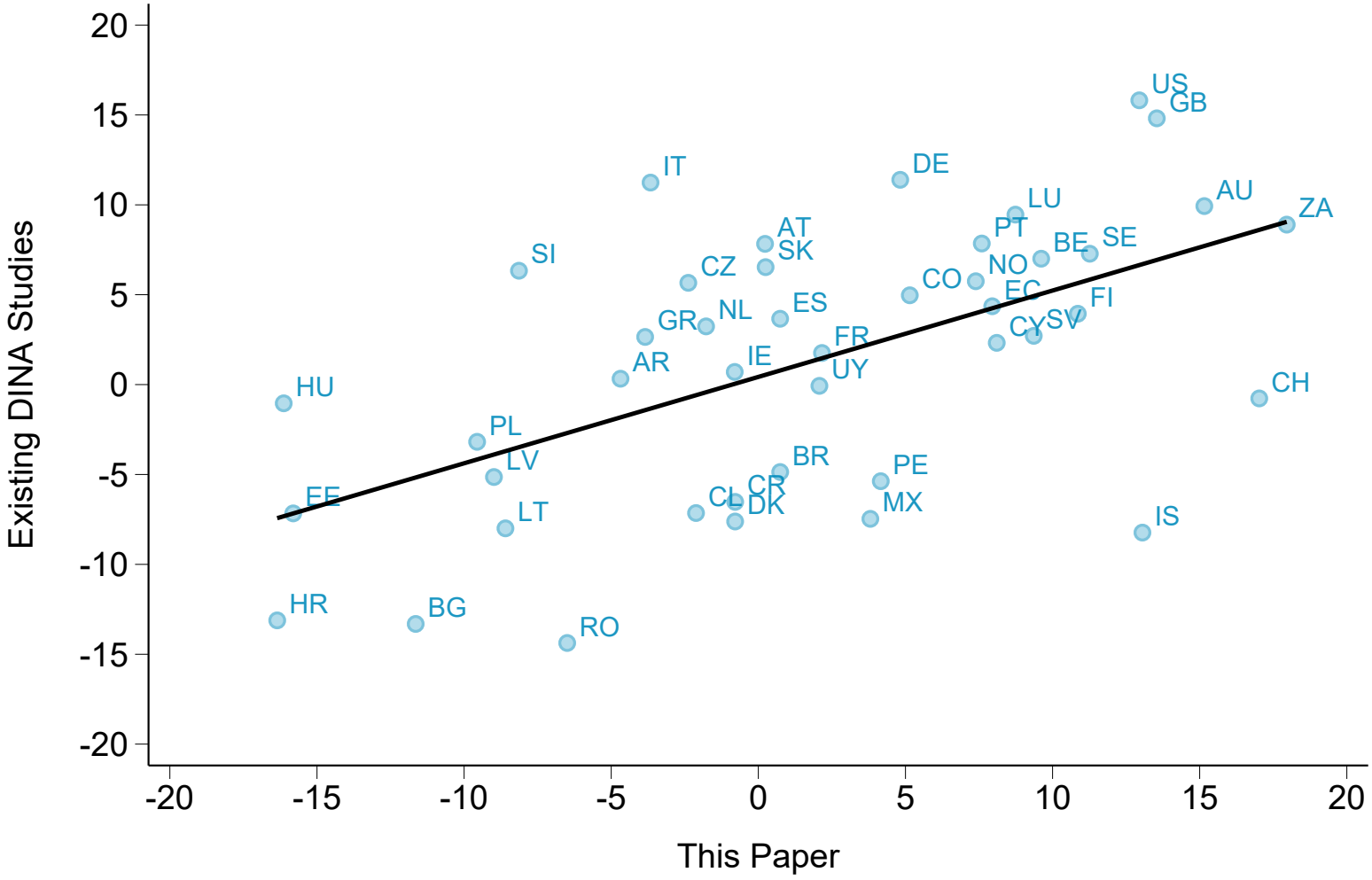
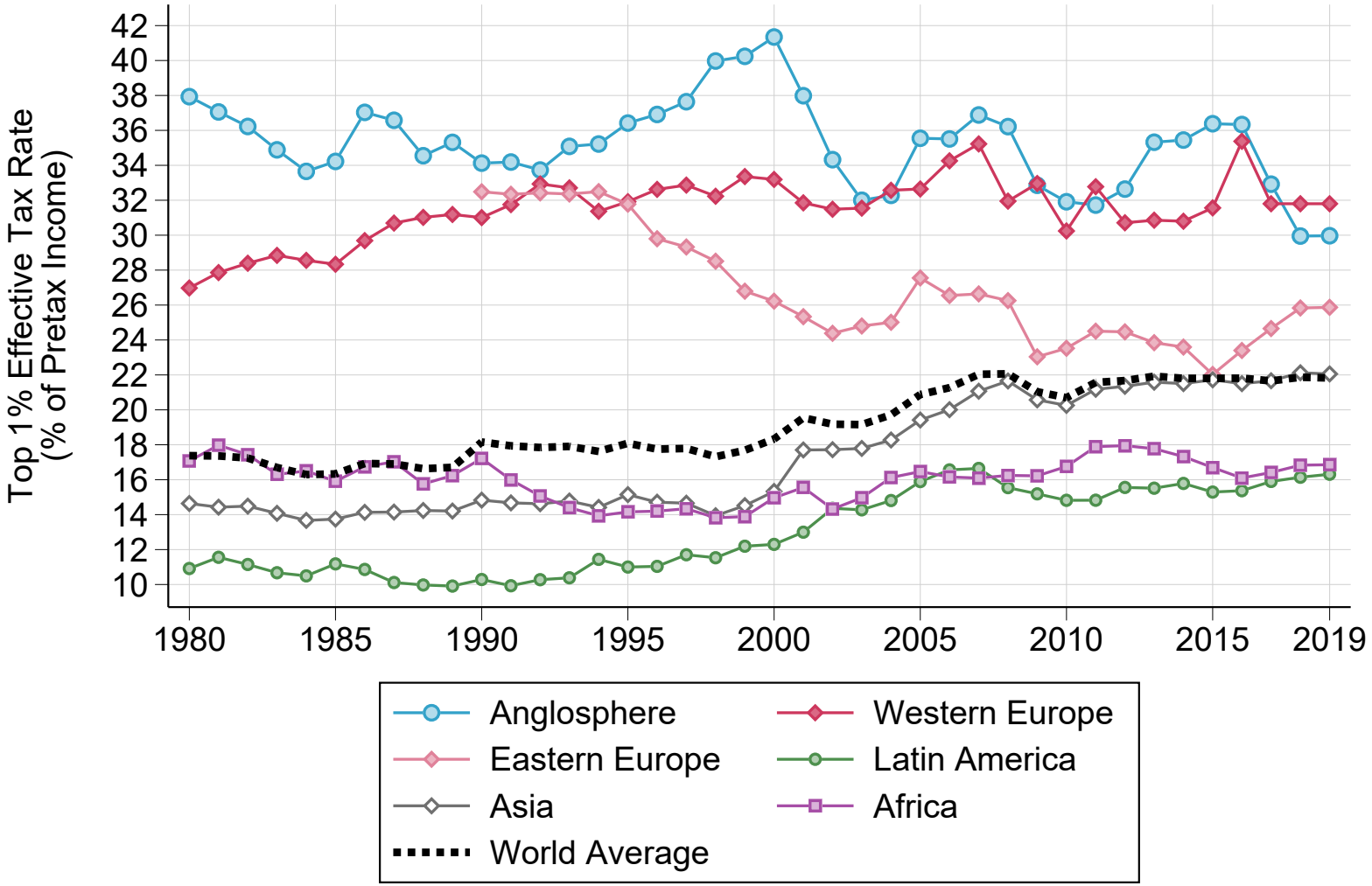


Figure A10 – Validation: Cross-Country Differences in Tax Progressivity



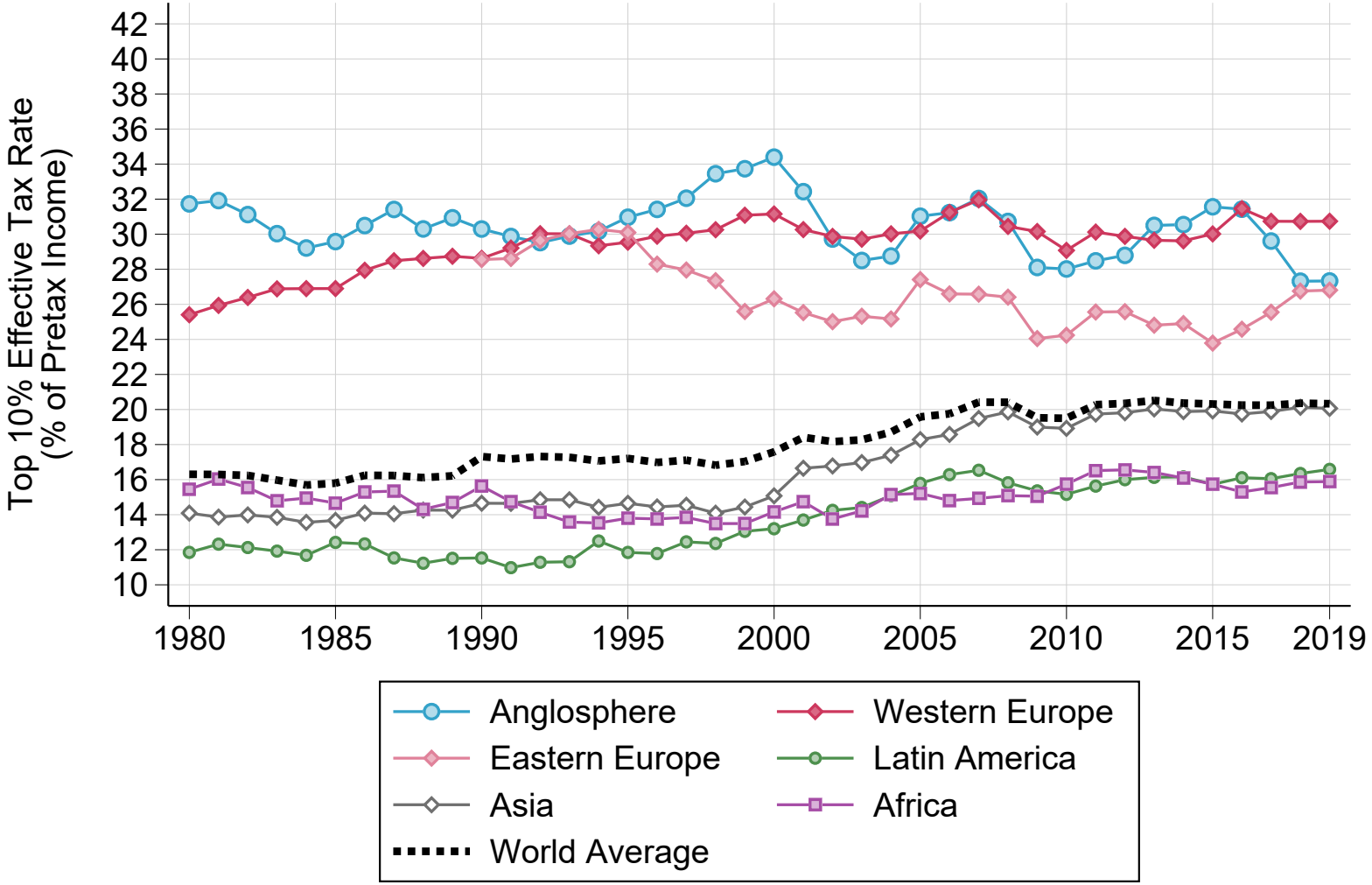
Notes. Authors' elaboration. The figure compares our estimates of tax progressivity to that of DINA papers across all country-years available. Tax progressivity is measured as the percent difference in the top 10% to bottom 50% average income ratio before and after removing taxes from pretax income.

Figure A11 – Top 1% Effective Tax Rate



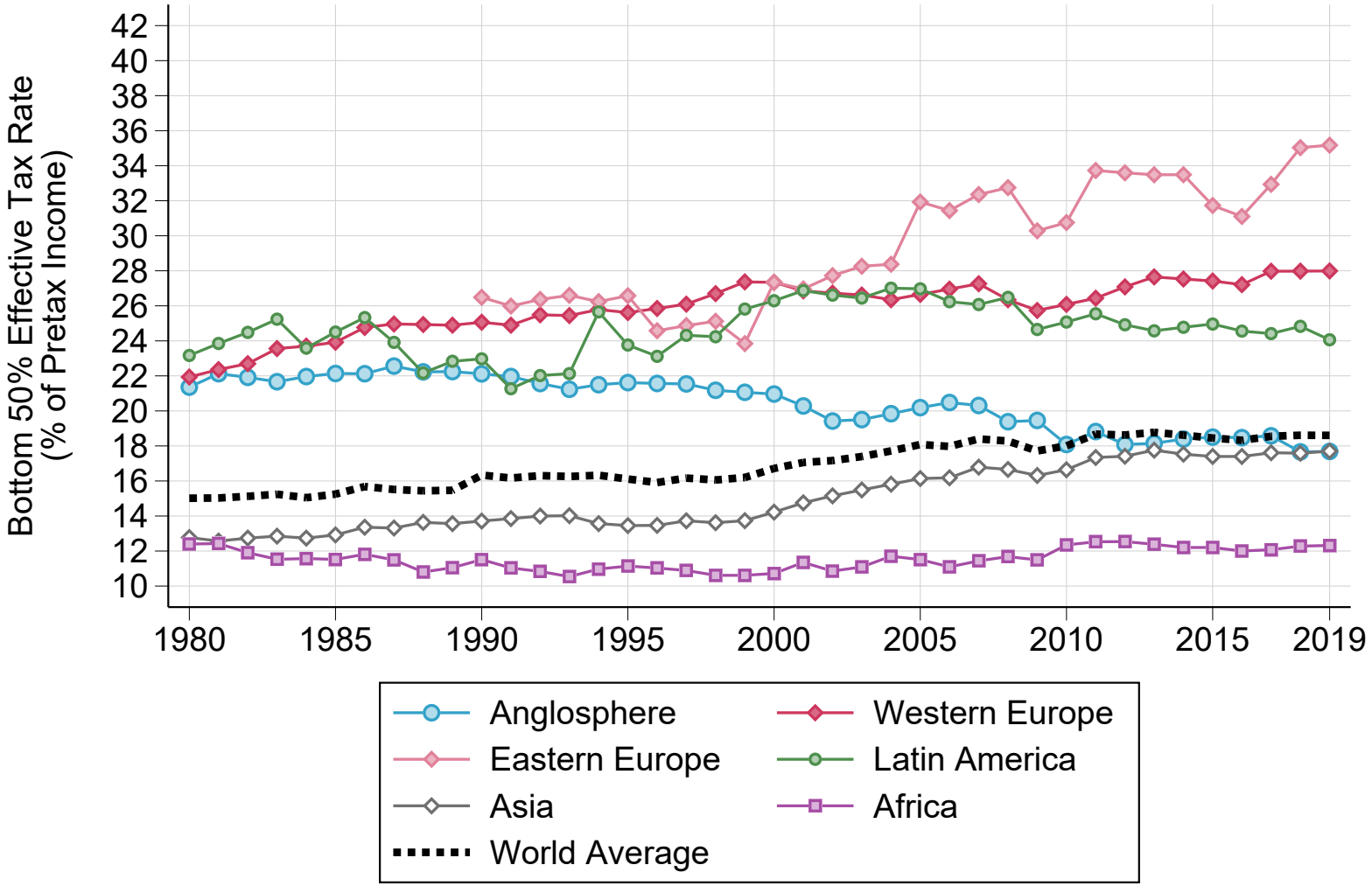
Notes. Authors' elaboration. Excludes social contributions.

Figure A12 – Top 10% Effective Tax Rate



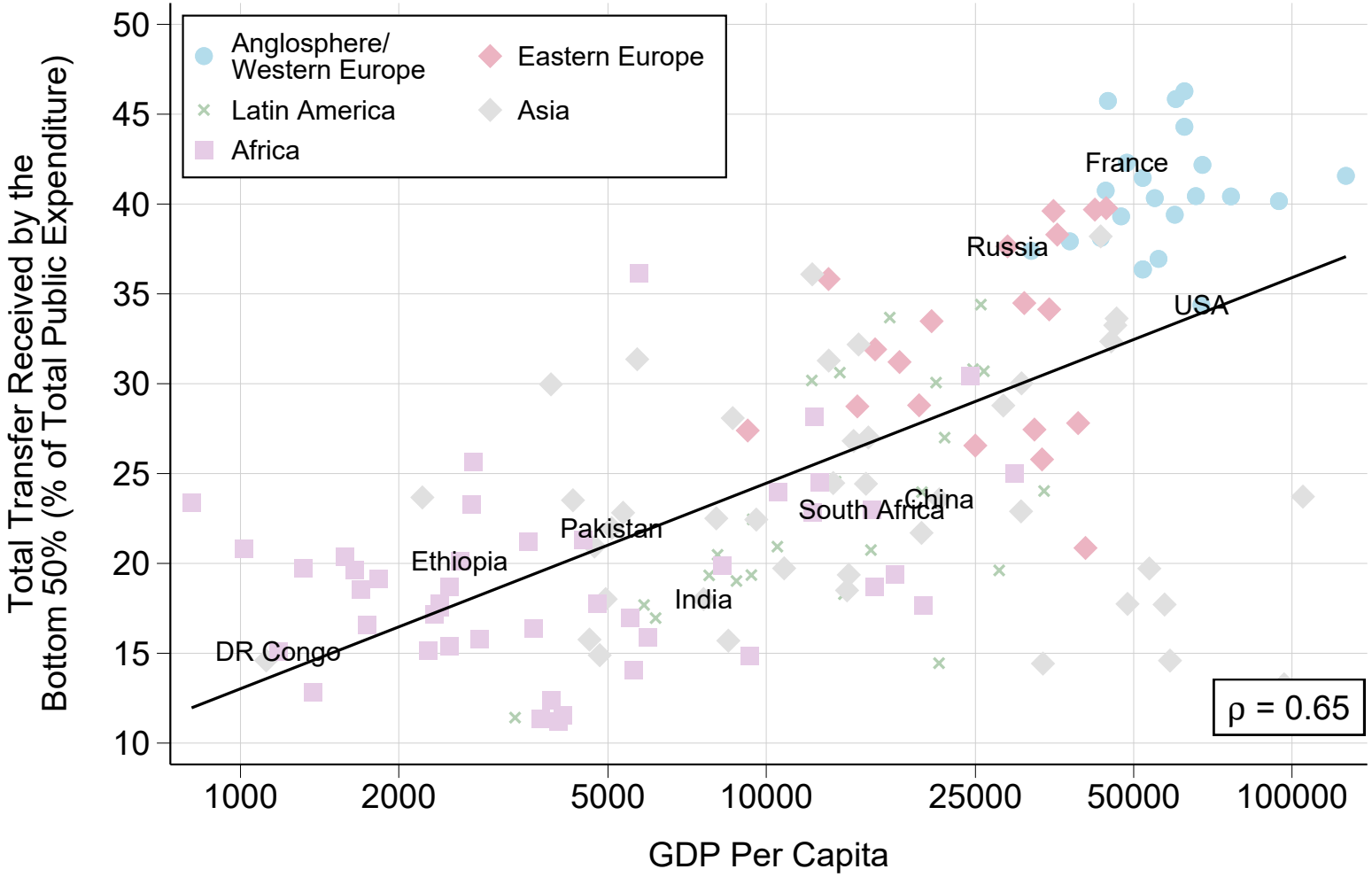
Notes. Authors' elaboration. Excludes social contributions.

Figure A13 – Bottom 50% Effective Tax Rate



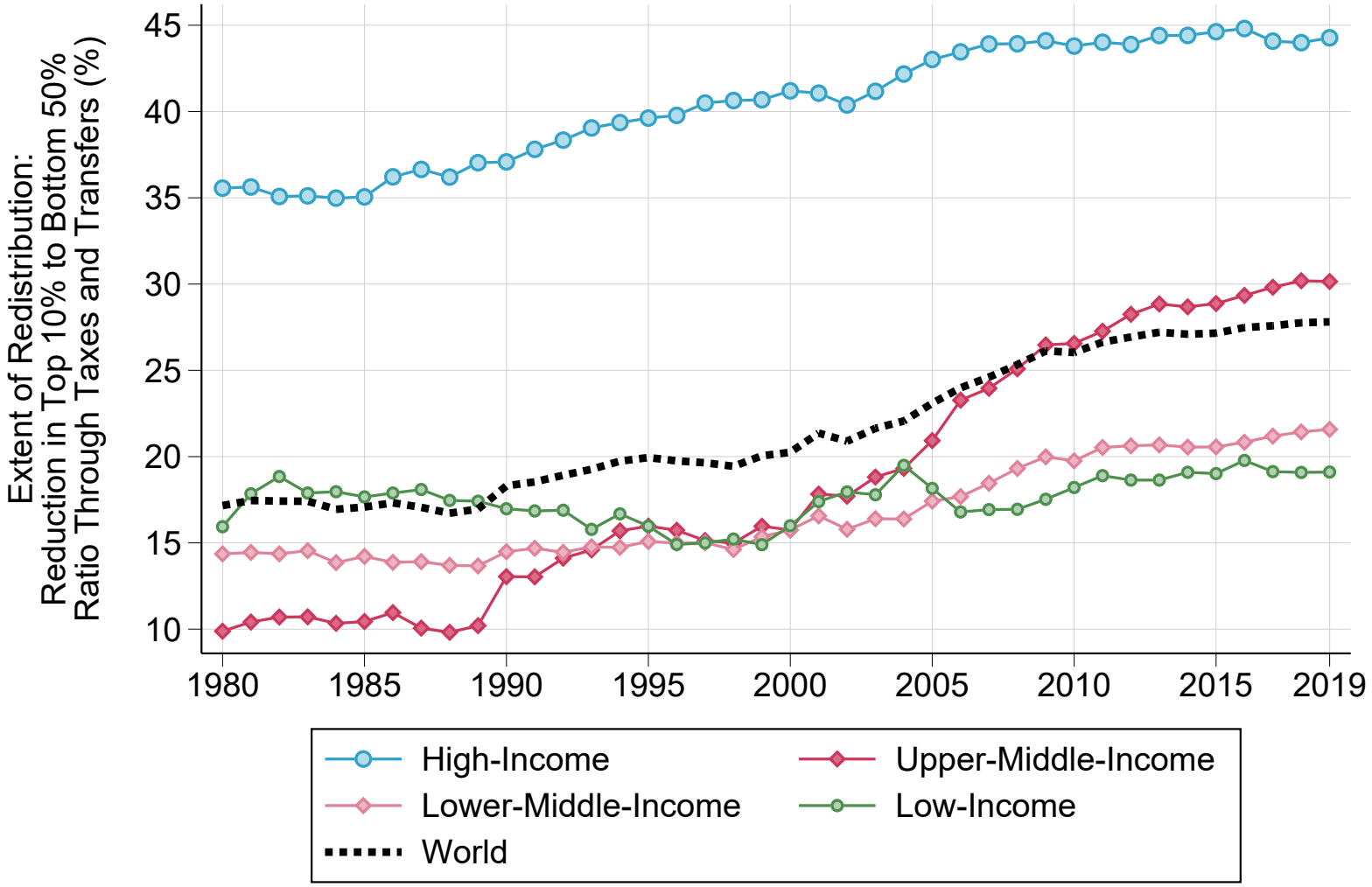
Notes. Authors' elaboration. Excludes social contributions.

Figure A14 – Transfer Progressivity Over the Course of Development:
Total Transfer Received by the Bottom 50% (% of Total Public Spending)



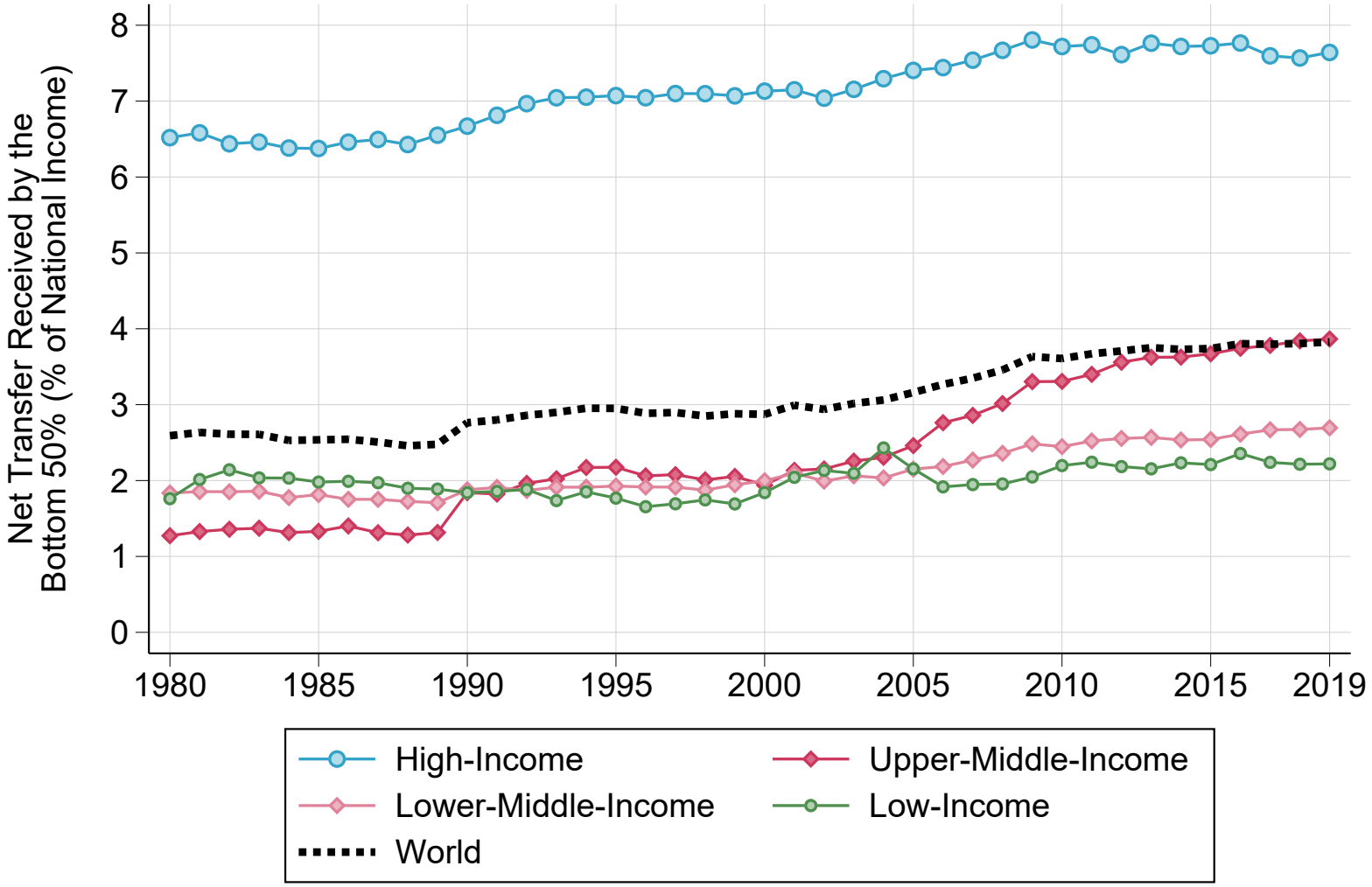
Notes. Total transfer received: sum of all transfers received (before paying taxes), expressed as a share of total government expenditure.

Figure A15 – Extent of Redistribution by Country Income Group, 1980-2019:
Percent Reduction in Top 10% to Bottom 50% Income Ratio, Pretax - Posttax



Notes. Country income groups from the World Bank.

Figure A16 – Extent of Redistribution by Country Income Group, 1980-2019:
Net Transfer Received by the Bottom 50% (% of National Income)



Notes. Country income groups from the World Bank.

Figure A17 – Top 10% to Bottom 50% Income Ratio: Pretax Versus Posttax

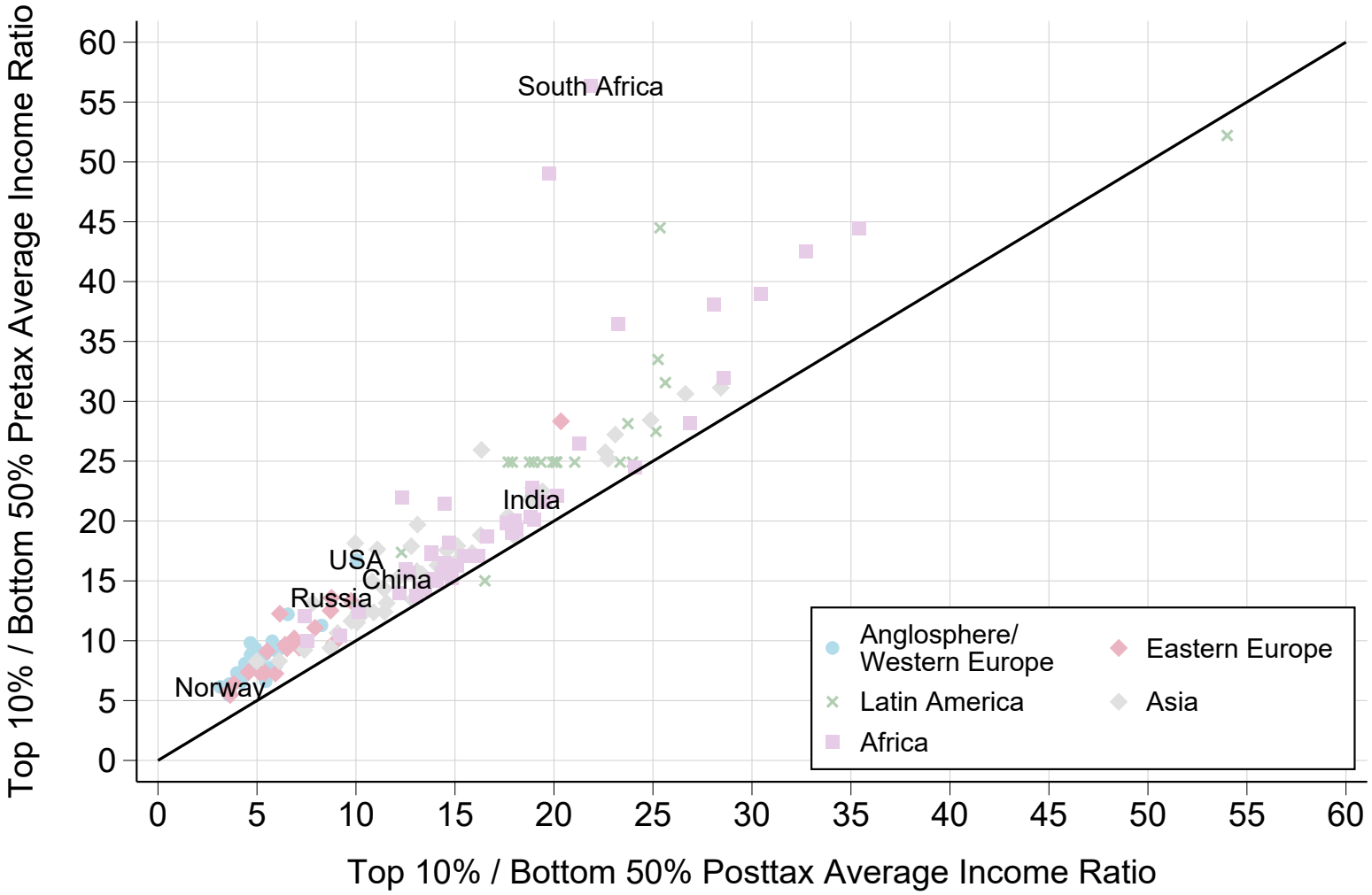


Figure A18 – Predistribution versus Redistribution:
Bottom 50% Pretax versus Posttax National Income Shares by World Region, 2019

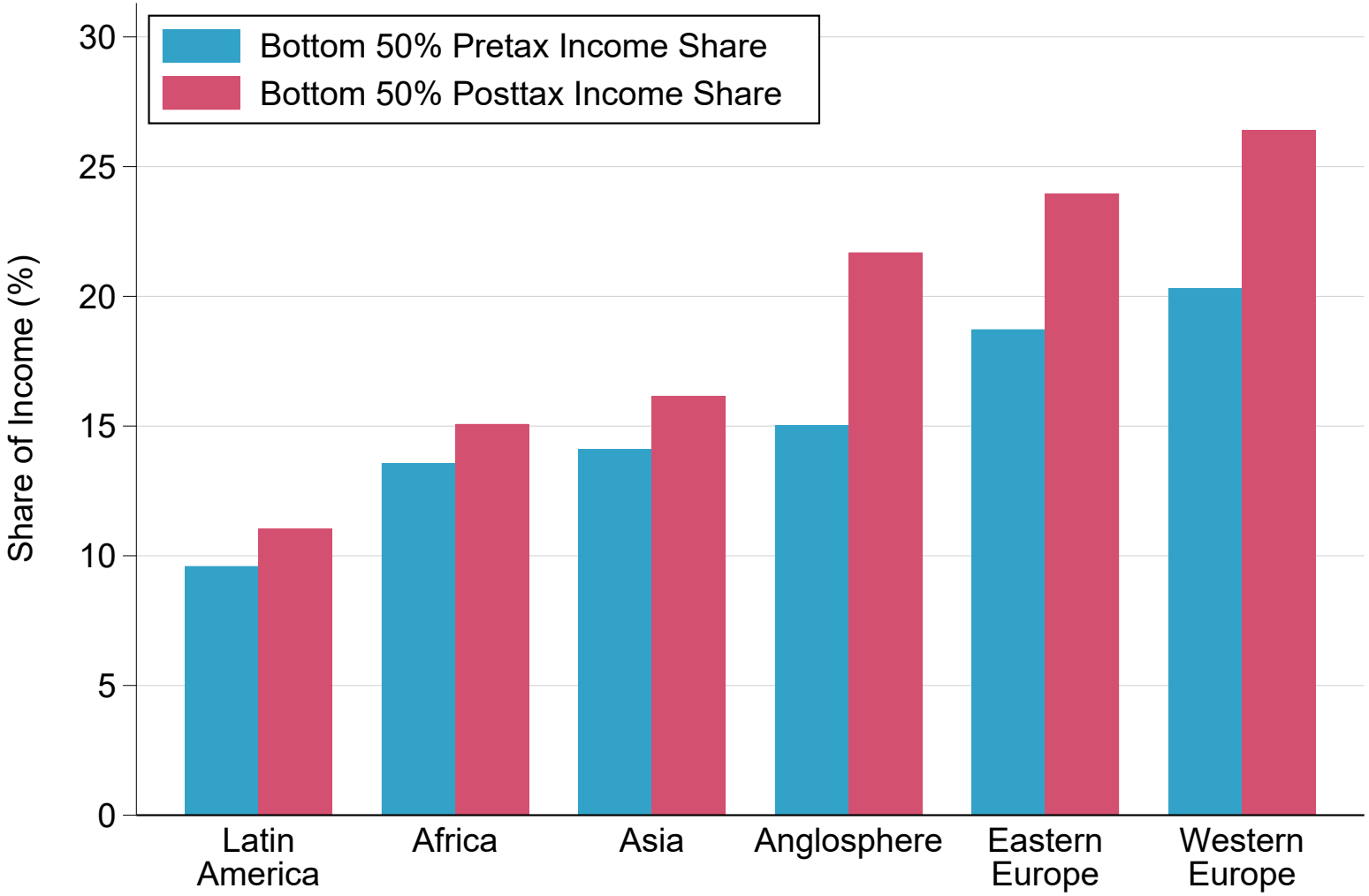


Figure A19 – Top 10% Pretax versus Posttax National Income Shares by World Region

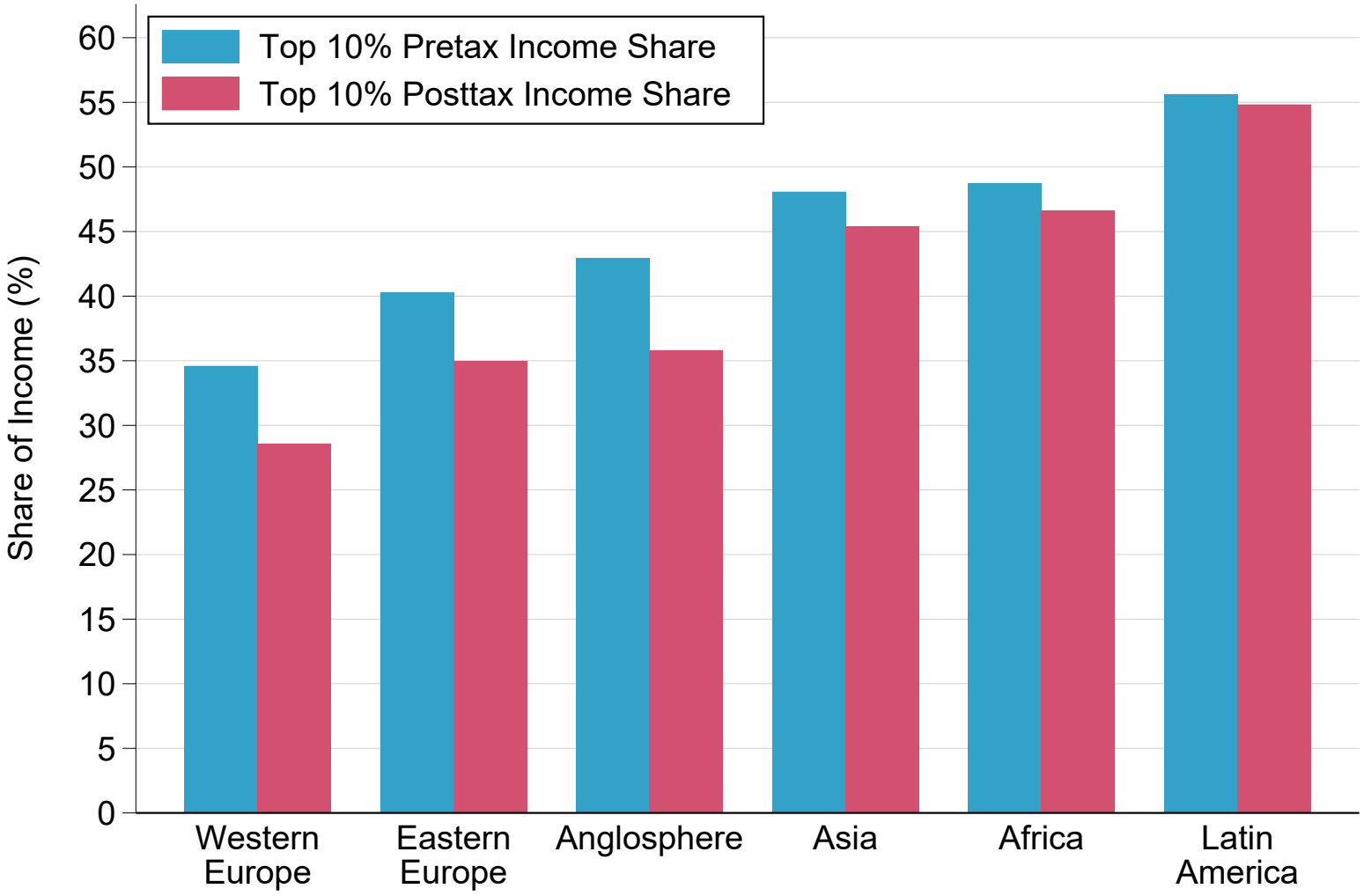


Figure A20 – Top 1% Pretax versus Posttax National Income Shares by World Region

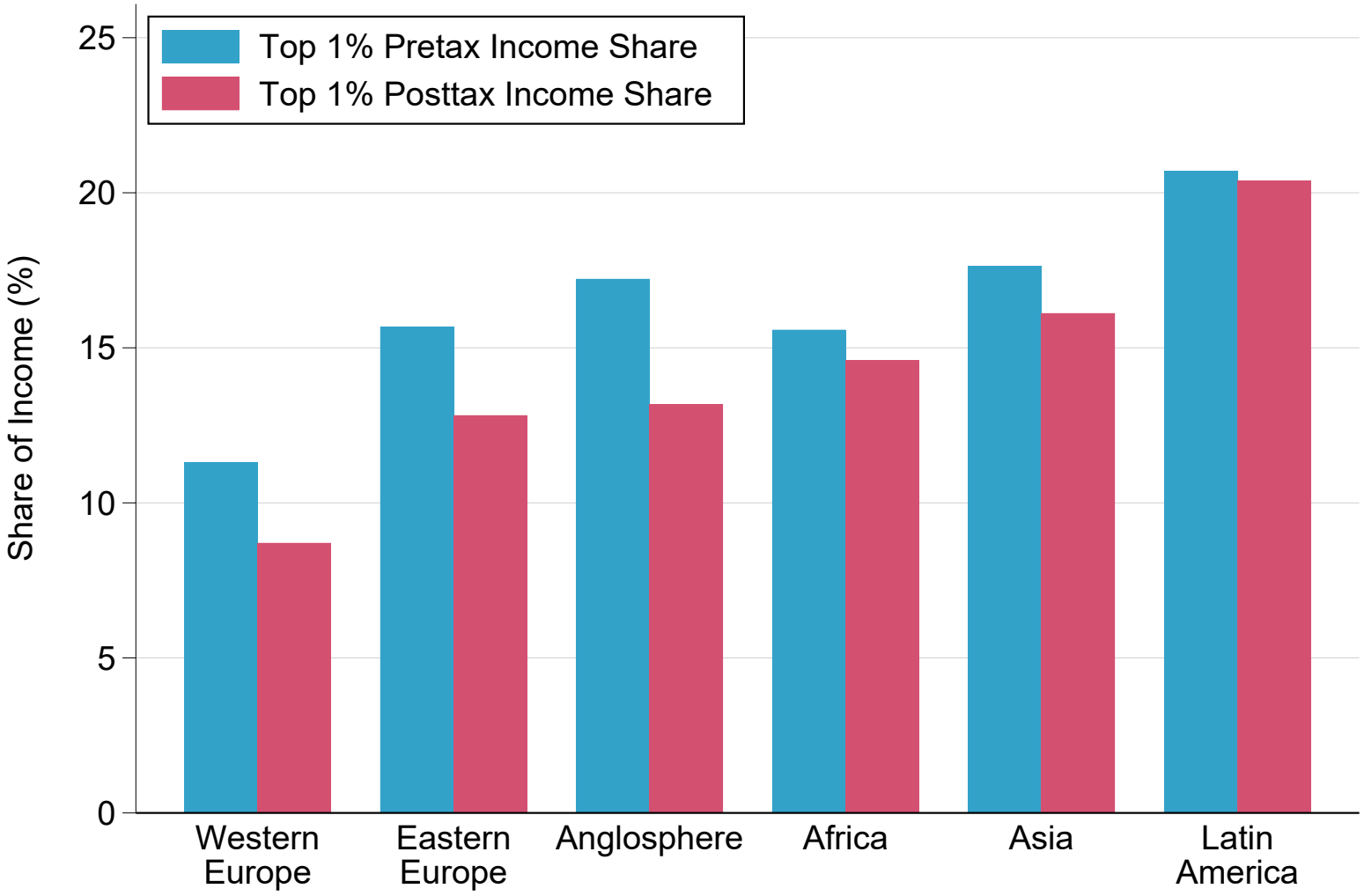


Figure A21 – Top 10% to Bottom 50% Pretax Income Ratio Versus Extent of Redistribution

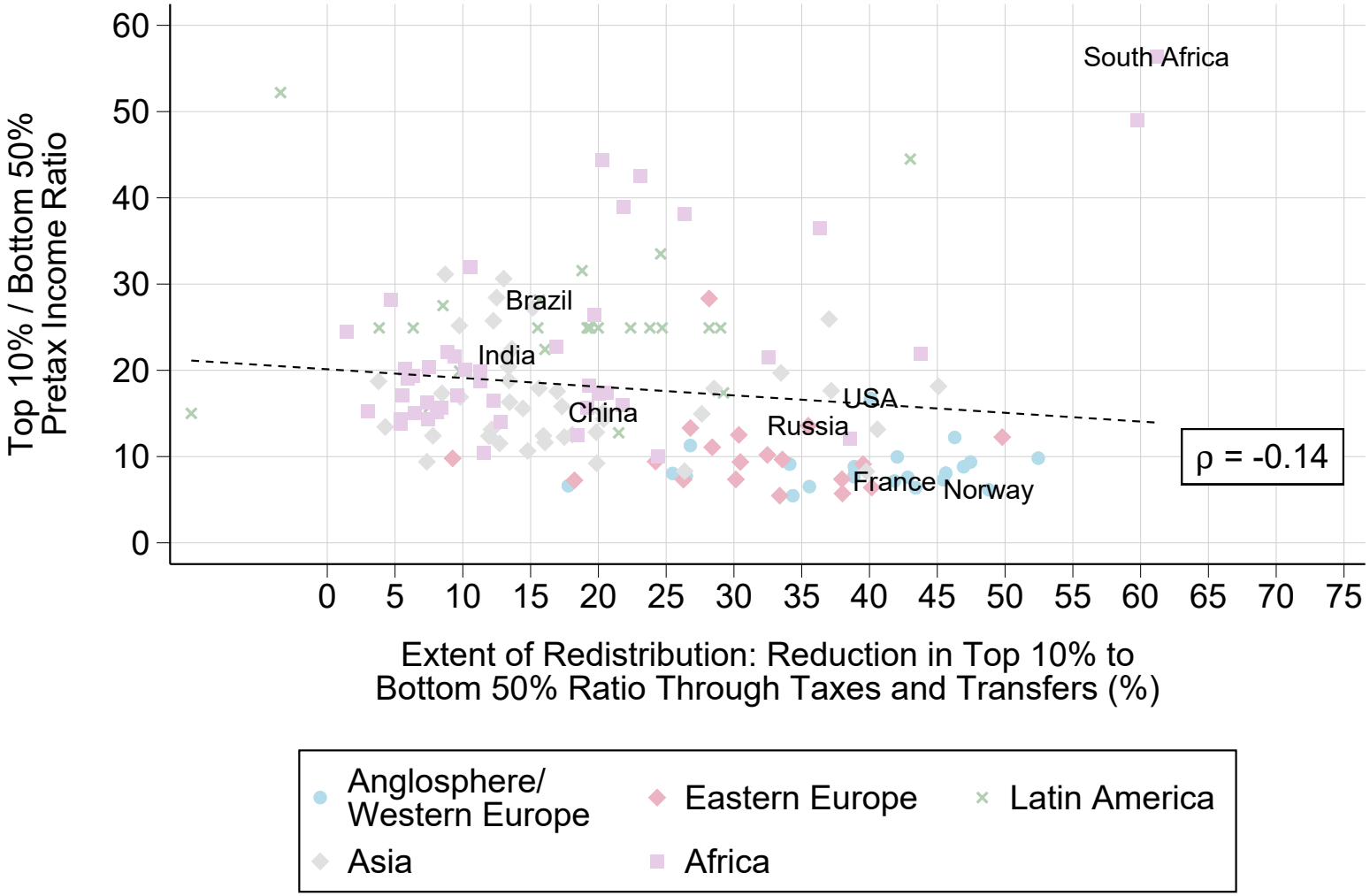


Figure A22 – Top 10% to Bottom 50% Pretax Income Ratio Versus Net Transfer Received by the Bottom 50%

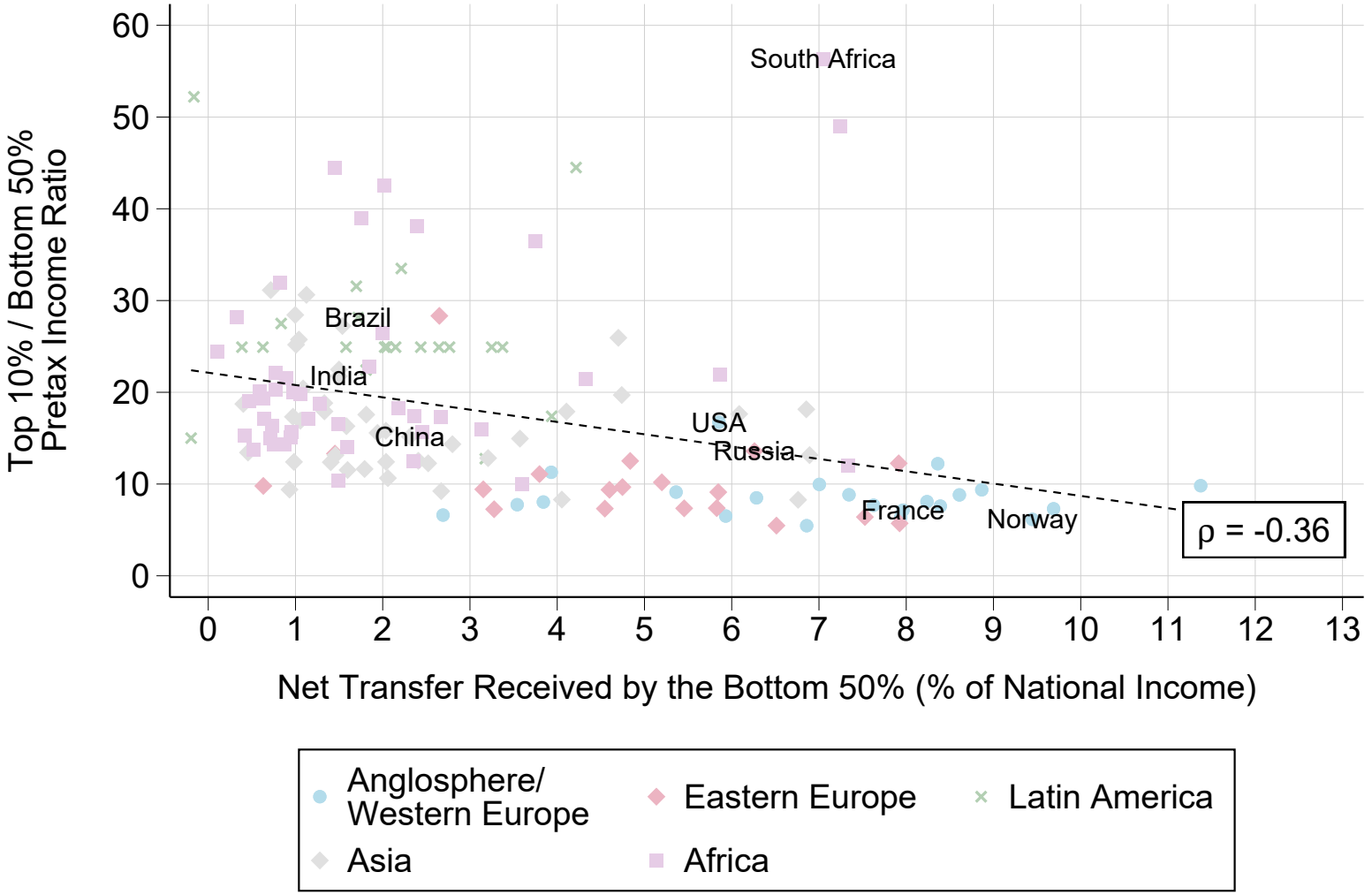
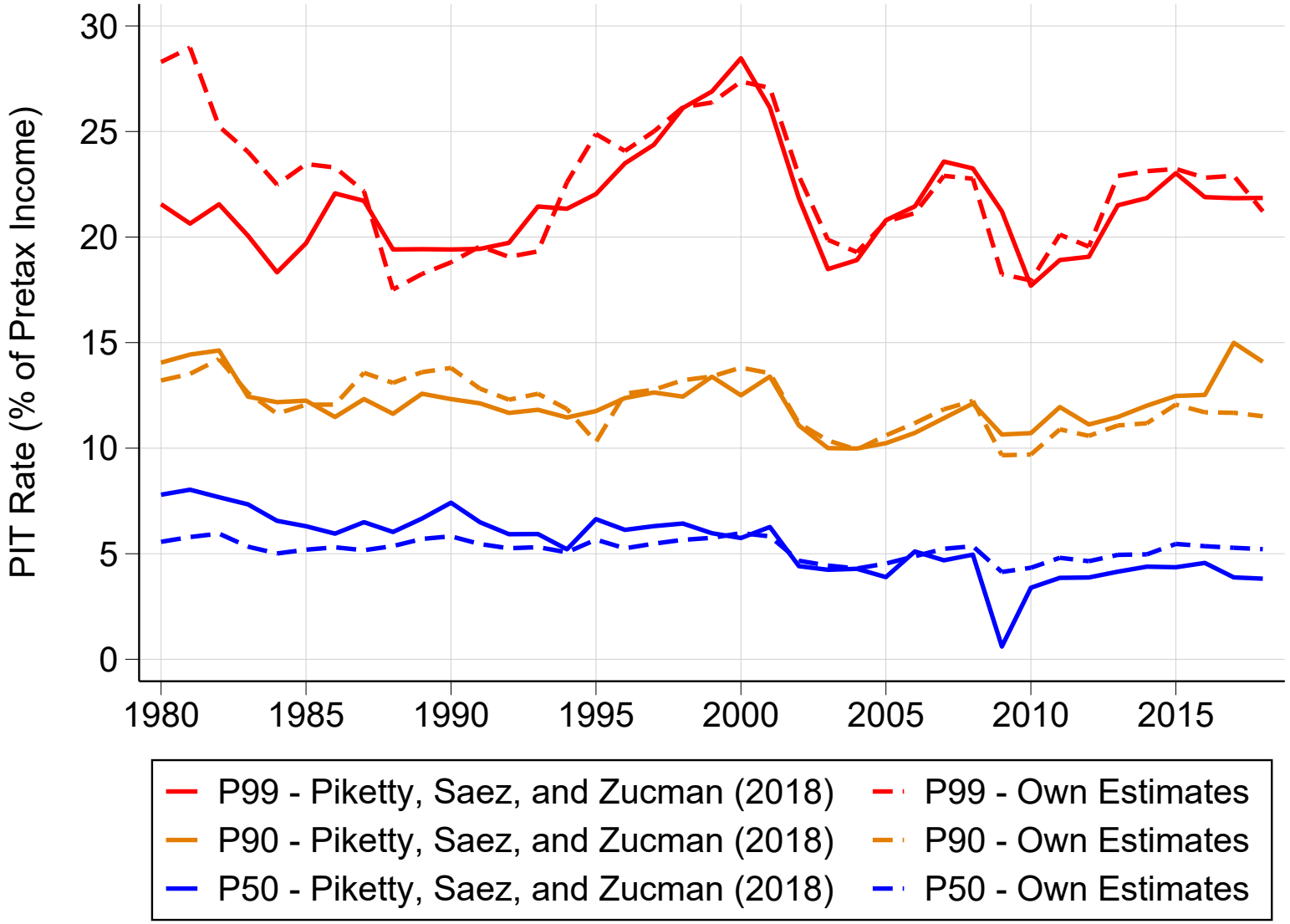


Figure A23 – Validation: Distributional Incidence of Personal Income Tax, United States, 1980-2018)



Notes. Authors' elaboration combining own estimates and data from Piketty, Saez, and Zucman (2018).

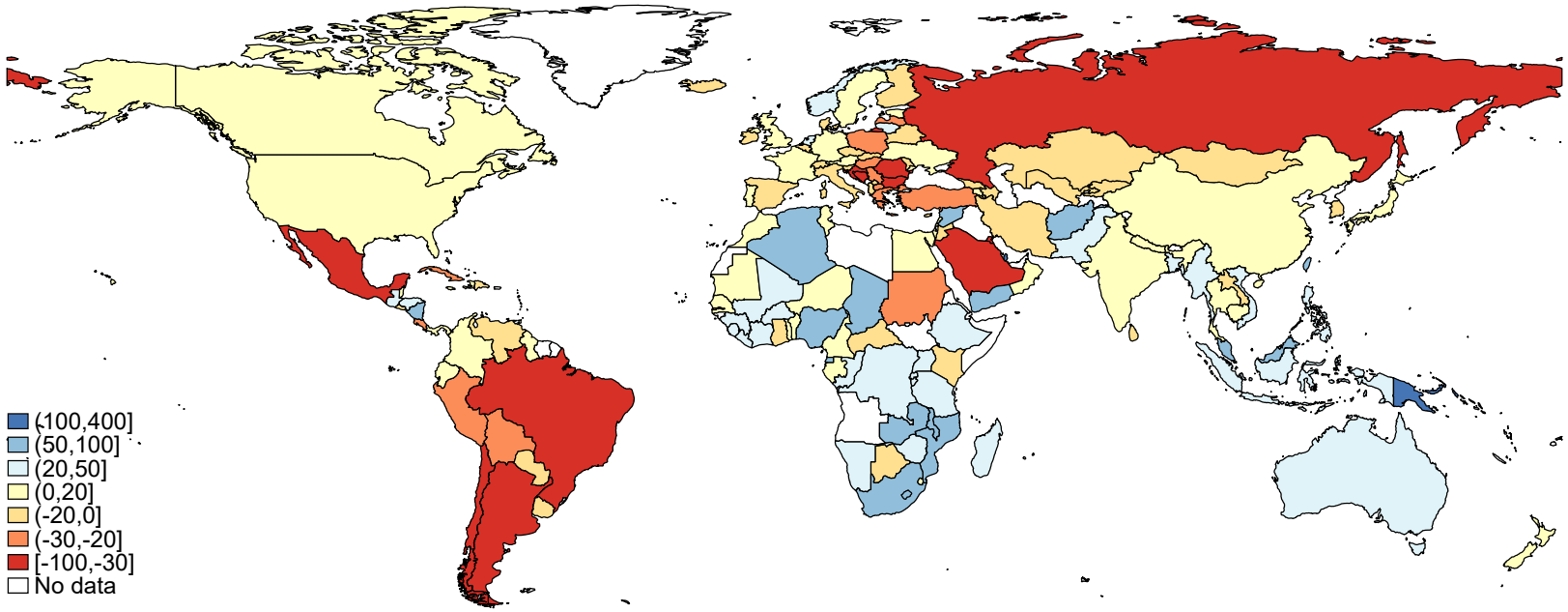
Table A1 – Extent of Redistribution by World Region: Decomposition by Tax and Transfer, 1980

	World Average	Anglosphere	Western Europe	Eastern Europe	Latin America	Asia	Africa
Personal Income Taxes	3.4%	11.4%	10.4%	3.3%	2.3%	1.9%	2.4%
Corporate Taxes	2.9%	3.4%	2.7%	8.5%	2.7%	2.2%	3.5%
Property & Wealth Taxes	0.3%	1.1%	0.7%	0.5%	0.2%	0.2%	0.1%
Indirect Taxes	-4.7%	-6.0%	-10.5%	-9.9%	-6.2%	-3.2%	-3.4%
Social Contributions	-0.4%	-2.0%	-0.3%	-1.1%	0.6%	-0.2%	-0.8%
All Taxes	3.0%	12.4%	6.0%	5.1%	-0.2%	1.6%	3.5%
Social Assistance	7.4%	14.5%	16.5%	15.4%	19.1%	3.6%	3.7%
Healthcare	6.3%	13.9%	11.1%	6.9%	16.4%	3.4%	6.0%
All Transfers	16.9%	32.1%	28.4%	24.8%	35.8%	10.3%	15.7%

Notes. Population-weighted averages of indicators in each country. The table reports the negative of the percent change in the top 10% to bottom 50% income ratio before and after removing the corresponding tax or adding to corresponding transfer to pretax income. For instance, the top row reports the percent reduction in inequality resulting from removing personal income taxes from individual incomes. Positive values indicate that the corresponding tax or transfer reduces inequality.

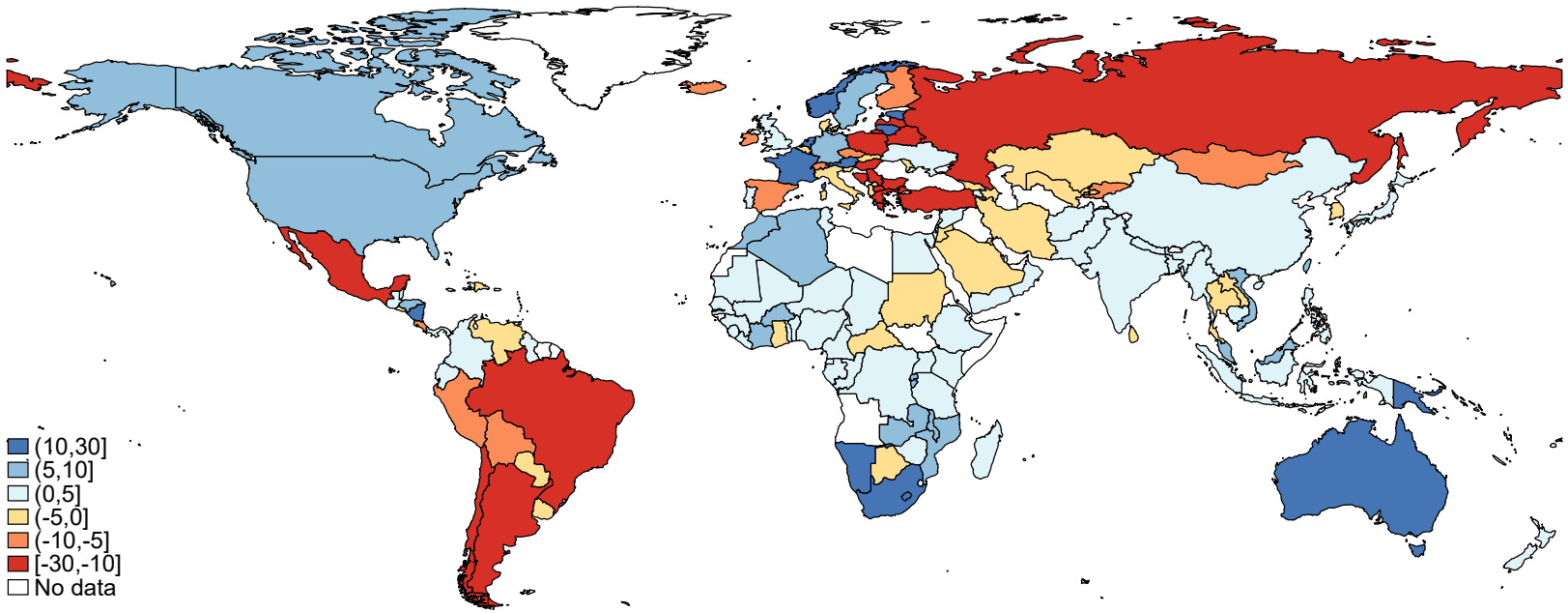
B. Alternative Measures of Tax Progressivity

Figure B1 – Relative Tax Progressivity Around the World:
Ratio of Top 10% to Bottom 50% Effective Tax Rates, 2019



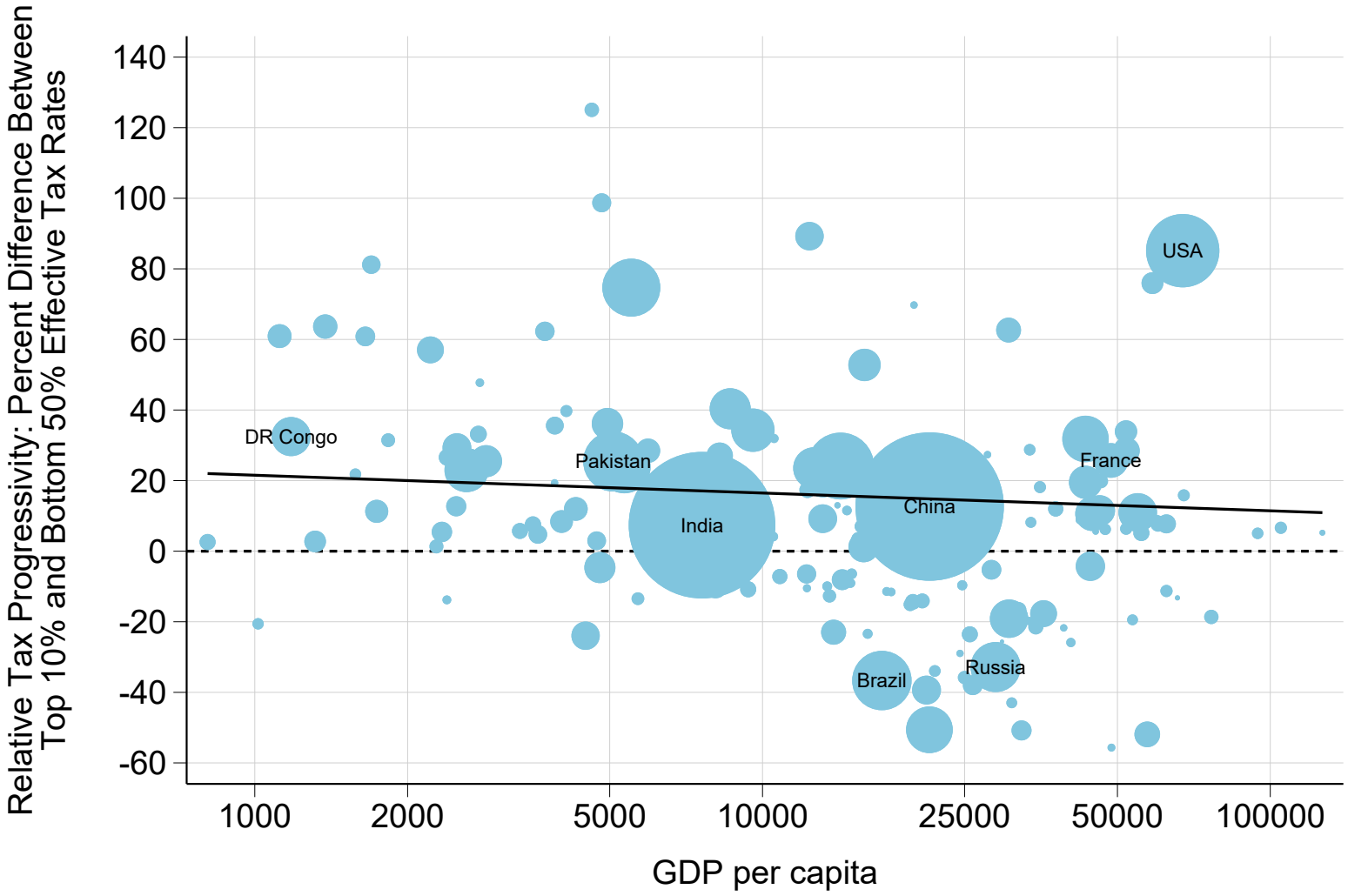
Notes. Includes social contributions.

Figure B2 – Normalized Tax Progressivity Around the World:
Percent Reduction in Top 10% to Bottom 50% Average Income Ratio (Pretax versus Net-of-tax Income)



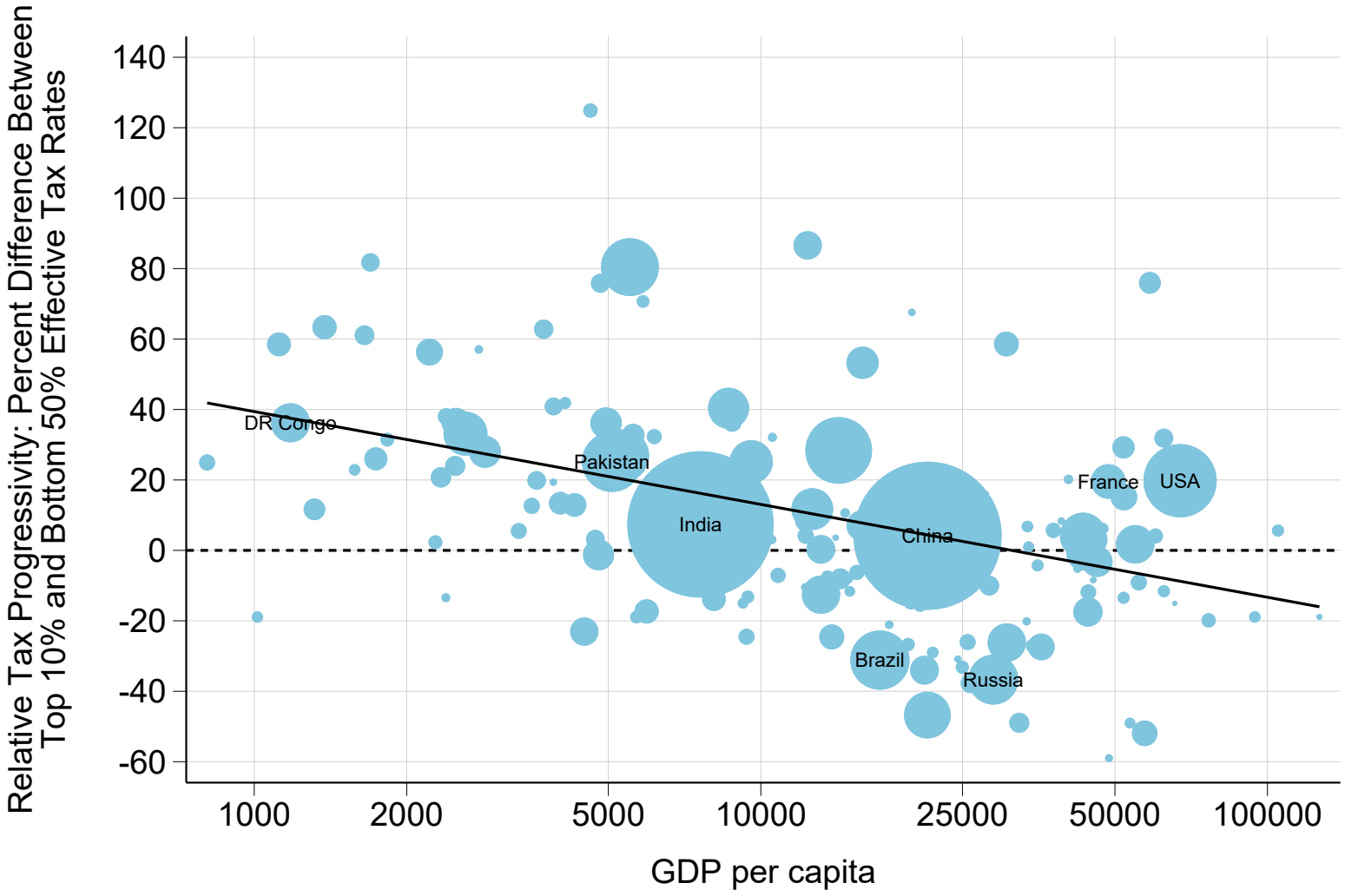
Notes. Includes social contributions.

Figure B3 – Relative Tax Progressivity Over the Course of Development:
Percent Difference Between Top 10% and Bottom 50% Effective Tax Rates, 2019



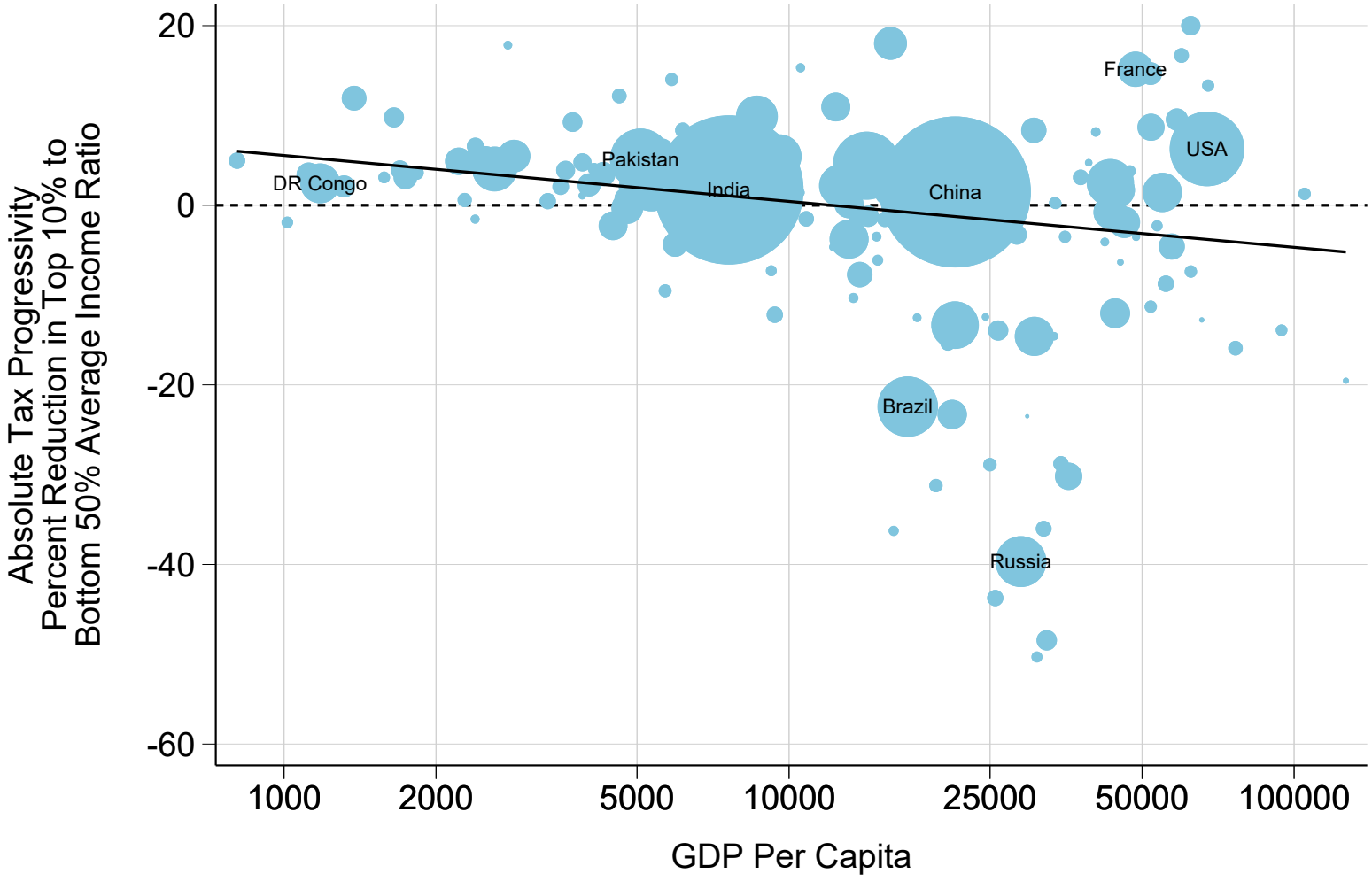
Notes. Excludes social contributions.

Figure B4 – Relative Tax Progressivity (Including Social Contributions) Over the Course of Development: Percent Difference Between Top 10% and Bottom 50% Effective Tax Rates, 2019



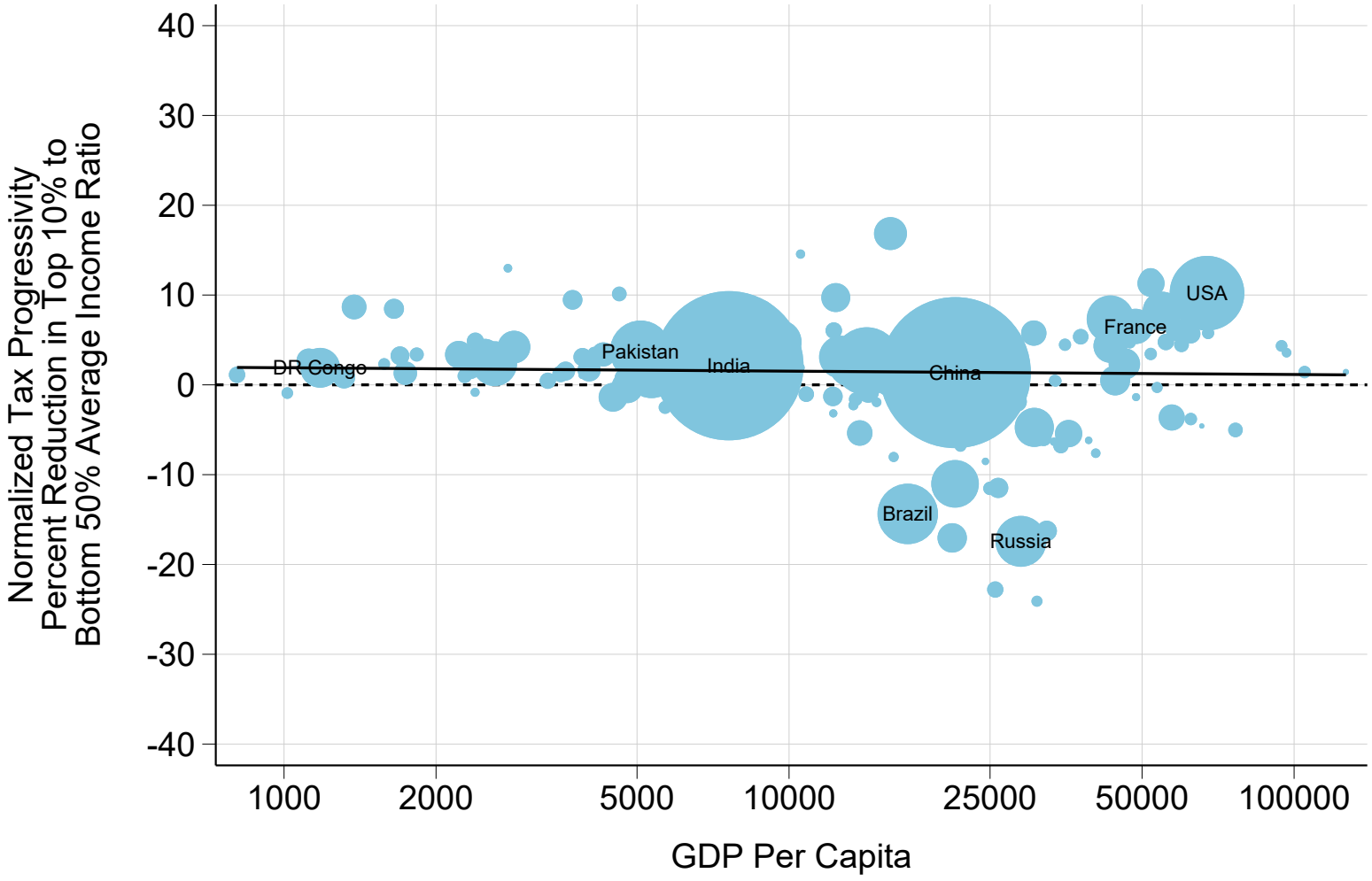
Notes. Includes social contributions.

Figure B5 – Absolute Tax Progressivity (Including Social Contributions) Over the Course of Development: Percent Reduction in Top 10% to Bottom 50% Average Income Ratio (Pretax versus Net-of-tax Income)



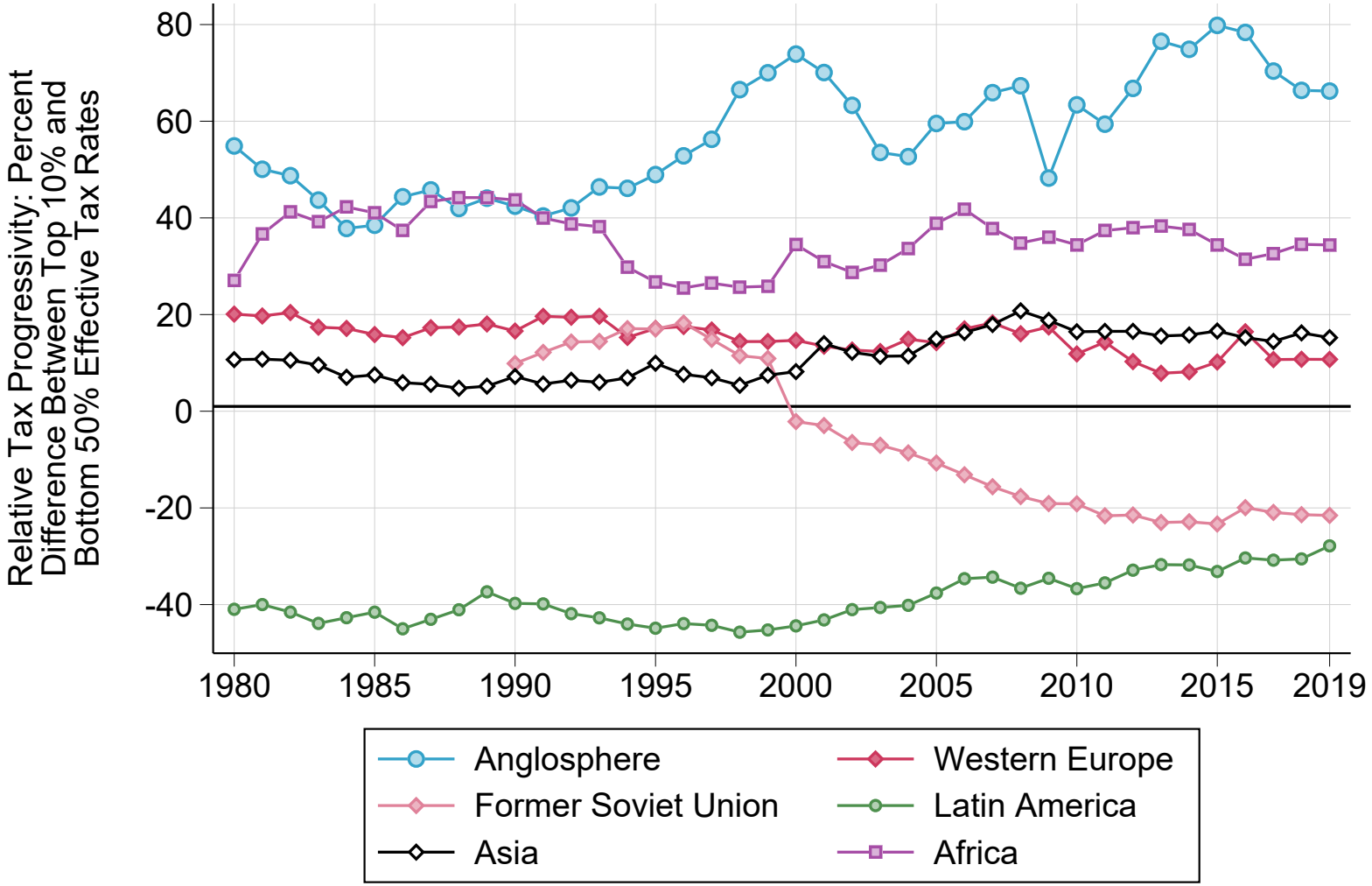
Notes. Includes social contributions.

Figure B6 – Normalized Tax Progressivity Over the Course of Development:
Percent Reduction in Top 10% to Bottom 50% Average Income Ratio (Pretax versus Net-of-tax Income)



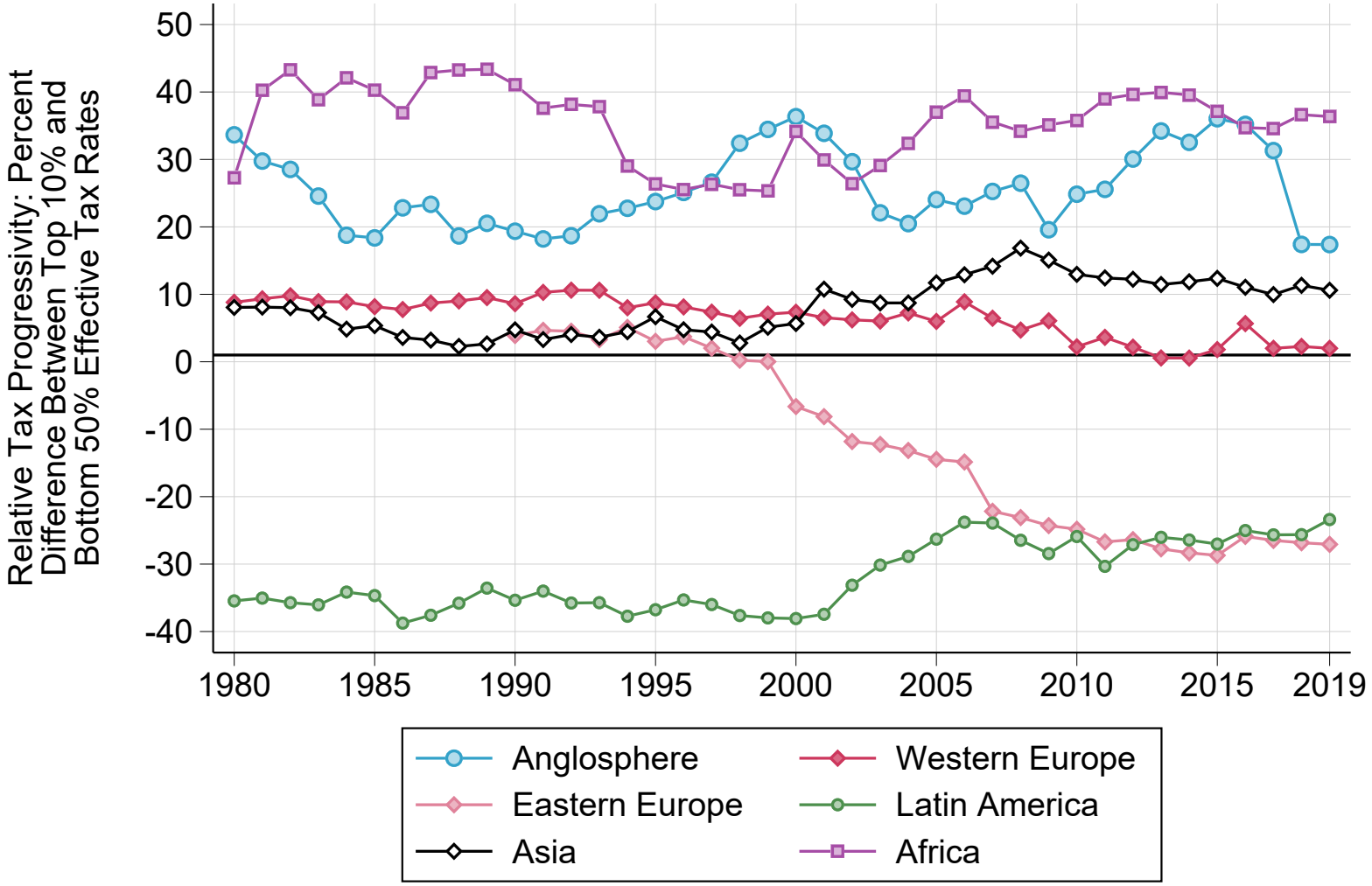
Notes. Excludes social contributions.

Figure B7 – Relative Tax Progressivity by World Region, 1980-2019



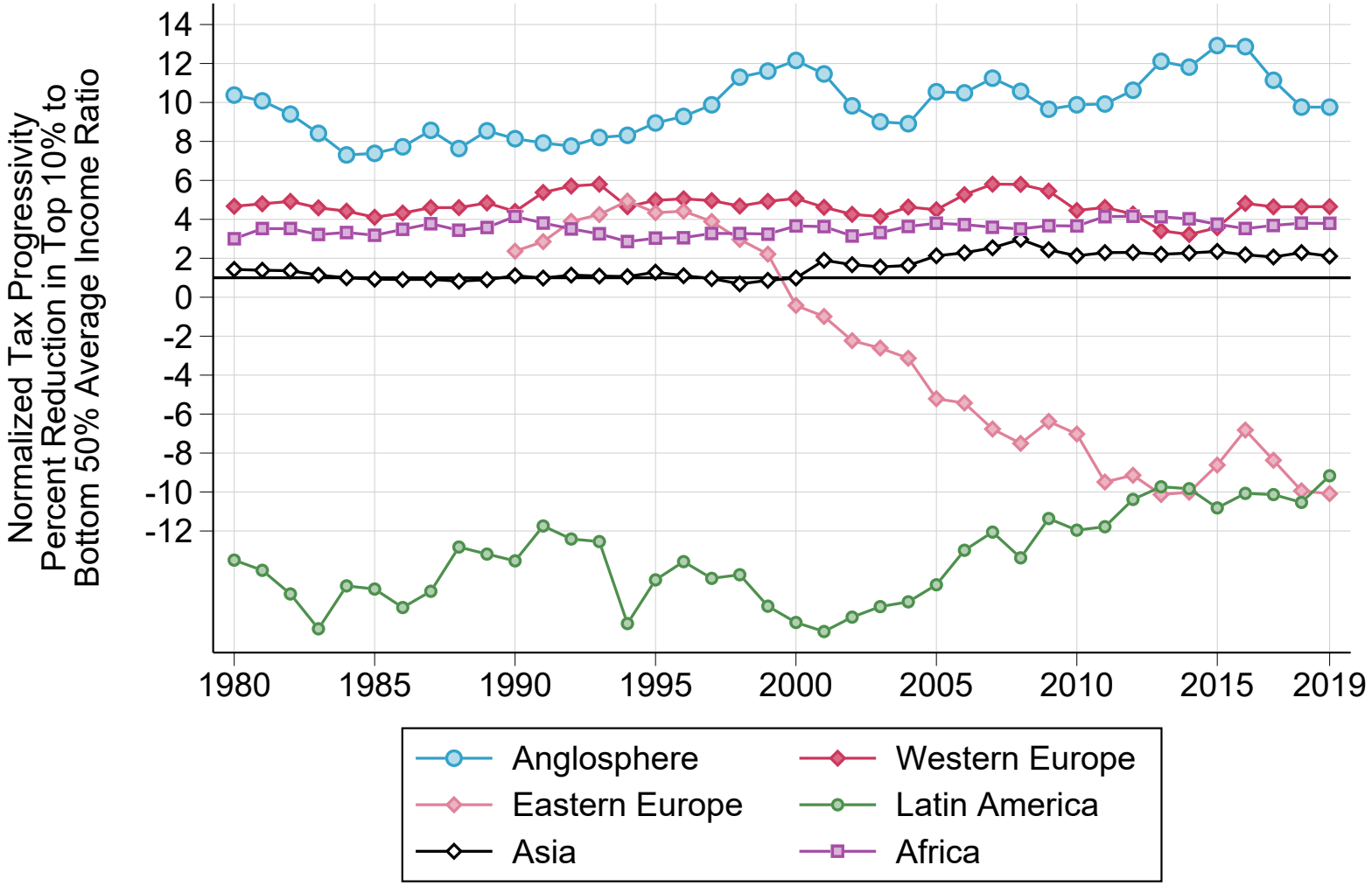
Notes. Excludes social contributions.

Figure B8 – Relative Tax Progressivity (Including Social Contributions) by World Region, 1980-2019



Notes. Includes social contributions.

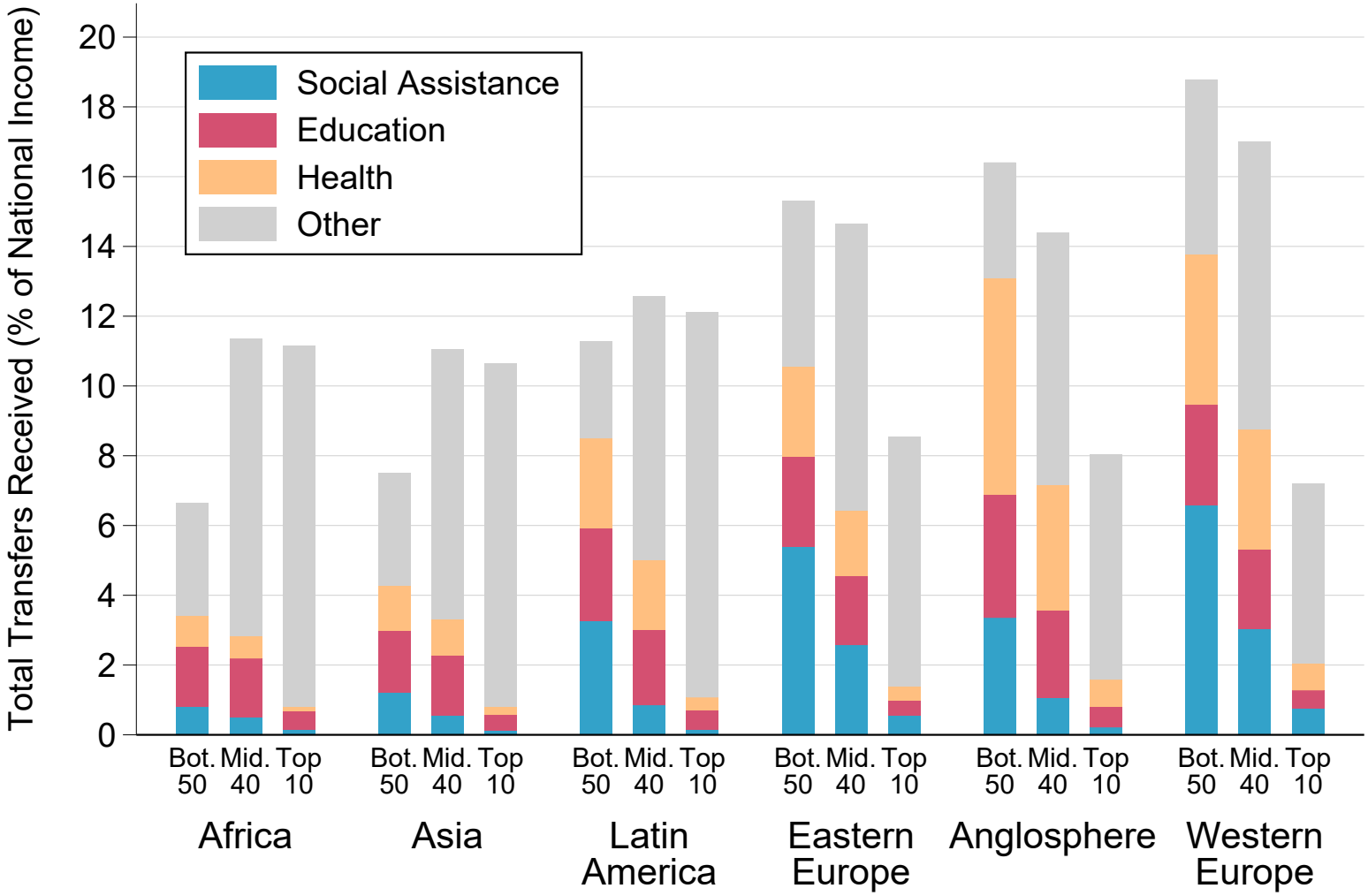
Figure B9 – Normalized Tax Progressivity by World Region, 1980-2019



Notes. Excludes social contributions.

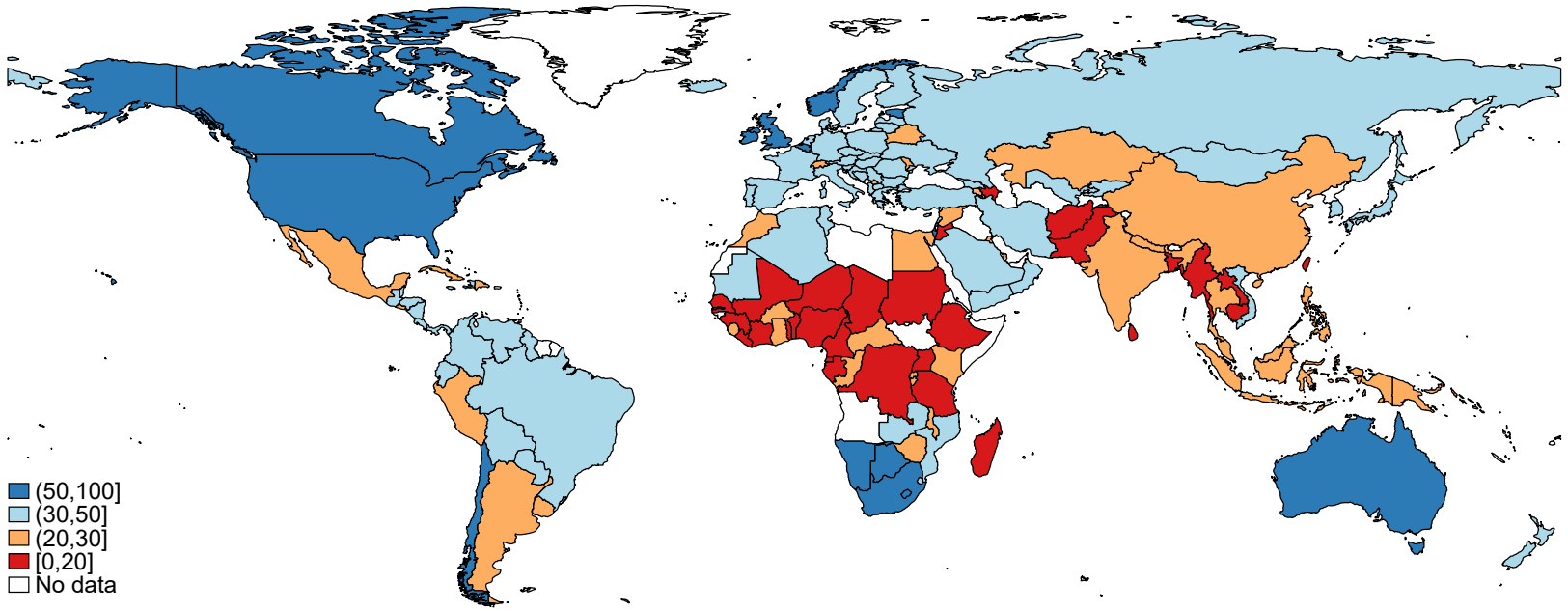
C. Results With Education Distributed Based on School Attendance

Figure C1 – Government Transfers Received by Income Group and World Region, 2019
Education Distributed Based on School Attendance



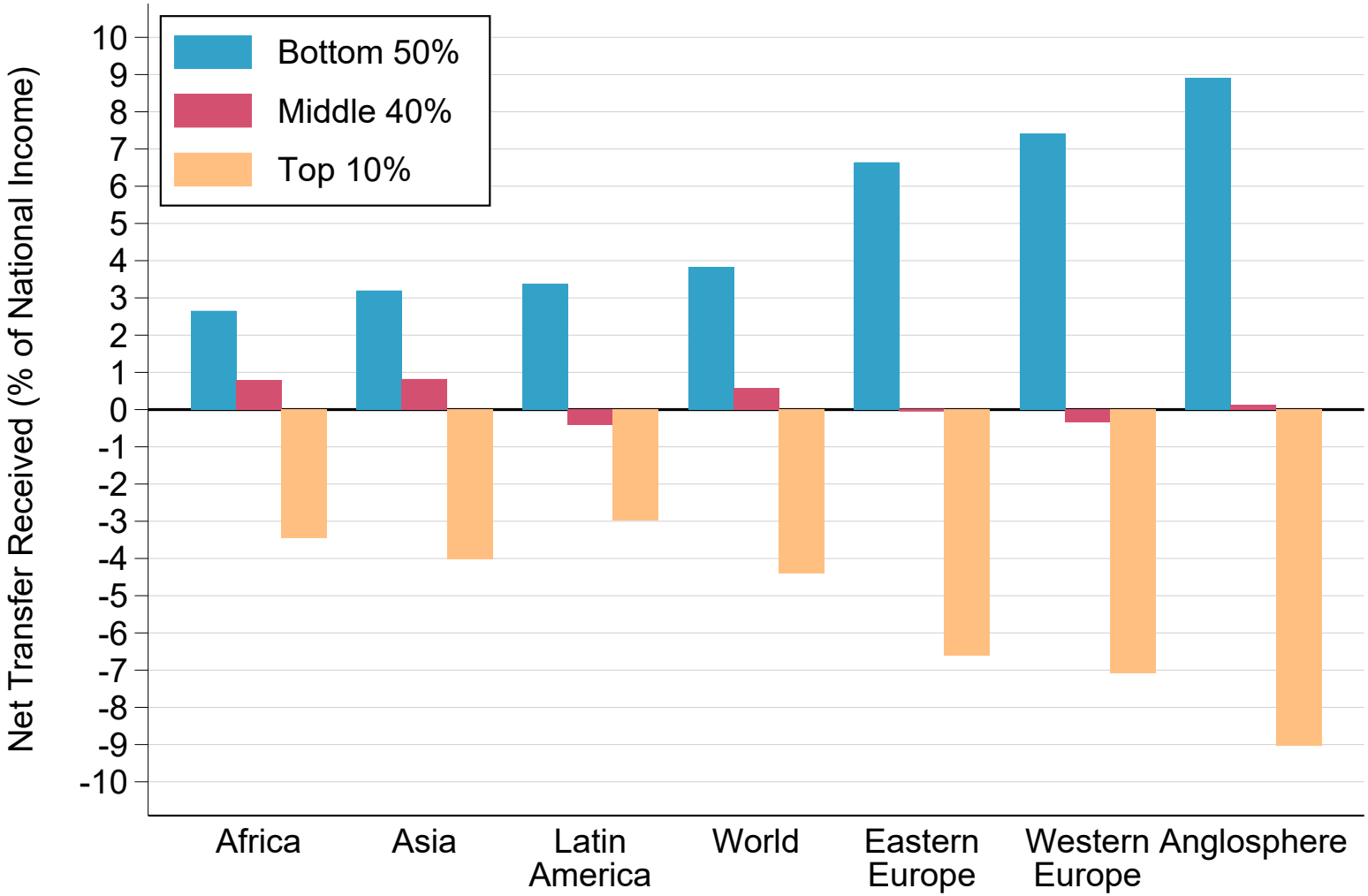
Notes. Population-weighted average of transfers received by income group in each country. Bot. 50: bottom 50% (p0p50); Mid. 40: middle 40% (p50p90); top 10: top 10% (p90p100).

Figure C2 – A Global Map of Redistribution
Percent Reduction in Top 10% to Bottom 50% Income Ratio, Pretax - Posttax
Education Distributed Based on School Attendance



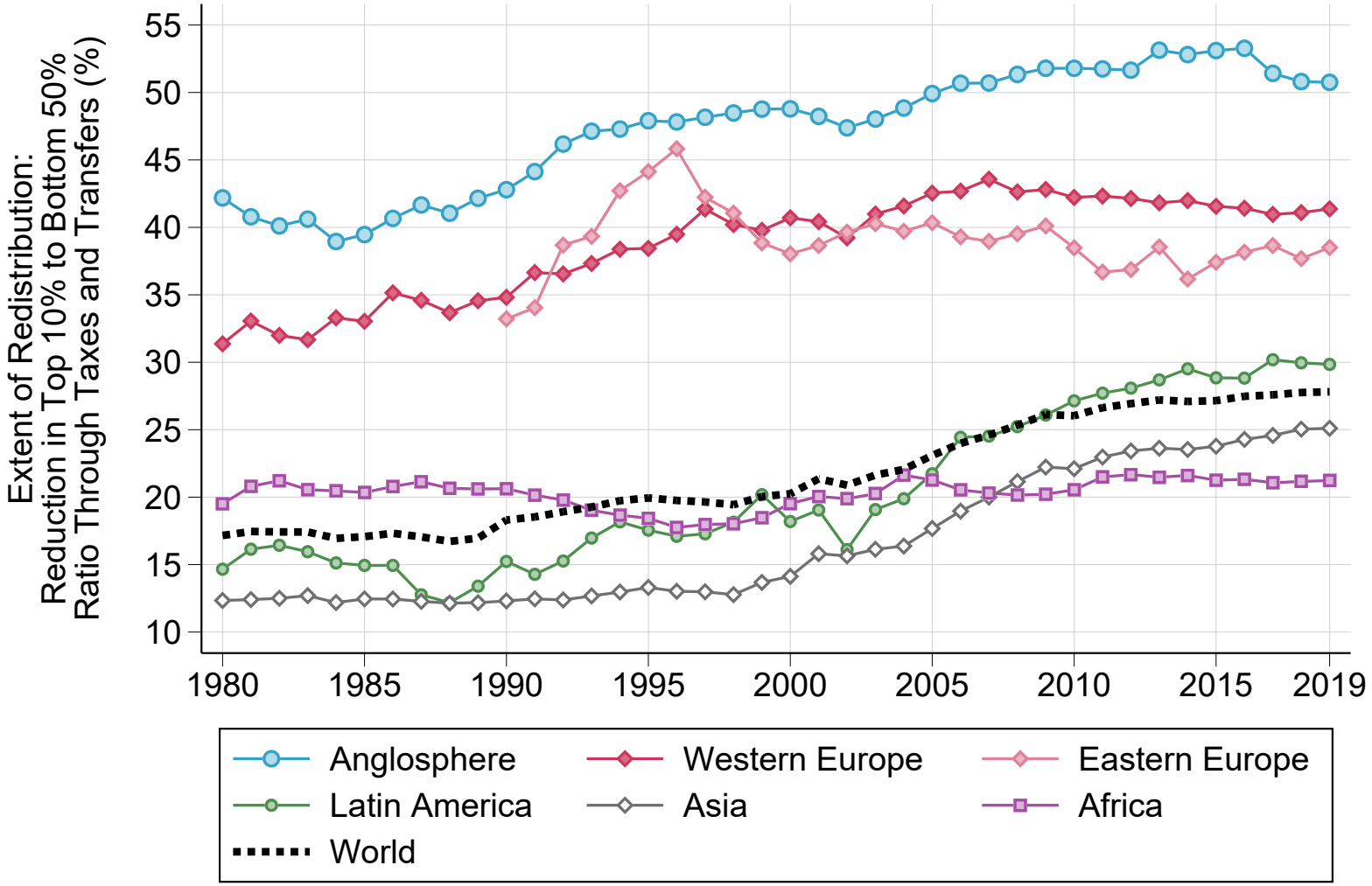
Notes. Posttax income: pretax income, minus all taxes, plus all transfers. Taxes exclude social contributions.

Figure C3 – A Global Map of Redistribution: Net Transfers Operated by the Tax-and-Transfer System Between Pretax Income Groups, 2019
Education Distributed Based on School Attendance



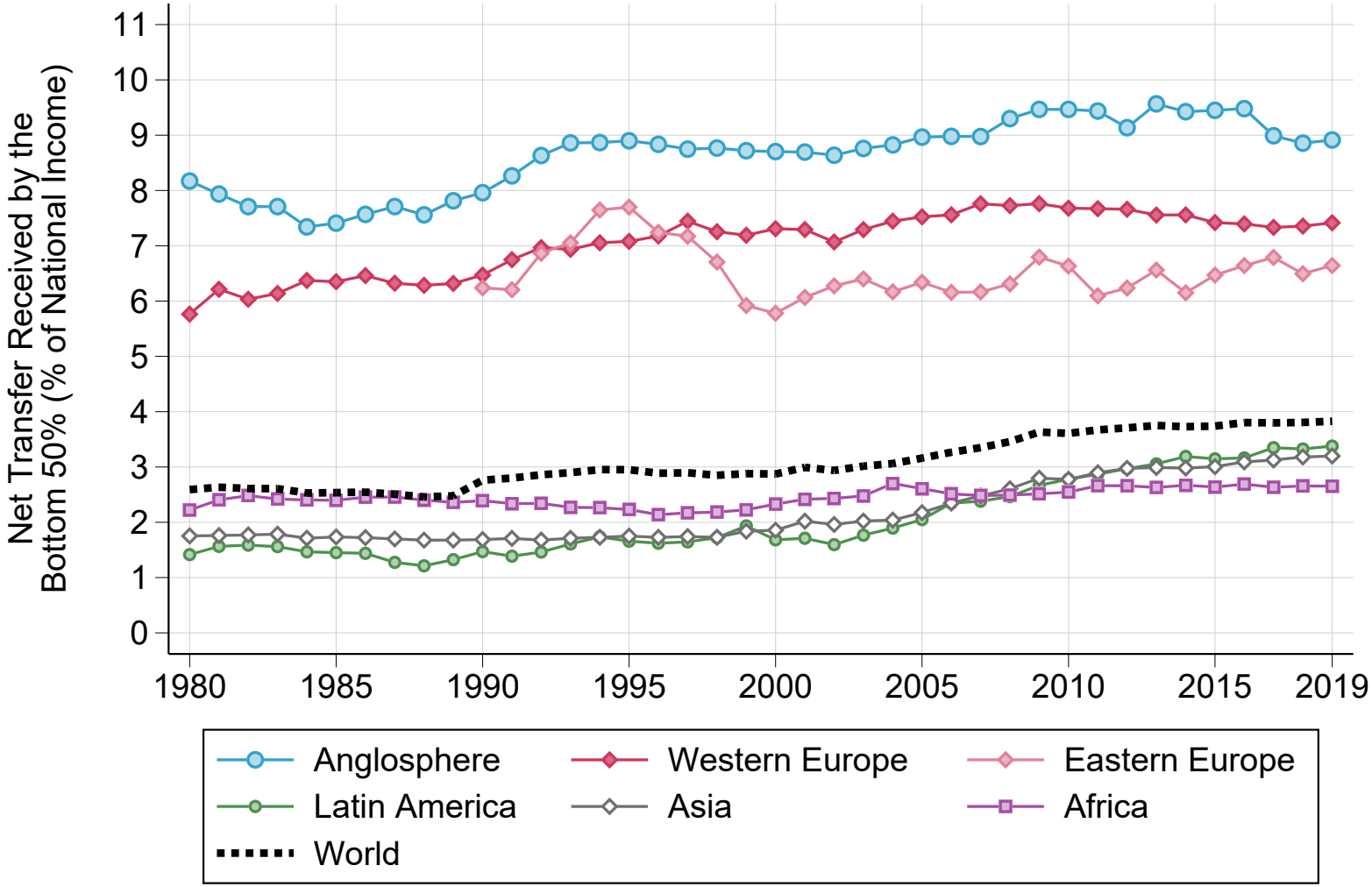
Notes. Net transfer: all transfers received minus all taxes paid, expressed as a share of national income. Taxes exclude social contributions. Population-weighted averages of net transfers received by income group in each country.

Figure C4 – Extent of Redistribution by World Region, 1980-2019:
Percent Reduction in Top 10% to Bottom 50% Income Ratio, Pretax - Posttax
Education Distributed Based on School Attendance



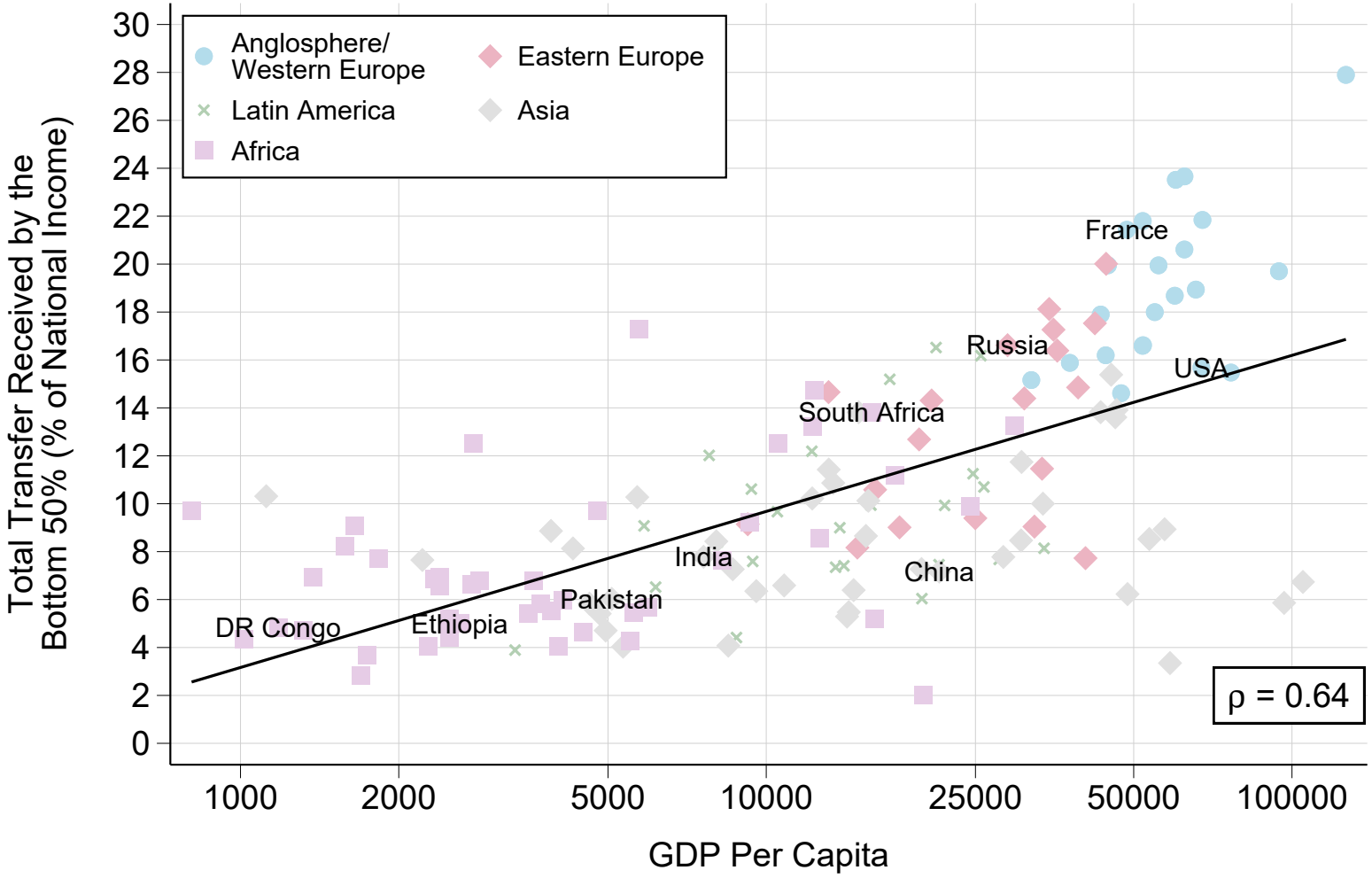
Notes. Population-weighted averages of the extent of redistribution in each country.

Figure C5 – Extent of Redistribution by World Region, 1980-2019:
Net Transfer Received by the Bottom 50% (% of National Income)
Education Distributed Based on School Attendance



Notes. Net transfer: all transfers received minus all taxes paid, expressed as a share of national income. Population-weighted averages of net transfers received in each country.

Figure C6 – Transfer Progressivity Over the Course of Development:
Total Transfer Received by the Bottom 50% (% of National Income)
Education Distributed Based on School Attendance



Notes. Total transfer received: sum of all transfers received (before paying taxes), expressed as a share of national income.

Figure C7 – Net Redistribution Over the Course of Development:
Percent Reduction in Top 10% to Bottom 50% Income Ratio, Pretax - Posttax
Education Distributed Based on School Attendance

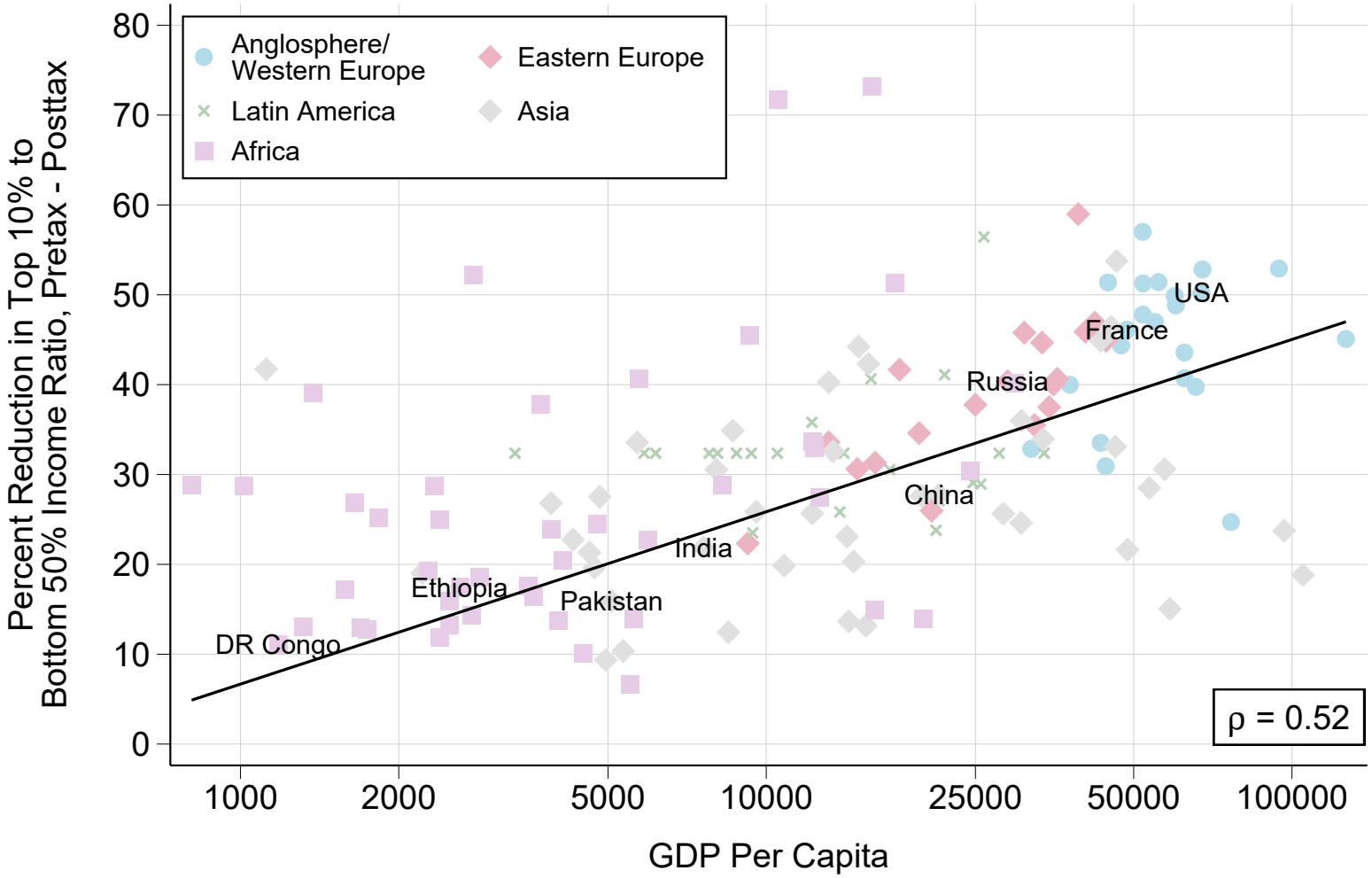


Figure C8 – Predistribution versus Redistribution:
Bottom 50% Pretax versus Posttax National Income Shares by Country, 2019
Education Distributed Based on School Attendance

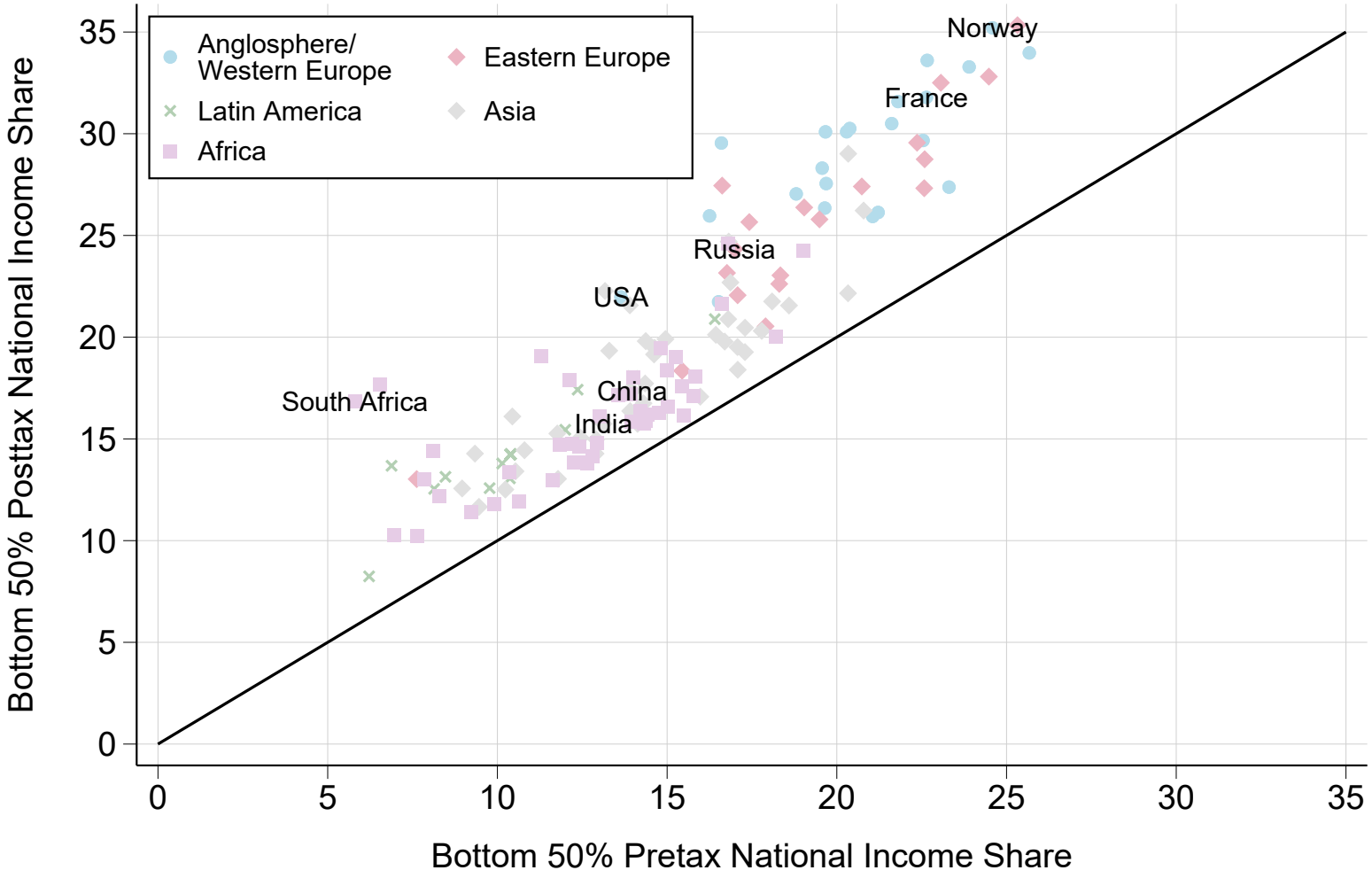


Figure C9 – Predistribution versus Redistribution:
Bottom 50% Pretax Income Share versus Extent of Redistribution, 2019
Education Distributed Based on School Attendance

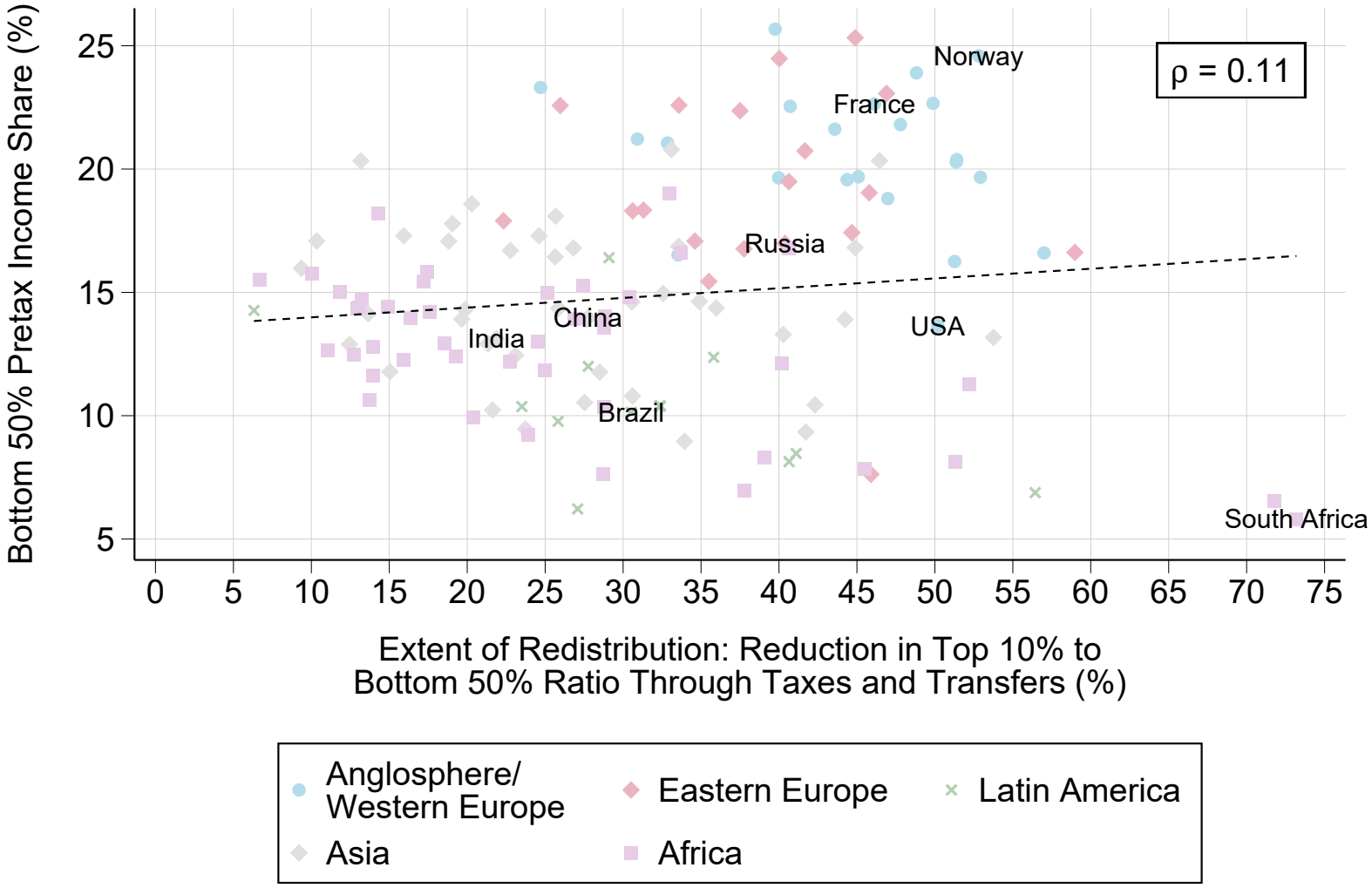


Figure C10 – Predistribution versus Redistribution:
Bottom 50% Pretax Income Share versus Net Transfer Received by the Bottom 50%, 2019
Education Distributed Based on School Attendance

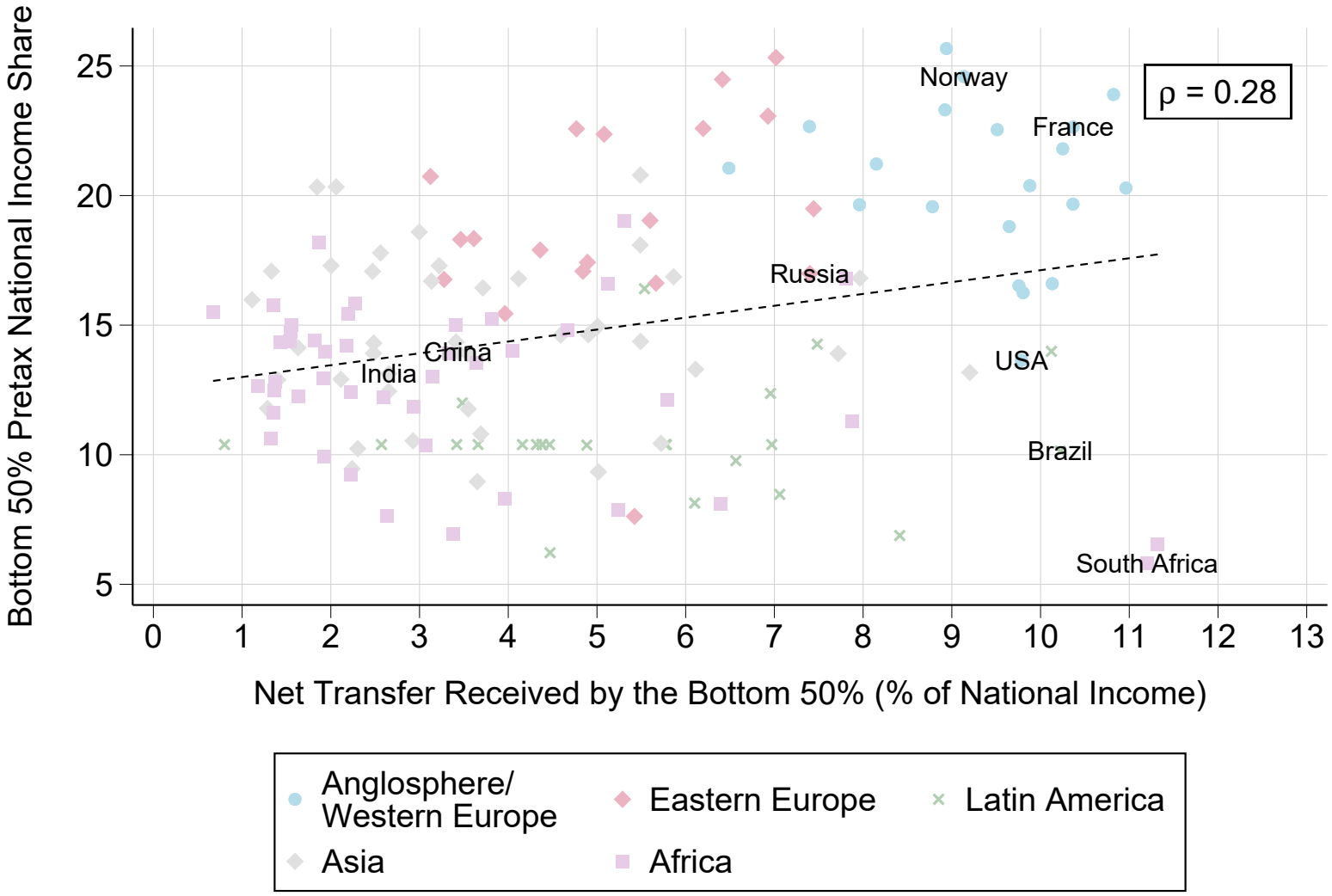


Table C1 – Extent of Redistribution by World Region: the Dominant Role of Transfers
Education Distributed Based on School Attendance

	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	20.0	18.9	14.5	4.2%	21.2%	19.7%
Anglosphere	14.8	13.0	7.3	11.6%	50.8%	22.8%
Asia	17.4	17.0	13.1	2.9%	25.1%	11.4%
Eastern Europe	11.2	13.0	6.9	-13.7%	38.5%	-35.6%
Latin America	31.6	35.0	21.9	-10.6%	29.8%	-35.4%
Western Europe	8.7	8.4	5.1	3.8%	41.4%	9.3%
World Average	18.2	18.0	13.1	1.8%	27.8%	6.5%

Notes. Population-weighted averages of indicators in each country. After taxes: top 10% to bottom 50% average income ratio in terms of net-of-tax income (pretax income minus all taxes). After taxes and transfers: top 10% to bottom 50% average income ratio in terms of posttax income (pretax income minus all taxes plus all transfers). Tax share of redistribution: ratio of extent of redistribution through taxes over extent of redistribution through taxes and transfers.

Table C2 – Extent of Redistribution by World Region: Decomposition by Tax and Transfer, 2019
Education Distributed Based on School Attendance

	World Average	Anglosphere	Western Europe	Eastern Europe	Latin America	Asia	Africa
Personal Income Taxes	4.4%	12.4%	14.0%	3.7%	4.6%	3.1%	3.2%
Corporate Taxes	4.2%	3.7%	3.7%	4.4%	4.0%	4.6%	3.3%
Property & Wealth Taxes	0.6%	0.8%	1.3%	0.6%	0.4%	0.6%	0.0%
Indirect Taxes	-7.7%	-7.3%	-14.7%	-23.4%	-10.2%	-6.9%	-3.3%
Social Contributions	-1.3%	-5.7%	-2.5%	-6.6%	-0.7%	-0.9%	0.2%
All Taxes	3.1%	12.1%	9.5%	-12.3%	0.9%	2.9%	4.2%
Social Assistance	10.4%	16.6%	22.9%	20.7%	23.5%	7.5%	5.5%
Education	12.0%	18.3%	11.0%	11.1%	21.4%	10.4%	10.9%
Healthcare	10.3%	28.4%	15.8%	11.2%	20.3%	7.5%	6.5%
All Transfers	24.7%	43.5%	37.3%	33.1%	43.0%	20.6%	17.3%

Notes. Population-weighted averages of indicators in each country. The table reports the negative of the percent change in the top 10% to bottom 50% income ratio before and after removing the corresponding tax or adding to corresponding transfer to pretax income. For instance, the top row reports the percent reduction in inequality resulting from removing personal income taxes from individual incomes. Positive values indicate that the corresponding tax or transfer reduces inequality. All series from this paper (existing DINA studies do not provide comparable, detailed decompositions by type of tax).