Who Benefits from Public Services? Novel Evidence and Implications for Inequality Measurement

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Abstract

Traditional inequality statistics focus on disposable income, ignoring transfers received by households in the form of public services. This article provides novel evidence on the distribution of in-kind transfers and its implications for inequality measurement. I combine historical budget data with rich microdata to estimate the distributional incidence of all major public services provided in South Africa from 1993 to 2019. All government transfers reduce inequality, but with large variations. The poorest 50% consume 60% of public education, 50% of healthcare, 40% of police and local government services, and only 7% of transport infrastructure. There have been enormous improvements in public services since the end of apartheid: in-kind transfers can account for half of real income growth among low-income households since 1993. These results have major implications for recent debates on inequality measures consistent with macroeconomic growth: typical assumptions made in the literature underestimate the rise of redistribution by 60%.

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1. Introduction

The standard concept used to track inequality is posttax disposable income, defined as the sum of pretax incomes, plus cash transfers received, minus direct taxes paid (e.g., OECD, 2011). This concept has the advantage of capturing money that effectively ends up in households' bank accounts and can be used to purchase goods and services. Yet, it suffers from a key limitation: it entirely ignores in-kind transfers received by households in the form of free public services. As a result, traditional income distribution statistics provide a very partial picture of government redistribution. This is especially true in developing countries, where cash transfers only represent a tiny fraction of public spending. Instead, the bulk of redistribution is made in the form of public goods as diverse as education, healthcare, transport infrastructure, police services, and water supply. In 2022, governments worldwide spent the equivalent of 30% of global GDP on public services (Gethin, 2024).

This article provides novel evidence on the distributional incidence of public services and its implications for the measurement of inequality. The context is post-apartheid South Africa, which provides an ideal case study given its recent history of profound sociopolitical change. Since the 1990s, newly elected governments have massively invested in education, healthcare, and other public services, with the explicit objective of reducing the extreme inequalities inherited from the apartheid regime of racial segregation. Drawing on twenty different household surveys, census microdata, and newly digitized budget reports, I build a microdatabase covering the joint distribution of pretax incomes, taxes, cash transfers, and in-kind transfers from 1993 to 2019. At the micro level, I observe households' intensity of use of different public services, such as school attendance, visits to healthcare providers, reliance on public transport, and ownership of state-subsidized dwellings. At the macro level, I exploit data on public spending by subnational region and function, which I directly map onto the microdata. Unlike existing studies, I account for the consumption of all major public services and the evolution of their progressivity over time. While my estimates are not devoid of limitations, they represent a significant improvement over the existing literature, which either ignores public services entirely or distributes them using *ad hoc* assumptions.

Drawing on this new database, I answer three fundamental questions on the distributional incidence of public services. Who consumes public services, and how progressive are different types of in-kind transfers in comparison to cash transfers? How has the distributional incidence of public services evolved over time? And what are the implications of accounting for public services for the measurement of levels and trends in inequality? Four main results arise from my analysis.

First, I find that government transfers are progressive (less concentrated than pretax income), but with large variations across functions of government. In 2019, the poorest 50% received about 75% of cash transfers, compared to 60% of education spending, 50% of public healthcare, 40% of police services, 40% of local government services, and less than 10% of transport expenditure. Overall, they benefit from about 40% of expenditure on public services. This is less than their share in the South African population (50%), but much higher than their share of pretax income (3%). In other words, public services unambiguously reduce inequality.

Second, redistribution in the form of public services is not only progressive but also quantitatively substantial. In 2019, 15% of South Africa's national income accrued to the bottom 50% in the form of in-kind transfers. This is three times larger than cash transfers received. As a result, accounting for public services has major implications for inequality measurement. The share of income received by the poorest 50% is 6% in terms of posttax disposable income. It rises to 15% after accounting for the consumption of public services.

Third, there has been a dramatic rise in government redistribution since the end of apartheid. From 1993 to 2019, total public services received by the bottom 50% grew by 50%, from 9% to 14% of national income. This transformation resulted from the combination of two factors. First, total government expenditure rose, both in real terms and as a fraction of national income. Second, there were significant improvements in the progressivity of most government policies, which increasingly accrued to low-income groups. As a result, redistribution has been a major driver of inclusive growth: in-kind transfers can account for half of real income growth among the poorest 50% since 1993.

Fourth, I show that usual assumptions made in the inequality literature lead to misleading conclusions on public services and redistribution. Among various approaches, researchers have typically allocated government consumption as a lump sum, proportionally to disposable income, or a combination of both (Auten and Splinter, 2024; Blanchet, Chancel, and Gethin, 2022; Piketty, Saez, and Zucman, 2018). These assumptions could, after all, provide a good approximation. I find that they do not. Proportionality to disposable income dramatically overestimates inequality in public services received, while a lump sum allocation significantly underestimates it. Most importantly, both methods fail to account for the fact that the progressivity of in-kind transfers has improved over time. As a result, they underestimate growth in the consumption of public services among low-income households by 60%.

A natural concern with this analysis relates to the quality of public services. My results focus on the distribution of public spending, which has the advantage of ensuring consistency between income distribution and national accounts statistics. Public services are part of GDP, and valued at cost of provision (United Nations Statistics Commission, 2008). Allocating public

spending to individuals is thus the most conceptually meaningful way of constructing estimates of redistribution that are consistent with national income growth. One might be concerned, however, that public spending may not reflect levels and trends in the quality of services received. To make progress in tackling this limitation, I provide alternative estimates that anchor the value of public services to actual outcomes. I account for the fact that the South African government may be inefficient at delivering public services, drawing on cross-country estimates of public sector productivity from a companion paper (Gethin, 2024). I also exploit available subjective and objective indicators on inequality in the quality of public services received. I find that these two corrections could imply a large downward adjustment in the real value of public services consumed by low-income households, in the order of 40-50%. However, they do not affect my results on the evolution of redistribution and its role in enhancing real income growth at the bottom of the distribution.

Another related concern is that spending on public services may differ from individuals' willingness to pay for them, which depends not only on the quality of public services but also on the structure of individual preferences. Estimating the welfare value of each public service and its evolution over time would be a considerable task, which is left for future research.[1] However, it is important to mention that traditional poverty and inequality statistics do already incorporate many in-kind incomes—such as gifts made by other households, the consumption of own production by farmers, or imputed rents—, whose size can be considerable. Very much like consumption and GDP do not equate to welfare (e.g., Sen, 1999), I refrain from making statements on the welfare value of each of the private and public goods consumed by individuals. More modestly, this article is concerned with the distribution of national income, in the sense of where the money created in a given economy flows in a given year.[2]

This article contributes to the growing literature bridging gaps between micro- and macro-approaches to the measurement of inequality. The need to include distributional statistics in the national accounts has been increasingly recognized in the past decade, translating into several attempts by statistical institutes and international institutions (e.g., Australian Bureau

[1]Among recent attempts at estimating the welfare value of specific public policies, see Currier, Glaeser, and Kreindler (2023), Finkelstein, Hendren, and Luttmer (2019), and Hendren and Sprung-Keyser (2020). Gethin (2024) provides a worldwide comparison of the cost of provision and welfare value of public education and healthcare, measured by discounted returns to schooling and gains in life expectancy enabled by the healthcare system.

[2]In a world with full information, perfect rationality and in which consumers can freely choose between existing goods, the value of an in-kind transfer is lower than or equal to that of cash (Atkinson and Stiglitz, 1976). Yet, in-kind transfers may be preferable to cash if they insure households against commodity price risk (Gadenne et al., 2022) or if recipients have a desire for self-control mechanisms (Liscow and Pershing, 2022). There is also survey evidence that individuals tend to prefer better public services over cash transfers (Khemani, Habyarimana, and Nooruddin, 2019; Thesmar and Landier, 2022). More generally, consumption may differ significantly from welfare, and this applies to both private and public goods.

of Statistics, 2019; Congressional Budget Office, 2022; OECD, 2024; Statistics Canada, 2019; Stiglitz, Sen, and Fitoussi, 2009). Following that line of research, Piketty, Saez, and Zucman (2018) construct Distributional National Accounts (DINA) for the United States, allocating the entirety of national income, taxes, and government expenditure to individuals. A number of studies following a comparable methodology have been conducted since then (e.g., Auten and Splinter, 2024; Blanchet, Chancel, and Gethin, 2022; Bozio et al., 2024; Bruil et al., 2022; De Rosa, Flores, and Morgan, 2024). The advantage of this methodology is that it produces estimates of income inequality that are consistent with macroeconomic growth. However, major uncertainties remain when it comes to public services, which are typically allocated using arbitrary assumptions such as proportionally to income or as a lump sum transfer.[3] This has strong implications for measurement, given that government consumption typically represents a third of GDP. Recent debates in the United States, where estimated levels and trends in inequality vary greatly depending on which approach is adopted, illustrate the lack of empirical evidence on the actual distribution of public services (Auten and Splinter, 2024; Piketty, Saez, and Zucman, 2018).

This paper makes substantive progress in three directions. First, I construct the first database covering the distributional incidence of all major public services, shedding light on the relative progressivity of different types of in-kind transfers (although see O'Dea and Preston, 2010 for seminal evidence on public services in the United Kingdom). Second, I gather historical data allowing me to track the distribution of public services over time. To the best of my knowledge, this article is the first to do so. I show that it is of fundamental importance for understanding trends in redistribution, given that the progressivity of public services provided varies substantially over time. Third, I show that accounting for the consumption of public services has major implications for the measurement of both levels and trends in inequality.

This paper also contributes to extending our broader knowledge of who benefits from public services. A number of studies have attempted to estimate the distributional incidence of specific

[3] Piketty, Saez, and Zucman (2018) allocate all non-health in-kind transfers proportionally to posttax disposable income. Blanchet, Chancel, and Gethin (2022) consider two polar scenarios, one in which in-kind transfers are distributed proportionally to posttax disposable income, and one in which they are received as a lump sum. Auten and Splinter (2024) adopt an intermediate approach, following Reynolds and Smolensky (1977) where half of spending is distributed proportionally and the other half as a lump sum. De Rosa, Flores, and Morgan (2024) allocate education and health spending based on fiscal incidence studies, and all other government spending proportionally to posttax disposable income. See also Bruil et al. (2022) and Germain et al. (2021), who distribute education and healthcare expenditure using detailed administrative data.

in-kind transfers, in particular education and healthcare.[4] I depart from these studies in two ways. First, in the spirit of recent efforts made by researchers and statistical institutes, I allocate in-kind transfers in a framework that is rooted in the national accounts. Second, I focus on all major public services, while existing studies restrict themselves to specific spending categories.

Finally, this article connects to existing evidence on the productivity of the public sector. The output of the public sector is measured at cost of provision in the national accounts. This may lead to misleading conclusions on GDP growth in the presence of large cross-country and time variations in government productivity. Cost of provision may overestimate the quality of public services in countries with high government inefficiencies (e.g., Chong et al., 2014; Das et al., 2016; Muralidharan and Sundararaman, 2015). At the same time, it may underestimate productivity growth in the presence of technological progress, as recently documented by Cutler et al. (2022) for the U.S. health sector. In this paper, I investigate the implications of anchoring the value of public services to actual outcomes, not only in aggregate but also by income group. I find that public sector inefficiencies could imply a substantial downward revision in in-kind transfers received. However, this revision does not affect estimated trends in the consumption of public services among low-income households.

The rest of the article is organized as follows. Section 2 outlines the conceptual background. Section 3 describes the methodology used to estimate the distributional incidence of public services. Section 4 presents the main results on the distribution of public services in South Africa. Section 5 studies the role played by the consumption of public services in the distribution of national income growth. Section 6 investigates the implications of accounting for public sector productivity. Section 7 draws on the main findings to evaluate usual assumptions made in the literature. Section 8 concludes.

2. Conceptual Background

2.1. Distribution of Public Services

I study the distributional incidence of public services by combining data on their value and their distributional incidence. Consider individual i receiving pretax income m_i, paying taxes $\tau(m_i)$,

[4] See for instance Benhenda (2019), Lustig (2018), Paulus, Sutherland, and Tsakloglou (2010), Riedel and Stichnoth (2022), Verbist, Förster, and Vaalavuo (2012), and Wagstaff et al. (2014) on education and healthcare, Aaberge et al. (2010) and Aaberge et al. (2019) on local government services, and Mladenka and Hill (1978) on police expenditure. Goldman, Woolard, and Jellema (2020) cover one year of data on the distribution of education and healthcare in the context of South Africa, using a methodology comparable to the one developed in this paper. See also Asher et al. (2021) on high-resolution spatial variations in public goods provision in India.

and receiving cash $c(m_i)$ and in-kind transfers $g(m_i)$ from the government. Posttax income is:

$$\underbrace{y_i}_{\substack{\text{Posttax}\\\text{Income}}} = \underbrace{m_i}_{\substack{\text{Pretax}\\\text{Income}}} - \underbrace{\tau(m_i)}_{\text{Taxes}} + \underbrace{c(m_i)}_{\substack{\text{Cash}\\\text{Transfers}}} + \underbrace{g(m_i)}_{\substack{\text{In-Kind}\\\text{Transfers}}} \tag{1}$$

The value of in-kind transfers received by i is:

$$g(m_i) = \sum_j g^j(m_i) = \sum_j \underbrace{G^j}_{\text{Value}} \times \underbrace{\gamma^j(m_i)}_{\text{Progressivity}} \tag{2}$$

where G^j is the total value of public service j in a given country-year, and $\gamma^j(m_i)$ is the share of G^j received by i.

2.2. Income Concepts

I adopt the principles of the recent literature bridging gaps between micro and macro estimates of the income distribution (Blanchet et al., 2021; Piketty, Saez, and Zucman, 2018). The objective is to construct inequality statistics that are consistent with the national accounts and distribute the totality of net national income—GDP minus capital depreciation plus net foreign income—to individuals. I will work with five income concepts.

1) Factor Income Factor income corresponds to all capital and labor income flows that accrue to individuals, before any form of government redistribution. By definition, it sums up to the net national income.

2) Pretax Income Pretax income corresponds to income after the operation of social insurance systems but before other types of redistribution. It is equal to factor income, plus pension benefits and unemployment benefits, minus the social contributions that pay for them. Pretax income also sums up to the net national income.

3) Posttax Disposable Income Posttax disposable income equals pretax income, minus direct taxes, plus cash transfers. This is the standard income concept used to measure income inequality, corresponding to the money that households actually receive in their bank accounts. Government redistribution is thus traditionally measured as the gap between pretax and posttax disposable income inequality (e.g., OECD, 2011). Unlike factor and pretax income, disposable income does not necessarily sum up to the net national income, because it ignores in-kind transfers received and indirect taxes paid.

4) Posttax Disposable Income Plus Public Services This income concept adds the consumption of public services to disposable income, such as education, healthcare, and public transport. The main objective of this paper is to construct this income concept, allowing for comparisons of levels and trends in inequality before and after accounting for in-kind transfers. This concept does not sum up to the net national income either, given that it still excludes indirect taxes paid by individuals.

5) Posttax National Income Posttax national income equals pretax income, minus all direct and indirect taxes, plus all cash and in-kind transfers, plus the government budget balance. By construction, it sums up to the net national income. Although my main analysis will focus on comparing income concepts 2, 3, and 4, I will also report results on posttax national income in the appendix.

2.3. Methodological Principles

Measuring the progressivity of public services is conceptually and empirically challenging, given that their ultimate beneficiaries cannot always be unambiguously identified. I rely on three allocation principles. First, public services accrue to individuals based on who receives them at a given point in time. Second, public services benefit households based on the price they would have to pay if the government was to actually make them pay for these services. Third, public services are valued in a way that is consistent with the national accounts, that is, at cost of provision (potentially adjusted for government productivity). These three principles are necessary to ensure conceptual consistency with both standard inequality statistics and macroeconomic growth rates reported in the national accounts.

2.3.1. Cash Flow Principle

First, I distribute public services to individuals actually consuming them at a given point in time. For instance, education spending is distributed to households who send their children to school, health spending is distributed to individuals using more intensively the public healthcare system, and public transport expenditure is distributed to individuals relying more extensively on public transportation. This ensures that public services are valued in a way that is conceptually consistent with standard fiscal incidence analysis, which focuses on taxes and transfers in a given period. Put differently, public services are allocated in the same way as if households were to receive a cash transfer at time t and immediately use it to pay the government selling the corresponding service.

A natural objection is that many public services have a strong dynamic component. For instance, education has large effects on future earnings, while free public healthcare has an insurance value even for households not using it at a given point in time. However, it is important to mention that this reasoning also applies to taxes and cash transfers. For instance, a progressive income tax might have negative value for individuals who are below the income tax threshold but expect to see their earnings increase in the future. Similarly, cash transfers have an insurance value in the sense that they provide financial support to households experiencing negative shocks (or the birth of a child in the case of family benefits). Accounting for these dynamic effects would imply moving from the distribution of national income to that of lifetime income. Lifetime inequality certainly is an important object of inquiry, but it is a different research question. I leave it for future research (among promising attempts, see Auerbach, Kotlikoff, and Koehler, 2023). For the study of current income inequality, conceptual consistency requires distributing pretax incomes, cash transfers, and in-kind transfers in a comparable way, that is, based on who receives them in a given year.

2.3.2. Equivalent Pricing Principle

Second, public services accrue to households based on the price that they *would actually pay*, rather than the price they *would be willing to pay*. This ensures again that cash transfers and public services are valued in a conceptually comparable way. If a household was to receive cash instead of the public service, they would have to pay the cost of provision of this service to the government to benefit from it, not the maximum value they would be willing to pay.

Standard inequality statistics focus on consumption and do not attempt to estimate willingness to pay for each good bought by each household. Similarly, I distribute public services based on who benefits more from them, not based on who puts lower or greater personal value on each type of service. For example, high-income households may be willing to pay significantly more for police services, as they may have more to lose from burglaries and other property crimes than low-income households.[5] One might then argue for a welfare valuation of police services that is proportional to household wealth. In contrast, assuming that the cost of solving a crime is the same across income groups, the national income perspective implies that detective services benefit households proportionally to crimes reported to the police. Consistency with standard consumption aggregates thus requires allocating police expenditure proportionally to reported crimes, not wealth. A household reporting a crime implicitly pays the wage of the detective solving the crime, not its entire wealth, to benefit from the detective's services.

[5]Notice however that low-income households tend to suffer significantly more from violent crimes, including murders, whose cost may be valued at an equally, if not higher level than property crime.

2.3.3. Consistency With National Accounts Principle

Third, the focus on this paper is on the distribution of national income growth. This implies valuing public services at cost of provision, simply because this is what statistical institutes do when constructing estimates of GDP growth. In other words, I aim to understand how total income created in a given economy flows to different income groups, before and after accounting for taxes paid and cash and in-kind transfers received.

Departing from cost of provision would imply revising estimates of GDP growth, specifically "deflating" public services in a way that is different from the average good consumed (see for instance Cutler et al., 2022 on the U.S. health sector). This represents a challenging task, which probably explains why national accountants have preferred to use cost of provision as a reasonable assumption until now. That being said, I investigate in section 6 the robustness of my results to adjusting transfers for the quality of public services received over time and throughout the income distribution.

3. Data and Methodology

This section presents the data and methodology used to estimate the distributional incidence of public services in South Africa. I start from a microfile constructed in a companion paper (Chatterjee, Czajka, and Gethin, 2023), which covers the distribution of factor and pretax income in South Africa since 1993. I then combine various data sources to estimate the distributional incidence of public education, healthcare, housing, local government services, public order and safety, transport, other economic affairs, and social protection.

3.1. Factor Income and Pretax Income

The starting point is a microfile covering the distribution of factor and pretax incomes in South Africa from 1993 to 2019. Chatterjee, Czajka, and Gethin (2023) construct this file by combining surveys, tax data, and national accounts to allocate the entirety of net national income to individuals. The database also records information on the composition of the household and the sociodemographic characteristics of each household member.

The bulk of my analysis focuses on incorporating the consumption of public services to this microfile. In broad strokes, I identify different functions of the South African government, and collect new budget data covering spending on each of them. I then combine various microdata sources to estimate how the consumption of public services varies by income group.

Figure 1 plots government expenditure in South Africa since 1993, expressed as a share of national income. Table 1 provides an overview of the microdata, budget data, and methodology used to allocate public spending to individuals. I now turn to presenting these sources and methods in detail.

3.2. Education

Education expenditure is large in South Africa, amounting to 9% of national income in 2019. Following the existing literature (e.g., Bruil et al., 2022; Germain et al., 2021; Lustig, 2018; Riedel and Stichnoth, 2022), I distribute education spending to children attending school, accounting for differences in public education spending by province and level of education.

At the macro level, I manually digitize historical series of government education expenditure by province and level. I rely on South Africa's provincial budget reports, which are publicly available from the website of the Ministry of Finance. The data cover total expenditure on early childhood development, primary education, secondary education, tertiary education, and adult basic education for each of South Africa's nine provinces.

At the micro level, I rely on the 1996, 2001, 2011, and 2016 censuses, as well as the 2007 community survey. The microdata samples provide information on school attendance, current grade, the type of school attended (private/public), and household income.

I then calculate the transfer received by income group p in province c at time t as:

$$g_{pct}^{\text{educ}} = \sum_{i=1}^{5} n_{ipct}^{educ} g_{ict}^{educ} \tag{3}$$

Where $i \in [1,5]$ refers to the five education levels outlined above, n_{ipct}^{educ} denotes the number of children from income group p in province c attending public schools at level i at time t, and g_{ict}^{educ} denotes average spending per pupil. Put simply, I allocate to each child attending school at level i the per-pupil expenditure on education at this level observed in a given province-year.[6]

[6]This amounts to assuming that each child within a given province-level cell receives the same transfer. Administrative data on the distribution of education expenditure in South Africa supports this assumption. See for instance Motala and Carel (2019), table 4.3, who show that personnel expenditure per learner is highly equalized across school quintiles (which are defined by the living standards of the community around the school and used by the South African government to allocate resources).

3.3. Healthcare

Public healthcare spending represented 5% of national income in 2019. I distribute it proportionally to the number of visits made to public healthcare providers, accounting for differences in public health spending by province and type of institution.

At the macro level, I digitize historical series on government healthcare expenditure by province. The budget data covers public spending on two types of institutions: clinics and hospitals.

At the micro level, I combine two different sets of surveys: the October Household Surveys (1995-1996) and the General Household Surveys (2004-2019). Both surveys report information on (1) whether household members have visited a healthcare provider in the past month (2) the type of institution (private/public) usually visited and (3) whether the institution usually visited is a clinic or a hospital.

I then calculate the transfer received by income group p in province c at time t as:

$$g_{pct}^{\text{heal}} = \sum_{i=1}^{2} n_{ipct}^{heal} g_{ict}^{heal} \tag{4}$$

Where $i \in [1,2]$ refers to clinics and hospitals, n_{ipct}^{heal} denotes the number of individuals from income group p in province c having visited a healthcare institution of type i at time t, and g_{ict}^{heal} denotes average spending per capita on healthcare institutions of type i.[7]

3.4. Public Housing

Housing development expenditure in South Africa is small in comparison to other functions of government (less than 1% of national income). It mainly corresponds to the Reconstruction and Development Programme (RDP), a large national housing programme initiated in 1994 that allows low-income households to acquire a house built by the government. To distribute public housing expenditure, I rely on the General Household Survey (2002-2019), which has consistently asked survey respondents whether any household member received a government housing subsidy to obtain this dwelling or any other dwelling. I then distribute public housing expenditure equally to each household having benefited from the program.

[7] In an earlier version of the paper, I investigated allocating healthcare spending at an even more granular level, using district-level data on public health spending available since 2001. Given that the results were almost identical, I opted for a province-level allocation, since it allows me to cover a longer time period.

3.5. Local Government Services

The local government sector is large in South Africa, and has been growing in the past decades thanks to increasing transfers from the central government. Spending by municipalities amounted to almost 10% of national income in 2019. Municipalities are in charge of providing households with electricity, water, sanitation, waste removal, and other basic services, some of which are distributed free of charge to poor households in the form of "free basic services" since 2001. They also deliver a number of local public services related to public safety, healthcare, administration, and other public goods.[8] In terms of administrative layers, South Africa's nine provinces are divided into 52 district municipalities, which are themselves divided into 205 local municipalities.

At the macro level, I construct new series on government expenditure by municipality, drawing on various local government budget reports.[9] The data cover spending made by both district and local municipalities. At the micro level, I rely on the 1996-2016 census microdata samples and the 2007 community survey, which cover households' local municipality of residence.

I then match the macrodata and microdata at the municipal level in each census, recoding municipality names and codes when necessary. I do so for both local and district municipalities, so as to distribute these two layers of local government one after the other. I then allocate local and district municipal expenditure on a lump basis to individuals, assuming that all households living in a given municipality benefit from the same transfer.[10]

3.6. Public Order and Safety

Expenditure on public order and safety (3.7% of national income) includes police services, law courts, and prisons. Police services are in turn broken down by the South African government

[8] See Appendix Figure F1, which plots the level and composition of total local government expenditure.

[9] I combine data from four sources. The first one are tables A2 published by the National Treasury, which cover operating expenditure by function in each of South Africa's municipalities from 2006 to 2019. The second one are tables A1 from the same source, which specifically cover expenditure made by municipalities for the provision of Free Basic Services. The third one are tables published in the 2008 Local Government Budgets and Expenditure Review, which cover total expenditure by municipality from 2003 to 2006. Finally, I digitize data on consolidated municipal operating expenditure by district council over the 1996-1999 period from the 2000 edition of the Local Government Budgets and Expenditure Reviews.

[10] One can compare this strategy to a more complex one, distributing separately free basic services, water expenditure, electricity expenditure, and other expenditure separately in each municipality, based on households' access to these different types of services. I also compared my results to those obtained when allocating municipal expenditure at the district level instead of the municipal level, using either census data (2001-2011) or the National Income Dynamics Study survey (2008-2016). I find that these three alternative strategies yield virtually identical results in terms of the distribution of municipal expenditure by income group. For 1996, I match individuals at the district level, given that I have no information on expenditure at a lower geographical level.

into “Visible policing," which aims to “Enable police stations to institute and preserve safety and security," and “Detective services" and “Crime Intelligence," whose objective is to investigate and solve crimes (South African Treasury, 2022).

Accordingly, I split public order and safety expenditure into two functions: an “insurance" function equal to visible policing, and a “use" function equal to the sum of detective services, crime intelligence, law courts, and prisons. The insurance function relates to crime prevention and security provision, which primarily benefit households through police presence and responsiveness to emergencies. In contrast, the use function corresponds to the set of services that are provided to households once crimes are already committed, from police investigations to justice and incarceration.

I distribute the insurance function of public order and safety proportionally to police presence by income group. Put simply, households benefiting from police presence are indirectly paying the wages of policemen in charge of watching over their neighborhood.[11] To do so, I rely on the 1998, 2007, 2012, and 2017 Victims of Crime survey microdata, which have consistently asked individuals about the frequency at which they see a police officer on duty in their area.[12]

I distribute the use function of public order and safety proportionally to crimes reported to the police. This corresponds to the fact that individuals benefit from government services, in the form of police investigations and law courts, when they are victims of a crime (O’Dea and Preston, 2010). In doing so, they are indirectly paying the wages of police investigators, judges, and prison personnel protecting them from their aggressor. I rely again on Victims of Crime surveys, which record all crimes suffered by survey respondents in the past year.[13]

3.7. Transport

Public spending on transport amounted to 2.5% of national income in 2019. It can be separated into two components: public transport and transport infrastructure.

[11]This strategy can also be motivated by the literature on the crime-reducing effects of police manpower and police presence on crime (Chalfin and McCrary, 2017; Di Tella and Schargrodsky, 2004; Levitt, 1997).

[12]Respondents are given a choice between “At least once a day," “At least once a week," “At least once a month," “Less than once a month," or “Never." I combine these options to derive a proxy for the number of days per year a respondent sees a police officer (coding each option as 365, 52, 12, 6, and 0, respectively).

[13]This amounts to assuming that public spending is constant by type of crime. Unfortunately, the budget data do not cover information that could be used to allow for heterogeneity in the type of crime experienced. To the extent that one would expect violent crimes and murders, which are disproportionately concentrated among low-income households, to be investigated at greater length by police services, this assumption might underestimate progressivity in public order and safety expenditure.

3.7.1. Public Transport

Public transport corresponds to spending on the public transport system, including buses and commuter rail, and represents about 20-25% of total transport expenditure. I distribute it proportionally to household expenditure on public transport. I rely on the 1993, 1995, 2000, 2005, 2008, 2010, and 2015 household income and expenditure survey microdata, which directly report household expenditure on public trains and buses.

3.7.2. Transport Infrastructure

Transport infrastructure expenditure corresponds to spending on roads, railroads, and other infrastructure. These amenities are used by three categories of actors to transport goods and people: households, firms, and the government. Accordingly, I split the transfer received by individuals into a household part, a firm part, and a government part. First, I use input-output tables provided by the OECD and the South African statistical institute to derive an estimate of what fractions of transport infrastructure are used by the household, corporate, and government sectors.[14] Second, I distribute each of these fractions to their ultimate beneficiaries.

For the household part, I assume that public infrastructure benefits individuals proportionally to their fuel consumption, as reported in 1993-2015 household income and expenditure surveys. This amounts to assuming that households disproportionately using their car, for instance, benefit from a greater government transfer on transport infrastructure.

For the firm part (mainly corresponding to the transport of goods by corporate vehicles), I use input-output tables to derive measures of the "transport intensity" of household consumption by expenditure category (COICOP). I then allocate infrastructure expenditure proportionally to this intensity measure, constructed at the household level in 1993-2015 household income and expenditure surveys. This amounts to assuming that households disproportionately consuming goods that need to be transported (for instance, goods produced in another country) indirectly benefit from public expenditure on the roads used to transport these goods.

Finally, I distribute the government part proportionally to household public transport expenditure, as estimated above. This amounts to considering that individuals using public transport not only directly benefit from using public vehicles, but also indirectly benefit from the fact that these public vehicles use roads or railways provided by the government.

[14] See Appendix Figure I2.

3.8. Other Economic Affairs

Expenditure on other economic affairs (2.8% of national income) mainly includes subsidies to specific economic sectors and other policies dedicated to supporting production. The South African budget decomposes it into six functions: General economic, commercial, and labour affairs; Agriculture, forestry, fishing and hunting; Fuel and energy; Mining, manufacturing and construction; Communication; and Recreation and Culture.

As in the case of transport infrastructure expenditure, I allocate expenditure on these different sectors proportionally to their consumption intensity.[15] First, I use input-output tables to estimate the indirect consumption intensity of these different sectors by COICOP category. I then allocate total government expenditure on these sectors proportionally to the total intensity of household consumption expenditure in this sector. This amounts to assuming, for instance, that households consuming goods that require more energy to be produced benefit more from energy subsidies provided to firms. The data source is again the 1993-2015 household income and expenditure survey microdata, which cover detailed information on household expenditure by COICOP category.

3.9. Social Protection

Social protection spending represents about 5% of national income, the majority of which consists in three cash transfers: the old age grant, the child support grant, and the disability grant.[16] These grants are observed in 1993-2015 household income and expenditure surveys.

Other social protection expenditure (1% of national income) mainly consists in "provincial social development", which brings together a large number of heterogeneous programs targeted to low-income households. These include, for instance, projects dedicated to reducing HIV prevalence, supporting disabled persons, providing centers for the treatment and prevention of drug abuse, or developing services aimed to prevent violence against women and children. In the absence of precise information on who benefits from each of these policies, I distribute other social protection expenditure proportionally to total cash transfers received.

[15] The exception is general economic, commercial, and labour affairs, for which no sector can be clearly identified. I distribute this component proportionally to the total transfer received in other economic affairs.

[16] See Appendix Figure C1. The old age grant is a means-tested monthly benefit available to South Africans older than 60. The child support grant is granted to a child's primary caregiver whose income falls below a specific threshold. The disability grant is provided to workers suffering from a permanent disability.

3.10. Incorporation into Microfile

The last step consists in incorporating these estimates into the Chatterjee, Czajka, and Gethin (2023) microfile, so as to cover the joint distribution of pretax income, cash transfers, and public services from 1993 to 2019. I do so in two steps.

First, I aggregate the consumption of each public service by income group, as constructed in the various data sources described in the previous sections. I then interpolate and extrapolate these profiles, assuming that progressivity has remained constant when no data is available, so as to cover the distributional incidence of each transfer over the whole 1993-2019 period.[17] The assumption of constant progressivity is likely conservative, given evidence that public services have become more progressive over time (see Section 4).

Second, I merge profiles of relative transfers received by income group into the microfile. I then proportionally rescale average transfers received for each category of expenditure, so as to obtain estimates of government transfers that are fully consistent with the level and composition of general government expenditure observed at the national level since 1993 (see Figure 1).

3.11. Posttax National Income

Since my objective is to study the role played by public services in reducing inequality, my main results focus on comparing posttax disposable income before and after adding the consumption of public services. One objection is that posttax disposable income only deducts part of the taxes paid to finance these services, ignoring indirect taxes and corporate taxes in particular. My main analysis also refrains from distributing spending on general public services and defense, for which no data on intensity of use is available.

As a robustness check, I construct a measure of posttax national income that deducts all taxes and adds all government expenditure to individual incomes. Indirect and corporate taxes paid are already available in the microfile and are distributed using standard fiscal incidence assumptions (see Chatterjee, Czajka, and Gethin, 2023). For other government expenditure, I make the conservative assumption that they are received proportionally to disposable income. This yields an estimate of posttax national income that sums up to the net national income.

[17] For instance, when 2018 is missing but not 2017 and 2019, relative transfers by income group in 2018 are estimated as the average of those observed in 2017 and 2019 (interpolation). When the last data point is 2015, I assume that relative transfers by income group have remained the same over 2015-2019 (extrapolation).

4. The Distribution of Public Services

I now present the main results on the distributional incidence of public services. How large is redistribution in the form of public services in South Africa, and how has it evolved since 1993? Table 2 provides a first answer to this question by reporting the share of public spending, the share of national income, and the real average transfer received by the poorest 50% by function of government in 1993 and 2019. Three main conclusions can be drawn.

4.1. Public Services Are Large and Progressive

Following the standard approach to the analysis of tax or transfer incidence, let us define a transfer as *relatively progressive* if it reduces inequality, that is, is less concentrated than income. Based on this definition, government redistribution in South Africa appears strongly progressive. In 2019, the poorest half of the population received only 2.7% of pretax income, but 48% of government expenditure and 44% of spending on public services. Every single category of government spending was relatively progressive, both in 1993 and 2019. In other words, government transfers unambiguously reduce inequality.

Public services also appear to be very large. In 2019, total public services received by the bottom 50% amounted to about $3500, corresponding to about five times their average pretax income. Public education spending alone represented twice their average income, and was about 35% higher than total social protection expenditure. Overall, public services amounted to almost 80% of total transfers accruing to the bottom 50% in 2019.

4.2. Progressivity Varies Significantly by Function of Government

There are large variations in progressivity across categories of government transfers. In particular, only social protection, education, health, and housing expenditure are *absolutely progressive*, that is, received in greater proportion by the poor than by the rich.

Social protection stands out as the most progressive spending category, with over three quarters of expenditure accruing to the bottom 50% in 2019. This is consistent with the fact that cash transfers are explicitly targeted towards low-income households.

Public education and healthcare also appear to be progressive in South Africa, for two main reasons. First, both services are used more extensively by low-income households, who overwhelmingly send their children to public schools and rely on public clinics for healthcare, while top earners primarily rely on private alternatives. Second, they are also used more intensively

by low-income households, who tend to have more children and visit health institutions more frequently because of greater healthcare needs.[18] As a result, the bottom 50% received about 61% of public education spending and 56% of public health spending in 2019.

Public housing expenditure is also absolutely progressive, with 58% of spending received by the bottom 50%. Indeed, low-income households are much more likely to live in a state-subsidized dwelling, although some middle- and high-income households do benefit from public housing too (see Appendix Figure G1).

Local government spending is regressive in absolute terms: the poorest 50% receive less than 40% of expenditure. This directly results from richer municipalities spending more on public services. In 2019, the top 10% benefited from nearly PPP $1700 per capita in local government expenditure, compared to $700 for the bottom 10% (see Appendix Figure F6).

Public order and safety expenditure is absolutely regressive too. This is true of spending on both visible policing and law enforcement. Richer households are significantly more likely to report crimes to the police (see Appendix Figure H3). They also live in neighborhoods with greater police presence (see Appendix Figure H4). As a result, the bottom 50% received just below 40% of public order and safety expenditure in 2019.

Transport and other economic affairs are the most regressive functions of government (although they are still progressive in relative terms). Only about a fifth of public transport expenditure accrues to the bottom 50%, because public transport is more intensively used by middle-class households in richer urban areas (see Appendix Figures I3 and I4). Infrastructure scarcely benefits low-income households at all: only 7% of expenditure accrues to the bottom 50%. This results from the fact that richer households use private vehicles to a much greater extent, and also benefit from higher consumption of transported goods.

Putting all cash and in-kind transfers together, how does total public spending received vary alongside the income distribution? Figure 2 plots total transfers received by pretax income decile in 2019. There are significant inequalities in the consumption of public services, which ranges from 2% of national income among the first decile to 5% among the top 10%. Because cash transfers are strongly progressive, total spending is much more broadly shared, ranging from 3.5% to 5% of national income. Low-income households receive mostly cash transfers,

[18] In 2016, the average number of children attending public schools exceeded 2 among the poorest 50%, compared to less than 0.4 among the top 10% (see Appendix Figure D4). Over 30% of children within the top 10% attend private schools, compared to less than 10% of children within the bottom 50% (see Appendix Figure D5). The same differences are visible for public healthcare. The share of individuals having visited a public health institution in the past three months strongly declines with income (see Appendix Figure E4). Over half of South Africans within the top income quintile are covered by private health insurance and rely primarily on private healthcare, compared to less than 5% of those in the bottom quintile (see Appendix Figures E5 and E6).

education, and healthcare, while the bulk of transfers received at the top of the distribution consist in transport, indirect subsidies, and local government services.

4.3. Government Redistribution Has Increased

There has been a dramatic rise in redistribution since the end of apartheid. Figure 3 plots the level and composition of transfers received by the bottom 50% since 1993. Total transfers expanded by 50%, from 12% to 18% of national income. The consumption of public services alone grew from 9% to 14% of national income. This expansion was primarily driven by education, healthcare, and local government spending, while other public services only represent a minor fraction of government transfers received by low-income households. Most importantly, a standard analysis focusing only on cash transfers would miss an enormous part of government redistribution, both in levels and trends. In 2019, cash transfers represented less than a quarter of total public expenditure accruing to the poorest 50% individuals in South Africa.

The rise of redistribution was the outcome of two factors. First, total expenditure on cash transfers and public services grew, from about 30% to 38% of national income. This rise was concentrated in the functions of government that are the most equally distributed (see Table 1). Second, the progressivity of transfers increased: from 1993 to 2019, the share of total government expenditure accruing to the bottom 50% expanded from 38% to 48%. The rise of progressivity happened across virtually all functions of government and can be accounted for by a number of factors, including improved access to education and healthcare and significantly lower spatial inequalities in the provision of local public goods.[19] The outcome of these three forces has been a large increase in the value of transfers received by the bottom 50%, which extends to all categories of public spending.

5. Public Services and the Distribution of National Income Growth in Post-Apartheid South Africa

I now turn to analyzing the incidence of cash and in-kind transfers on the distribution of national income growth. This analysis delivers two main conclusions: public services strongly reduce income inequality, and they have significantly contributed to income growth among low-income

[19] See for instance Appendix Figure D4: from 1996 to 2016, the average number of children attending public schools remained the same within the bottom 50%, while it was divided by more than two within the top 10%. Figures F3 and F4 show that there has been a dramatic convergence of local government spending across municipalities, as the rise of overall expenditure was driven by the catch-up of low-spending municipalities.

households since 1993.

5.1. Public Services Strongly Reduce Inequality

Given that public services are large and progressive, it naturally follows that they contribute to reducing inequality. To get a sense of their redistributive power, consider Table 3, which provides information on the distribution of pretax income, posttax disposable income, and posttax disposable income plus public services in South Africa in 2019.[20]

Pretax income is extremely unequally distributed. In 2019, the top 0.1% received over 8% of pretax income, while the bottom 50% received 2.7%. The average pretax income of the poorest quintile was not far from an exact zero. This may look striking but should not come as a surprise, in a country where the unemployment rate has regularly exceeded 25% since the end of apartheid. Together, these figures confirm South Africa's position as one of the most unequal countries in the world (Chancel et al., 2022; Chatterjee, Czajka, and Gethin, 2022).

Columns 4 and 5 remove direct taxes and add cash transfers to reach posttax disposable income. Cash transfers are large and progressive in South Africa, while direct taxes are mostly borne by the top 10%. As a result, moving from pretax to posttax disposable income doubles the average income of the bottom 50%. The top 10% see their average income decrease, while the average income of the middle 40% is scarcely affected.

The last two columns add the consumption of public services to individual incomes. Inequality is substantially lower in terms of this income concept than in terms of posttax disposable income. The bottom 50% income share moves from 6% to 15%. Their average income increases from about $1300 to $4500. In other words, 70% of income received by low-income households consists in income indirectly received in the form of public services. South Africa's poorest individuals thus receive little cash income, but they do consume large quantities of free education, healthcare, electricity, water supply, public housing, and police services.

5.2. Public Services Account for a Large Share of Low-Income Households' Income Gains

Not only do in-kind transfers reduce inequality, they have contributed to significantly increasing incomes at the bottom of the distribution since the end of apartheid. Figure 4 represents the evolution of the bottom 50% average income from 1993 to 2019, before and after adding different layers of government transfers to the analysis. Average factor income grew by 14%

[20] Appendix Table A1 extends this analysis to posttax national income, with similar conclusions.

over this period. Adding pensions and unemployment benefits leaves this picture unchanged, since these transfers are very small and almost entirely received by top-income groups.[21]

Accounting for other cash transfers brings the bottom 50% real income growth rate to 53%. This effect is almost entirely due to the adoption of the child support grant in 1998, which was followed by a gradual rise in take-up rates until today.[22] Accounting for in-kind social protection further increases this figure to 67%, mirroring the development of various provincial social development programs.

Education, healthcare, and local government spending account for the bulk of government redistribution in the form of public services. Adding education and healthcare increases the bottom 50% income growth rate to 82%, while adding local government services further pushes it to 99%. The total growth rate of the bottom 50% after all transfers reaches 95%, which is almost two times higher than that of pretax income plus cash transfers. In other words, the consumption of public services accounts for about half of real income growth among low-income households since the end of apartheid.

Figure 5 provides a more granular picture of the distribution of national income growth by plotting total real income growth by income percentile before and after accounting for government redistribution.[23] Pretax income growth has not been particularly inclusive, with slightly higher growth rates observed among both the top 1% and bottom 30%. Moving from pretax to posttax disposable income increases growth rates experienced at the bottom of the distribution, in particular among the bottom 20%. Finally, the upper line plots the distribution of growth after accounting for the consumption of public services. This raises growth substantially for all income groups within the bottom 70%, with particularly strong effects at the very bottom of the distribution. All in all, government redistribution has played a key role in making the distribution of economic growth more inclusive. Income inequality has unambiguously declined after accounting for the consumption of public services, with real income growth rates among low-income households being 2 to 3 times higher than those observed among the top 10%.

[21] See Appendix Figures B1, B2, and B3. Private pension contributions and benefits are almost exclusively paid and received by the top 30%, with contributions being approximately equal to benefits within each income decile. The unemployment insurance fund is extremely small and has run large surpluses, with total unemployment benefits paid falling below 0.1% of national income in 2019.

[22] See Appendix Figures C1, C2, C3, and C4.

[23] Appendix Figure A3 shows similar results when comparing posttax disposable to posttax national income.

6. Accounting for Public Sector Productivity

The above analysis focused on the distribution of public spending. The major advantage of this approach is consistency with the national accounts: public services are part of GDP, and valued at cost of provision. One might be concerned, however, that cost of provision may not accurately capture levels and trends in the output of the public sector. Put simply, national accounts may be wrong.[24] In this section, I investigate the sensitivity of my results to adjusting the value of public services using two productivity parameters: aggregate productivity, measuring the South African government's overall efficiency at providing public services, and heterogeneous productivity, capturing inequality in the quality of services received by income group.

6.1. Conceptual Framework

I consider an extension of the previous analysis in which the value of public services is allowed to differ from cost of provision. Let us rewrite the value of public service j received by i as:

$$g^j(m_i) = \underbrace{G^j}_{\text{Spending}} \times \underbrace{\gamma^j(m_i)}_{\text{Progressivity}} \times \underbrace{\theta^j(m_i)}_{\text{Productivity}} \tag{5}$$

Where $\theta^j(m_i)$ captures the fact that for a given cost of provision, individuals may receive services of different quality. Empirically, it is useful to make a distinction between two notions of productivity:

$$\theta^j(m_i) = \underbrace{\Theta^j}_{\substack{\text{Aggregate} \\ \text{Productivity}}} \times \underbrace{q^j(m_i)}_{\substack{\text{Heterogeneous} \\ \text{Productivity}}} \tag{6}$$

Θ^j is the aggregate productivity of public spending on function j, which does not depend on m_i. It captures the fact that the government may be more or less efficient at providing a given service than a benchmark production unit. For instance, public schools in South Africa may be less cost-efficient than public schools in other countries, which implies that all public education transfers should be reduced by a constant factor.

$q^j(m_i)$ is a heterogeneous productivity parameter. It captures the fact that the quality of services

[24] This concern has led to the emergence of a growing literature in recent decades, which seeks to adjust national accounts aggregates for them to better reflect actual education and health outcomes. Among recent attempts, for instance, Cutler et al. (2022) combine rich data on medical spending and health outcomes in the United States over the 1999-2012 period. They find that national accounts hugely underestimate productivity growth in medical care, which has grown by 1.5% annually while official data show no change at all during this period.

provided, holding cost constant, may differ between income groups. For instance, teachers in poorer areas may be more or less qualified than those in richer areas, independently from the wages they receive.

6.2. Aggregate Productivity

I propose to estimate aggregate productivity by comparing the quality of public services received in South Africa to that of other countries in the world. I rely on estimates from a companion paper (Gethin, 2024), in which I combine a number of data sources to estimate levels and trends in public education and healthcare productivity around the world since 1980. The methodology relies on comparing the quality of public services received at different levels of cost of provision. If a government delivers public services of better quality than any other at a given cost, its productivity is set to $\Theta^j = 1$. All governments with a comparable cost but lower outcomes are then attributed a Θ^j between 0 and 1, based on their distance to this "efficient frontier."[25]

Appendix Figure A4 provides the main intuition in the case of education. There is a strong relationship between education spending per child and expected human capital at age 5 (constructed by combining data on school attendance and test scores). The efficient frontier is plotted at the top of the figure, corresponding to the maximum output observed at each level of cost of provision. The trajectory of South Africa from 1990 to 2019 is highlighted in red, revealing a very low quality of education in comparison to other countries with comparable spending levels. It has significantly improved, however, growing by about 20% during this period. Overall, South Africa has slightly converged toward the frontier.

Appendix Figure A4 extends this analysis to healthcare. The outcome of interest is the healthcare access and quality index provided by the Global Burden of Disease study (GBD, 2022), which ranks healthcare systems based on death rates from 32 causes of death that could be avoided by timely and effective medical care. South Africa stands out again as one of the countries with the lowest quality of healthcare given its level of healthcare expenditure. It has grown by 30% since 1990, however, for only mild increases in real health expenditure, leading South Africa to move closer towards the efficient frontier.

Taking the ratio of each output to its value observed at the frontier yields an estimate of Θ^j for

[25] I view these estimates as providing a lower bound on government productivity for three main reasons (see Gethin (2024) for a more complete discussion). First, PPP conversion factors already make an adjustment for public sector productivity, so this approach holds the risk of "double-counting" inefficiencies (World Bank, 2013). Second, this methodology implies always reducing transfers in all countries that are not at the frontier ($\Theta \leq 1$). This is equivalent to assuming that governments are never more efficient than the private sector. Third, omitted variable bias implies that productivity is likely to be underestimated in poorer countries, whose lower outcomes are arguably the product of other factors than government performance (such as lower income *per se*).

these two functions of government. Public education productivity is found to have increased from about 0.45 to 0.5, while public healthcare productivity has grown from 0.4 to 0.55. Correcting for aggregate productivity thus amounts to reducing the value of public services received by as much as 50-60%.

Unfortunately, cross-country data on the quality of other public services is not available. In the absence of better information, I thus proxy the aggregate productivity of other in-kind transfers by the average of the education and healthcare productivity indicators in each year.

6.3. Heterogeneous Productivity

Another potential issue is that the quality of public services may vary by income group, even after accounting for differences in spending received. For instance, teachers teaching in poorer areas may be less qualified, even if they are paid the same as teachers in richer areas. Accounting for such "heterogeneous productivity" is extremely challenging, as it would ideally imply deriving monetary indicators of how the value added of each type of service varies by income group.

In the absence of better information, I combine a number of data sources to get a sense of variations in the quality of public services received. Table 4 reports data on how service delivery varies by income quintile, based on a battery of indicators covering three complementary dimensions: subjective perceptions of public services, objective indicators of government output, and distance to public institutions. Two main conclusions can be drawn from these figures.

First, there is evidence that poorer households benefit from public services of lower quality. With the exception of public schools, local public institutions are always perceived as being of significantly lower quality by the bottom income quintile than by the rest of the population. Low-income households are also characterized by public school teachers with lower knowledge of mathematics, more frequent water and electricity interruptions, and public housing of lower value. They tend to live further away from public institutions, in particular police stations and hospitals (but not public schools and public transport).

Second, these inequalities remain modest. In particular, the data point to clear bounds on the gap between top and bottom income groups. There is not a single indicator on which the bottom 20% scores less than 70% of the sample mean. The ratio exceeds 0.85 for most measures, in particular when it comes to subjective perceptions. There are some indicators, such as the success of the police at making an arrest after the household reported a crime, on which the government does not appear to perform better for the rich than for the poor.

It is also important to stress that there is a risk of double-counting: some of these indicators do

not account for the fact that higher quality is the result of greater resources already captured in the analysis. For instance, estimates of school teachers' knowledge of mathematics are based on the entire South African population, including private schools, which are disproportionately used by households in the top quintile and benefit from substantial private resources (Venkat and Spaull, 2015). Similarly, quality differentials in local government services largely reflect the major differences in resources that exist between richer and poorer municipalities (see Section 4). In this context, estimates derived from these indicators should be taken as upper bounds on the degree of heterogeneous productivity by income group. In the results that follow, I take the average of these different subjective and objective measures by government function, and correct the transfer received by each income group accordingly.

6.4. Results

Figure 6 plots public services received by income decile in 2019 before and after adjusting for productivity. Adjusting for productivity strongly reduces the value of public services, especially for low-income households. The average transfer received is almost divided by two. Before adjustment, transfers range from 2% of national income for the bottom decile to 5% for the top 10%. After adjustment, they range from 1% to 3.5%. The low productivity of the South African government, together with inequalities in the quality of services provided, thus imply a large downward reduction in estimates of redistribution.

Because adjusting for productivity strongly reduces the value of public services, it naturally follows that their redistributive impact is lower. Adding the consumption of public services to disposable income now increases the bottom 50% income share from 6% to 12% (see Appendix Table A2). Public services thus end up having a lower redistributive power, but still very significant, almost two times as large as that of cash transfers.

Appendix Figure A7 reproduces Figure 4 after adjusting in-kind transfers for public sector productivity. The average income of the bottom 50% now reaches about $3,000 after accounting for all transfers, compared to about $4,500 in Figure 4. By this measure, public sector inefficiencies reduce the average income of the bottom 50% by a third. However, adjusting for productivity does not alter the trend: the bottom 50% average income rose by 53% before accounting for in-kind transfers, compared to 95% after doing so.[26]

In summary, large public sector inefficiencies and inequalities in the quality of services received in South Africa could imply that public services do not reduce inequality as much as an analysis relying on cost of provision would suggest. However, even under conservative assumptions on

[26]Appendix Figures A8 and A9 show similar results for the distribution of growth and the bottom 50% share.

the productivity of the South African government, they still end up having large effects on the income distribution and have been major drivers of inclusive growth since the end of apartheid.

7. Implications for Inequality Measurement

I conclude this article with an assessment of assumptions made in the existing literature.

7.1. Assumptions in the Existing Literature

The recent inequality literature has made considerable efforts at constructing estimates of inequality that are consistent with national income growth. Unlike traditional income distribution statistics, which restrict themselves to disposable income, this implies allocating the entirety of government taxes and expenditure to individuals.

Mainly because of a lack of data, however, existing studies have adopted a variety of assumptions when it comes to the distribution of public services. Piketty, Saez, and Zucman (2018) distribute all U.S. government spending other than cash transfers and healthcare proportionally to disposable income. In contrast, Auten and Splinter (2024) distribute half of this spending proportionally to disposable income and the other half as a lump sum, following Reynolds and Smolensky (1977). Blanchet, Chancel, and Gethin (2022) consider two alternative scenarios, one in which public services are allocated proportionally to posttax disposable income, and one in which they are received as a lump sum. A handful of studies have used information on the distribution of education, using a methodology comparable to the one adopted in this paper, while still allocating other public services proportionally or as a lump sum (Bruil et al., 2022; De Rosa, Flores, and Morgan, 2024; Germain et al., 2021; Riedel and Stichnoth, 2022).

All these studies share two things in common. First, they do not exploit any information on the actual use of public services beyond healthcare (and education in a handful of cases). Second, in the absence of data, they always assume that the progressivity of public services has remained constant over time.[27] The main question is whether these simplifying assumptions can still provide a good approximation of levels and trends in redistribution.

[27]The exception is healthcare in the United States (Medicaid and Medicare), for which Piketty, Saez, and Zucman (2018) and Auten and Splinter (2024) do have longitudinal data. All other studies rely on only one year of data (or no data at all) for both education and healthcare.

7.2. An Evaluation of Competing Methods

To evaluate the accuracy of these competing methods, I compare my results to those obtained with three alternative scenarios. In the first scenario, I allocate all public services proportionally to disposable income, as in Piketty, Saez, and Zucman (2018). In the second scenario, I allocate half proportionally and half as a lump sum, as in Auten and Splinter (2024). In the third scenario, I allocate all public services as a lump sum. I focus on non-health expenditure and report results including health expenditure in the appendix.

Figure 7 plots public services received by income quintile in South Africa in 2019 under these different scenarios.[28] The actual distribution of public services, as estimated in this paper, ends up falling somewhere in-between a pure lump sum and the "half-half" approach of Auten and Splinter (2024). The bottom quintile receives about 5% of national income in the form of public services in the data, compared to 6% under a lump sum allocation and 3% under a half-half allocation. Proportionality to disposable income leads to a dramatic overestimation of inequality in public services received, with the bottom 20% receiving only 0.3% of national income. This assumption seems hard to sustain, given direct evidence that low-income households do consume large quantities of free education and other public services.

Figure 8 turns to a longitudinal perspective, comparing the evolution of public services received by the bottom 50% since 1993.[29] The true distribution of public services was actually quite close to a half-half allocation in 1993, and has gradually converged toward a lump sum since then. The most important result is that all methods strongly underestimate the growth of redistribution. The actual consumption of public services by the bottom 50% has grown by 63% as a share of national income. The proportionality assumption underestimates this increase by 30%, while other assumptions underestimate it by 60%.

7.3. Decomposing Trends in Government Redistribution

To shed light on the reasons underlying this discrepancy, I decompose changes in redistribution into three components. The transfer received by a given income group can be reexpressed as:

$$g(m_i) = \sum_j \underbrace{G}_{\text{Total Spending}} \times \underbrace{s^j}_{\text{Composition}} \times \underbrace{\gamma^j(m_i)}_{\text{Progressivity}} \tag{7}$$

[28] Appendix Figure A10 reproduces Figure 7 after including health expenditure.
[29] Appendix Figure A11 reproduces Figure 8 after including health expenditure.

Where G is total spending on all public services in a given year, s^j is the share of public spending dedicated to public service j, and $\gamma^j(m_i)$ is the share of spending on public service j received by income group i.

Figure 9 isolates the role played by each of these components in explaining the rise of redistribution in South Africa.[30] The top line shows the actual share of national income received by the bottom 50%, which increased by 63%. The second line from the top isolates the role played by changes in progressivity: total spending and its composition by function of government are taken as they are, but progressivity $\gamma^j(m_i)$ is fixed to its 1993 value. The line below fixes total spending in addition to progressivity: total government expenditure as a fraction of national income is fixed to its 1993 value. Finally, the dotted line further assumes that the composition of government expenditure by function has remained the same. By construction, this counterfactual implies no change in transfers received by the bottom 50% since 1993.

The takeaway is that changes in progressivity and total spending explain the bulk of the rise of redistribution. Absent rising progressivity, transfers would have increased by 29% instead of 63%. Absent rising progressivity and total expenditure, they would have grown by only 4%. In other words, progressivity $\gamma^j(m_i)$ accounts for 54% of improvements in government redistribution, total spending G accounts for 40%, and the composition of spending s^j accounts for 6%. Because standard allocation methods fail to incorporate changes in both the progressivity and composition of government expenditure, they end up missing 60% of growth in transfers received by low-income households since the end of apartheid.

8. Conclusion

Public services remain absent from existing inequality statistics, despite representing the bulk of government redistribution in low- and middle-income countries. Focusing on the case of post-apartheid South Africa, this article argued that accounting for the distribution of in-kind transfers is essential to accurately track inequality and the distribution of macroeconomic growth. Not only do public services powerfully reduce inequality, they have become increasingly progressive, contributing to generating large real income gains for low-income households since the end of apartheid. Because recent attempts at accounting for the consumption of public services rely on *ad hoc* assumptions, they end up missing about 60% of the growth in transfers received at the bottom of the distribution.

These results call for future research in at least two directions. First, there is a need to develop

[30] Appendix Figure A12 reproduces Figure 9 after including health expenditure.

more granular analyses of the distributional incidence of public services. This article focused on broad categories, such as education, healthcare, and transport infrastructure, with only partial information on the various policies underlying these categories. On the macro side, more disaggregated data on the budgets adopted by governments would allow for a comprehensive view of what public services governments actually provide and how this changes over time. On the micro side, there is a crucial lack of data on who actually uses public services and how this varies geographically and historically. This calls for the collection of new surveys and administrative data asking detailed questions about households' access and consumption of different types of public services.

Another natural avenue for future research is to better understand how low-income households actually value public services, not only in comparison to cash transfers, but also in comparison to one another. Evidence on this question remains extremely scarce, although some surveys suggest that individuals do strongly value public goods (Khemani, Habyarimana, and Nooruddin, 2019; Thesmar and Landier, 2022). Answering this question would require new methods and data sources that go beyond those mobilized in this article.

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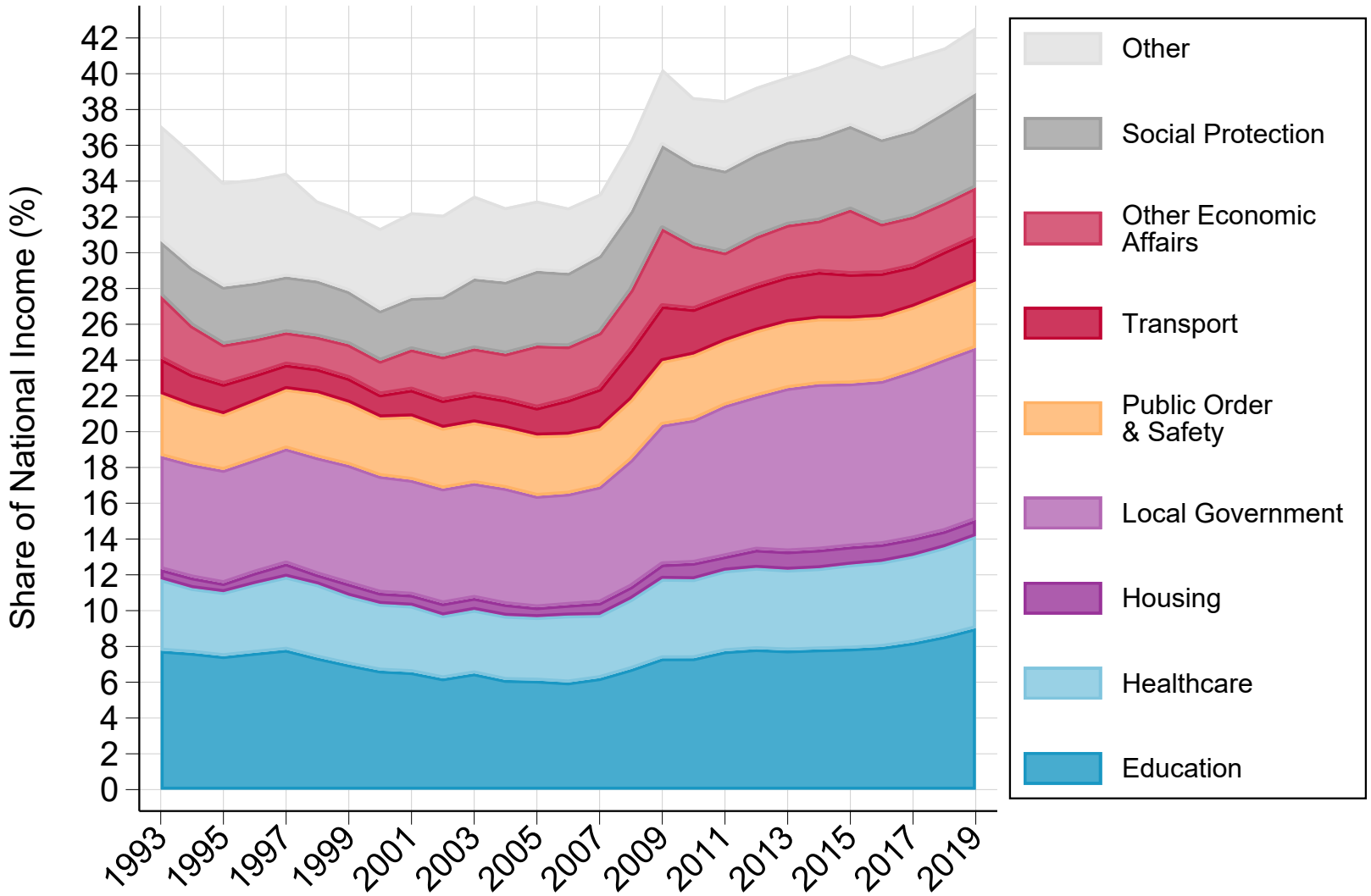
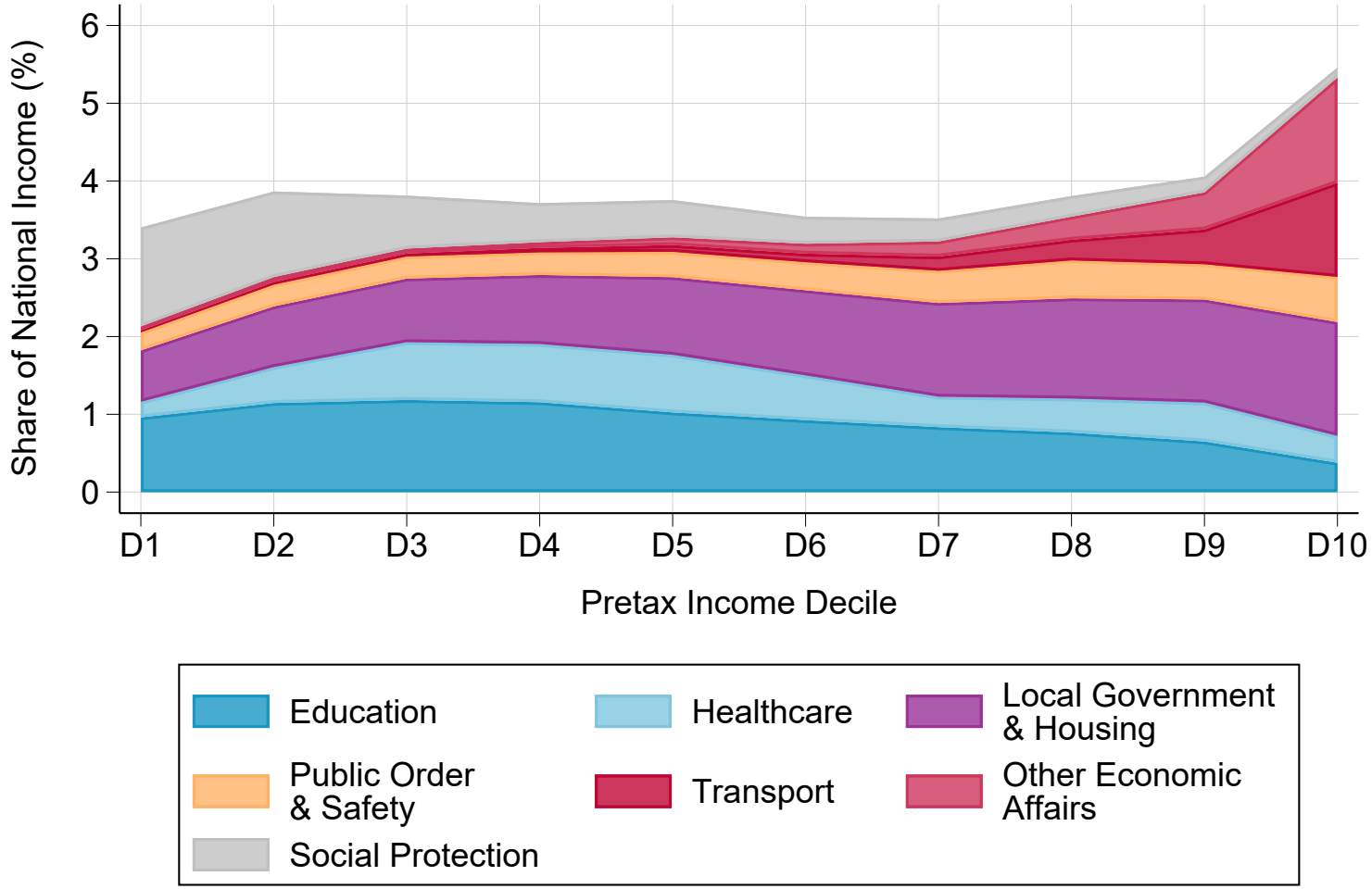
Figure 1 – Government Expenditure in South Africa, 1993-2019



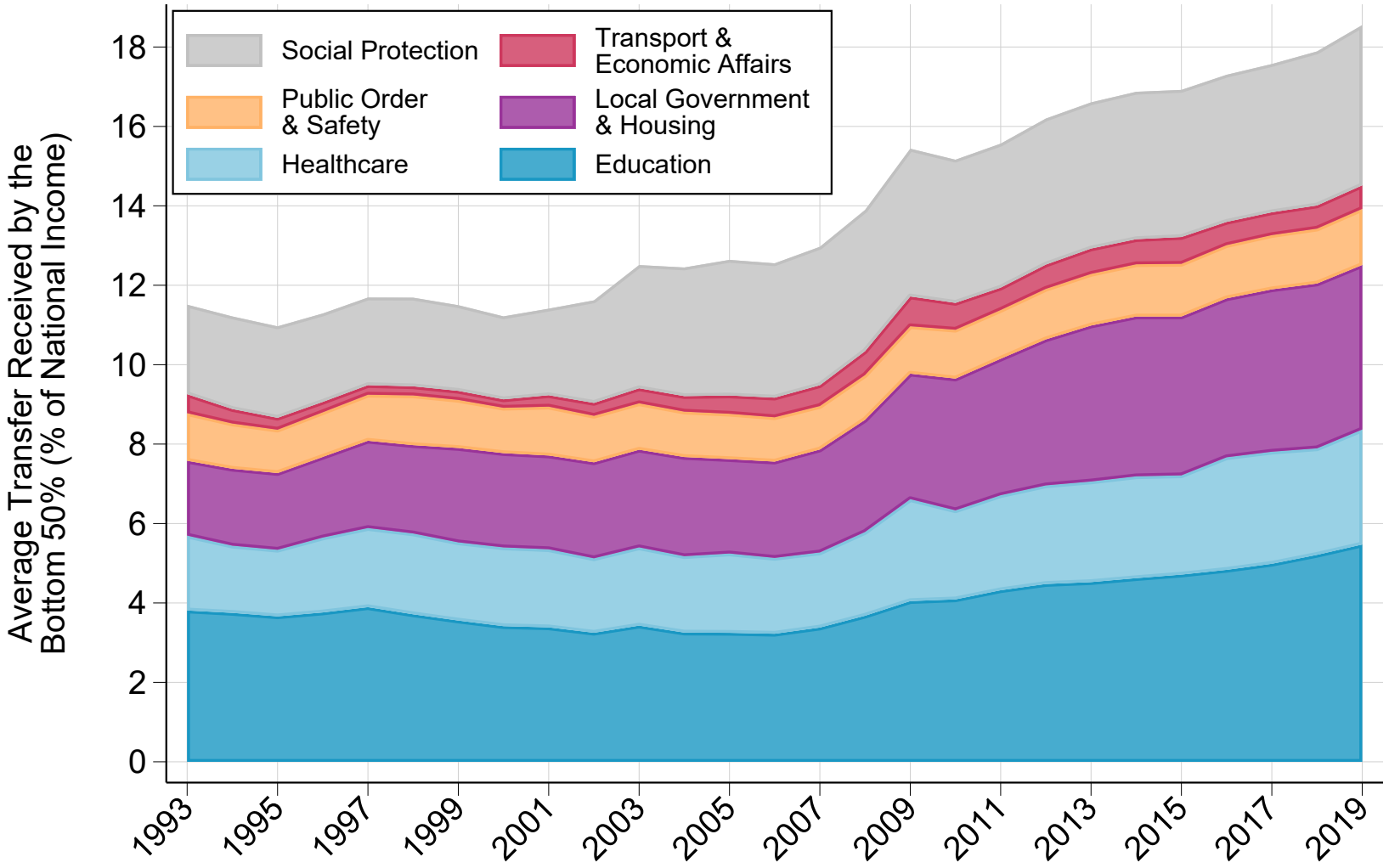
Notes. The figure plots the level and composition of general government expenditure in South Africa, expressed as a share of net national income. Total expenditure grew from 37% to 42% of national income over the 1993-2019 period. Local government: all government expenditure made by district and local municipalities. Public order and safety: police services, law courts, and prisons. Transport: public transport and transport infrastructure expenditure. Other economic affairs: expenditure on economic affairs other than transport, such as subsidies to agriculture, energy, manufacturing, and recreation and culture. Social protection: cash transfers and in-kind social protection programs. Other: general public services, defense, and environmental protection. Author's computations combining data from the South African Reserve Bank, the South African National Treasury, and Local Government Budget Reports.

Figure 2 – Government Transfers Received by Pretax Income Decile, 2019



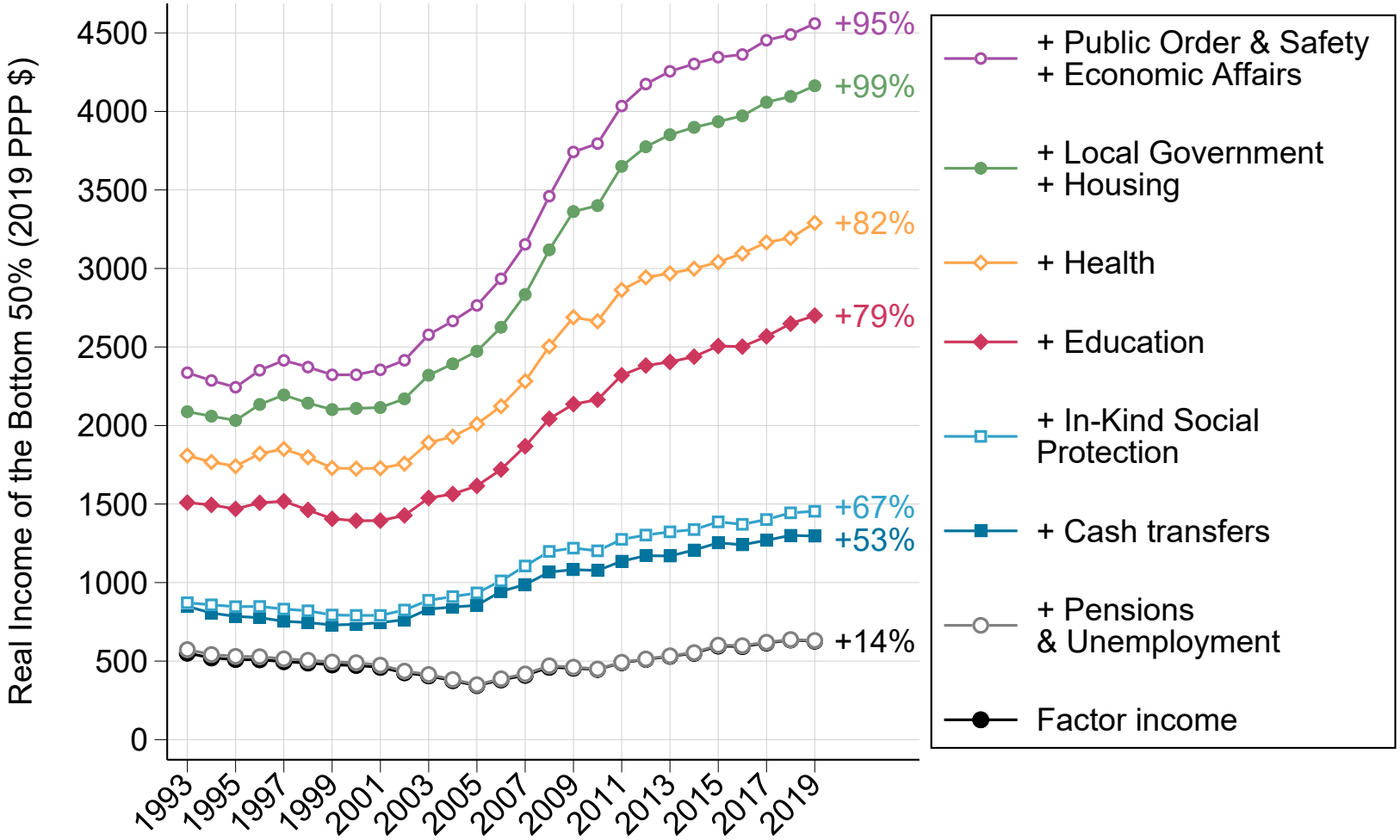
Notes. The figure represents the level and composition of government transfers received by pretax income decile in South Africa in 2019, expressed as a share of net national income. Local government: all government expenditure made by district and local municipalities. Public order and safety: police services, law courts, and prisons. Transport: public transport and transport infrastructure expenditure. Other economic affairs: expenditure on economic affairs other than transport, such as subsidies to agriculture, energy, manufacturing, and recreation and culture. Social protection: cash transfers and in-kind social protection programs. Income is split equally between all household members.

Figure 3 – The Rise of Redistribution: Government Transfers Received by the Bottom 50%, 1993-2019



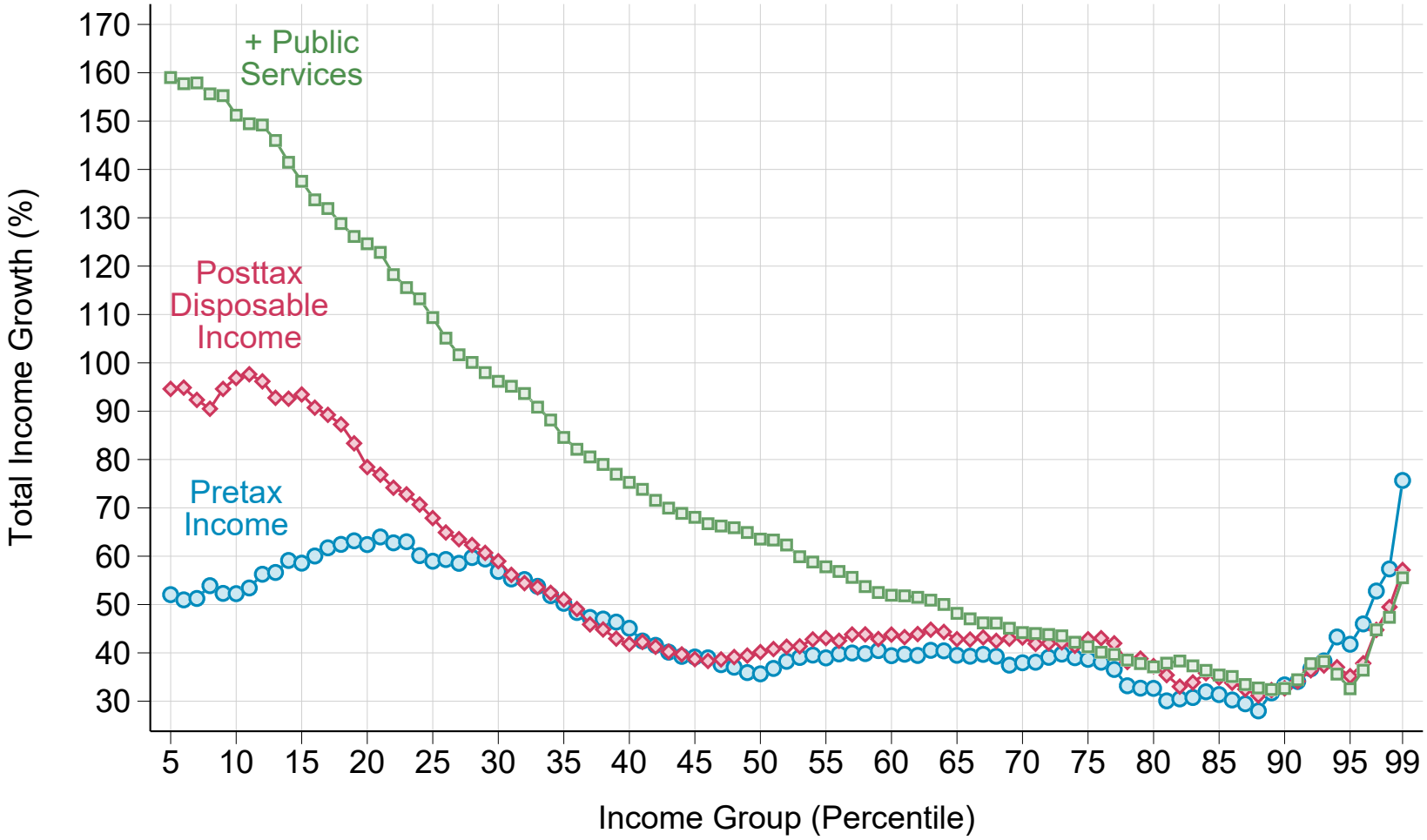
Notes. The figure represents the level and composition of government transfers received by the poorest 50%, expressed as a share of net national income. Transfers increased from 12% to 18% of national income over the 1993-2019 period. Local government: all government expenditure made by district and local municipalities. Public order and safety: police services, law courts, and prisons. Transport and economic affairs: public transport and transport infrastructure expenditure, as well as expenditure on other economic affairs, such as subsidies to agriculture, energy, manufacturing, and recreation and culture. Social protection: cash transfers and in-kind social protection programs. Income is split equally between all household members.

Figure 4 – Public Services and Real Income Growth Among the Bottom 50%



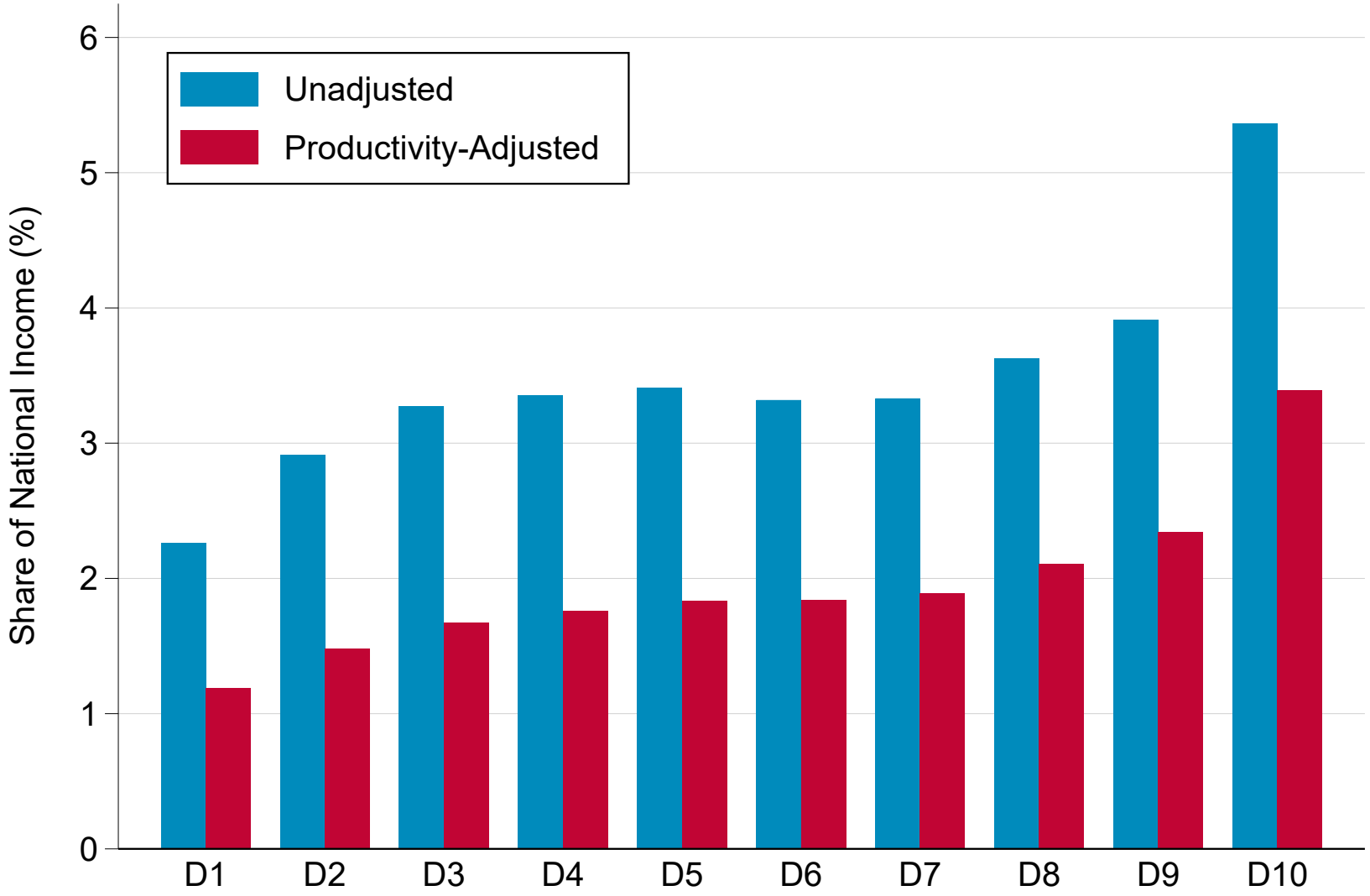
Notes. The figure represents the evolution of the real average income of the bottom 50%, before and after adding cash and in-kind transfers one by one to individual incomes. The average income of the bottom 50% grew by 14% in terms of factor income from 1993 to 2019, while it grew by 95% after adding all cash and in-kind transfers to individual incomes. Factor income is the sum of all capital and labor incomes, before any form of government redistribution. Local government: all government expenditure made by district and local municipalities. Public order and safety: police services, law courts, and prisons. Transport and economic affairs: public transport and transport infrastructure expenditure, as well as expenditure on other economic affairs, such as subsidies to agriculture, energy, manufacturing, and recreation and culture. Social protection: cash transfers and in-kind social protection programs. Income is split equally between all household members.

Figure 5 – Public Services and the Distribution of Economic Growth, 1993-2019



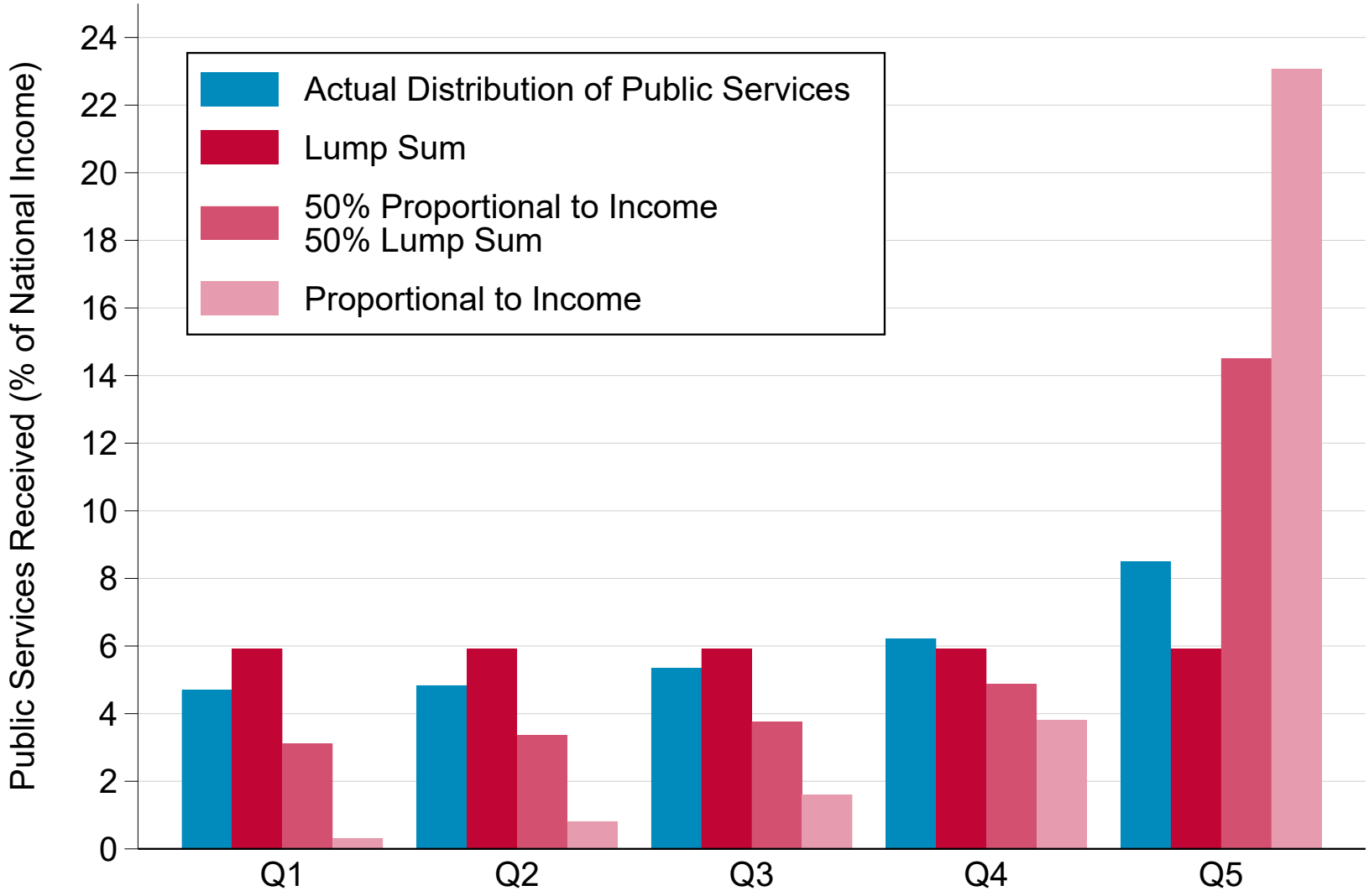
Notes. The figure displays total real income growth for each percentile of the distribution from 1993 to 2019 for different income concepts. The average income of the 20^{th} percentile grew by 60% in terms of pretax income, 80% in terms of posttax disposable income, and 125% after adding the consumption of public services to individual incomes. Pretax income equals capital and labor income, minus social contributions, plus pension and unemployment benefits. Posttax disposable income equals pretax income, minus direct taxes, plus cash transfers. The upper line adds the consumption of public services to posttax disposable income. Public services include in-kind social protection, education, healthcare, housing subsidies, local government services, public order and safety, transport, and other economic affairs. Income is split equally between all household members. Excludes individuals with incomes lower than 1% of the median income in a given year.

Figure 6 – Public Services Received by Income Decile, 2019: Before Versus After Productivity Adjustment



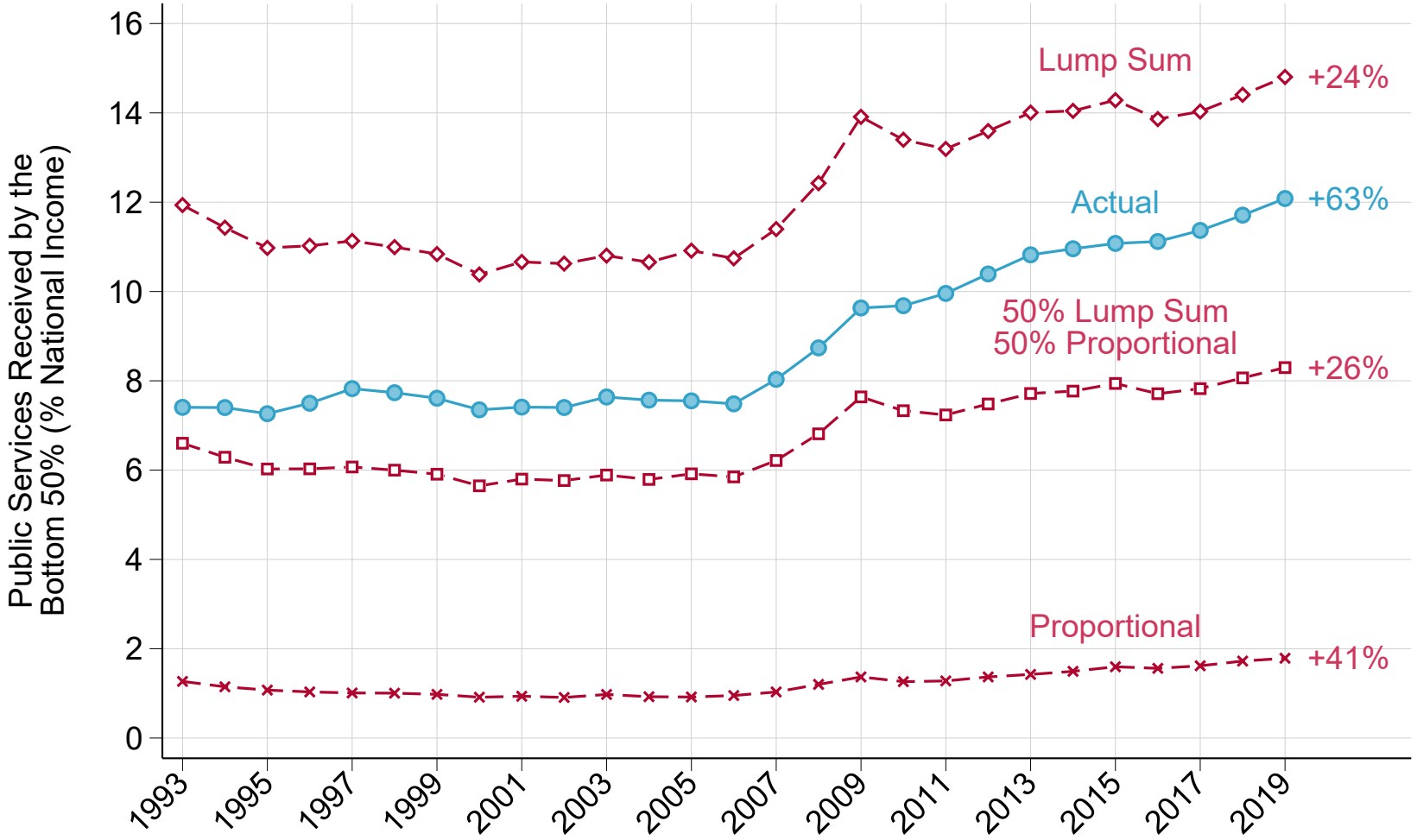
Notes. The figure plots total spending on public services received by income decile in 2019, expressed as a share of national income, before and after adjusting its value for aggregate and heterogeneous productivity. Aggregate productivity refers to the fact that the South African government may be inefficient at providing public services overall. Heterogeneous productivity corresponds to the fact that the quality of public services, controlling for their cost of provision, may vary by income group. Public services include in-kind social protection, education, healthcare, housing subsidies, local government services, public order and safety, transport, and other economic affairs. Income is split equally between all household members.

Figure 7 – Comparison with Existing Allocation Methods: Public Services Received by Income Quintile



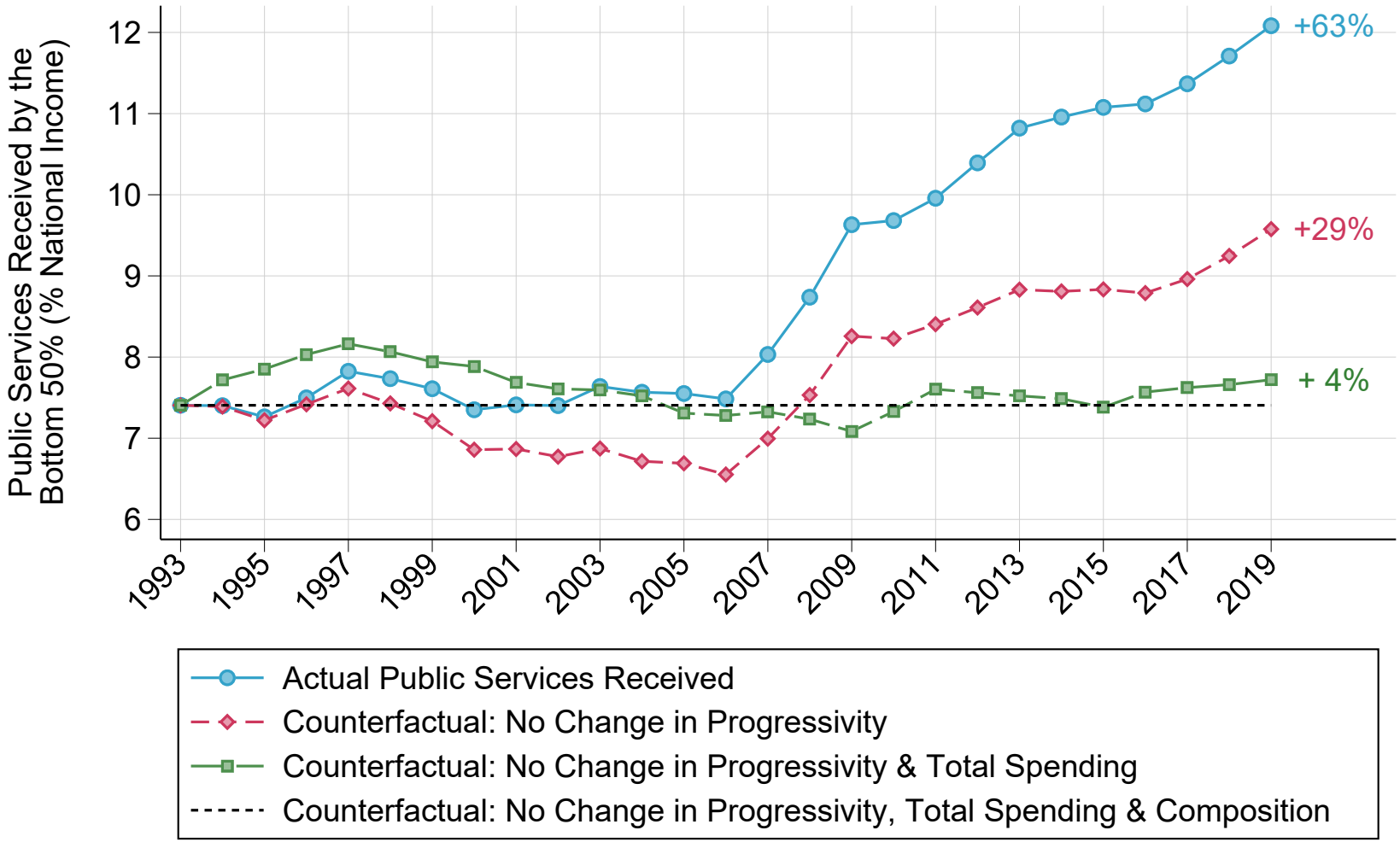
Notes. The figure displays the value of public services received by posttax disposable income quintile in 2019, expressed as a share of national income, depending on which method is used to allocate public services to individuals. Actual distribution of public services: estimates from this paper. Proportional to income: all public services allocated proportionally to disposable income, as in Piketty, Saez, and Zucman (2018). 50% proportional to income, 50% lump sum: half of spending on public services allocated proportionally to disposable income, half allocated as a lump sum, as in Auten and Splinter (2024). Lump sum: all public services allocated as a lump sum, as in Blanchet, Chancel, and Gethin (2022). Public services include in-kind social protection, education, housing subsidies, local government services, public order and safety, transport, and other economic affairs. Income is split equally between all household members.

Figure 8 – Comparison with Existing Allocation Methods: Public Services Received by the Bottom 50%



Notes. The figure displays the evolution of spending on public services received by the bottom 50% from 1993 to 2019, expressed as a share of national income, depending on which method is used to allocate public services to individuals. Actual distribution of public services: estimates from this paper. Proportional to income: all public services allocated proportionally to disposable income, as in Piketty, Saez, and Zucman (2018). 50% proportional to income, 50% lump sum: half of spending on public services allocated proportionally to disposable income, half allocated as a lump sum, as in Auten and Splinter (2024). Lump sum: all public services allocated as a lump sum, as in Blanchet, Chancel, and Gethin (2022). Public services include in-kind social protection, education, housing subsidies, local government services, public order and safety, transport, and other economic affairs. Income is split equally between all household members.

Figure 9 – Decomposing Redistribution: The Roles of Progressivity, Total Spending, and Composition of Public Services



Notes. The figure plots the evolution of total spending on public services received by the bottom 50% from 1993 to 2019, expressed as a share of national income, for different counterfactual scenarios. No change in progressivity: bottom 50% share of spending on each public service fixed to its 1993 value. No change in progressivity and total spending: in addition to no change in progressivity, fix total public spending to its 1993 value. No change in progressivity, total spending, and composition: in addition to no change in progressivity and total spending, fix the composition of spending by type of public service to its 1993 value. By construction, this latter counterfactual is equal to the 1993 transfer. Public services include in-kind social protection, education, housing subsidies, local government services, public order and safety, transport, and other economic affairs. Income is split equally between all household members.

Table 1 – Methodology Used to Distribute Government Expenditure in South Africa

	Method	Microdata	Macrodata	% of NNI	
				1993	2019
Education	Lump sum per student by level and province	Census	Provincial Budgets	7.8	9.0
Healthcare	Proportional to healthcare use by institution and province	GHS/OHS	Provincial Budgets	4.0	5.1
Housing	Lump sum per beneficiary	GHS	National Budget	0.6	0.9
Local Government	Lump sum per municipality	Census	Local Gov. Budgets	6.3	9.6
Public Order and Safety				3.5	3.7
Insurance Component	Proportional to police presence	VCS	National Budget	1.9	1.8
Use Component	Proportional to reported crimes	VCS	National Budget	1.5	2.0
Transport				2.0	2.5
Public Transport	Proportional to public transport expenditure	IES/LCS	National Budget	0.5	0.5
Infrastructure	Proportional to transport-intensive consumption	IES/LCS	National Budget Input-Output Tables	1.5	1.9
Other Economic Affairs	Proportional to sector-intensive consumption	IES/LCS	National Budget Input-Output Tables	3.5	2.8
Social Protection				3.0	5.3
Cash Transfers	Microsimulation	IES/LCS	National Budget	2.8	4.2
In-Kind Transfers	Proportional to cash transfers	IES/LCS	National Budget	0.2	1.1
Total				30.7	38.9

Notes. The table reports the methodology used to distribute the South African government budget from 1993 to 2019, together with the corresponding microdata sources, macrodata sources, and expenditure on each government function as a share of net national income (NNI) in 1993 and 2019. Local government: all government expenditure made by district and local municipalities. Insurance component of public order and safety: expenditure on visible policing. Use component of public order and safety: expenditure on police detective services, law courts, and prisons. Transport: public transport and transport infrastructure expenditure. Other economic affairs: expenditure on economic affairs other than transport, such as subsidies to agriculture, energy, manufacturing, and recreation and culture. GHS: General Household Surveys; IES: Income and Expenditure Surveys; LCS: Living Conditions Surveys; OHS: October Household Surveys; VCS: Victims of Crime Surveys.

Table 2 – Government Redistribution in South Africa, 1993-2019:
Level, Composition, and Progressivity of Transfers Received by the Bottom 50%

	Share of Total Expenditure Received (%)		Share of National Income Received (%)		Average Transfer Received (2021 PPP USD)	
	1993	2019	1993	2019	1993	2019
Social Protection	74	77	2.3	4.0	390	950
Education	49	61	3.8	5.5	650	1290
Health	47	56	1.9	2.9	320	680
Housing	45	58	0.3	0.5	40	120
Local Government	26	38	1.6	3.6	280	850
Public Order and Safety	35	38	1.2	1.4	210	330
Visible Policing	38	38	0.7	0.7	120	160
Law Enforcement	31	38	0.5	0.7	80	170
Transport	7	10	0.1	0.2	20	60
Public Transport	14	21	0.1	0.1	10	30
Infrastructure	5	7	0.1	0.1	10	30
Other Economic Affairs	10	13	0.3	0.4	60	80
Total	38	48	11.5	18.6	1970	4360
Total excl. Cash Transfers	34	44	9.4	15.2	1610	3580
Pretax Income			3.3	2.7	570	630

Notes. The table reports the level and composition of government transfers received by the bottom 50% of the pretax income distribution in South Africa in 1993 and 2019. Columns 2-3 show the share of total transfers received by the bottom 50%. Columns 4-5 report the corresponding. share of net national income received. Columns 6-7 report the average annual transfer received by the bottom 50%, expressed in 2021 PPP USD. In 2019, the poorest 50% received 77% of social protection expenditure, corresponding to 4% of national income, or $950 per capita. Local government: all government expenditure made by district and local municipalities. Visible policing: expenditure on visible policing. Law enforcement: expenditure on police detective services, law courts, and prisons. Transport: public transport and transport infrastructure expenditure. Other economic affairs: expenditure on economic affairs other than transport, such as subsidies to agriculture, energy, manufacturing, and recreation and culture. Social protection: cash transfers and in-kind social protection programs. Income and transfers are split equally between all household members. The last row shows the pretax income share and the average pretax income of the bottom 50%.

Table 3 – The Distribution of Income in South Africa in 2019

	Pretax Income		Posttax Disposable Income		Disposable Income + Public Services	
	Average Income ($)	Income Share (%)	Average Income ($)	Income Share (%)	Average Income ($)	Income Share (%)
Full population	11,800	100	10,700	100	14,800	100
Bottom 50%	630	2.7	1,290	6.0	4,550	15.4
Bottom 20%	45	0.1	550	1.0	3,100	4.2
Next 30%	1,020	2.6	1,780	5.0	5,530	11.2
Middle 40%	8,410	28.6	8,380	31.4	12,900	34.9
Top 10%	80,700	68.7	67,000	62.6	73,500	49.7
Top 1%	329,000	28.0	267,000	24.9	278,000	18.8
Top 0.1%	970,000	8.3	739,000	6.9	747,000	5.1

Notes. The table reports statistics on the distribution of income in South Africa in 2019 for different income concepts. In 2019, the bottom 50% received 2.7% of pretax income, corresponding to an average pretax income of $630. Pretax income equals capital and labor income, minus social contributions, plus pension and unemployment benefits. Posttax disposable income equals pretax income, minus direct taxes, plus cash transfers. The last two columns add the consumption of public services to posttax disposable income. Public services include in-kind social protection, education, healthcare, housing subsidies, local government services, public order and safety, transport, and other economic affairs. Income is split equally between all household members. Average incomes are expressed in 2021 PPP USD.

Table 4 – Indicators of Heterogeneous Public Service Delivery by Income Quintile in South Africa

	Q1	Q2	Q3	Q4	Q5	$q^j(Q1)$	Source
Subjective Indicators (% Positively Rating)							
Local public school	69	69	69	68	69	1.01***	Census
Local public clinic	46	45	46	46	50	0.98***	Census
Local public hospital	47	47	47	48	51	0.97***	Census
Local police services	43	43	44	45	48	0.97***	Census
Electricity supply	63	63	63	64	67	0.99***	Census
Water supply	50	54	58	62	68	0.85***	Census
Refuse removal services	49	54	57	60	66	0.85***	Census
Sanitation services	52	56	59	64	74	0.85***	Census
Government-subsidized dwelling	48	49	50	51	53	0.96***	Census
Police response to reported crime	52	53	52	53	56	0.98	VCS
Objective Indicators							
School teacher mathematics test success rate (%)	38	40	40	47	67	0.82***	SACMEQ
Share of reported crimes leading to arrest (%)	24	20	21	18	20	1.15	VCS
Asked to pay a bribe in past 12 months (%)	5	9	8	11	15	1.78***	VCS
Water interruption in past 3 months (%)	19	19	17	16	14	0.90***	Census
Electricity interruption in past 3 months (%)	32	28	25	21	16	0.76***	Census
Value of subsidized dwelling (Rand 1,000)	167	173	221	245	359	0.72***	GHS
Distance to Nearest Public Services (km)							
Primary school	1.5	1.5	1.6	1.8	2.0	1.12***	LCS
Secondary school	2.9	2.8	2.6	2.4	2.8	0.93***	LCS
Clinic	4.7	4.5	3.8	3.5	3.8	0.86***	LCS
Hospital	13.2	12.6	10.2	8.6	7.3	0.79***	LCS
Police station	8.6	8.1	6.1	4.9	4.6	0.75***	LCS
Public transport	1.1	1.0	1.1	1.0	1.3	1.04*	LCS

Notes. The table reports estimates of heterogeneous government productivity by income group, based on a number of subjective and objective indicators of public service delivery. Q1 to Q5 refer to income quintiles. $q^j(Q_1)$ measures the relative quality of services received by the bottom quintile, equal to the ratio of the value of the indicator for Q1 to the overall sample mean (or its inverse when greater values correspond to lower quality of public services). Values of $q^j(Q_1)$ below 1 indicate that the bottom quintile receives services of lower quality than average. Statistical significance stars correspond to a regression of the indicator of interest on a dummy taking one if the individual belongs to the bottom quintile. *** p<0.01, ** p<0.05, * p<0.1. Census: 2016 national census. GHS: 2019 General Household Survey. VCS: 2017 Victims of Crime Survey. LCS: 2014-2015 Living Conditions Survey. SACMEQ: The Southern and Eastern Africa Consortium for Monitoring Educational Quality (estimates from Venkat and Spaull, 2015).

Who Benefits from Public Services? Novel Evidence and Implications for Inequality Measurement

Amory Gethin

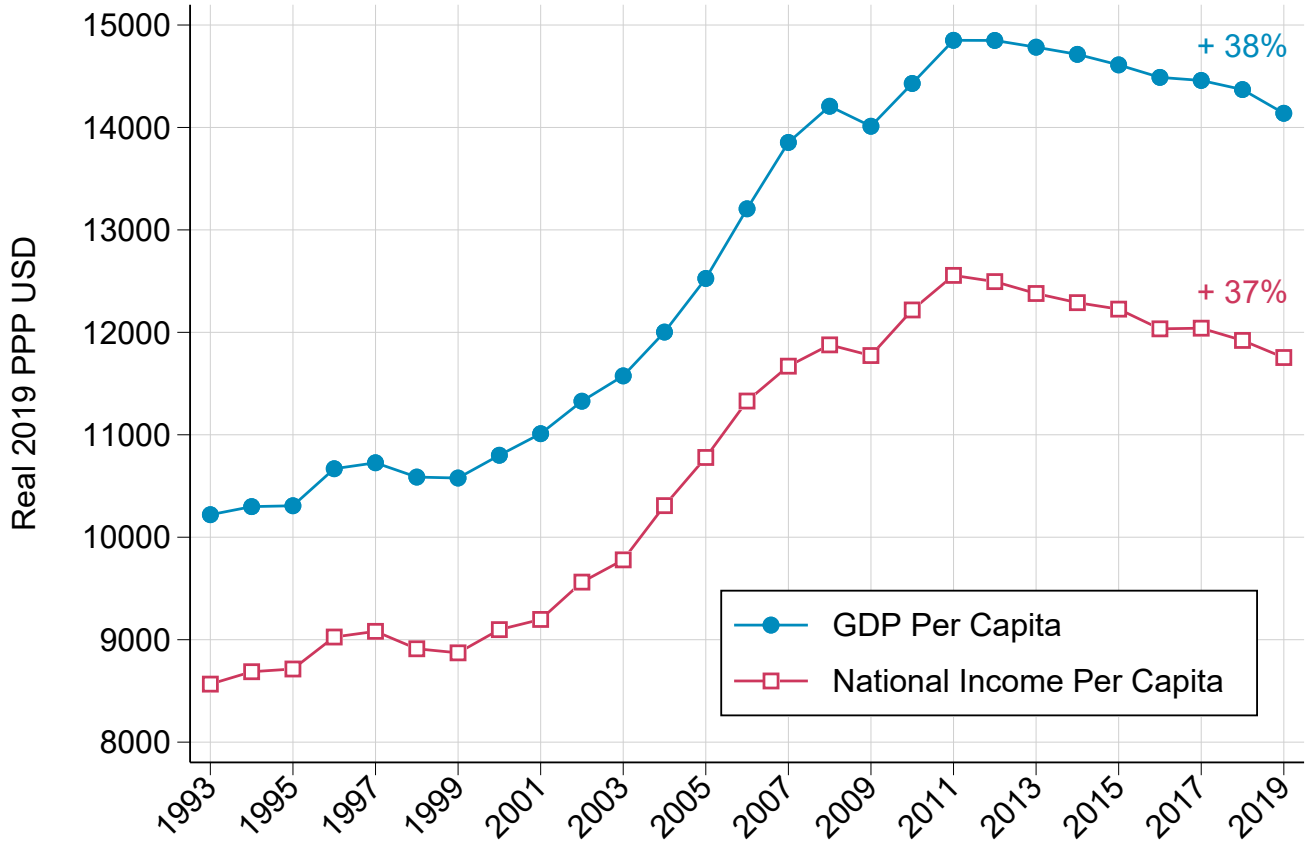
August 2024

ONLINE APPENDIX

This appendix supplements my article "Who Benefits from Public Services? Novel Evidence and Implications for Inequality Measurement." It contains supplementary figures and tables.

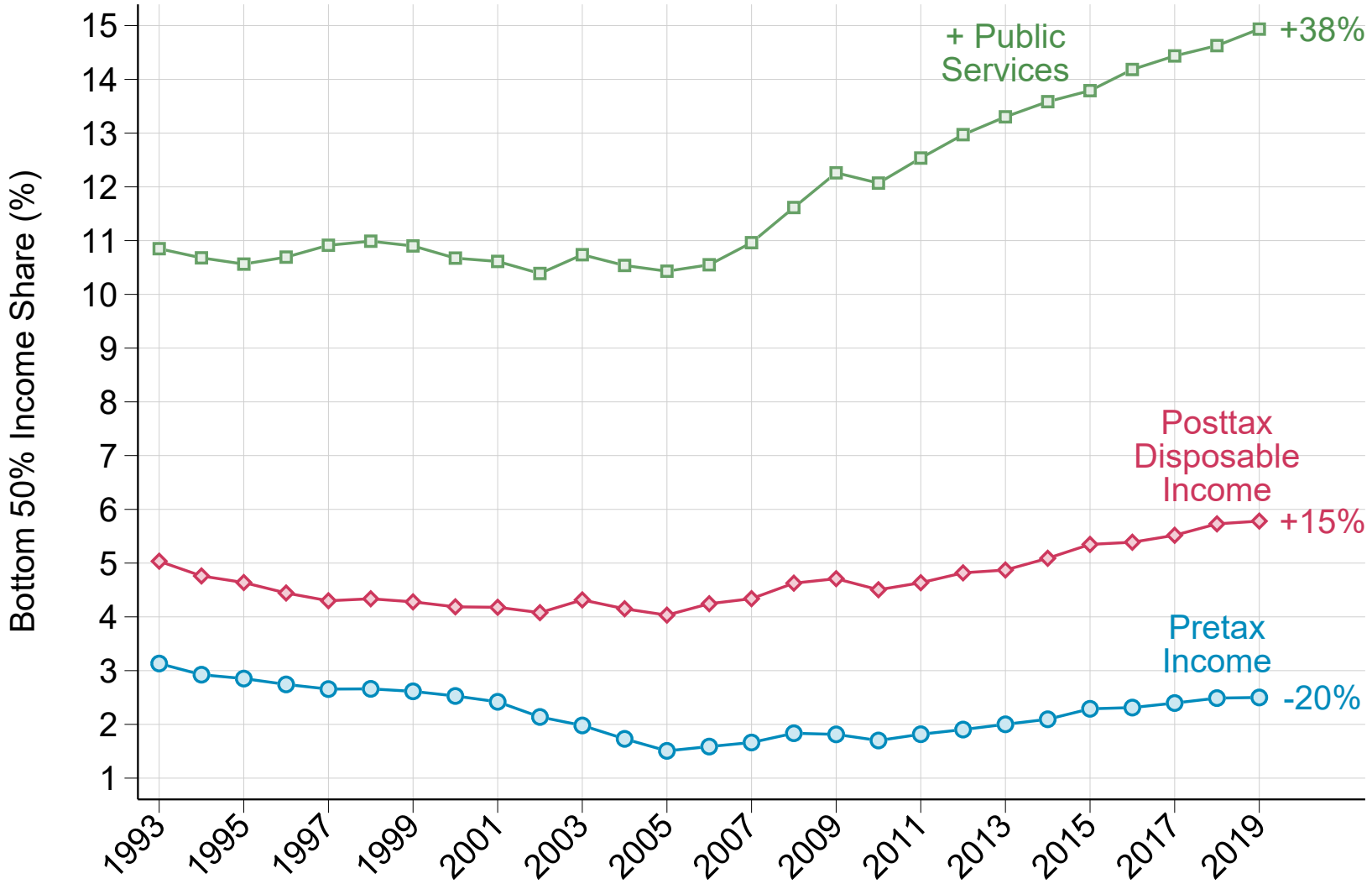
A. Additional Key Results

Figure A1 – GDP and National Income Per Capita in South Africa, 1993-2019



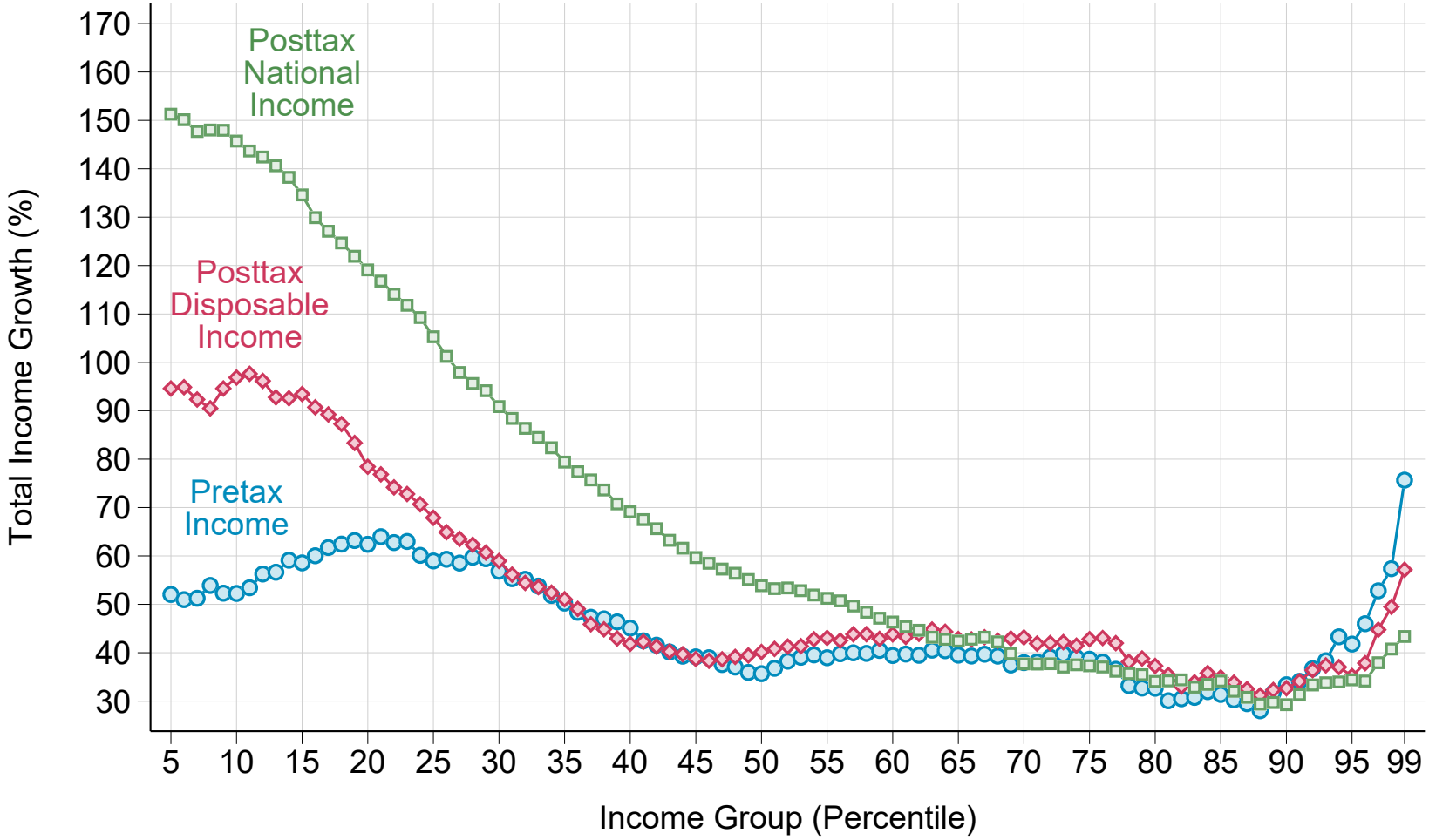
Notes. Author's elaboration using data from the South African Reserve Bank. Growth figures correspond to total real growth rates between 1993 and 2019.

Figure A2 – Public Services and Inequality: Bottom 50% Income Share, 1993-2019



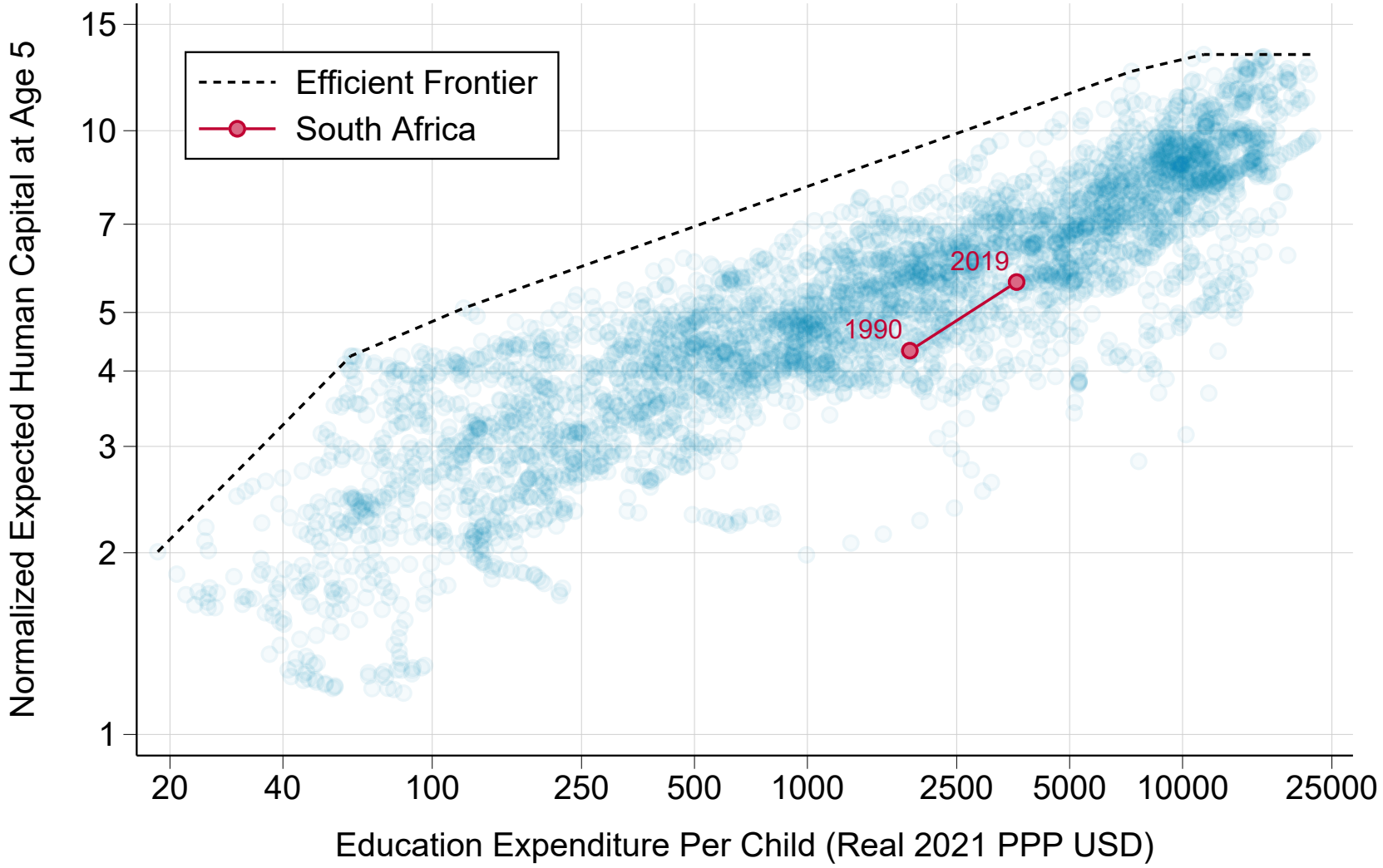
Notes. The figure represents the share of income received by the bottom 50% from 1993 to 2019 for different income concepts. Pretax income equals capital and labor income, minus social contributions, plus pension and unemployment benefits. Posttax disposable income equals pretax income, minus direct taxes, plus cash transfers. The upper line adds the consumption of public services to posttax disposable income. Income is split equally between all household members.

Figure A3 – Public Services and the Distribution of Economic Growth, 1993-2019 (Pretax Versus Posttax)



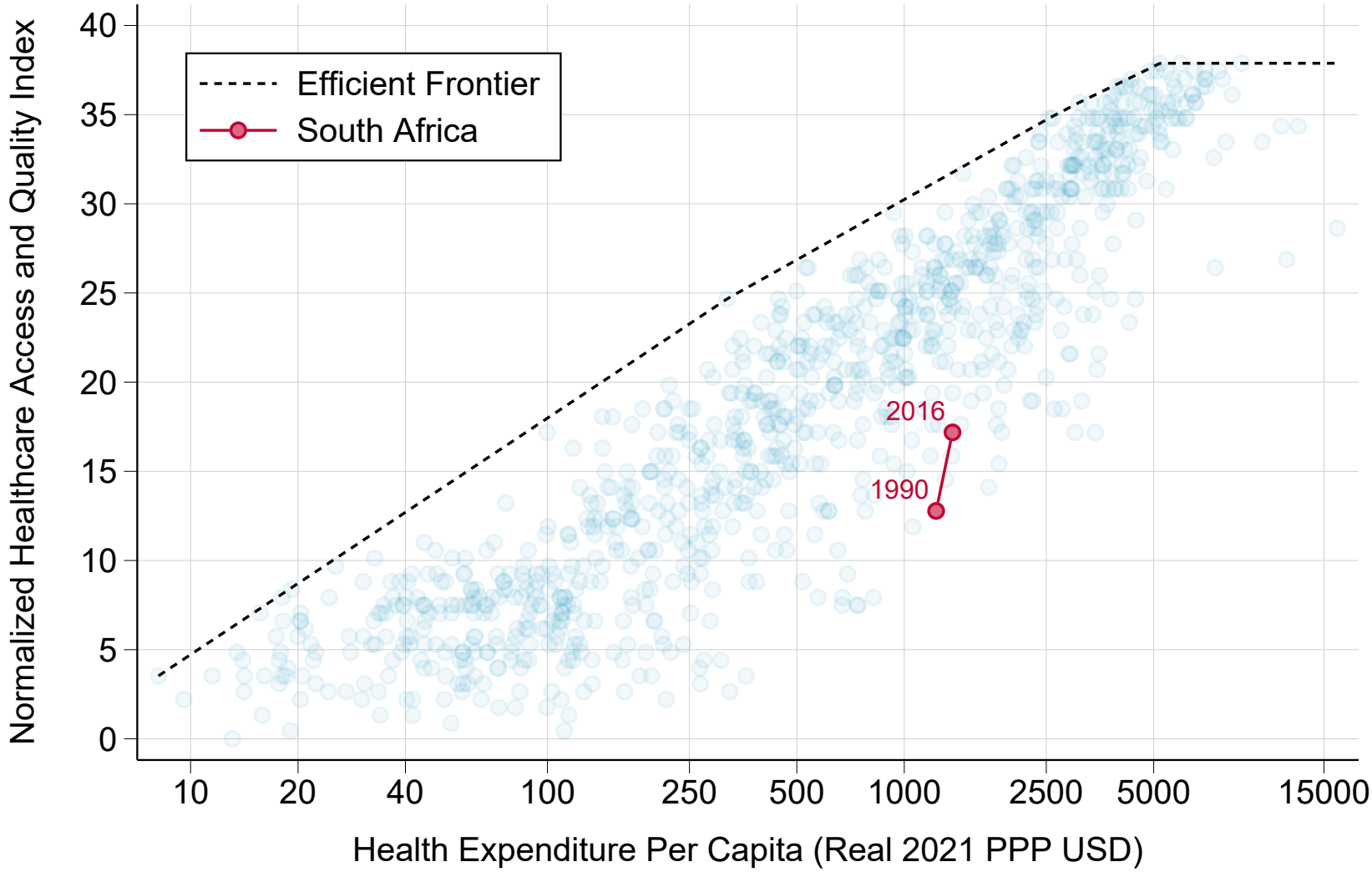
Notes. The figure displays the total real income growth rate for each percentile of the distribution from 1993 to 2019 for different income concepts. Pretax income equals capital and labor income, minus social contributions, plus pension and unemployment benefits. Posttax disposable income equals pretax income, minus direct taxes, plus cash transfers. Posttax national income deducts all taxes and adds all government transfers. Income is split equally between all household members. Excludes individuals with incomes lower than 1% of the median income in a given year.

Figure A4 – Accounting for Public Sector Productivity: Education Spending Versus Expected Human Capital at Age 5



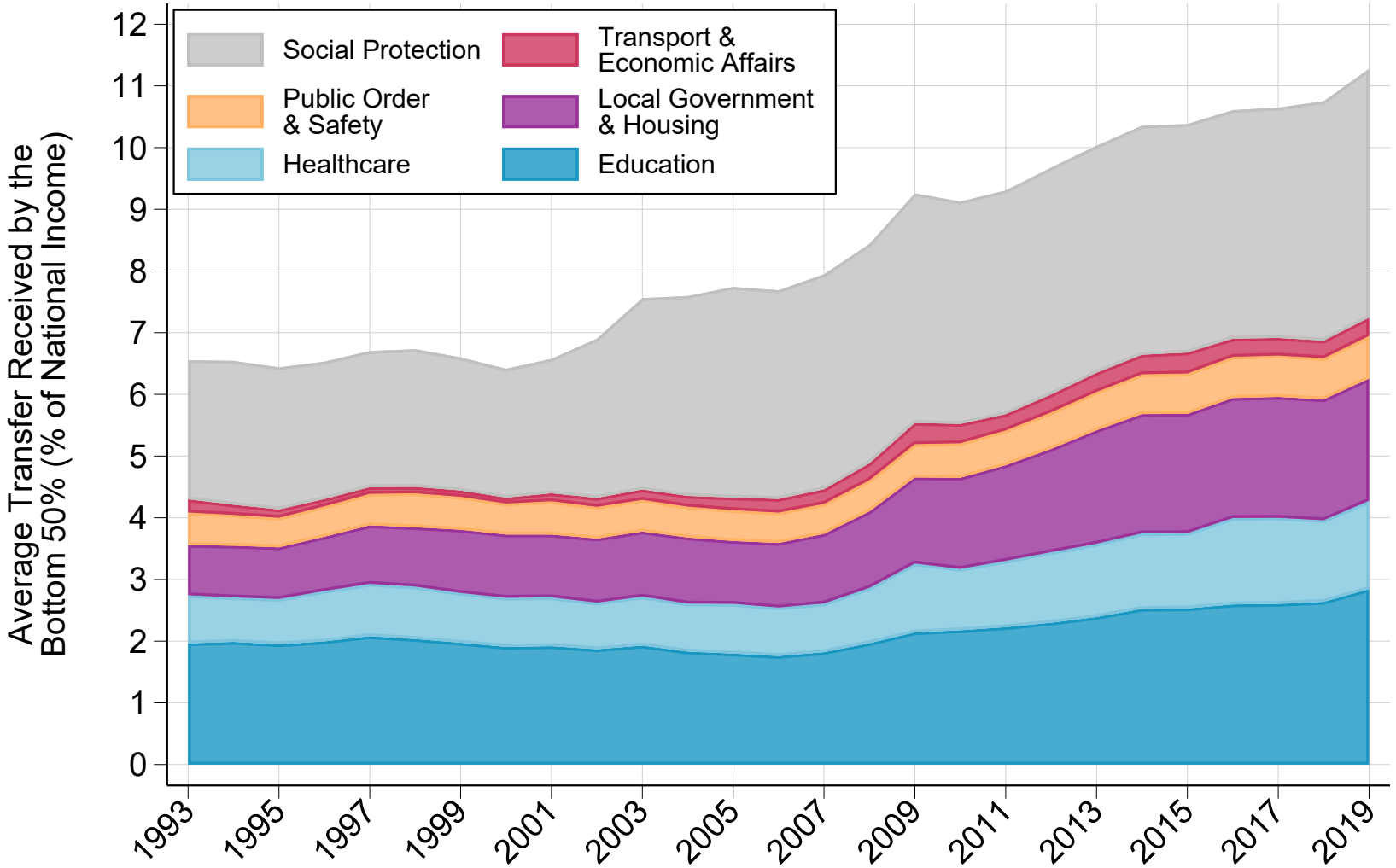
Notes. Figure adapted from Gethin (2024). The figure plots the relationship between education expenditure per child and expected human capital at age 5. Each data point is a country-year. The upper dashed line represents the efficient frontier, defined as a piecewise linear estimate of the maximum achievable output at each level of expenditure. The trajectory of South Africa from 1990 to 2019 is highlighted in red.

Figure A5 – Accounting for Public Sector Productivity: Healthcare Spending Versus Quality of Healthcare



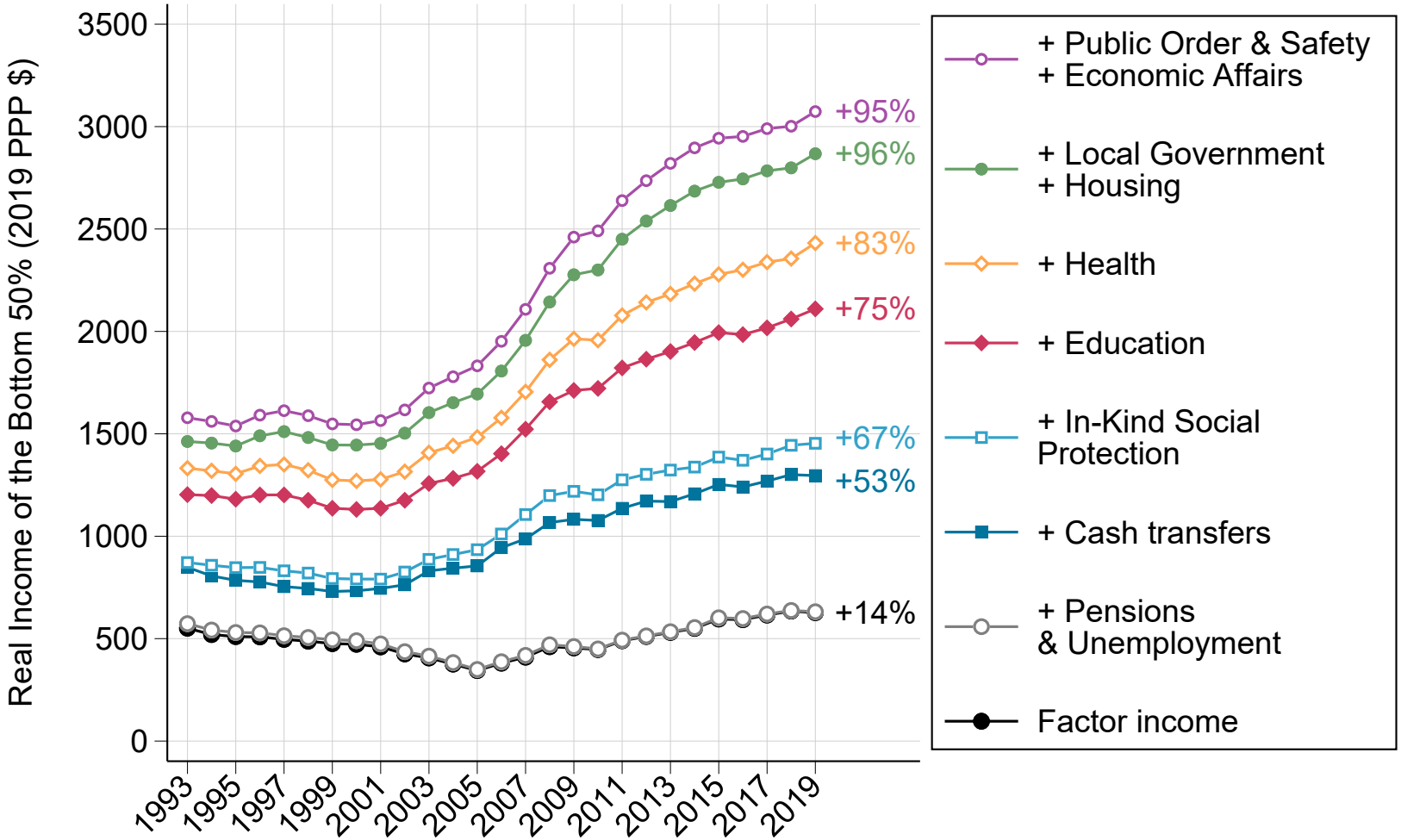
Notes. Figure adapted from Gethin (2024). The figure plots the relationship between healthcare expenditure per capita and quality of healthcare, measured using the Healthcare Access and Quality index reexpressed in units of life expectancy. Each data point is a country-year. The upper dashed line represents the efficient frontier, defined as a piecewise linear estimate of the maximum achievable output at each level of expenditure. The trajectory of South Africa from 1990 to 2016 is highlighted in red.

Figure A6 – The Rise of Redistribution: Government Transfers Received by the Bottom 50%, 1993-2019 (Productivity-Adjusted)



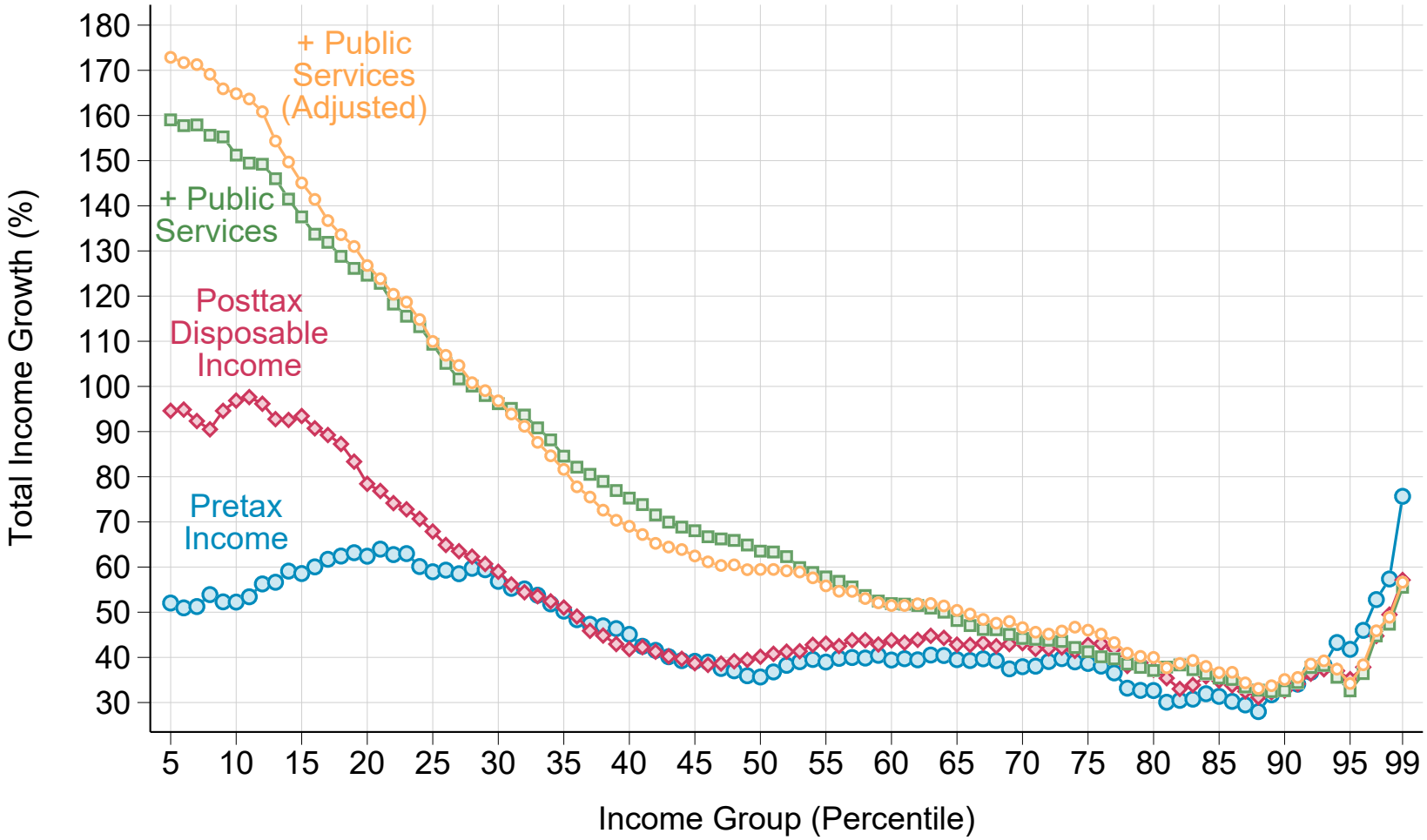
Notes. The figure represents the level and composition of government transfers received by the poorest 50%, expressed as a share of net national income. The value of public services is adjusted for aggregate and heterogeneous productivity. Aggregate productivity refers to the fact that the South African government may be inefficient at providing public services overall. Heterogeneous productivity corresponds to the fact that the quality of public services, controlling for their cost of provision, may vary by income group. Income is split equally between all household members. Figure 3 reproduces this figure without any productivity adjustment.

Figure A7 – Bottom 50% Average Income Before and After Transfers, 1993-2019: Productivity-Adjusted



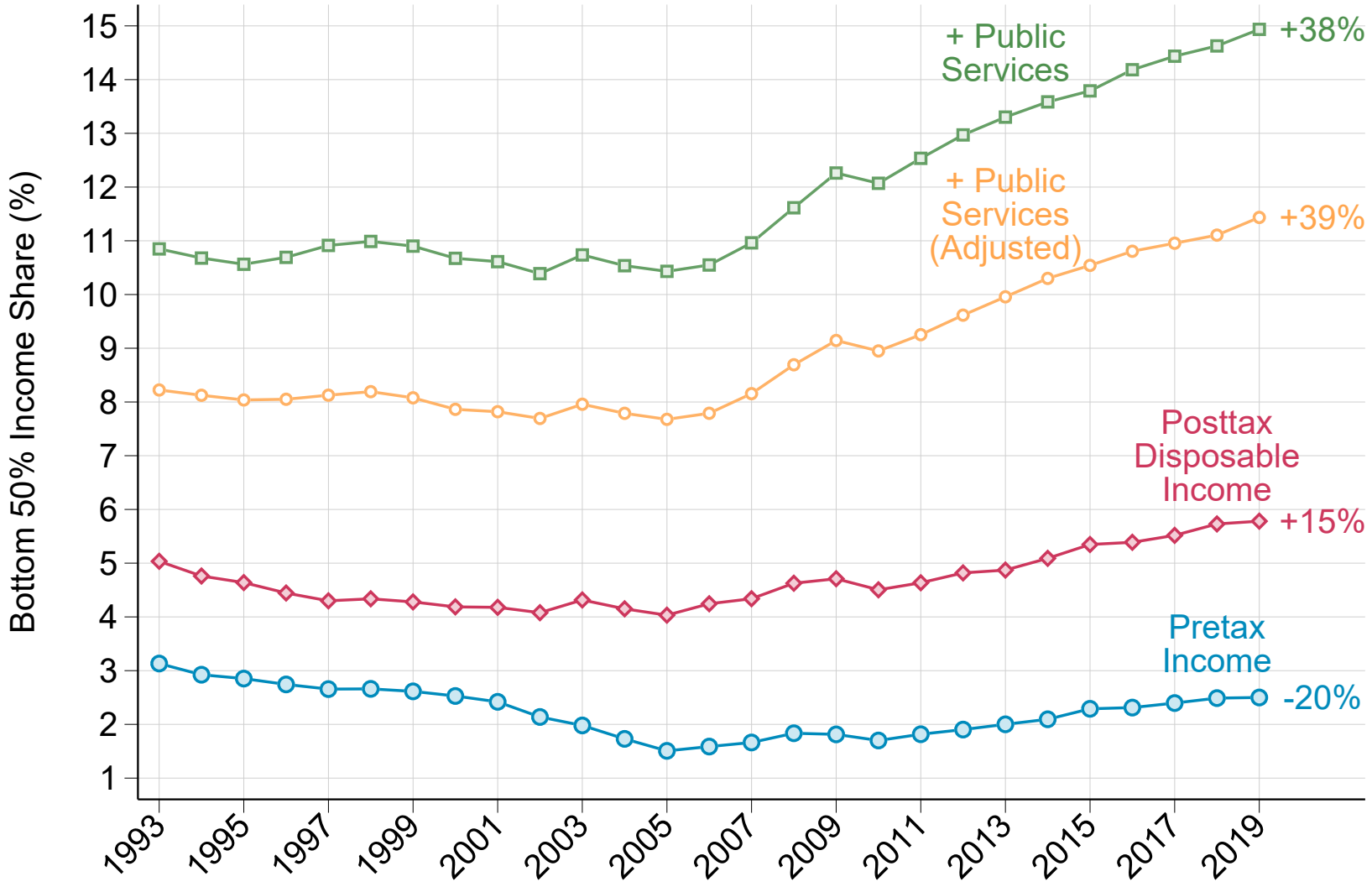
Notes. The figure represents the evolution of the real average income of the bottom 50%, before and after adding cash and in-kind transfers one by one to the analysis. The value of public services is adjusted for aggregate and heterogeneous productivity. Aggregate productivity refers to the fact that the South African government may be inefficient at providing public services overall. Heterogeneous productivity corresponds to the fact that the quality of public services, controlling for their cost of provision, may vary by income group. Income is split equally between all household members. Figure 4 reproduces this figure without any productivity adjustment.

Figure A8 – Public Services and the Distribution of Economic Growth, 1993-2019
(With Productivity-Adjusted Estimates)



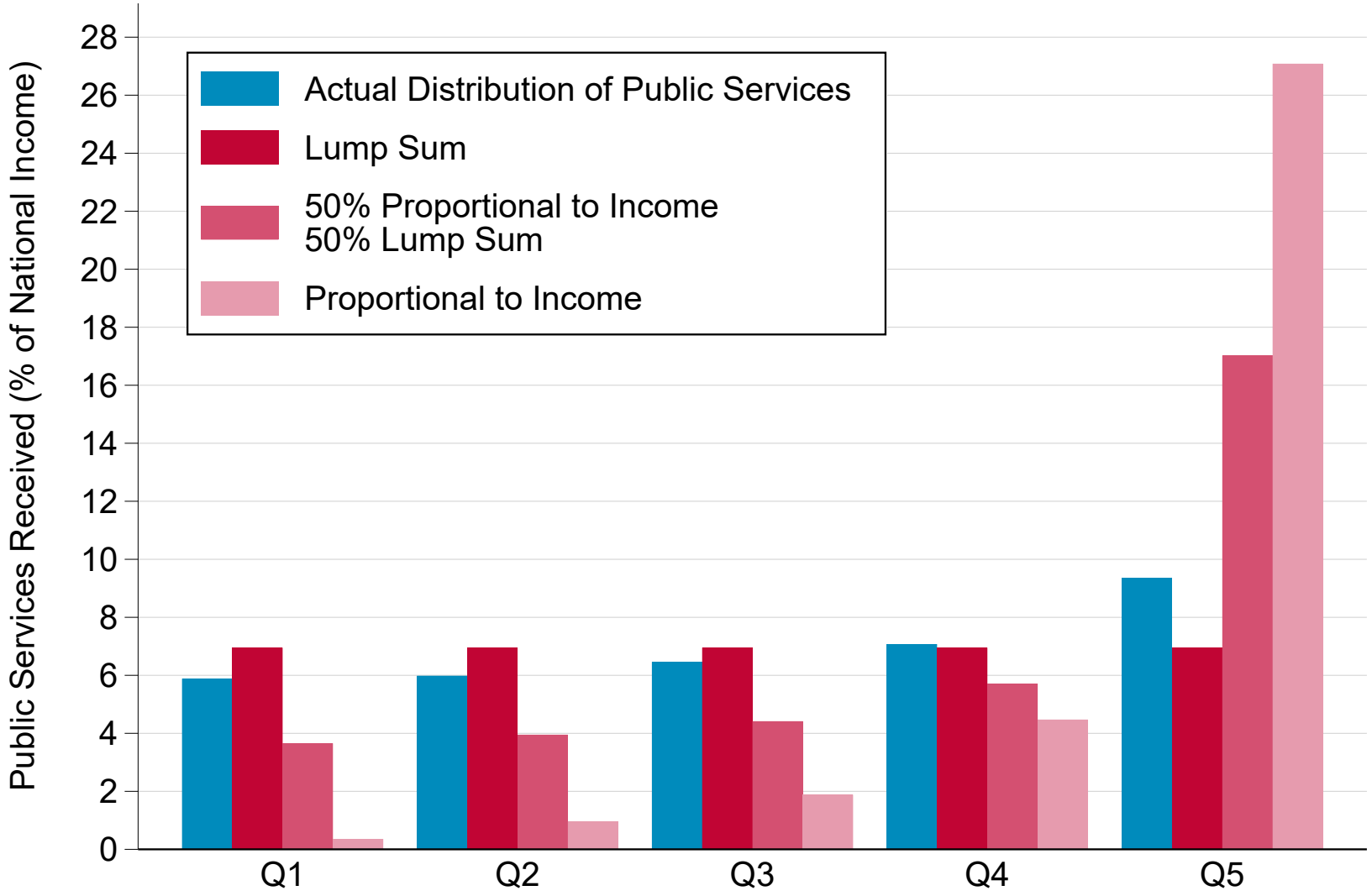
Notes. The figure displays the total real income growth rate for each percentile of the distribution from 1993 to 2019 for different income concepts. Pretax income equals capital and labor income, minus social contributions, plus pension and unemployment benefits. Posttax disposable income equals pretax income, minus direct taxes, plus cash transfers. The two upper lines add the consumption of public services to posttax disposable income, before and after adjusting for aggregate and heterogeneous public sector productivity. Aggregate productivity refers to the fact that the South African government may be inefficient at providing public services overall. Heterogeneous productivity corresponds to the fact that the quality of public services, controlling for their cost of provision, may vary by income group. Income is split equally between all household members. Excludes individuals with incomes lower than 1% of the median income in a given year.

Figure A9 – Public Services and Inequality: Bottom 50% Income Share, 1993-2019
(With Productivity-Adjusted Estimates)



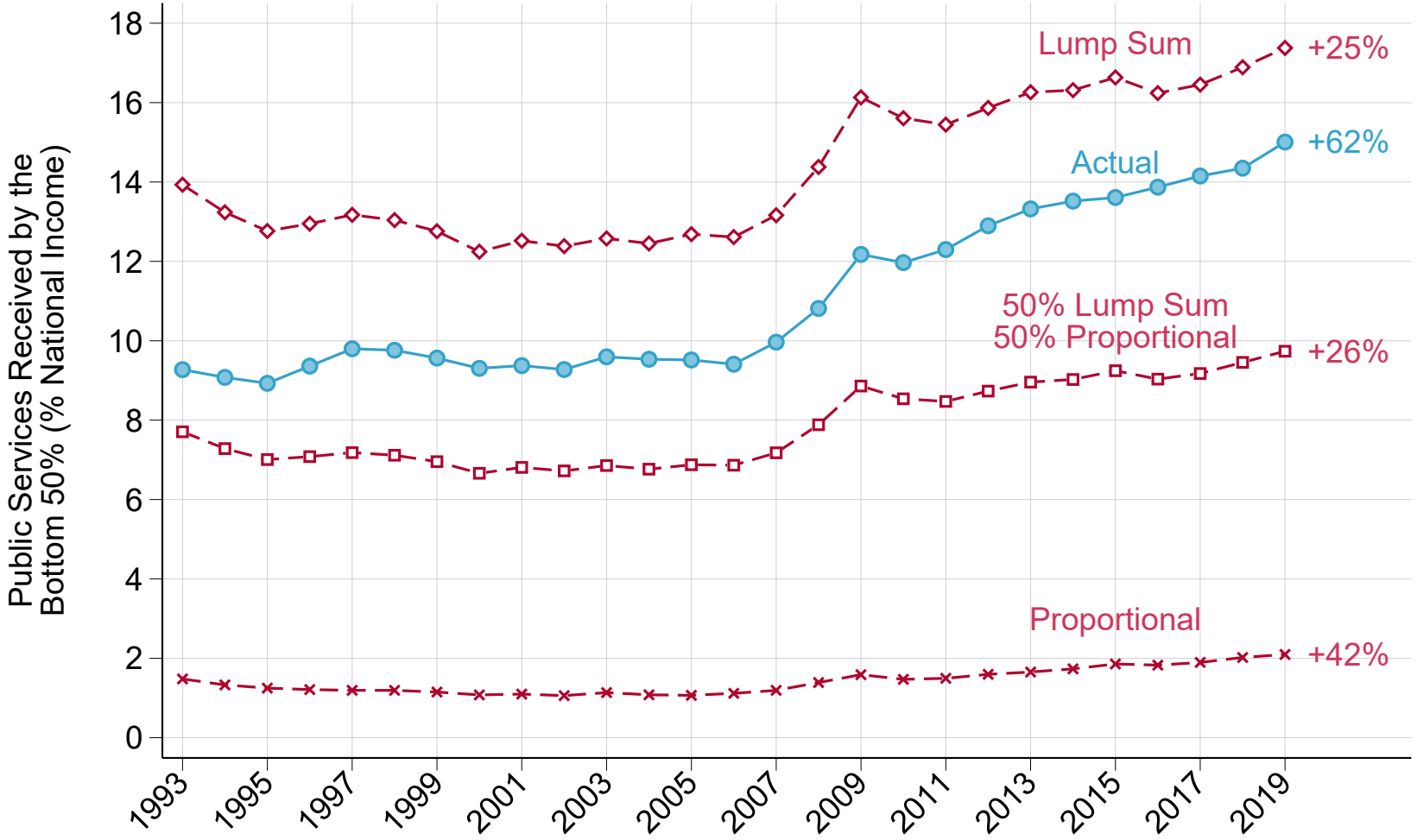
Notes. The figure represents the share of income received by the bottom 50% from 1993 to 2019 for different income concepts. Pretax income equals capital and labor income, minus social contributions, plus pension and unemployment benefits. Posttax disposable income equals pretax income, minus direct taxes, plus cash transfers. The upper line adds the consumption of public services to posttax disposable income. The second line from the top adjusts in-kind transfers for aggregate and heterogeneous productivity. Aggregate productivity refers to the fact that the South African government may be inefficient at providing public services overall. Heterogeneous productivity corresponds to the fact that the quality of public services, controlling for their cost of provision, may vary by income group. Income is split equally between all household members.

Figure A10 – Comparison with Existing Allocation Methods: Public Services Received by Income Quintile (Including Healthcare)



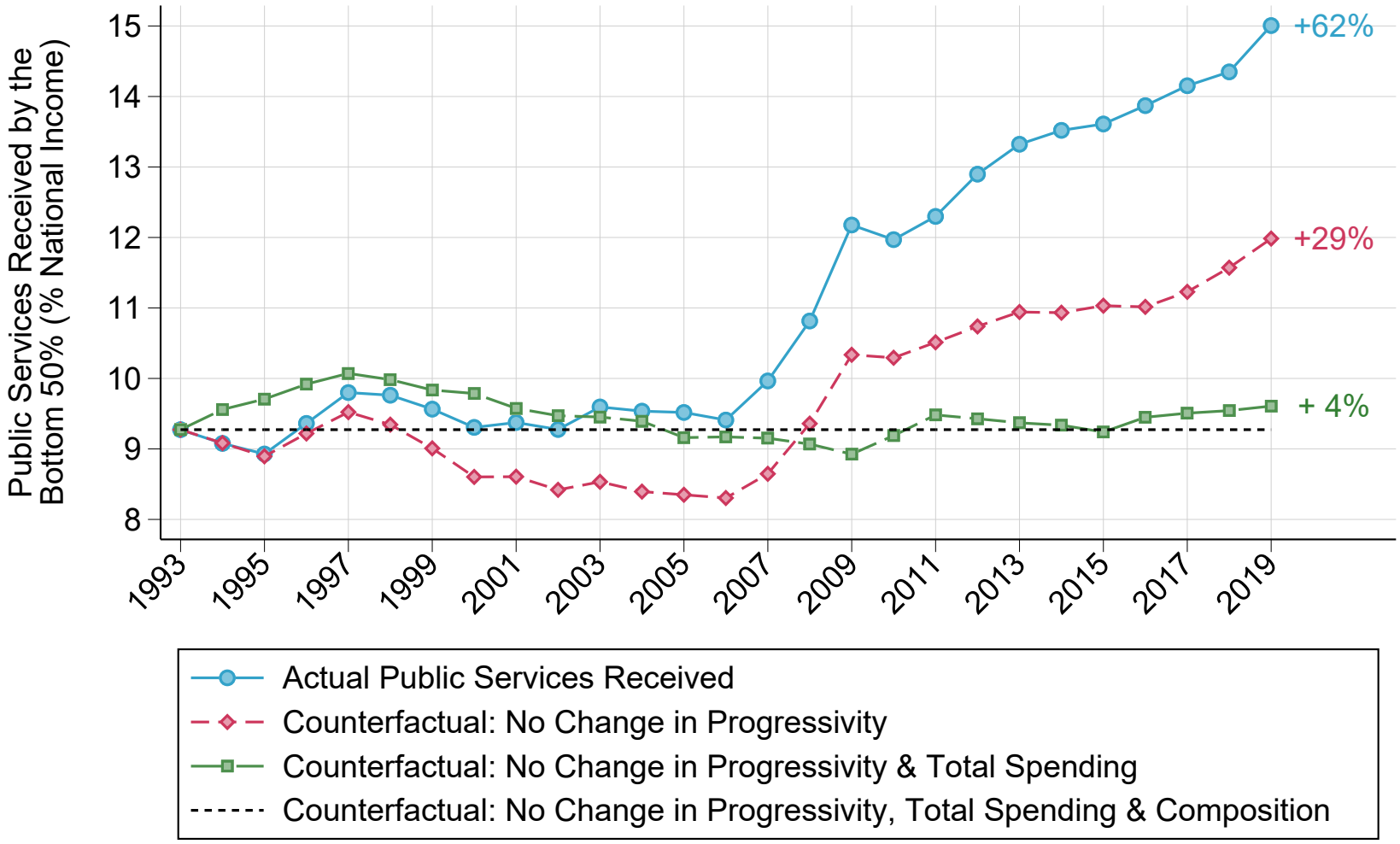
Notes. The figure displays the value of public services received by posttax disposable income quintile in 2019, expressed as a share of national income, depending on the method used to allocate public services to individuals. Public services include healthcare. Actual distribution of public services: estimates from this paper. Lump sum: all public services allocated as a lump sum. 50% proportional to income, 50% lump sum: half of the value of public services allocated proportionally to disposable income, half allocated as a lump sum. Proportional to income: all public services allocated proportionally to disposable income. Income is split equally between all household members.

Figure A11 – Comparison with Existing Allocation Methods: Public Services Received by the Bottom 50%, 1993-2019 (Including Healthcare)



Notes. The figure displays the value of public services received by the bottom 50% from 1993 to 2019, expressed as a share of national income, depending on the method used to allocate public services to individuals. Public services include healthcare. Actual distribution of public services: estimates from this paper. Lump sum: all public services allocated as a lump sum. 50% proportional to income, 50% lump sum: half of the value of public services allocated proportionally to disposable income, half allocated as a lump sum. Proportional to income: all public services allocated proportionally to disposable income. Income is split equally between all household members.

Figure A12 – Decomposing Redistribution: The Roles of the Progressivity, Total Value, and Composition of Public Services (Including Healthcare)



Notes. The figure plots the value of public services received by the bottom 50% from 1993 to 2019, expressed as a share of national income, for different counterfactual scenarios. No change in progressivity: bottom 50% share of spending on each public service fixed to its 1993 value. No change in progressivity and total value: in addition to no change in progressivity, fix total public spending to its 1993 value. No change in progressivity, total value, and composition: in addition to no change in progressivity and total value, fix the composition of spending by type of public service to its 1993 value. By construction, this latter counterfactual is equal to the 1993 transfer.

Table A1 – The Distribution of Income in South Africa in 2019 (With Posttax National Income)

	Pretax Income		Posttax Disposable Income		Disposable Income + Public Services		Posttax National Income	
	Average Income ($)	Income Share (%)	Average Income ($)	Income Share (%)	Average Income ($)	Income Share (%)	Average Income ($)	Income Share (%)
Full population	11,800	100	10,700	100	14,800	100	11,800	100
Bottom 50%	630	2.7	1,290	6.0	4,550	15.4	3,550	15.1
Bottom 20%	45	0.1	550	1.0	3,100	4.2	2,160	3.7
Next 30%	1,020	2.6	1,780	5.0	5,530	11.2	4,470	11.4
Middle 40%	8,410	28.6	8,380	31.4	12,900	34.9	10,300	35.0
Top 10%	80,700	68.7	67,000	62.6	73,500	49.7	58,700	49.9
Top 1%	329,000	28.0	267,000	24.9	278,000	18.8	218,000	18.6
Top 0.1%	970,000	8.3	739,000	6.9	747,000	5.1	630,000	5.4

Notes. The table reports statistics on the distribution of income in South Africa in 2019 for different income concepts. Pretax income equals capital and labor income, minus social contributions, plus pension and unemployment benefits. Posttax disposable income equals pretax income, minus direct taxes, plus cash transfers. Posttax national income deducts all taxes and adds all government transfers. Income is split equally between all household members.

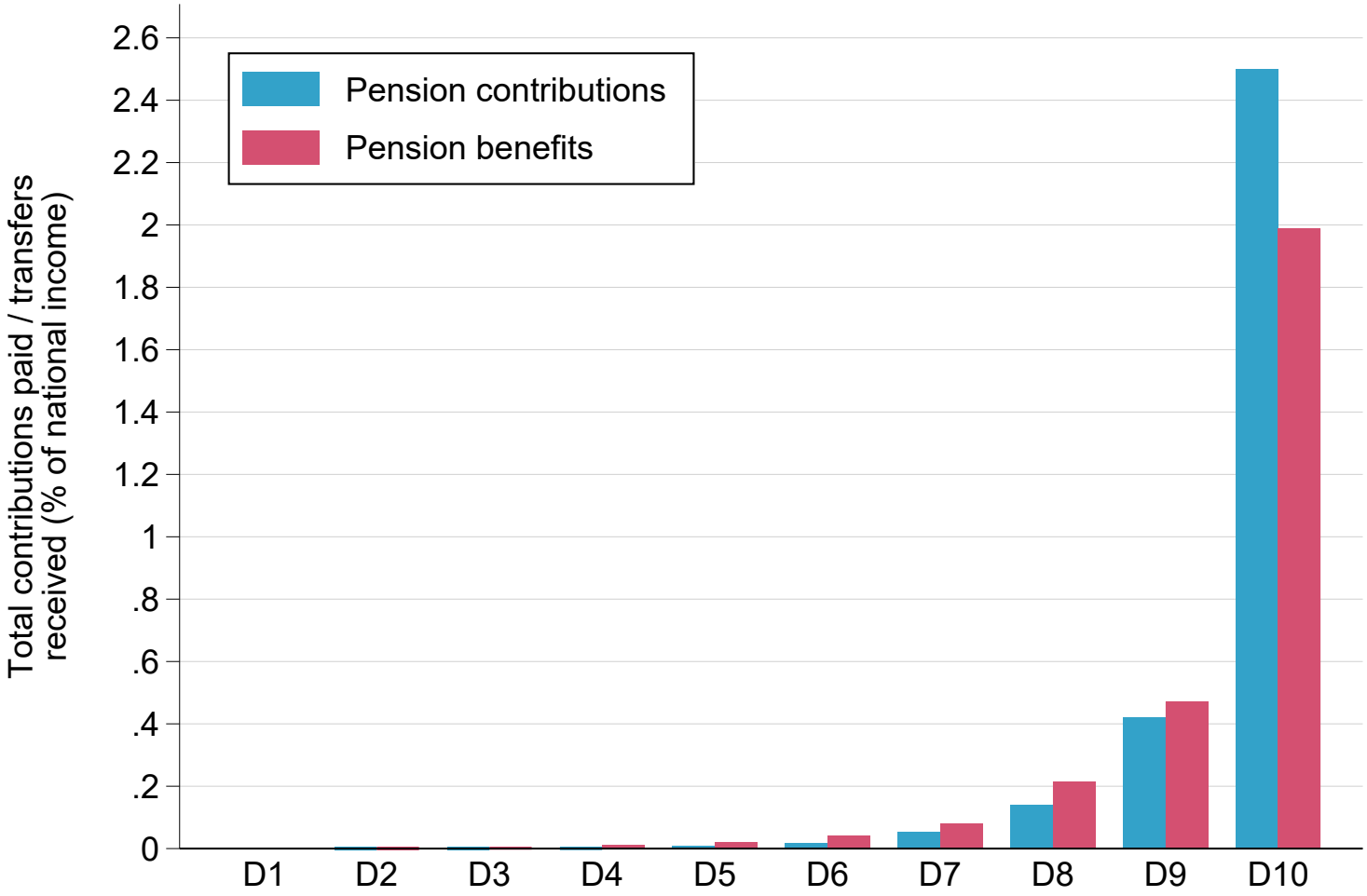
Table A2 – The Distribution of Income in South Africa in 2019: Productivity-Adjusted

	Pretax Income		Posttax Disposable Income		Disposable Income + Public Services	
	Average Income ($)	Income Share (%)	Average Income ($)	Income Share (%)	Average Income ($)	Income Share (%)
Full population	11,800	100	10,700	100	13,000	100
Bottom 50%	630	2.7	1,290	6.0	3,070	11.8
Bottom 20%	45	0.1	550	1.0	1,990	3.1
Next 30%	1,020	2.6	1,780	5.0	3,790	8.7
Middle 40%	8,410	28.6	8,380	31.4	10,900	33.5
Top 10%	80,700	68.7	67,000	62.6	71,000	54.7
Top 1%	329,000	28.0	267,000	24.9	274,000	21.1
Top 0.1%	970,000	8.3	739,000	6.9	744,000	5.7

Notes. The table reports statistics on the distribution of income in South Africa in 2019 for different income concepts. Pretax income equals capital and labor income, minus social contributions, plus pension and unemployment benefits. Posttax disposable income equals pretax income, minus direct taxes, plus cash transfers. Public services are adjusted for aggregate and heterogeneous productivity. Aggregate productivity refers to the fact that the South African government may be inefficient at providing public services overall. Heterogeneous productivity corresponds to the fact that the quality of public services, controlling for their cost of provision, may vary by income group. Income is split equally between all household members.

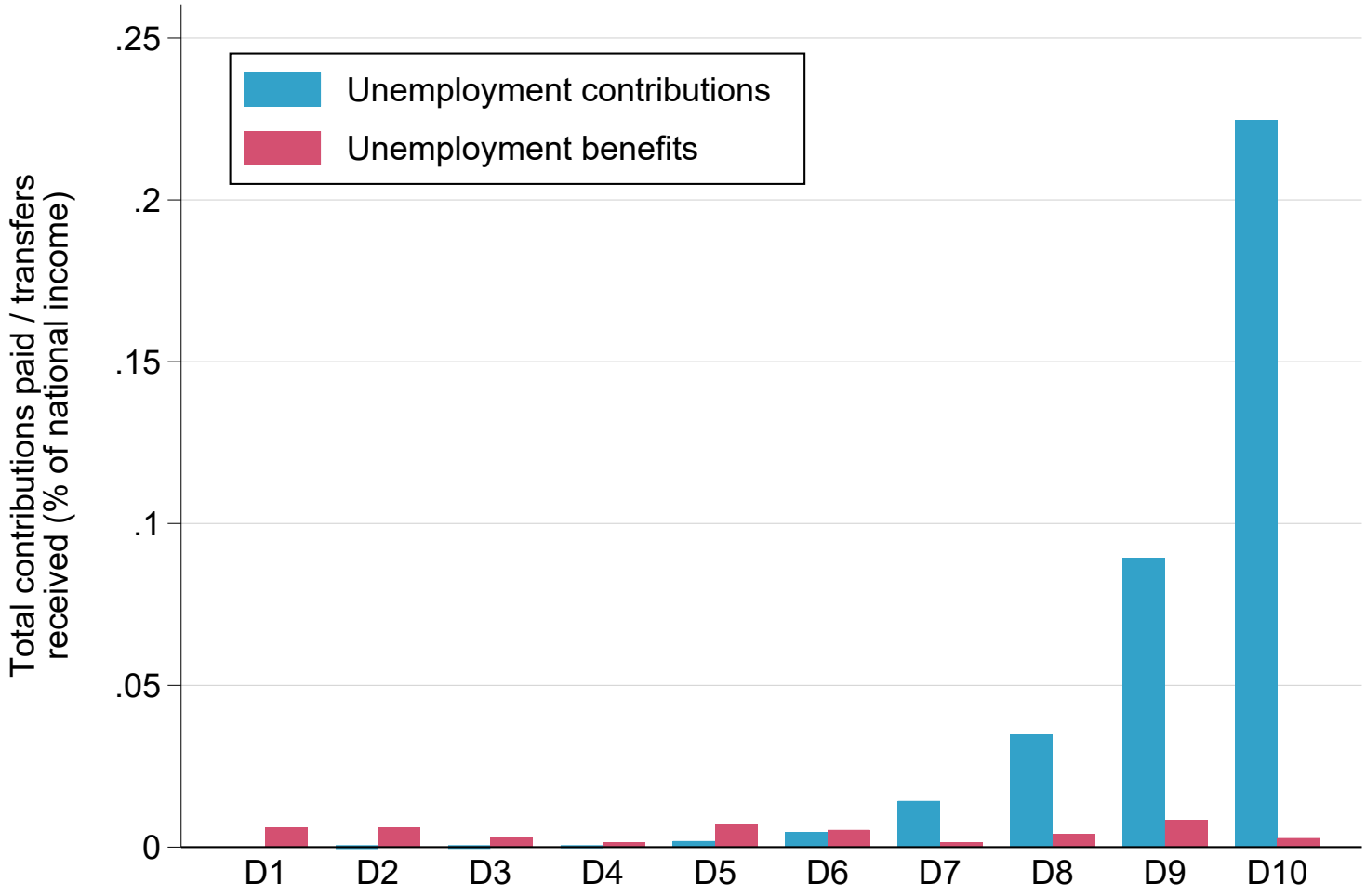
B. Pension and Unemployment Systems

Figure B1 – Pension Contributions and Benefits Paid/Received by Income Decile, 2019



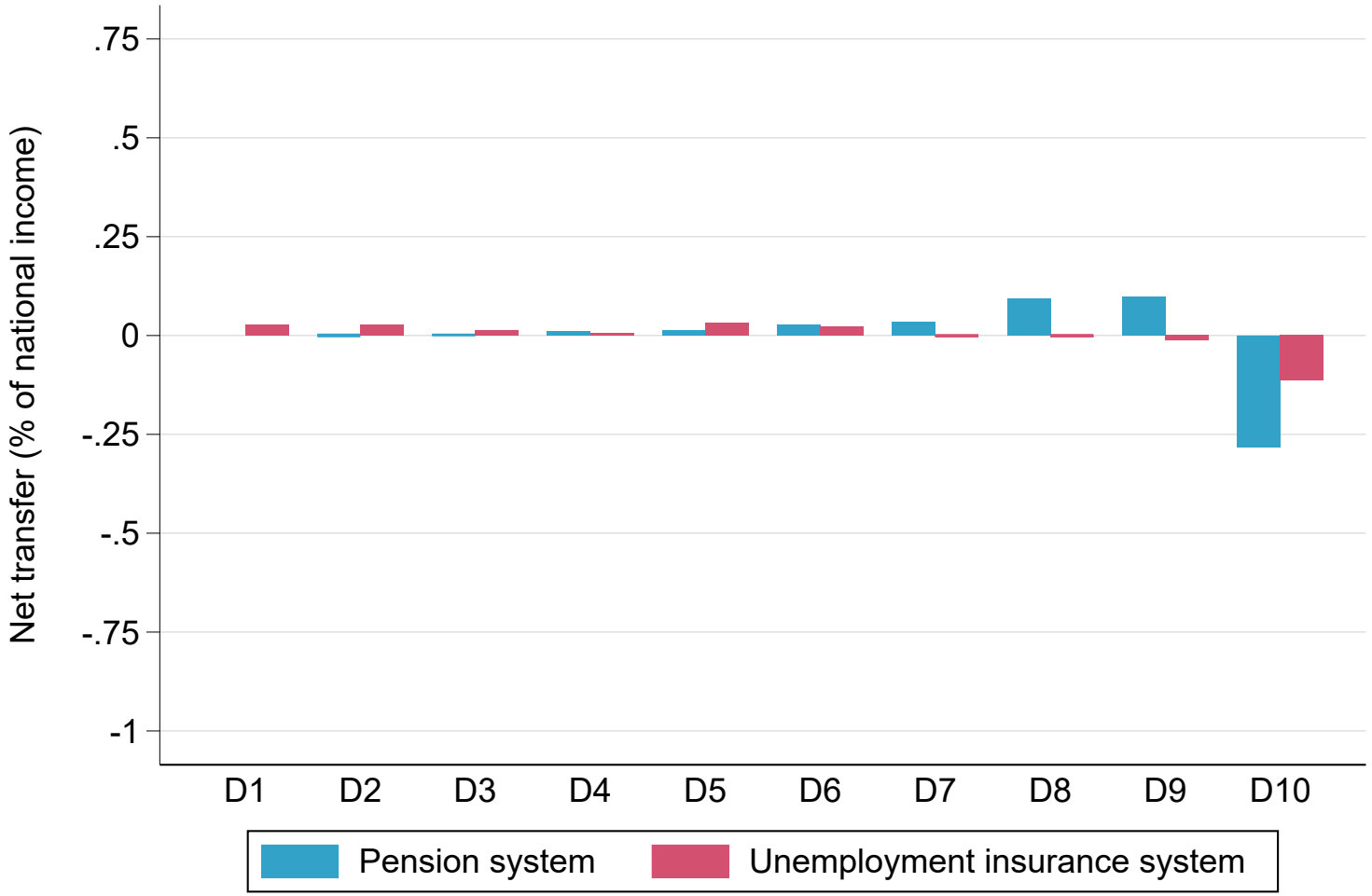
Notes. The figure plots the pension contributions paid and pension benefits received by pretax income decile in 2019, expressed as a share of national income. Author's computations combining surveys, tax, and national accounts data (see Chatterjee, Czajka, and Gethin, 2023).

Figure B2 – Unemployment Insurance Contributions and Benefits Paid/Received by Income Decile, 2019



Notes. The figure plots the unemployment insurance contributions paid and unemployment insurance benefits received by pretax income decile in 2019, expressed as a share of national income. Author's computations combining surveys, tax, and national accounts data (see Chatterjee, Czajka, and Gethin, 2023).

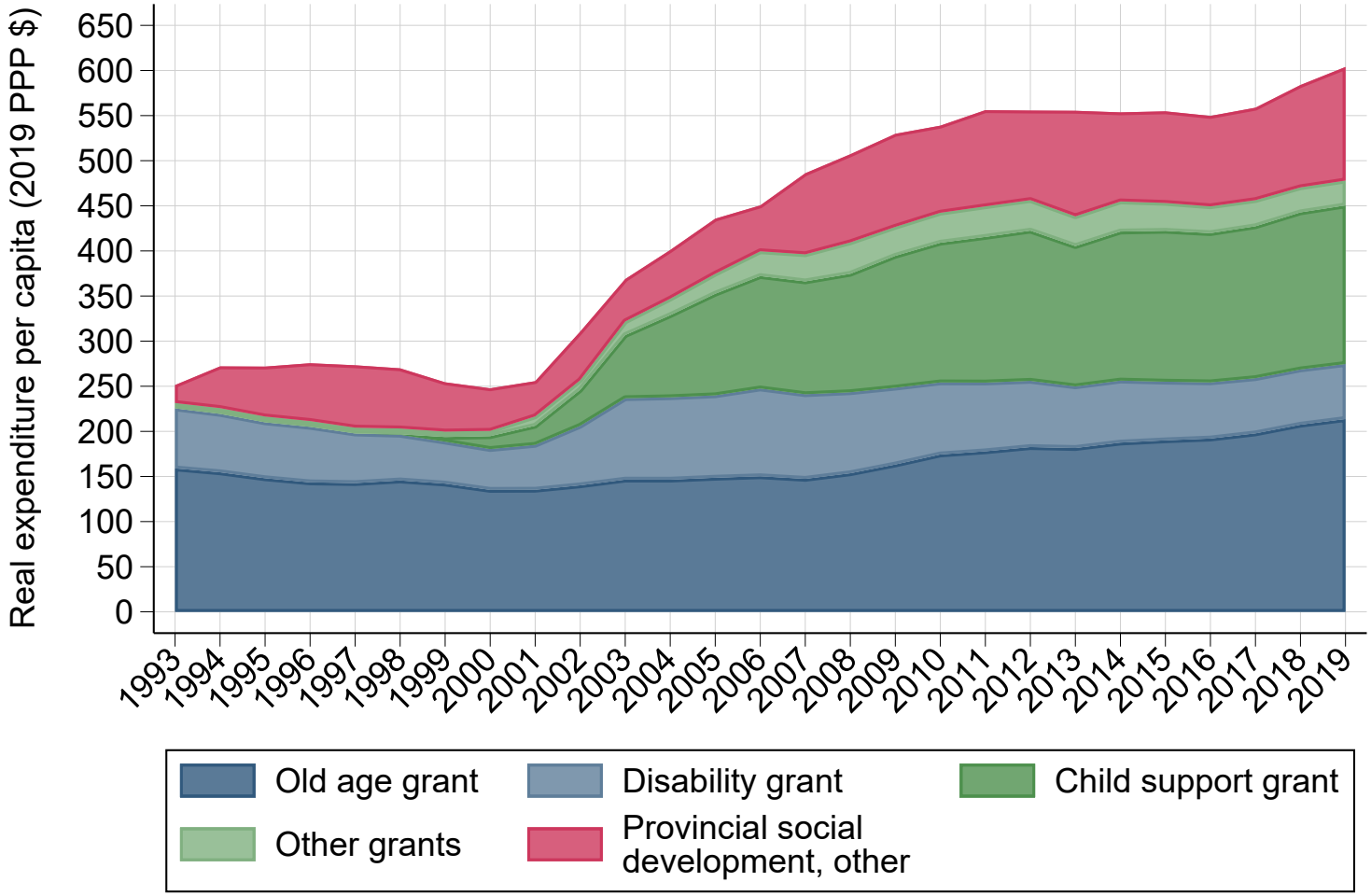
Figure B3 – Net Transfers Operated by the Pension and Unemployment Insurance Systems Between Income Deciles, 2019



Notes. The figure plots the gap between benefits received and contributions paid by pretax income decile, for both the pension and unemployment insurance systems, expressed as a share of national income. Author's computations combining surveys, tax, and national accounts data (see Chatterjee, Czajka, and Gethin, 2023).

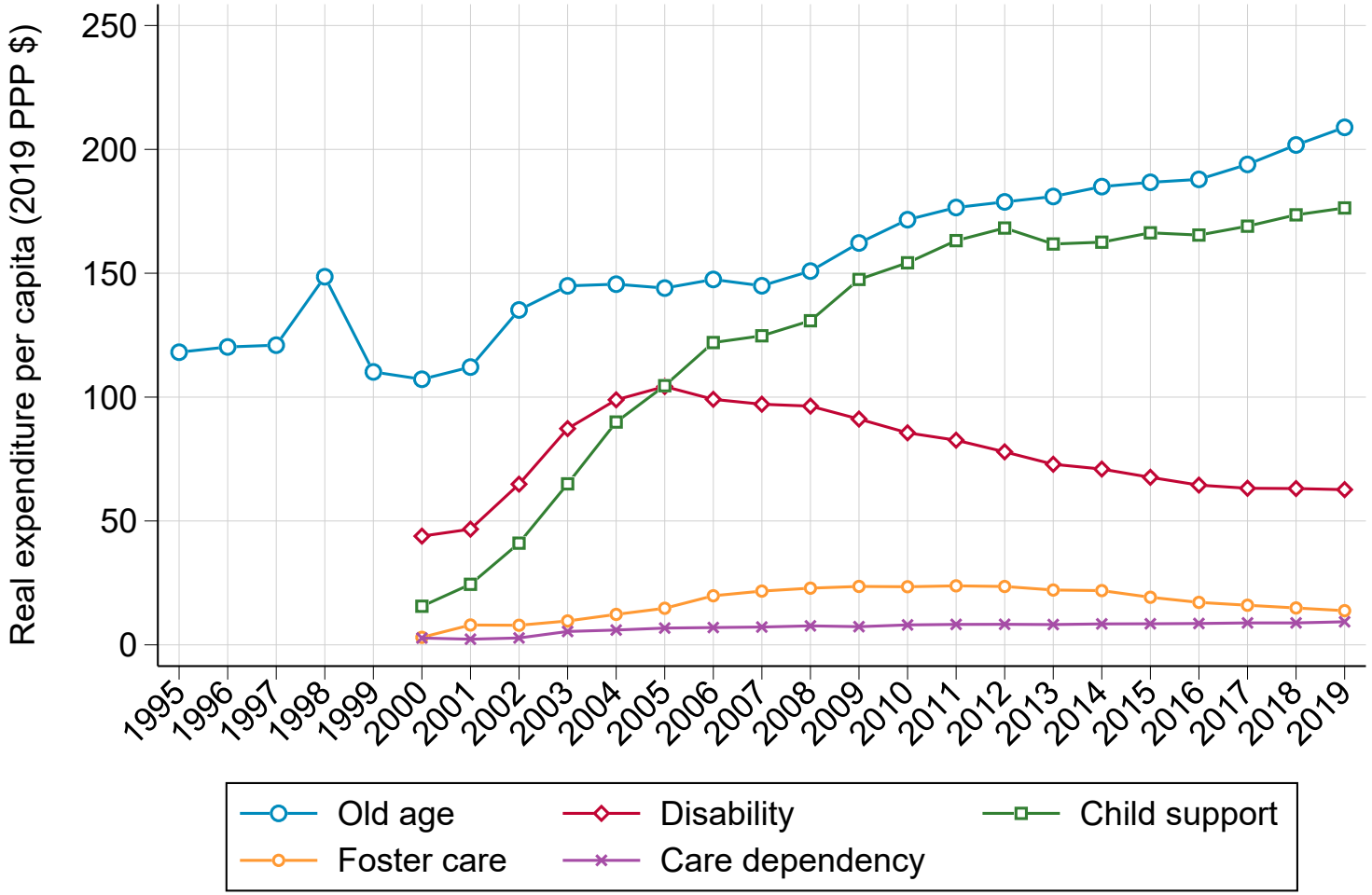
C. Social Protection

Figure C1 – Level and Composition of Social Protection Expenditure in South Africa, 1993-2019



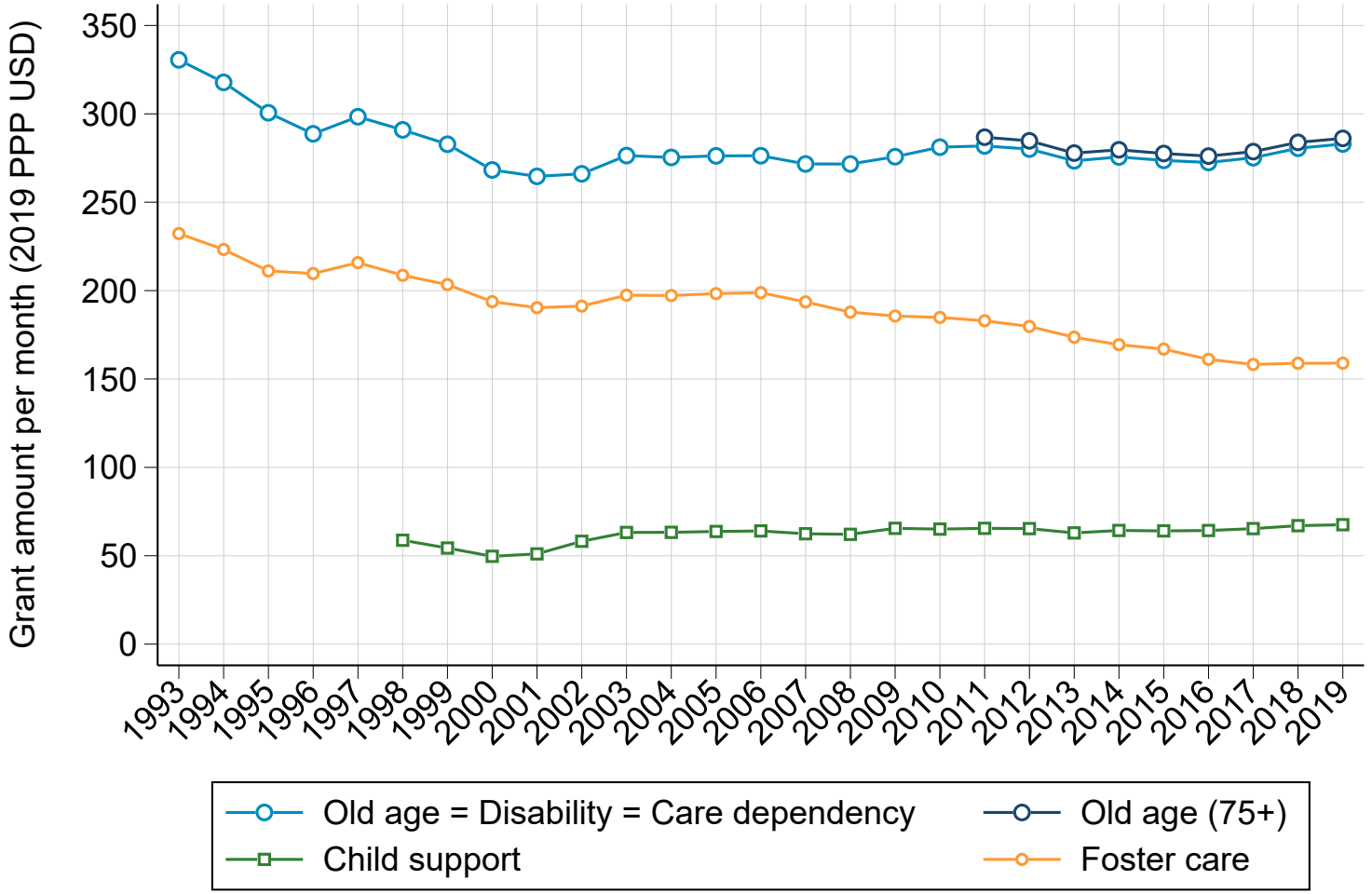
Notes. Author's computations combining data from South African National Treasury Budget Reports (1994-2020).

Figure C2 – Per Capita Expenditure on Social Grants in South Africa, 1993-2019



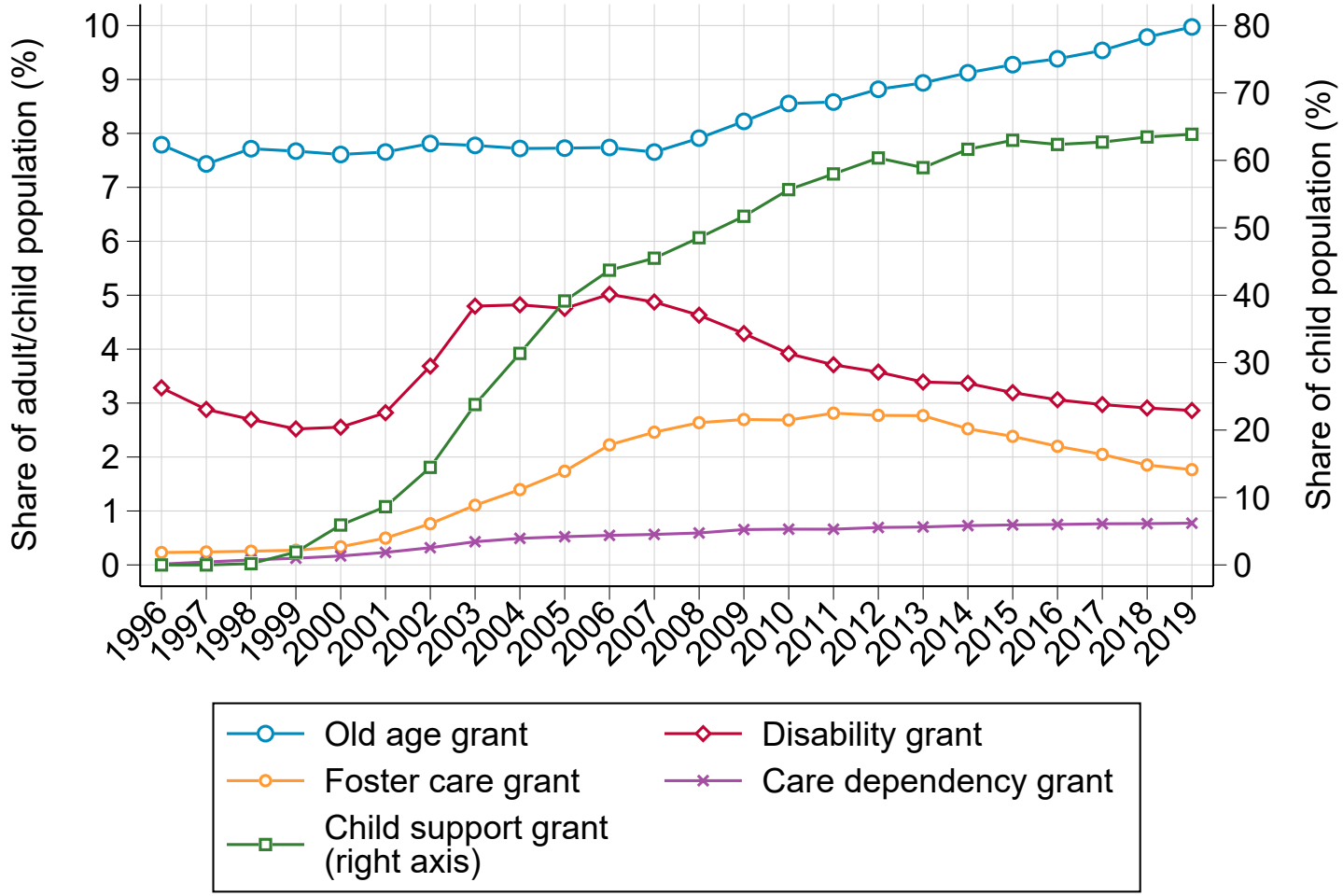
Notes. Author's computations combining data from South African National Treasury Budget Reports (1994-2020).

Figure C3 – Real Monthly Value of Social Grants in South Africa, 1993-2019



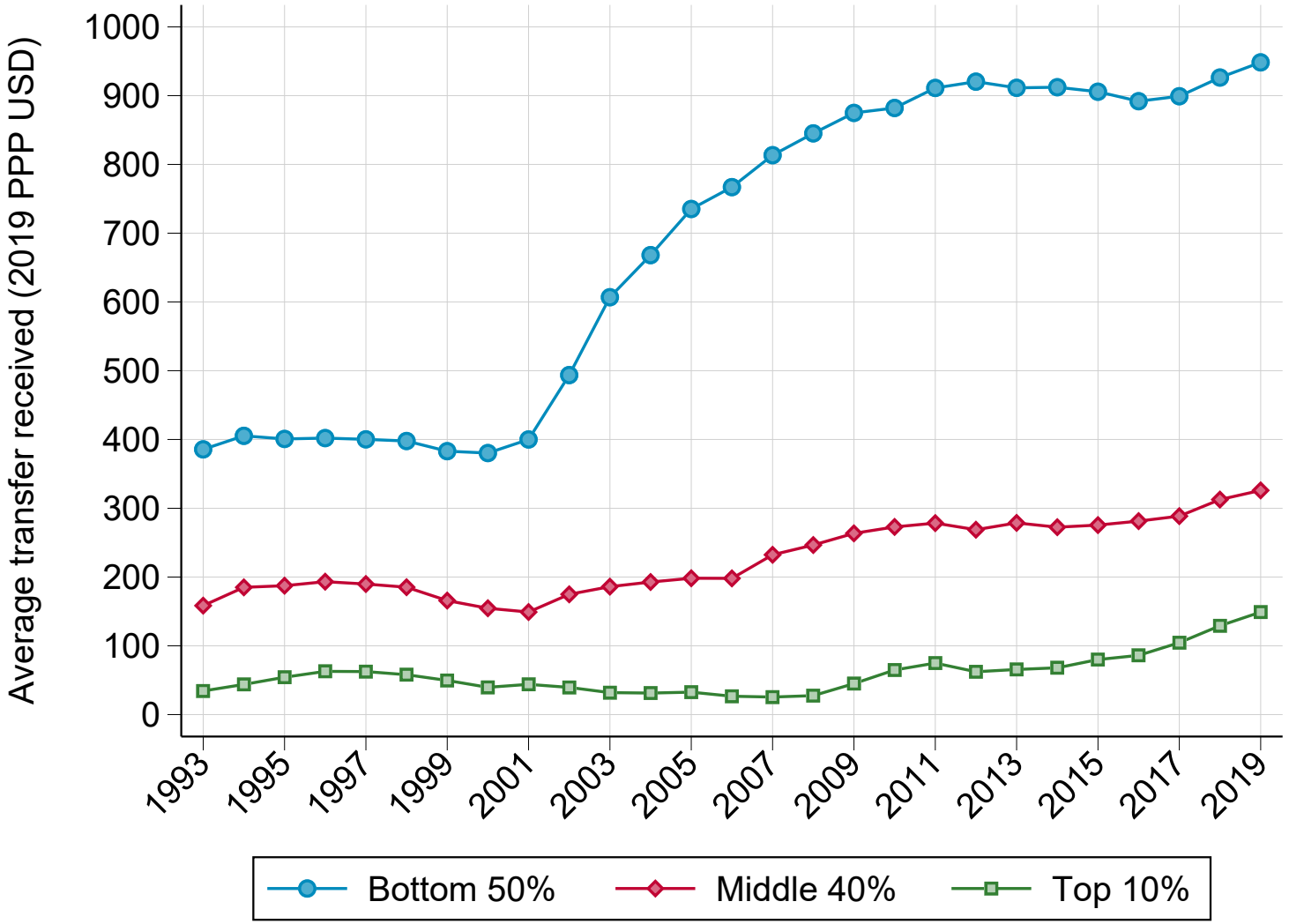
Notes. Author's computations combining data from South African National Treasury Budget Reports (1994-2020).

Figure C4 – Share of Population Receiving Social Grants in South Africa, 1993-2019



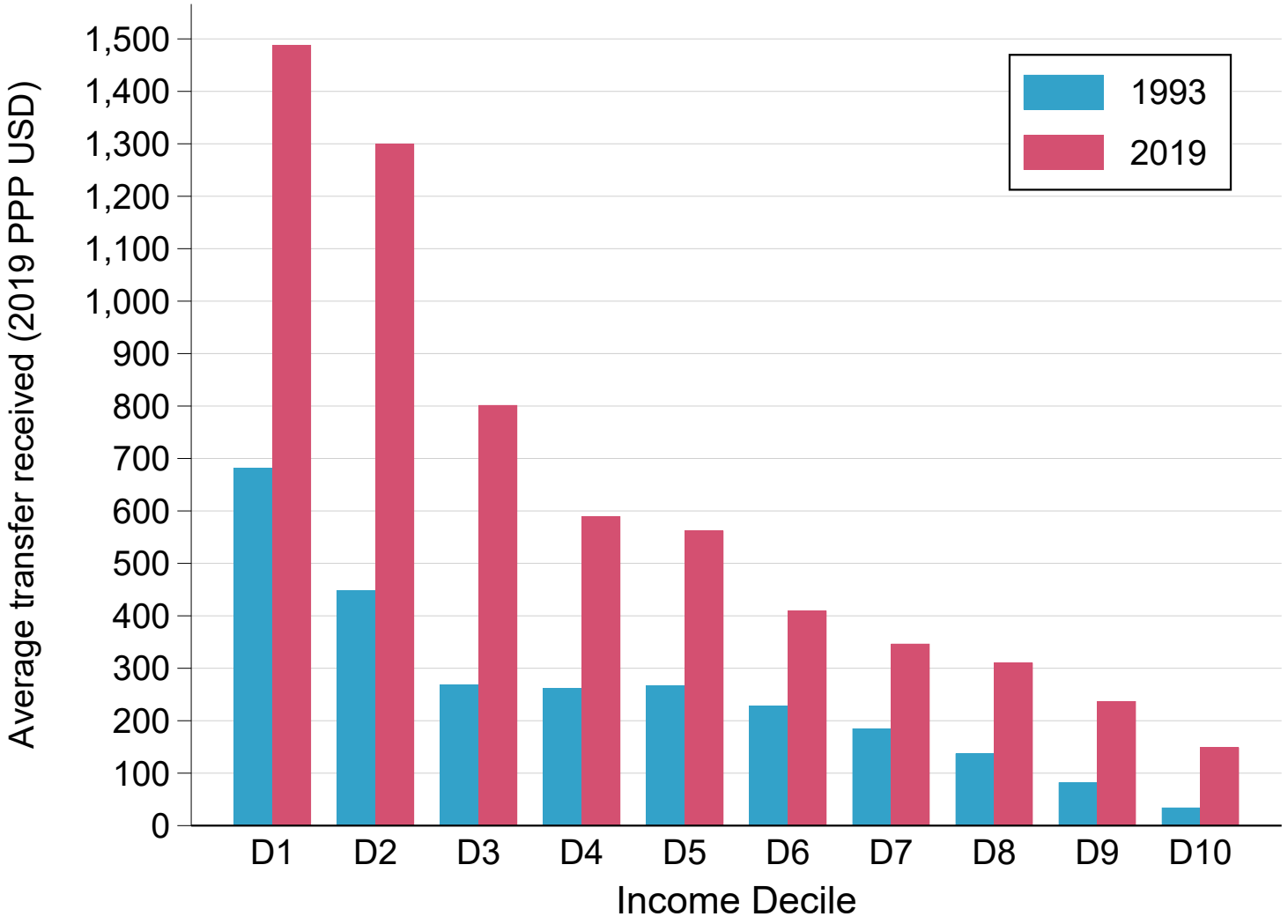
Notes. Author's computations combining data from South African National Treasury Budget Reports (1994-2020).

Figure C5 – Average Social Protection Transfer Received by Income Group, 1993-2019



Notes. The figure plots the average social protection transfer received by pretax income group from 1993 to 2019. Social protection expenditure includes both cash transfers and in-kind social protection programs. Income and transfers are split equally between all household members.

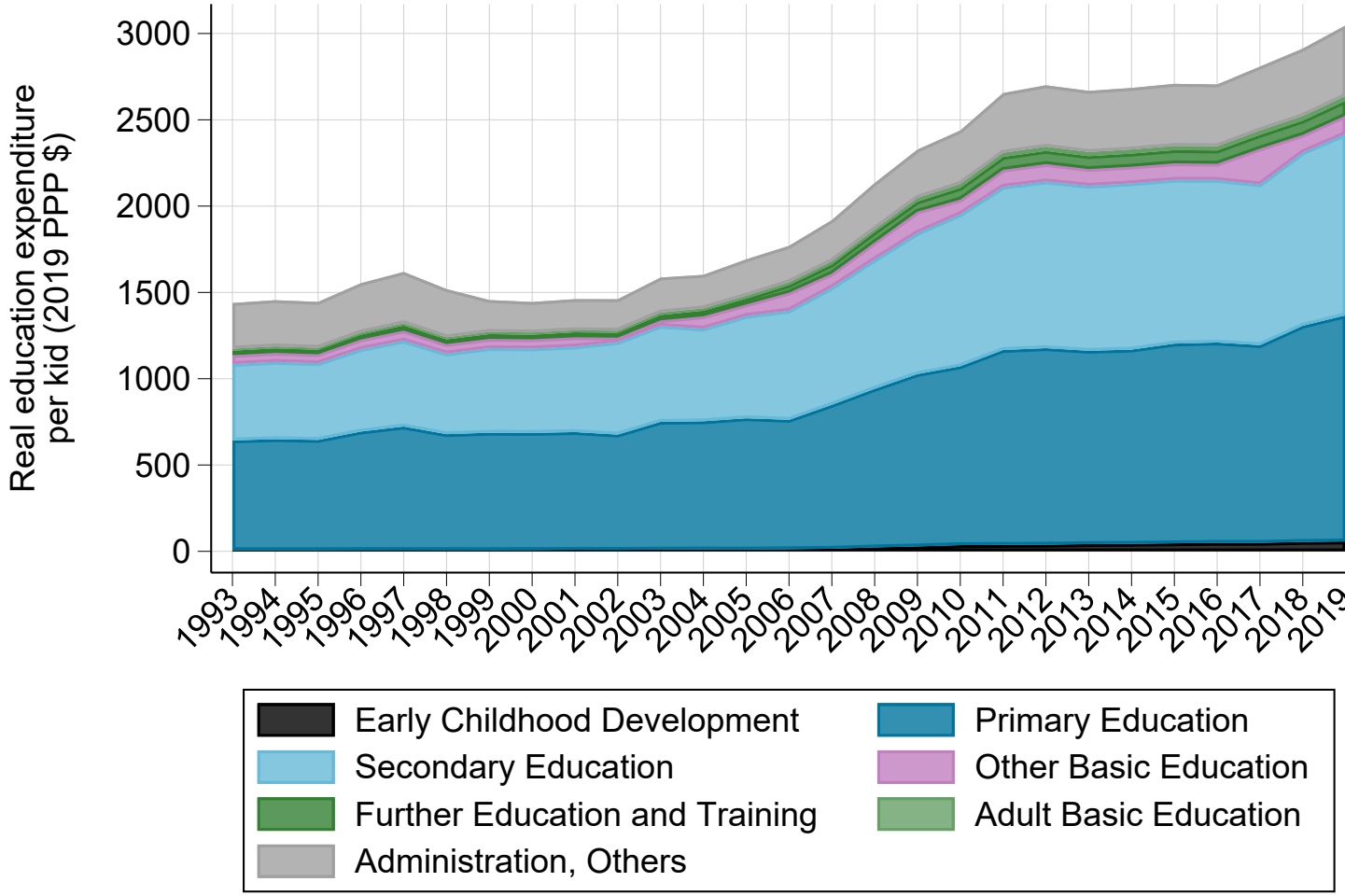
Figure C6 – Average Social Protection Transfer Received by Income Decile, 1993-2019



Notes. The figure plots the average social protection transfer received by pretax income decile in 1993 and 2019. Social protection expenditure includes both cash transfers and in-kind social protection programs. Income and transfers are split equally between all household members.

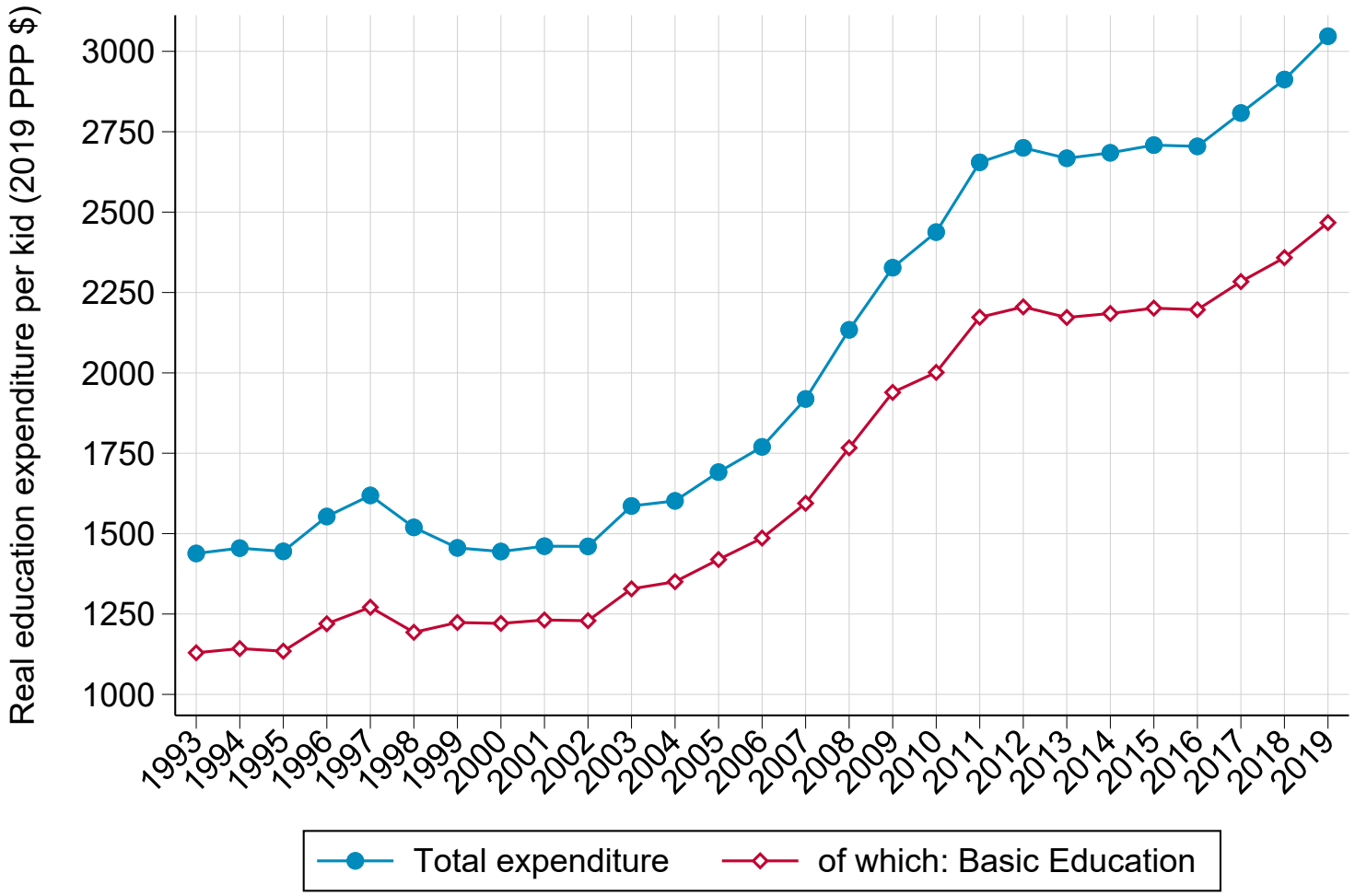
D. Education

Figure D1 – Level and Composition of Education Expenditure in South Africa, 1993-2019



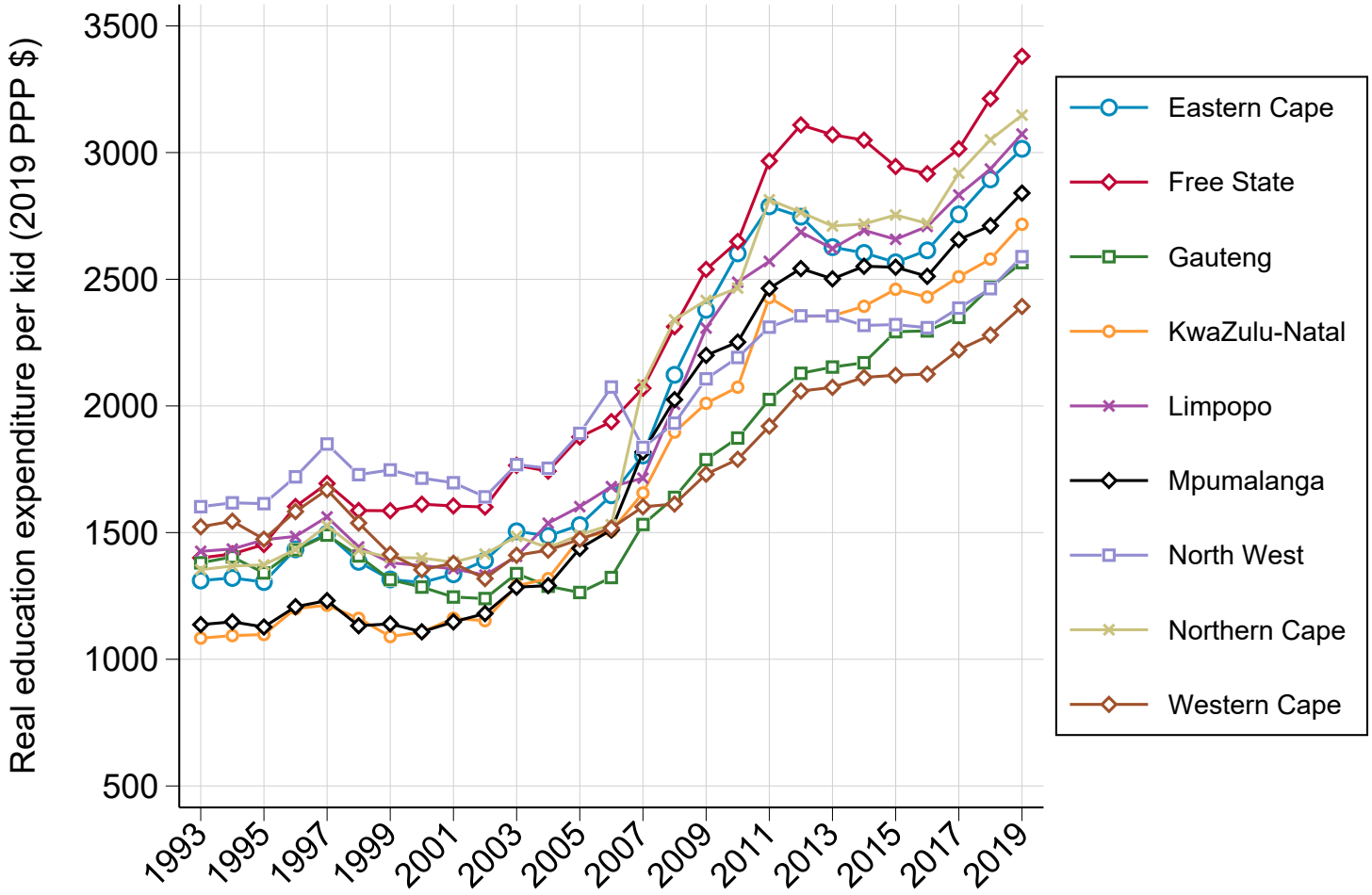
Notes. The figure plots the level and composition of public education expenditure in South Africa from 1993 to 2019. Author's computations combining data from South African National Treasury Budget Reports (1994-2020) and Provincial Budget Reports (2002-2020).

Figure D2 – The Rise of Education Expenditure in South Africa, 1993-2019:
The Role of Basic Education



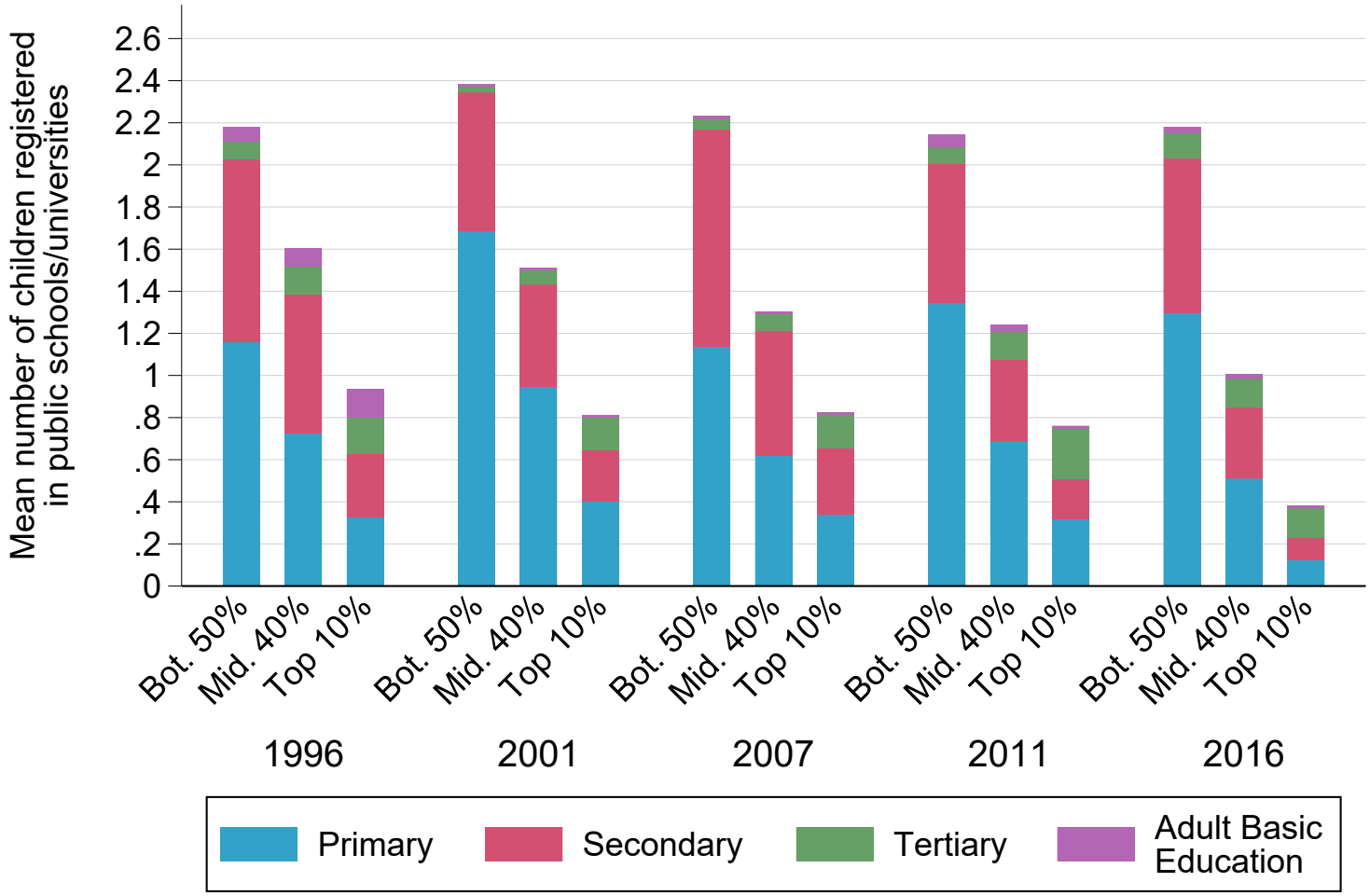
Notes. Author's computations combining data from South African National Treasury Budget Reports (1994-2020).

Figure D3 – Real Education Expenditure Per Child by South African Province, 1993-2019



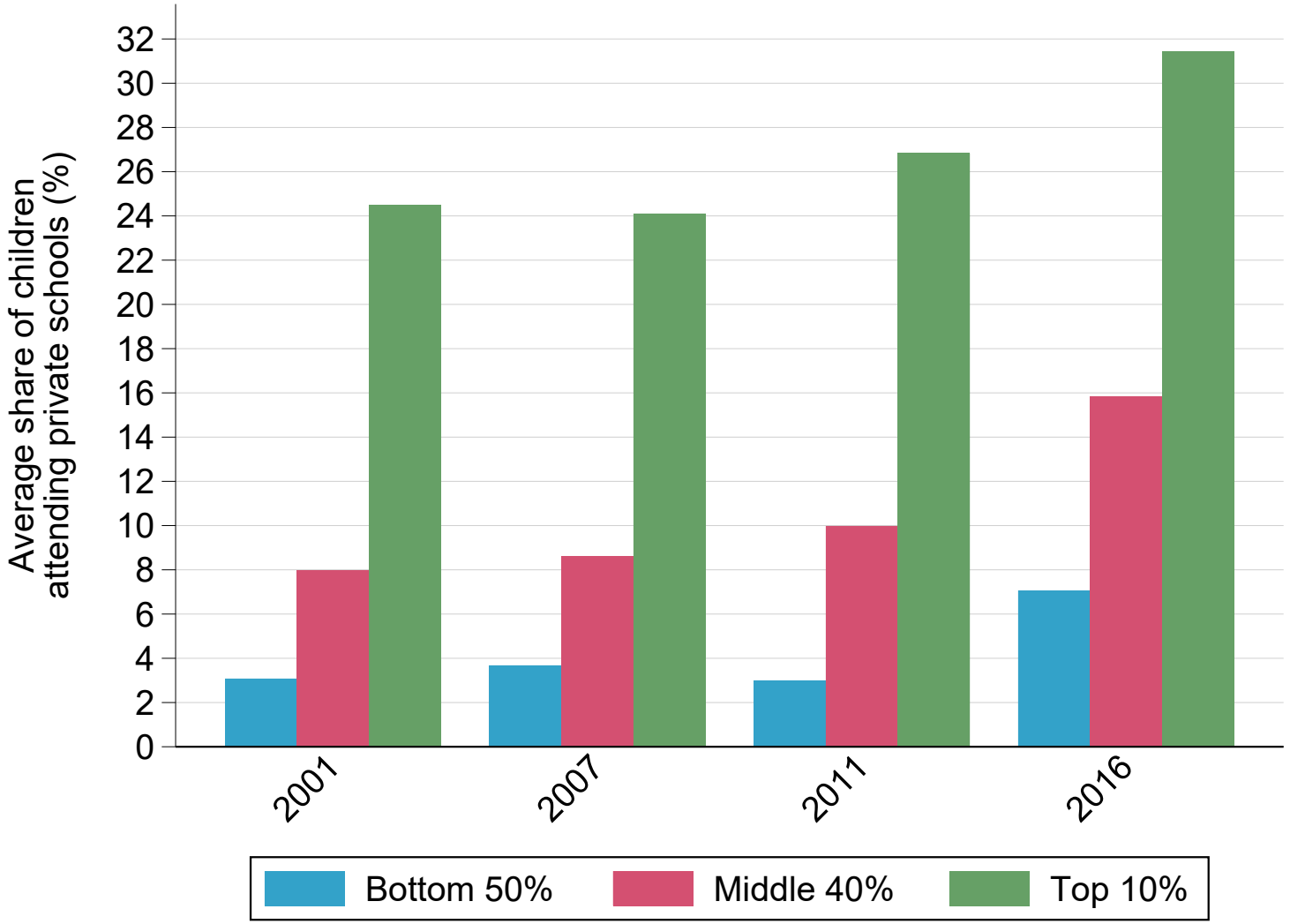
Notes. The figure plots the evolution of average education expenditure per child by province from 1993 to 2019. Author's computations combining data from South African National Treasury Budget Reports (1994-2020) and Provincial Budget Reports (2002-2020).

Figure D4 – Average Number of Children Attending Public Schools by Income Group, 1996-2016



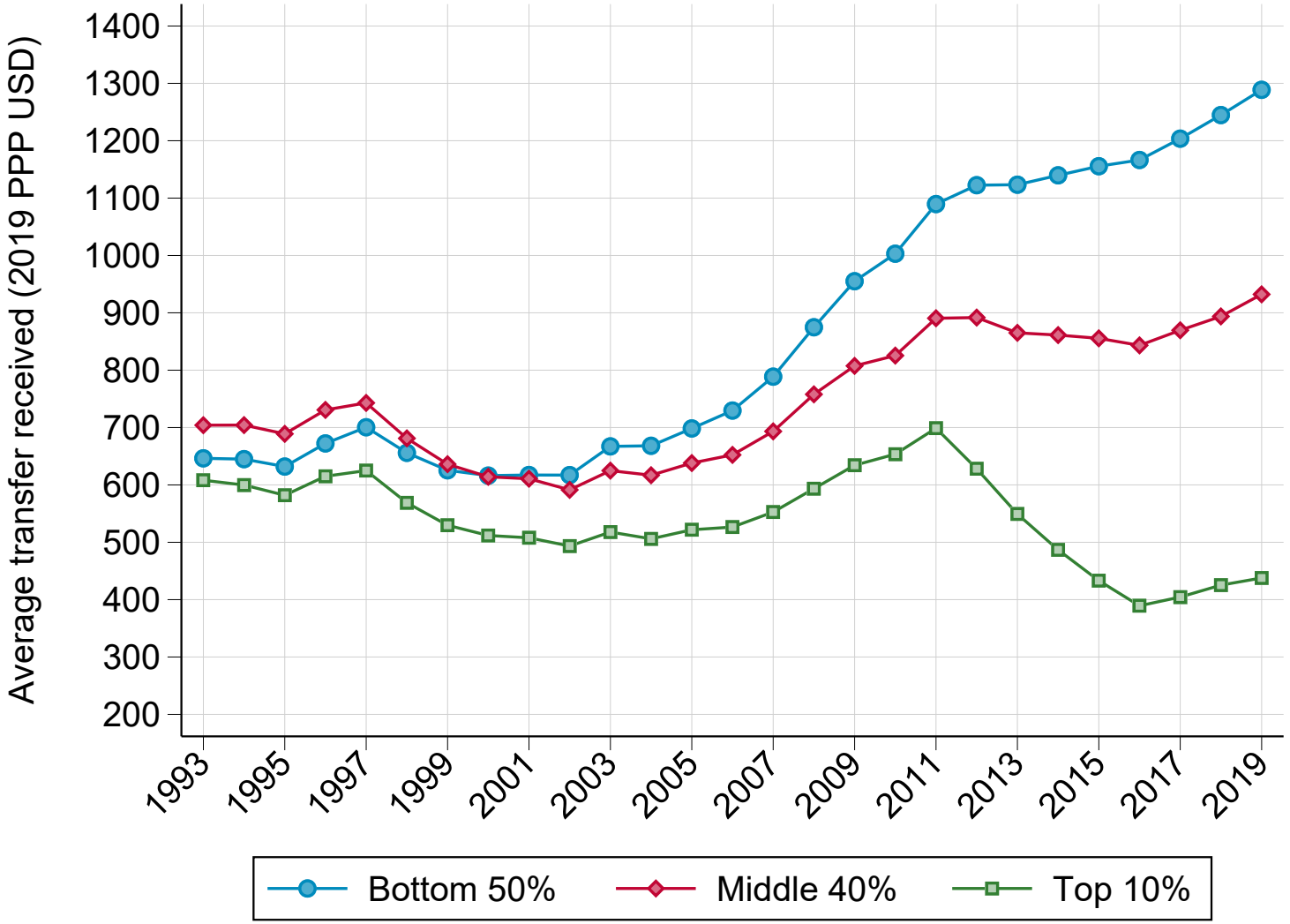
Notes. The figure plots the average number of children currently attending public schools by pretax income group. Author's computations using census sample microdata.

Figure D5 – Share of Children Attending Private Schools by Income Group, 2001-2016



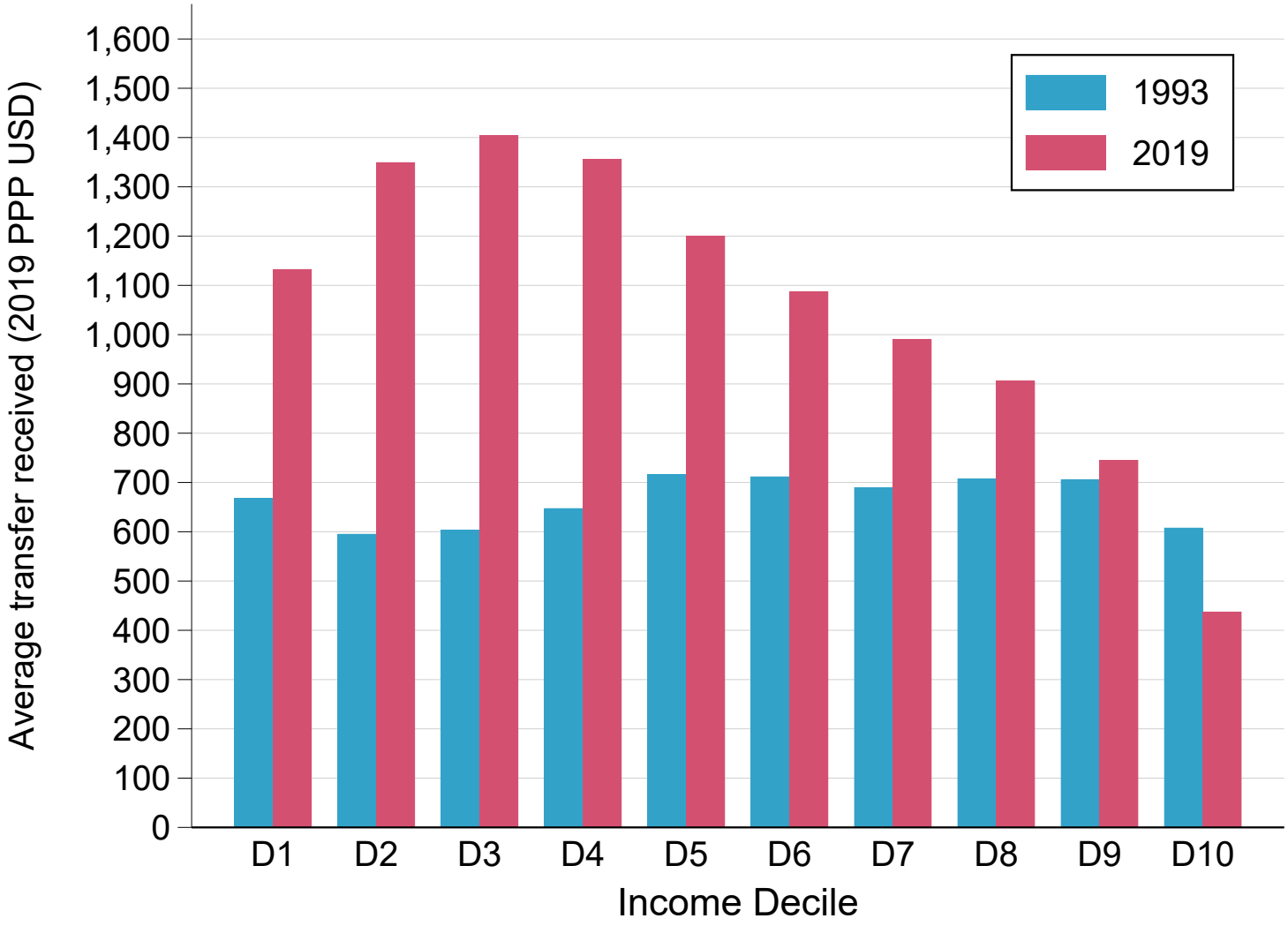
Notes. The figure plots the share of children currently attending private schools by pretax income group. Author's computations using census sample microdata.

Figure D6 – Average Education Transfer Received by Income Group, 1993-2019



Notes. The figure plots the average public education transfer received by pretax income group from 1993 to 2019. Income and transfers are split equally between all household members.

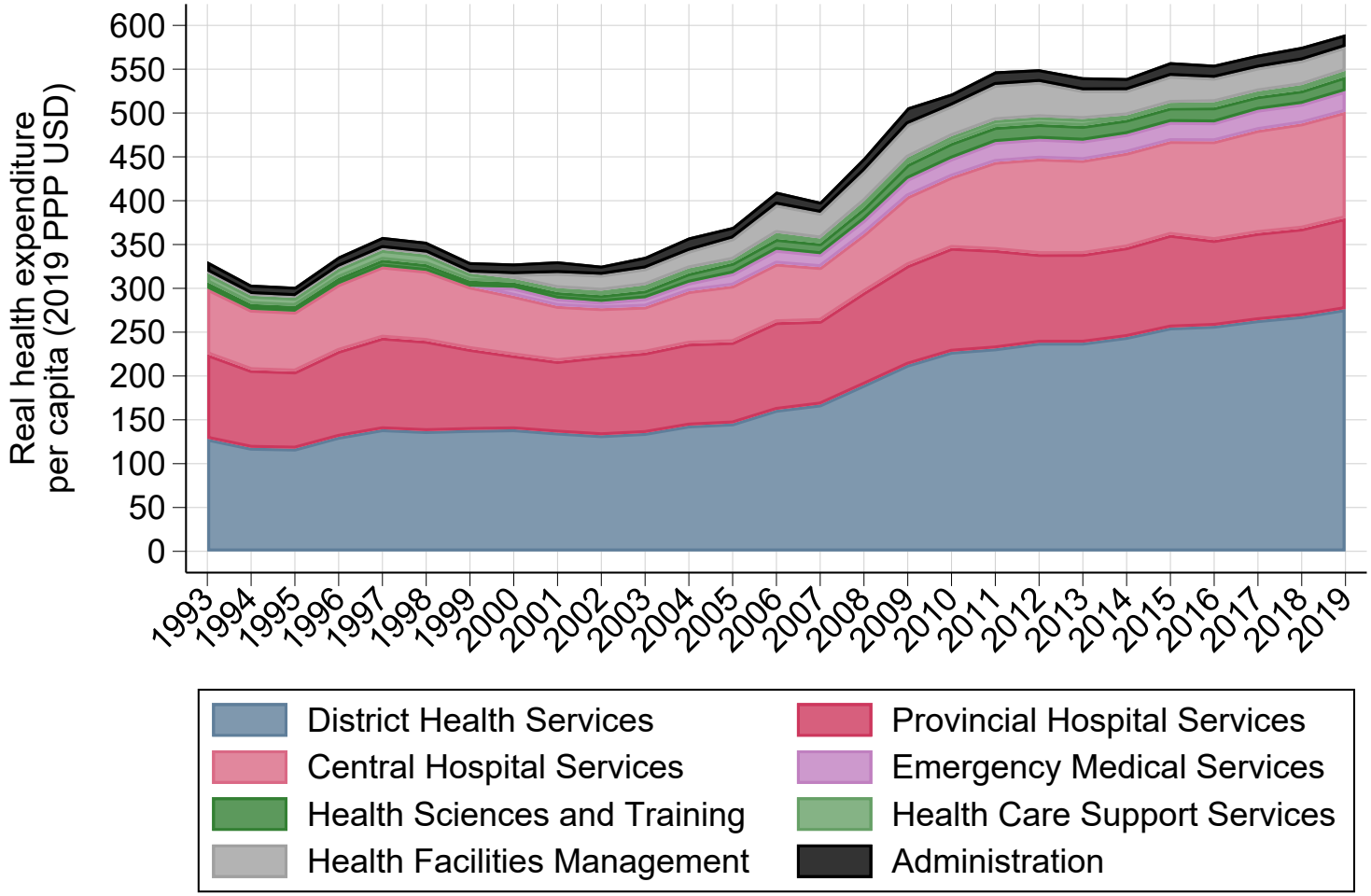
Figure D7 – Average Education Transfer Received by Income Decile, 1993-2019



Notes. The figure plots the average public education transfer received by pretax income decile in 1993 and 2019. Income and transfers are split equally between all household members.

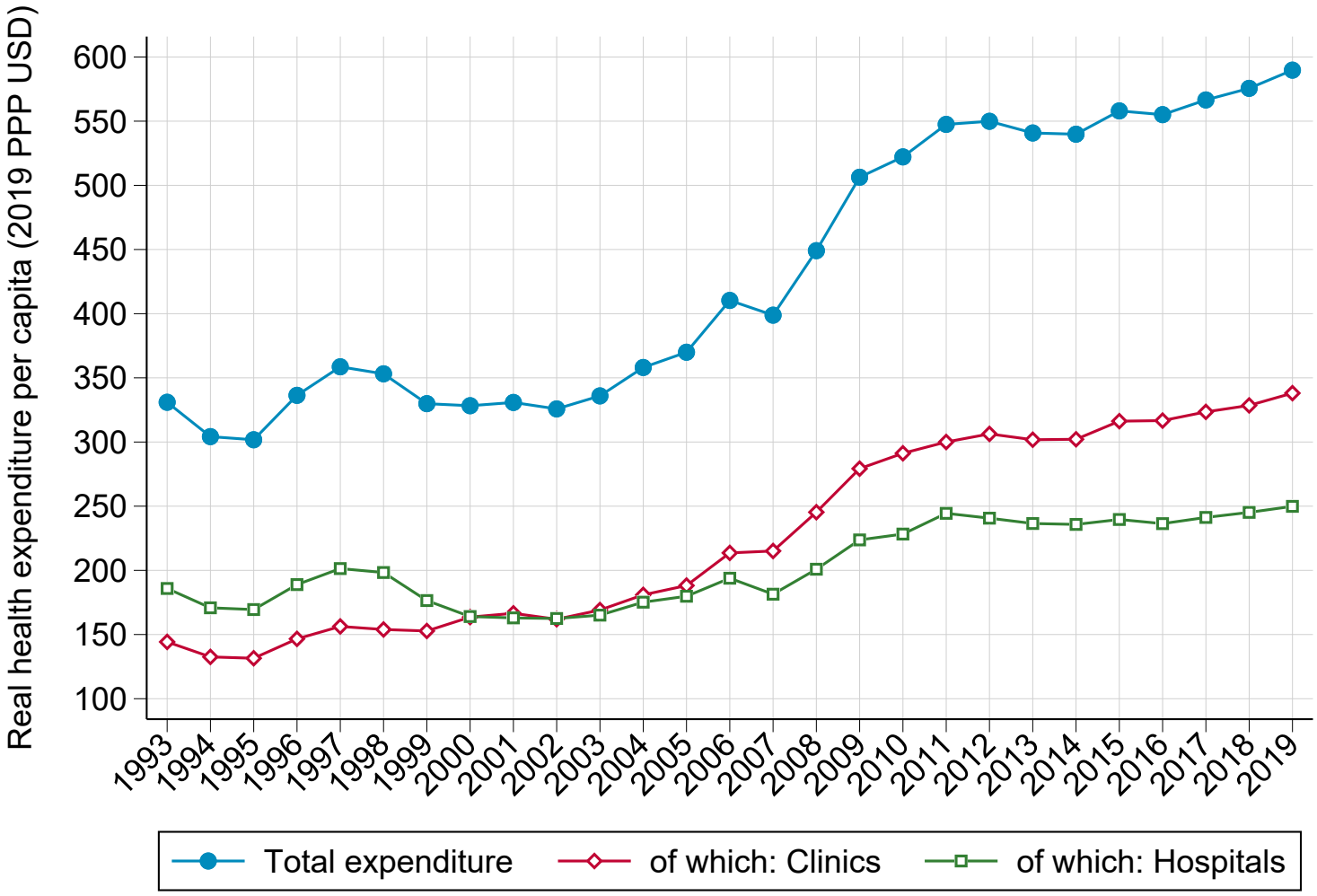
E. Health

Figure E1 – Level and Composition of Health Expenditure in South Africa, 1993-2019



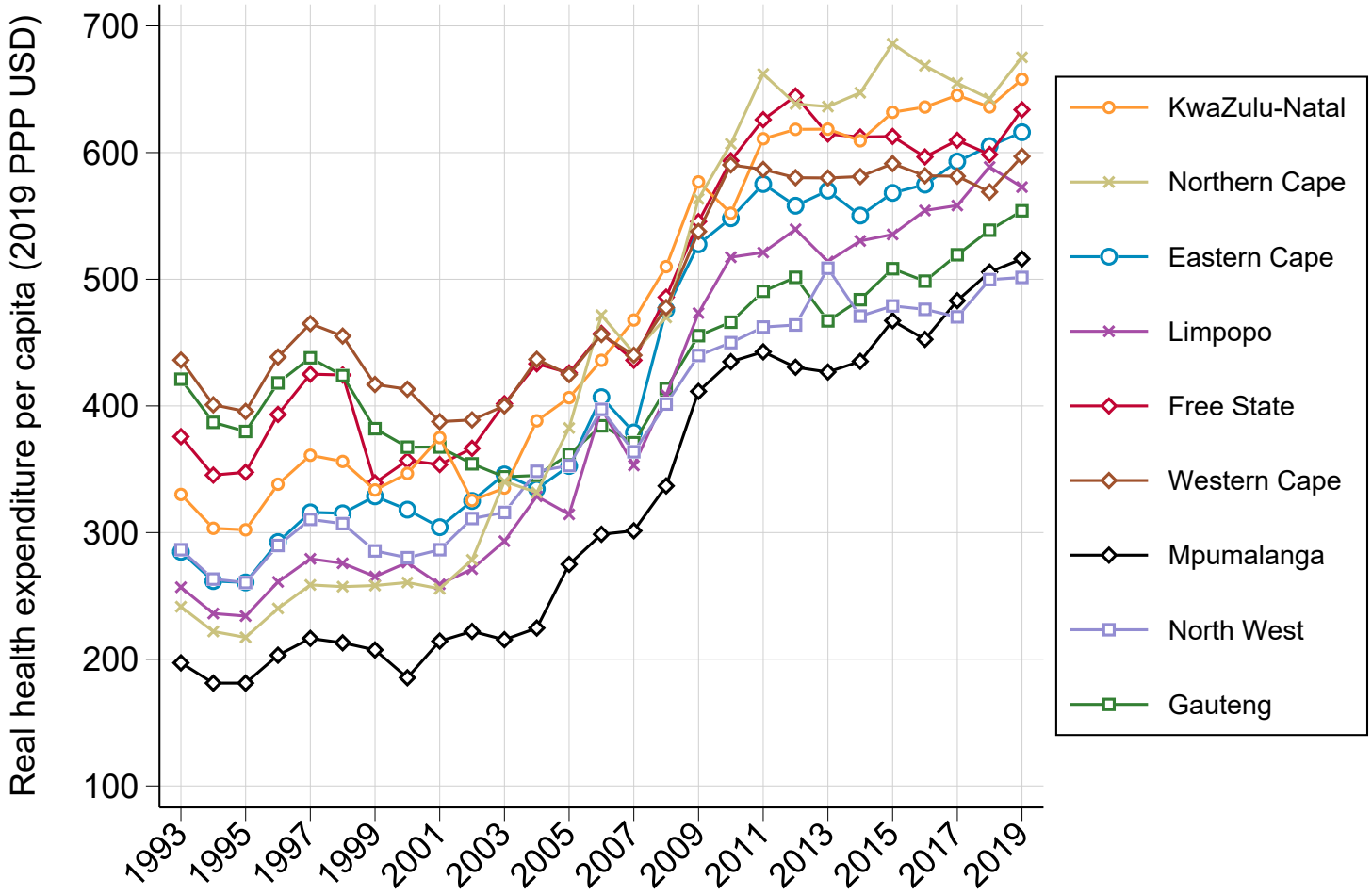
Notes. The figure plots the level and composition of public health expenditure from 1993 to 2019. Author's computations combining data from South African National Treasury Budget Reports (1994-2020) and Provincial Budget Reports (2002-2020).

Figure E2 – Level and Composition of Health Expenditure in South Africa, 1993-2019: Clinics Versus Hospitals



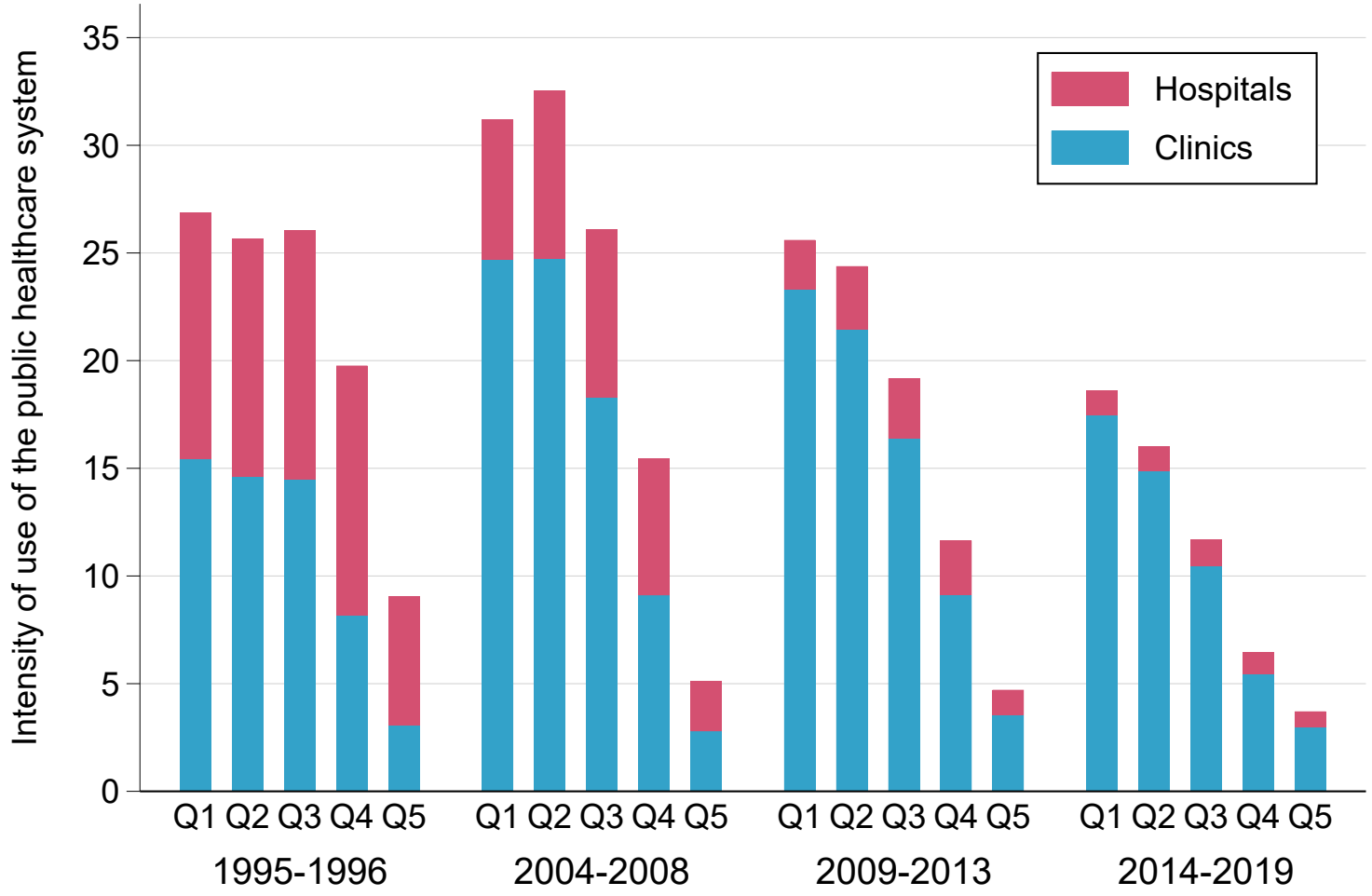
Notes. The figure plots per-capita health expenditure made by clinics and hospitals in South Africa from 1993 to 2019. Author's computations combining data from South African National Treasury Budget Reports (1994-2020) and Provincial Budget Reports (2002-2020).

Figure E3 – Real Health Expenditure Per Capita by South African Province, 1993-2019



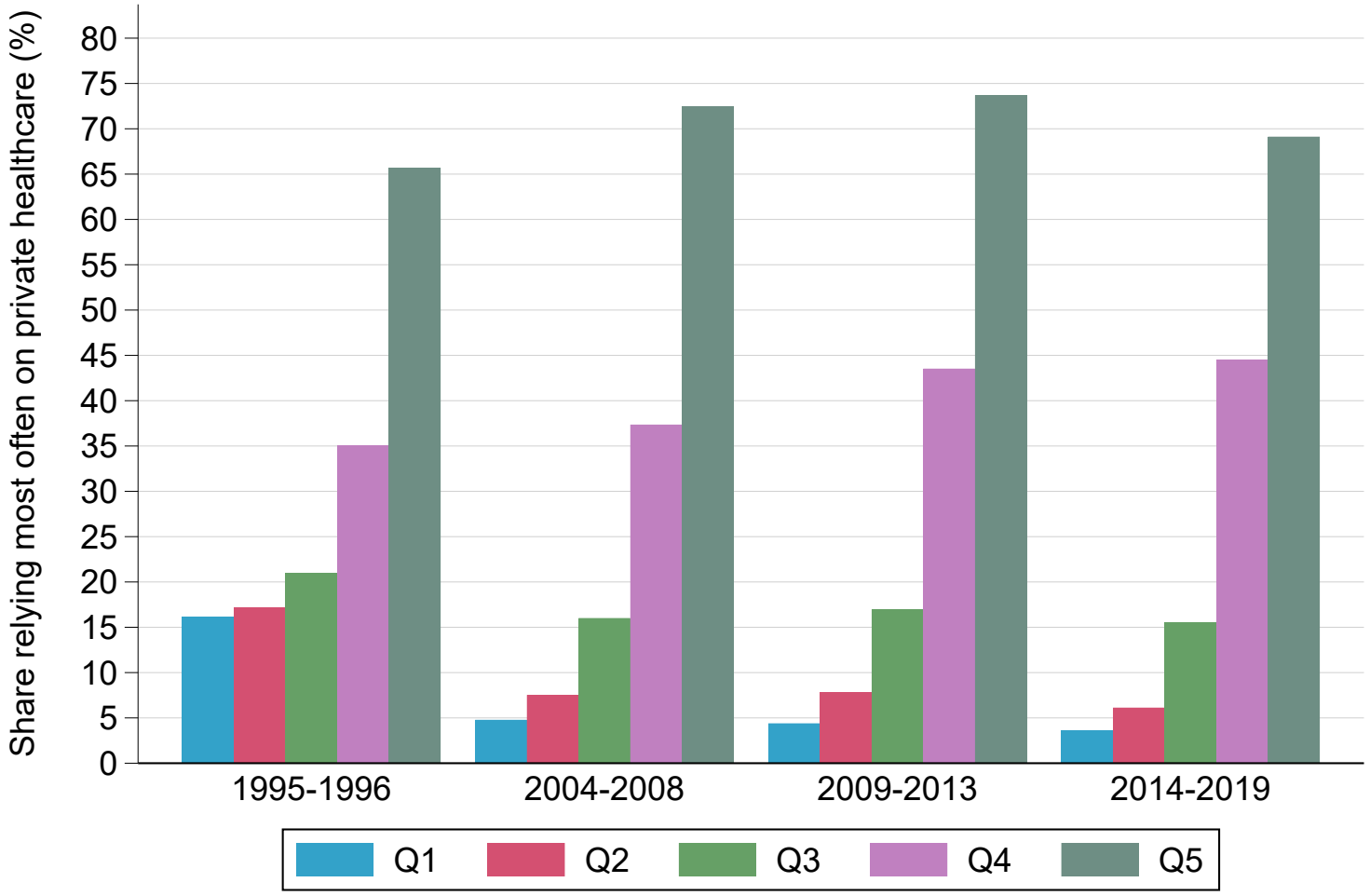
Notes. The figure plots the evolution of average health expenditure per capita by province from 1993 to 2019. Author's computations combining data from South African National Treasury Budget Reports (1994-2020) and Provincial Budget Reports (2002-2020).

Figure E4 – Intensity of Use of the Public Healthcare System by Income Quintile, 1995-2019



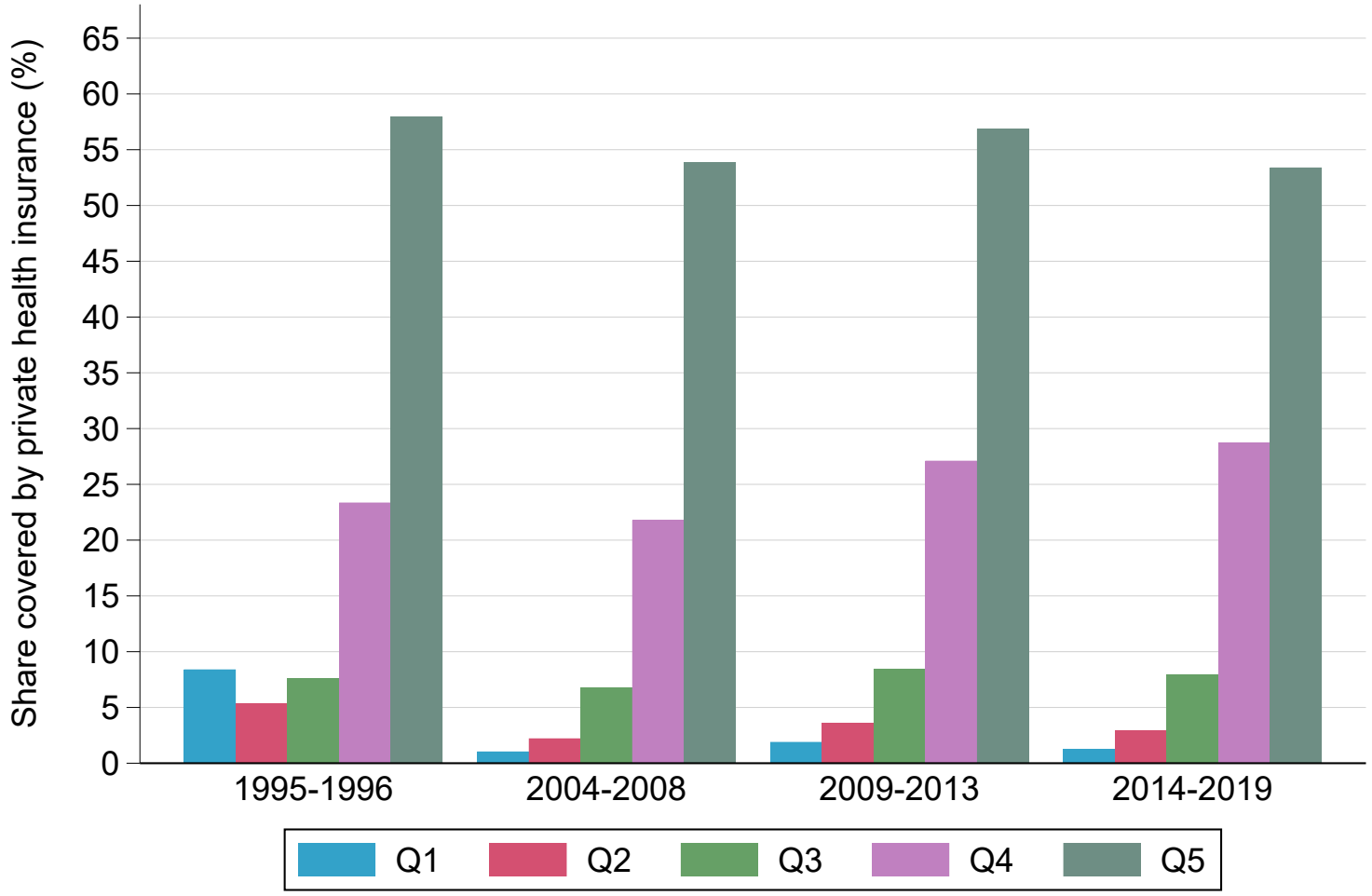
Notes. The figure plots average intensity of use of the public healthcare system by pretax income quintile. Author's computations using October Household Surveys (OHS, 1995-1996) and General Household Surveys (GHS, 2004-2019). OHS figures correspond to the share of individuals who either went to the hospital, or consulted a health worker in the past month, and declare going most often to public institutions to do so. GHS figures correspond to the share of individuals who consulted a health worker in the past three months and declare going most often to public institutions to do so.

Figure E5 – Private Healthcare Use by Income Quintile, 1995-2019



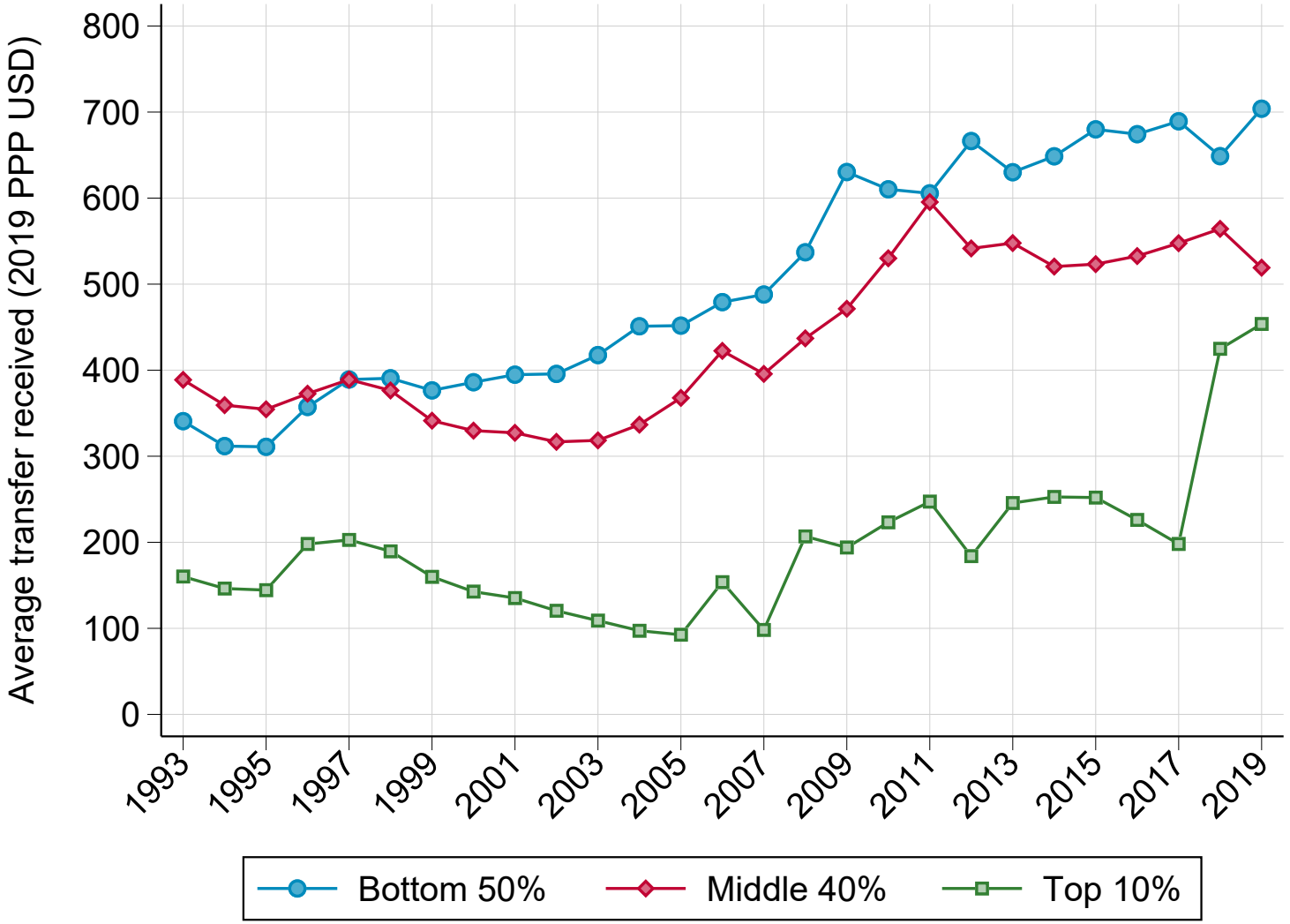
Notes. The figure plots the share of individuals declaring going most often to private clinics or private hospitals for healthcare by pretax income quintile. Author's computations using General Household Surveys (GHS, 2004-2019) and October Household Surveys (OHS, 1995-1996).

Figure E6 – Private Health Insurance Coverage by Income Quintile, 1995-2019



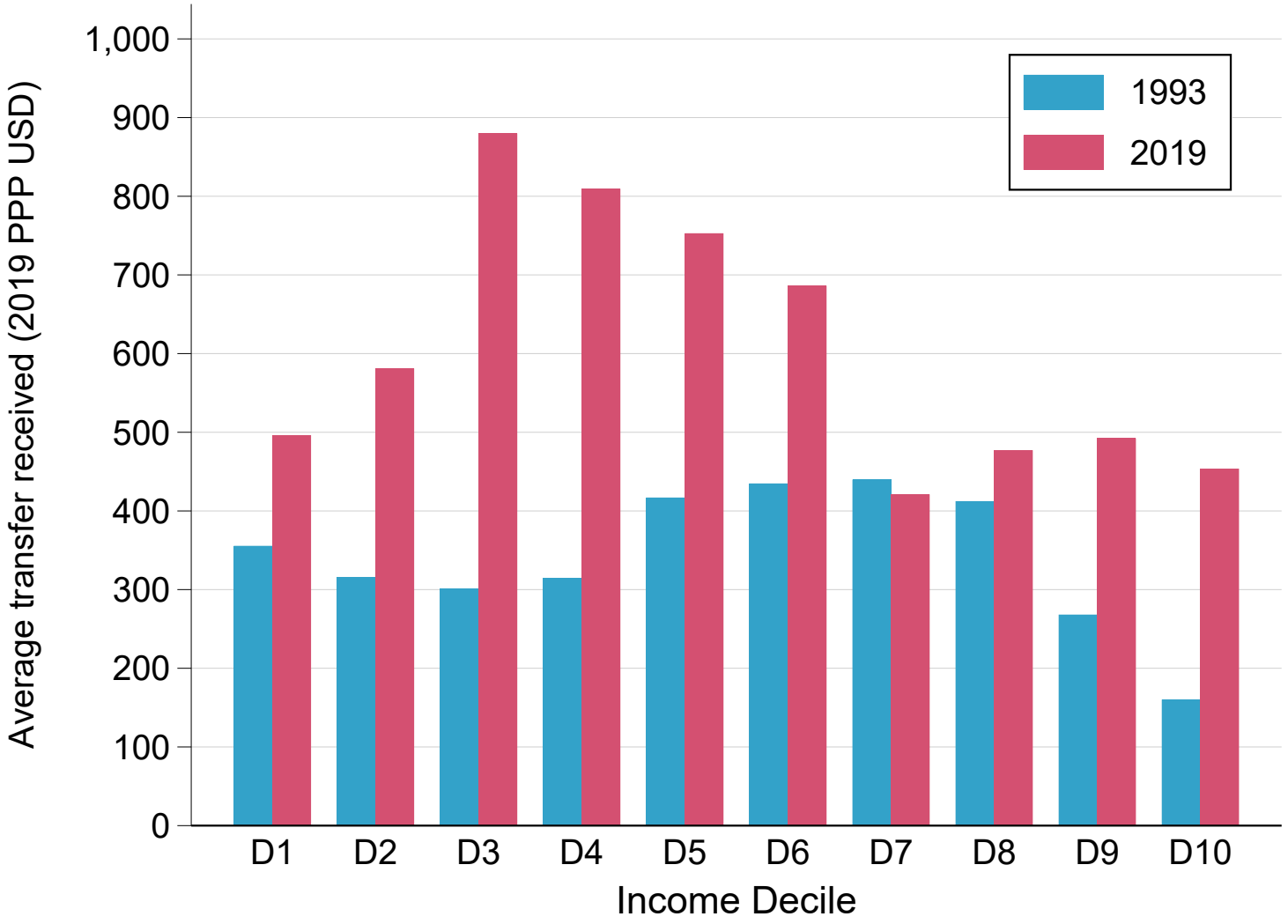
Notes. The figure plots the share of individuals declaring being covered by a medical aid, a medical benefit scheme, or any other form of private insurance by pretax income quintile. Author's computations using General Household Surveys (GHS, 2004-2019) and October Household Surveys (OHS, 1995-1996).

Figure E7 – Average Health Transfer Received by Income Group, 1993-2019



Notes. The figure plots the average public health transfer received by pretax income group from 1993 to 2019. Income and transfers are split equally between all household members.

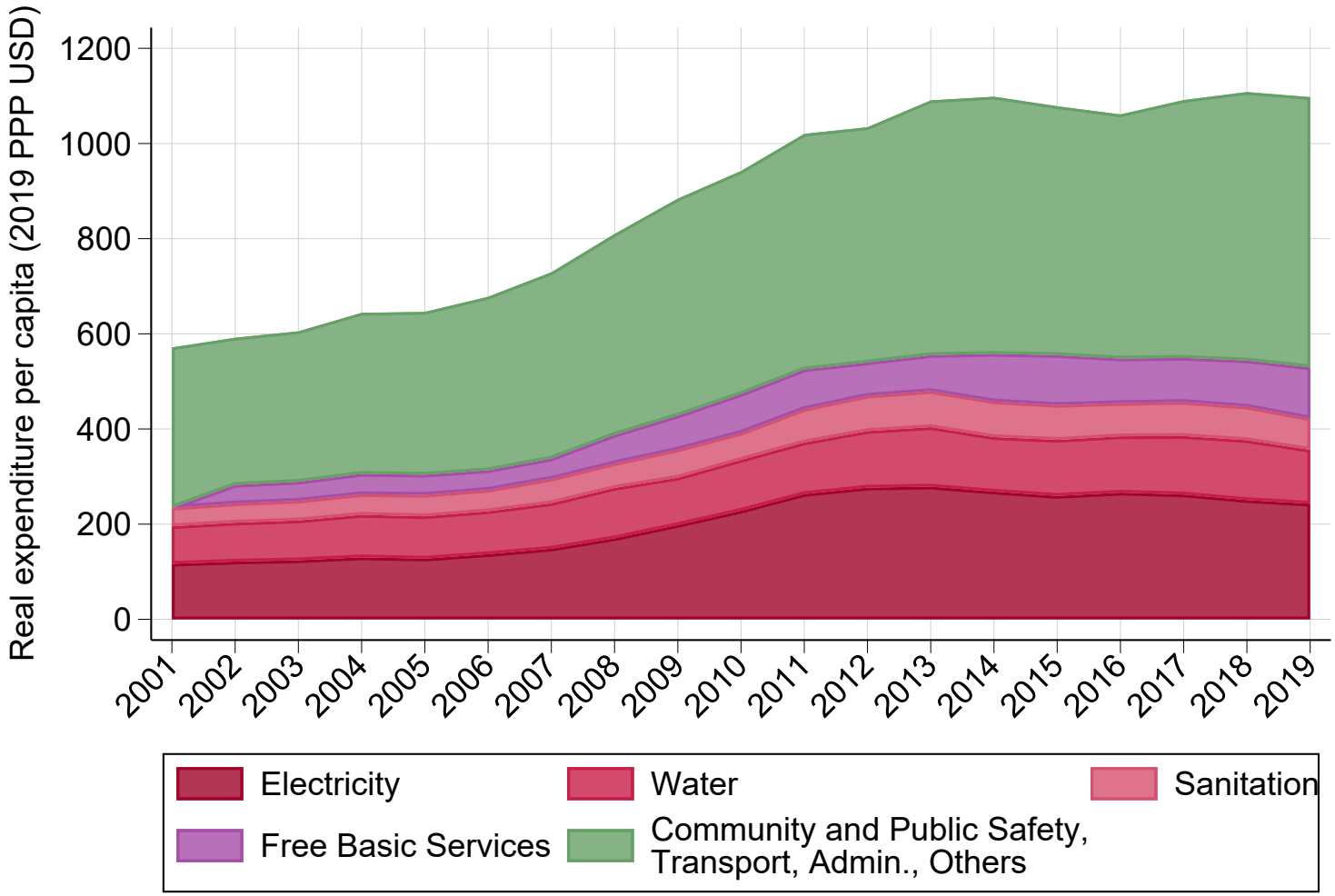
Figure E8 – Average Health Transfer Received by Income Decile, 1993-2019



Notes. The figure plots the average public health transfer received by pretax income decile from 1993 to 2019. Income and transfers are split equally between all household members.

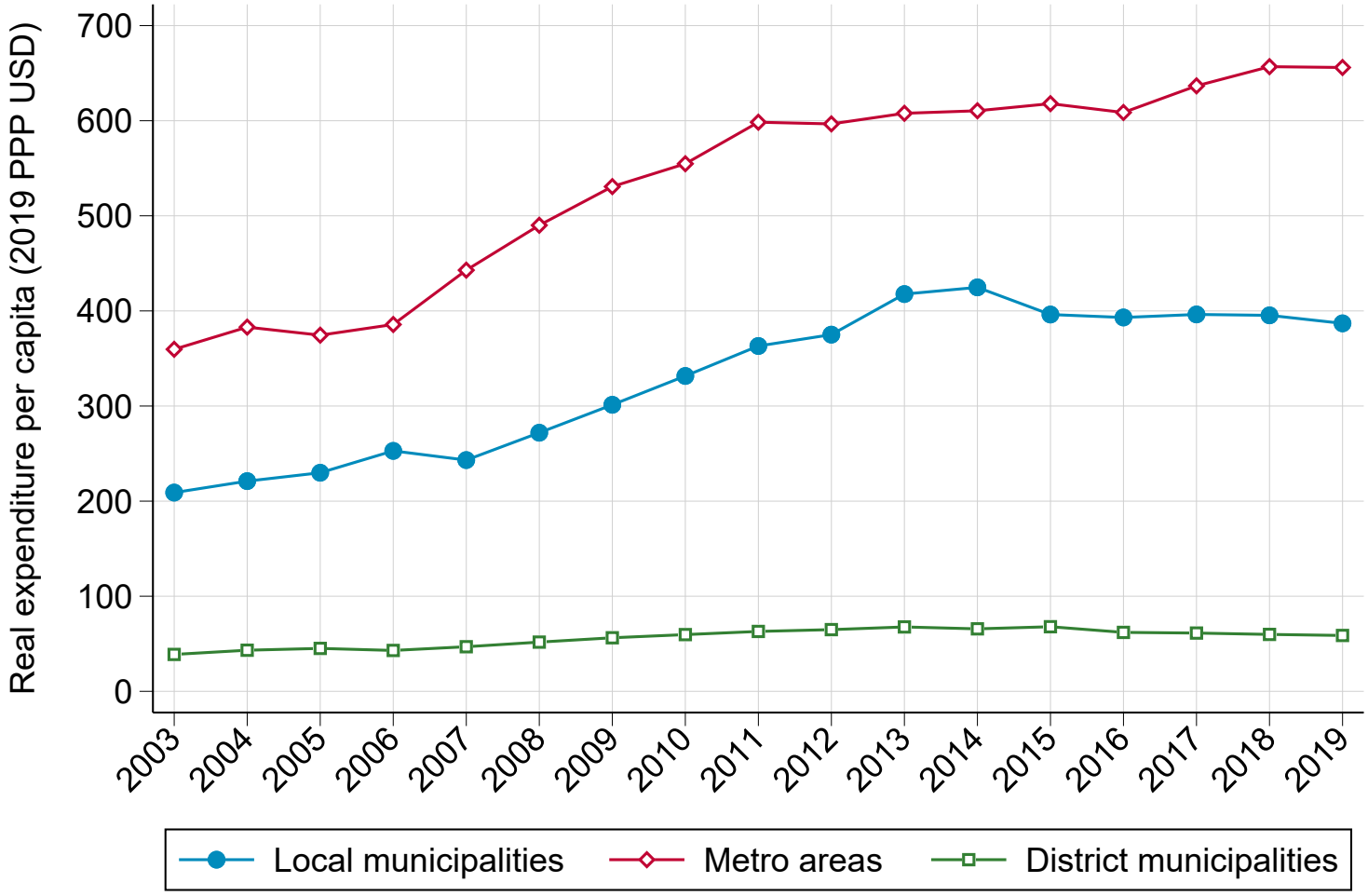
F. Local Government

Figure F1 – Level and Composition of Local Government Expenditure, 2001-2019



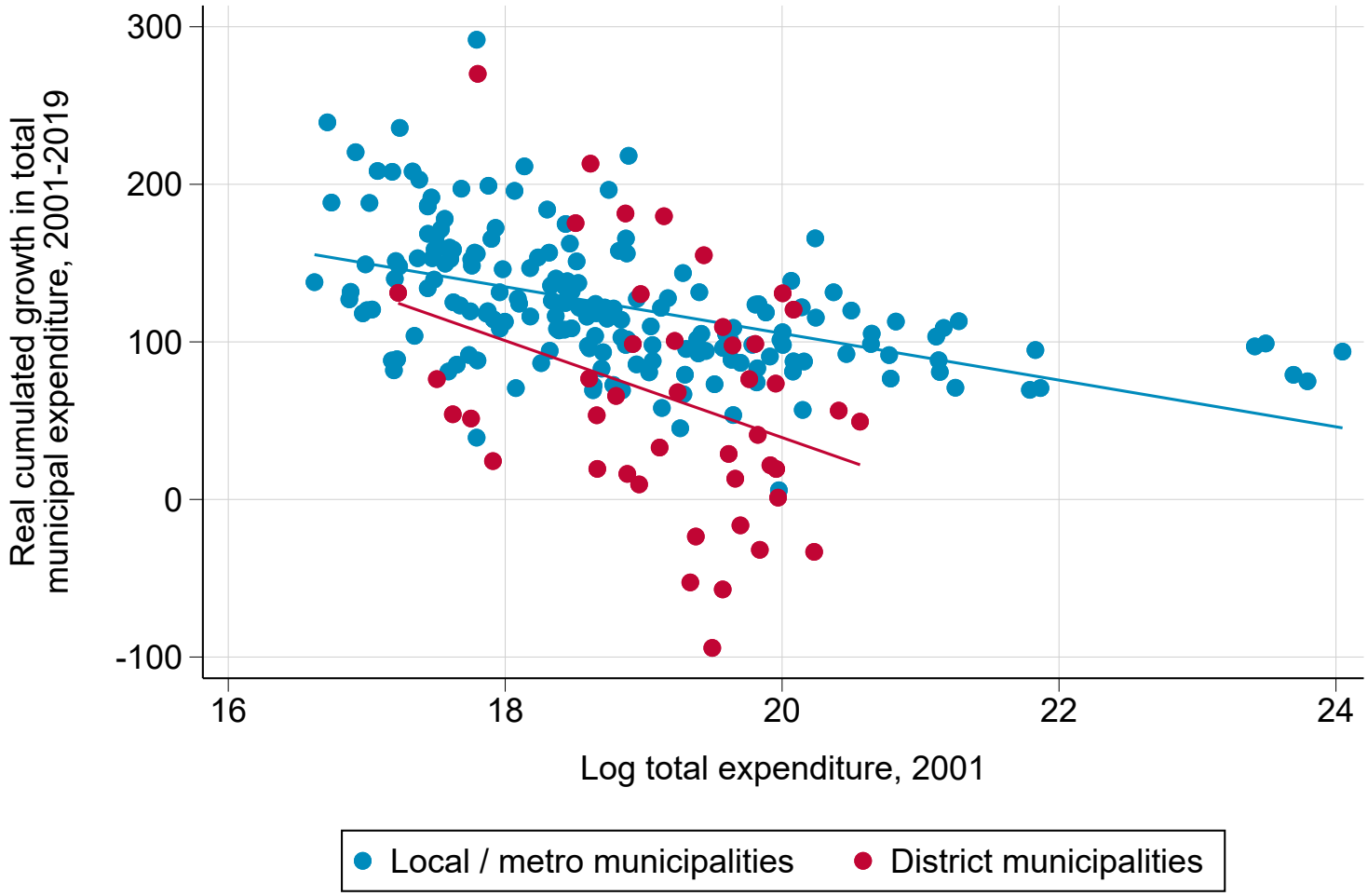
Notes. The figure plots the level and composition of local government expenditure in South Africa from 1993 to 2019. Local government expenditure includes all spending made by district and local municipalities. Author's computations combining data from Local Government Budget Reports.

Figure F2 – Local Government Expenditure in South Africa by Type of Municipality, 2003-2019



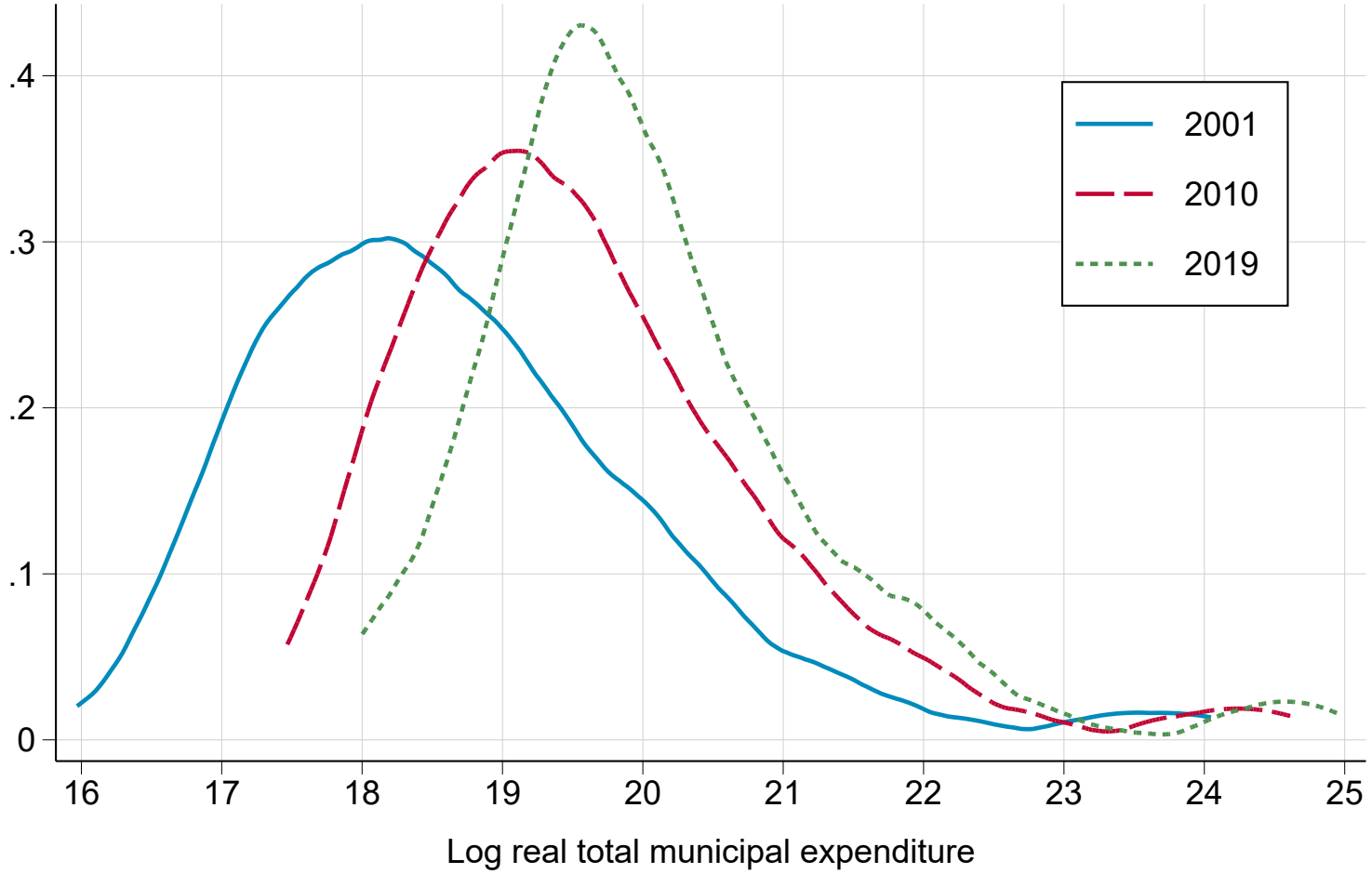
Notes. The figure plots the evolution of per-capita expenditure made by local municipalities, district municipalities, and metro areas from 1993 to 2019. Author's computations combining data from Local Government Budget Reports.

Figure F3 – The Decline of Spatial Inequalities in Local Public Goods:
Total Expenditure in 2001 Versus 2001-2019 Growth Rate



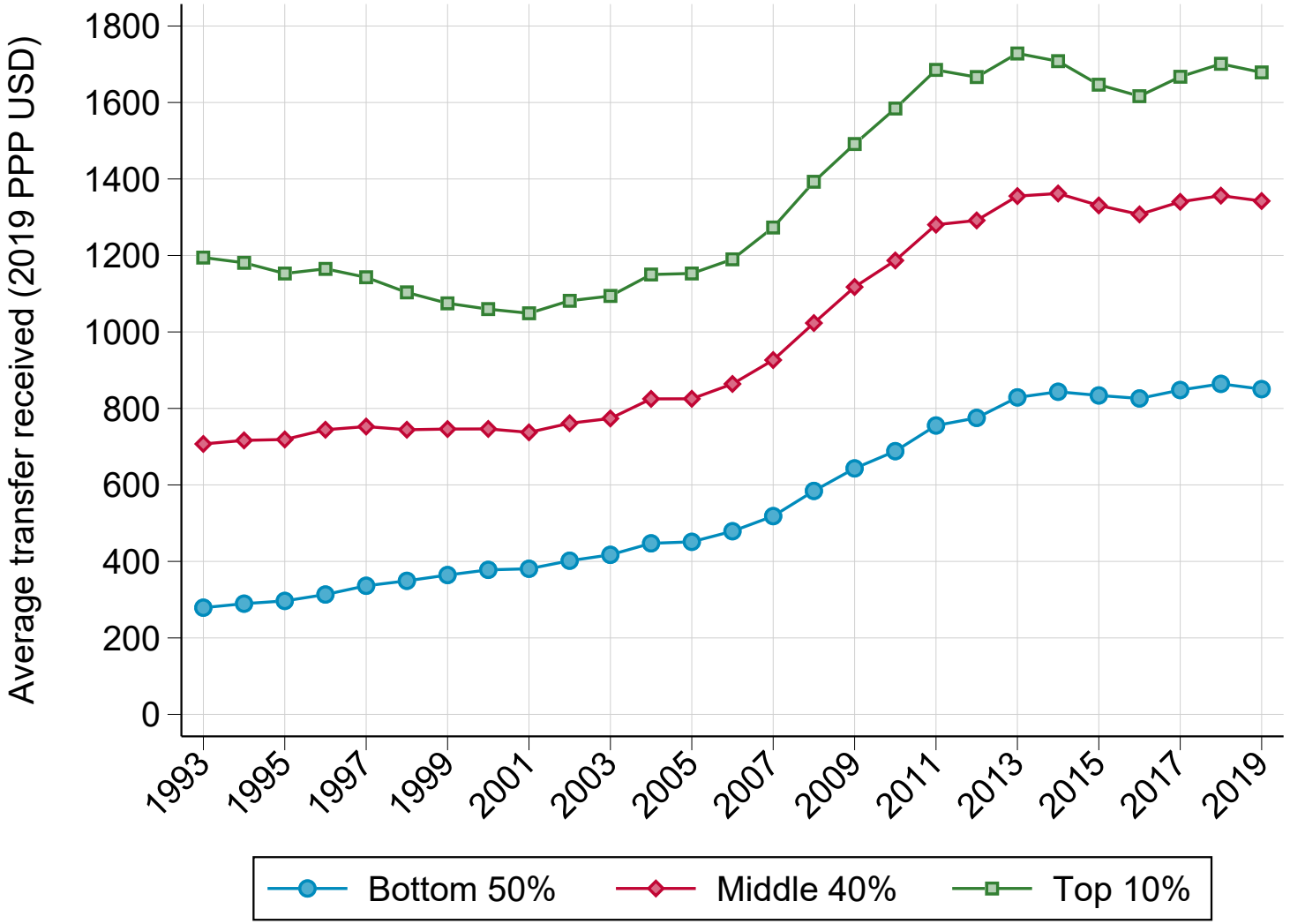
Notes. The figure compare total expenditure in 2001 to total spending growth experienced between 2001 and 2019 by municipality, separately for local/metro municipalities and district municipalities. There has been a convergence in local spending: municipalities with lower levels of spending in 2001 have seen a greater increase in public spending since then. Author's computations combining data from Local Government Budget Reports.

Figure F4 – The Decline of Spatial Inequalities in Local Public Goods:
Kernel Density of Local Municipality Total Expenditure, 2001-2019



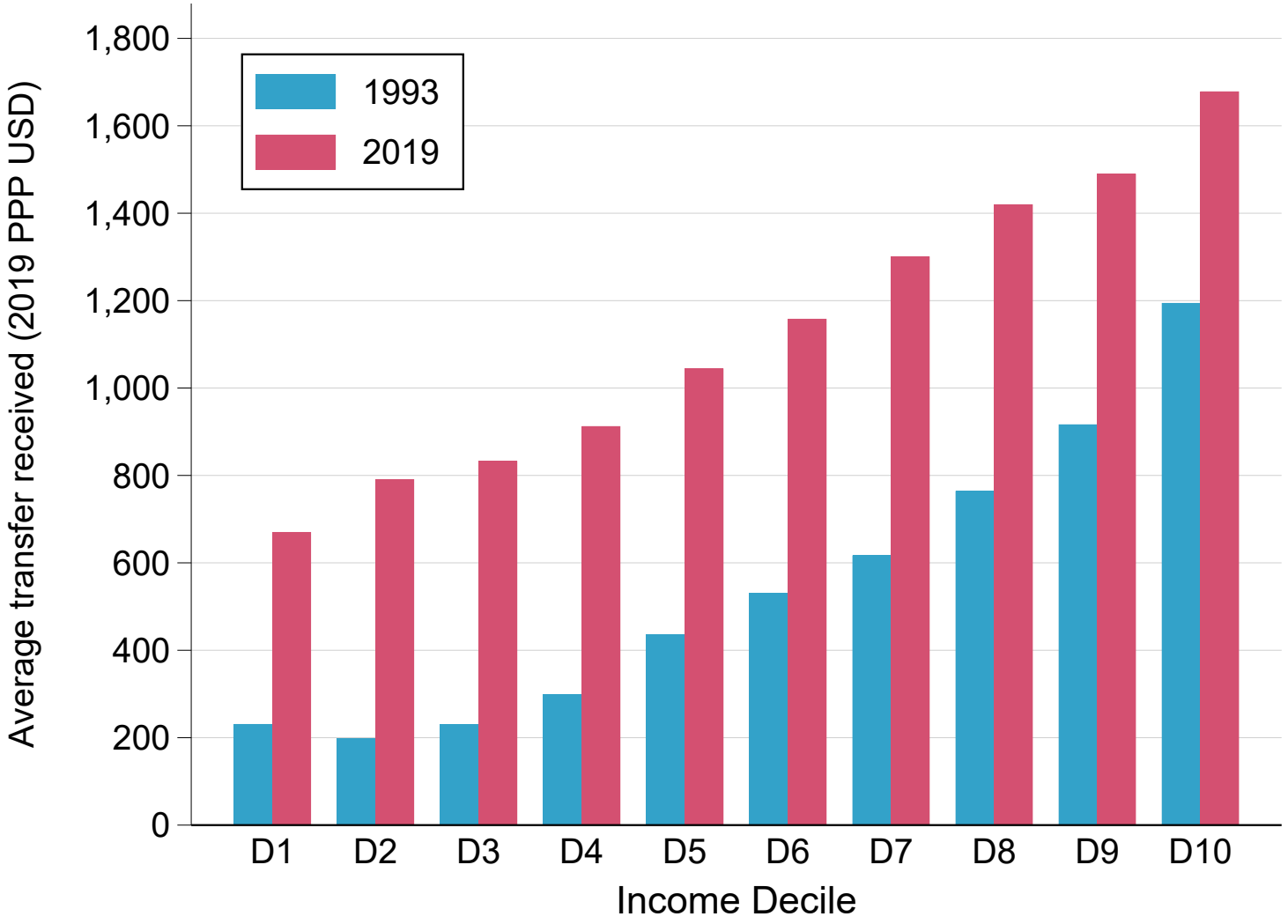
Notes. The figure plots the distribution of public spending across municipalities in 2001, 2010, and 2019. There has been a convergence in spending across municipalities: spatial variations in spending patterns are lower in 2019 than in 2001. Author's computations combining data from Local Government Budget Reports.

Figure F5 – Average Local Government Transfer Received by Income Group, 1993-2019



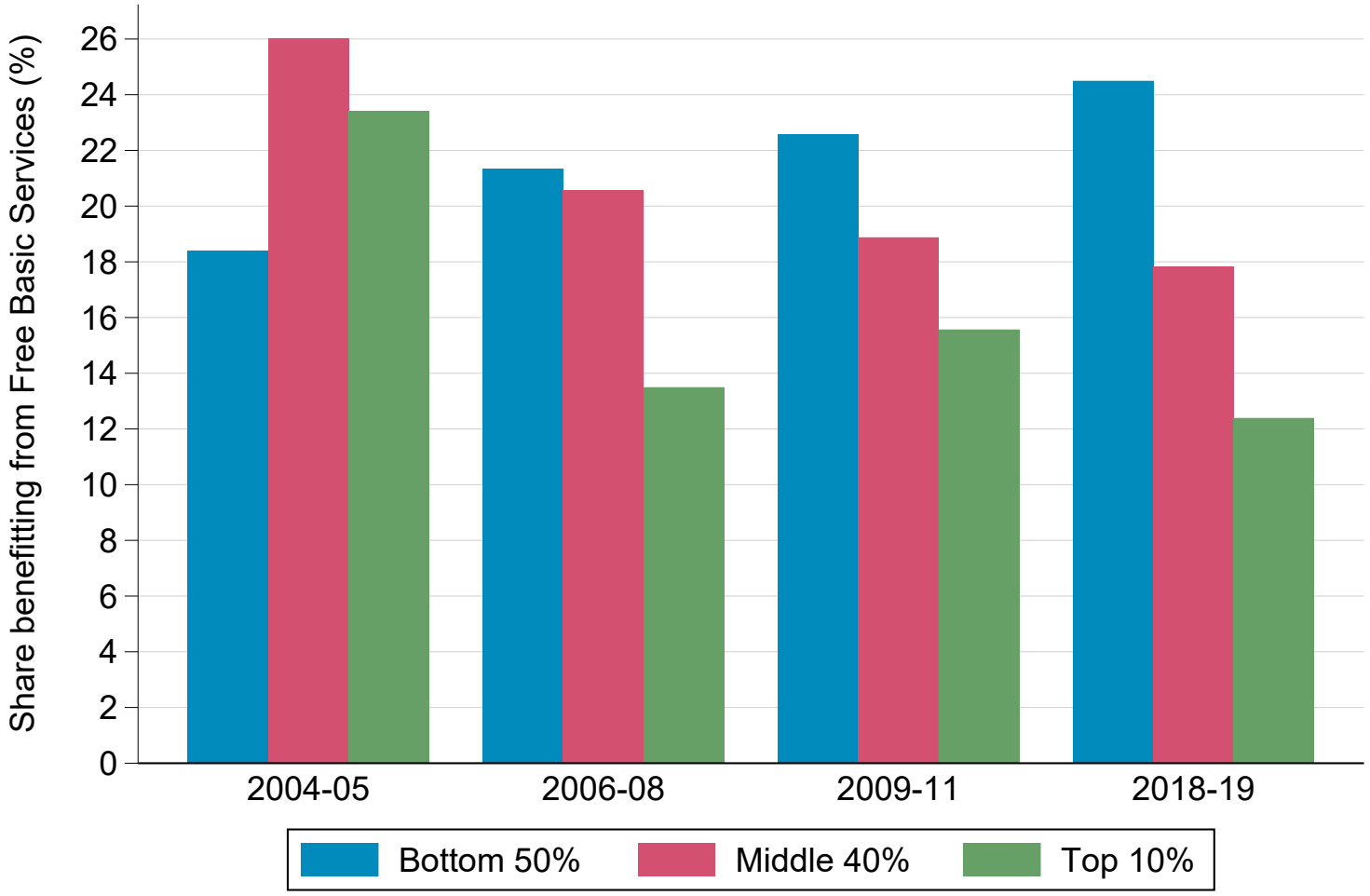
Notes. The figure plots the average local government transfer received by pretax income group from 1993 to 2019. Local government expenditure includes all spending made by district and local municipalities. Income and transfers are split equally between all household members.

Figure F6 – Average Local Government Transfer Received by Income Decile, 1993-2019



Notes. The figure plots the average local government transfer received by pretax income decile in 1993 and 2019. Local government expenditure includes all spending made by district and local municipalities. Income and transfers are split equally between all household members.

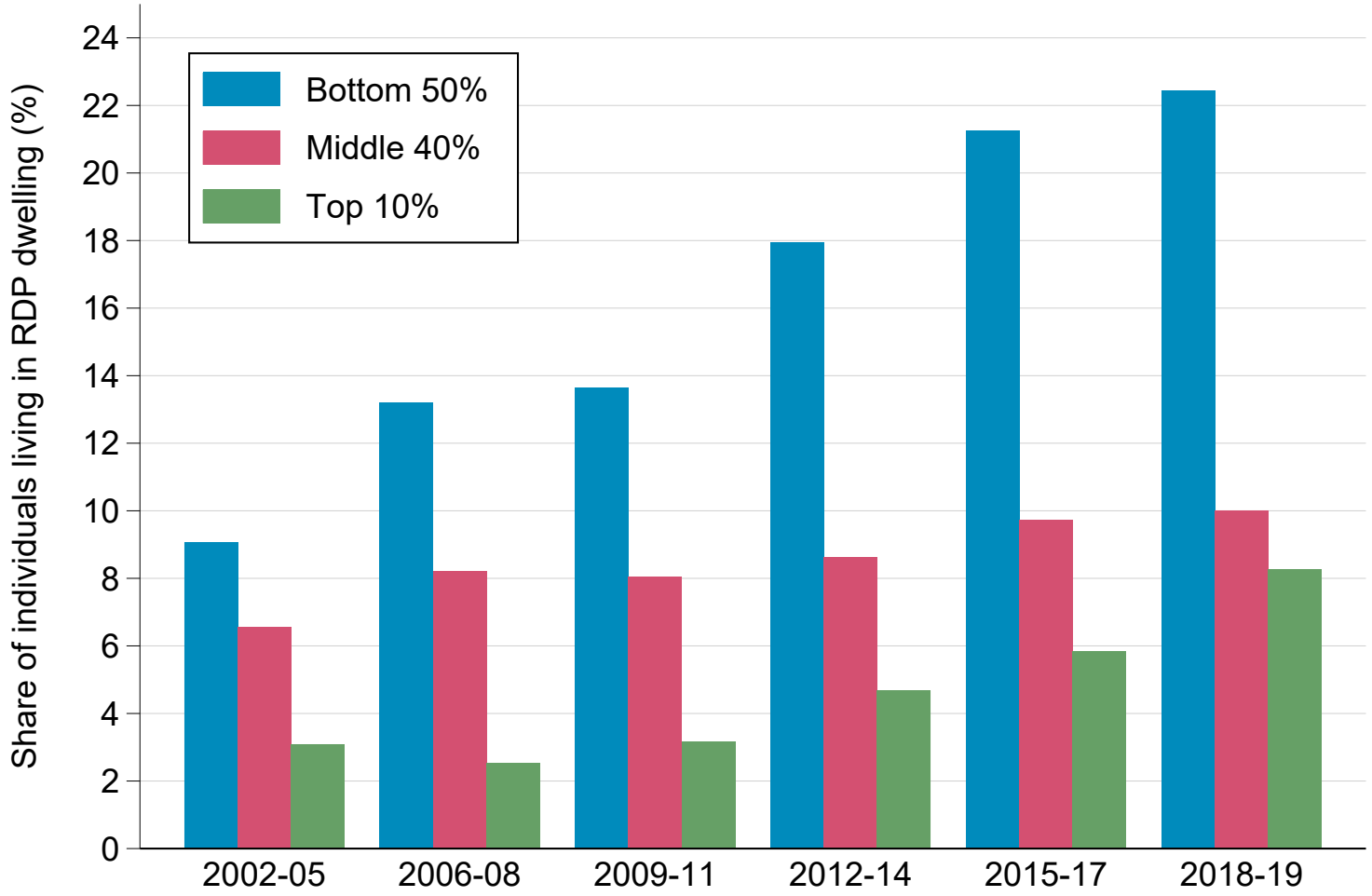
Figure F7 – Access to Free Basic Electricity by Income Group, 2004-2019



Notes. The figure represents the share of individuals who declare benefiting from free basic electricity in their municipality of residence by pretax income group. Author's computations combining data from General Household Surveys.

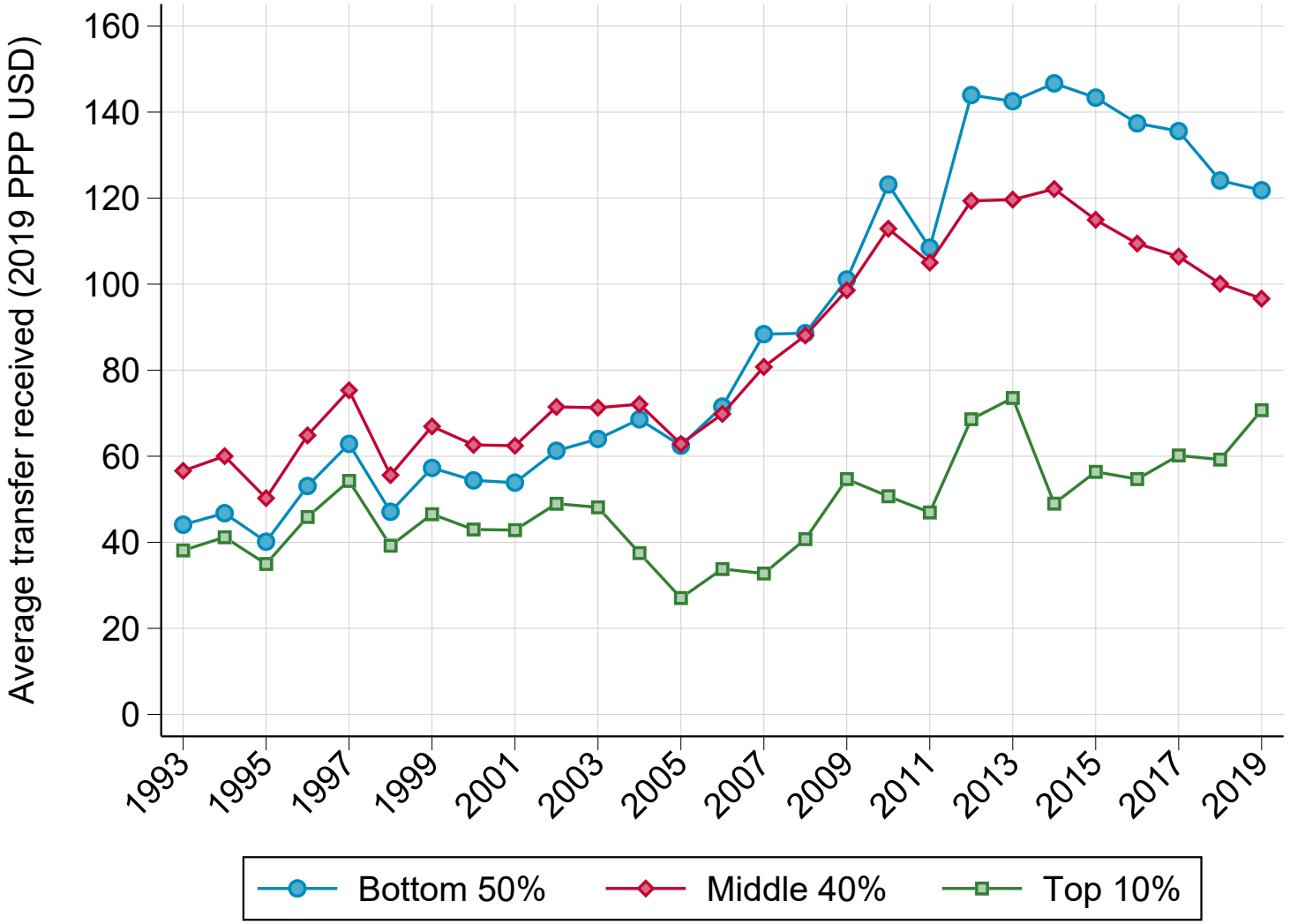
G. Housing

Figure G1 – Share of Individuals Living in Government-Subsidized Dwelling by Income Group, 2008-2019



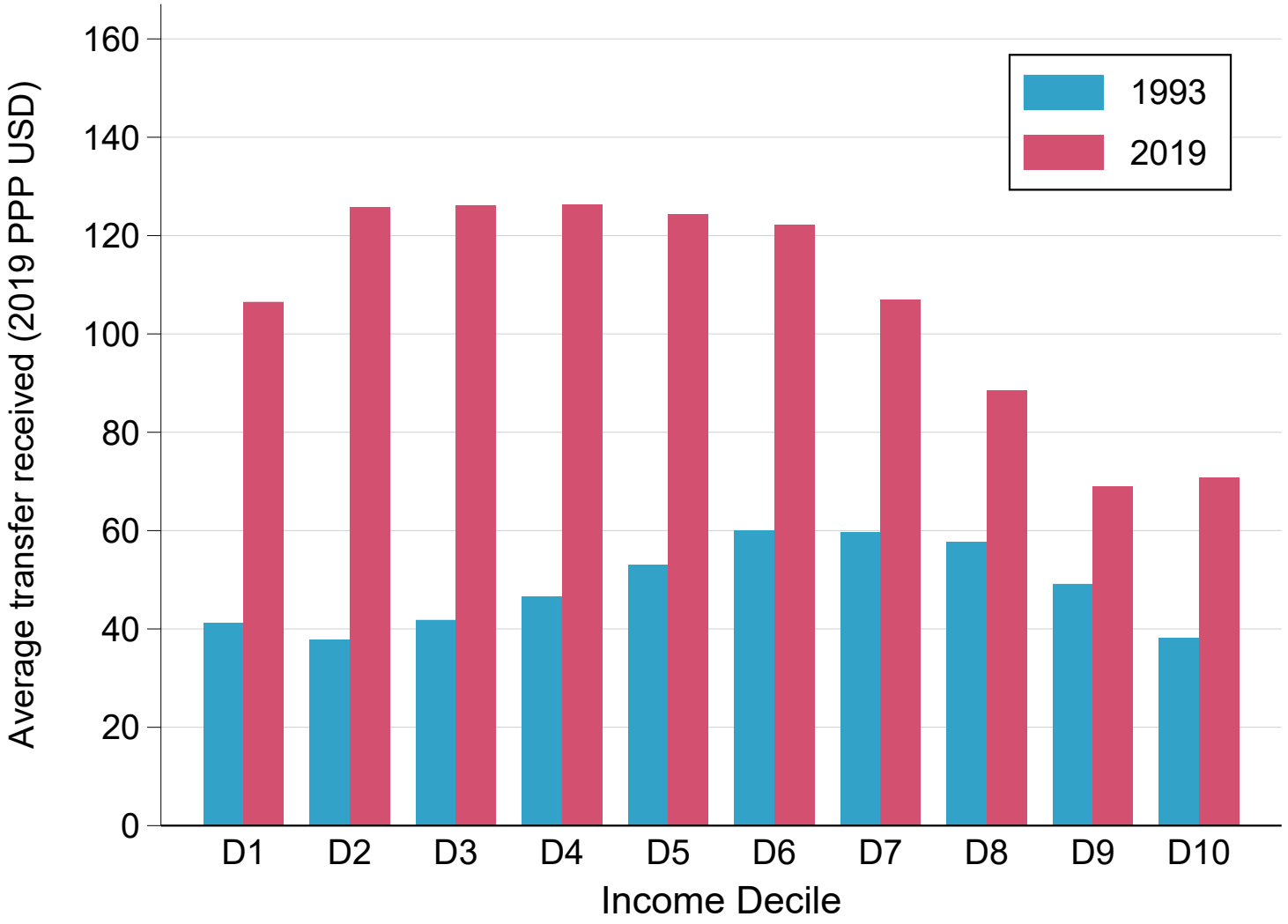
Notes. The figure shows the share of individuals living in households with at least one person who declared receiving "assistance from government to obtain this, or any other dwelling," by pretax income group. Author's computations combining General Household Surveys.

Figure G2 – Average Housing Transfer Received by Income Group, 1993-2019



Notes. The figure plots the average public housing transfer received by pretax income group from 1993 to 2019. Income and transfers are split equally between all household members.

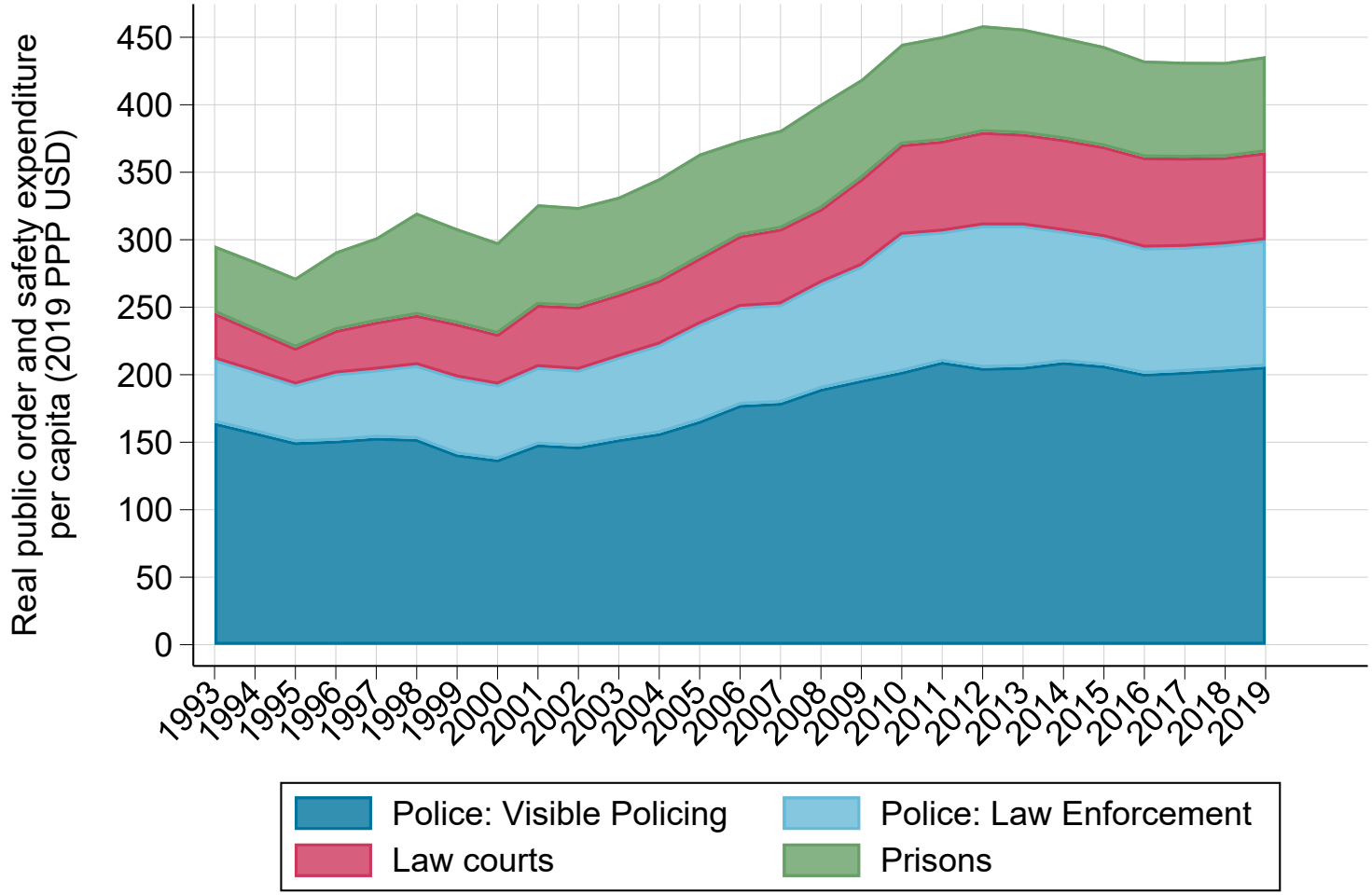
Figure G3 – Average Housing Transfer Received by Income Decile, 1993-2019



Notes. The figure plots the average public housing transfer received by pretax income decile in 1993 and 2019. Income and transfers are split equally between all household members.

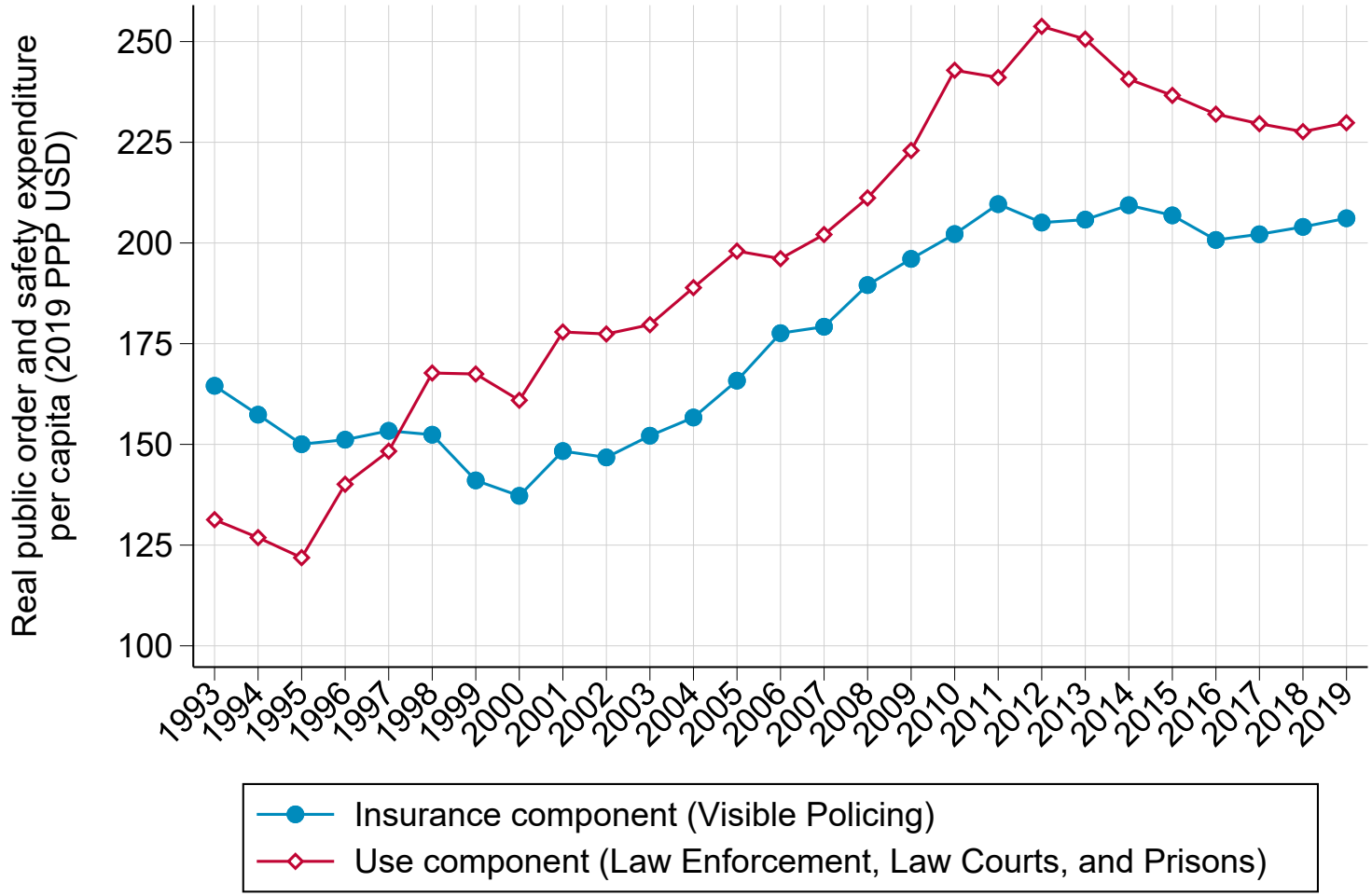
H. Public Order and Safety

Figure H1 – Level and Composition of Public Order and Safety Expenditure in South Africa, 1993-2019



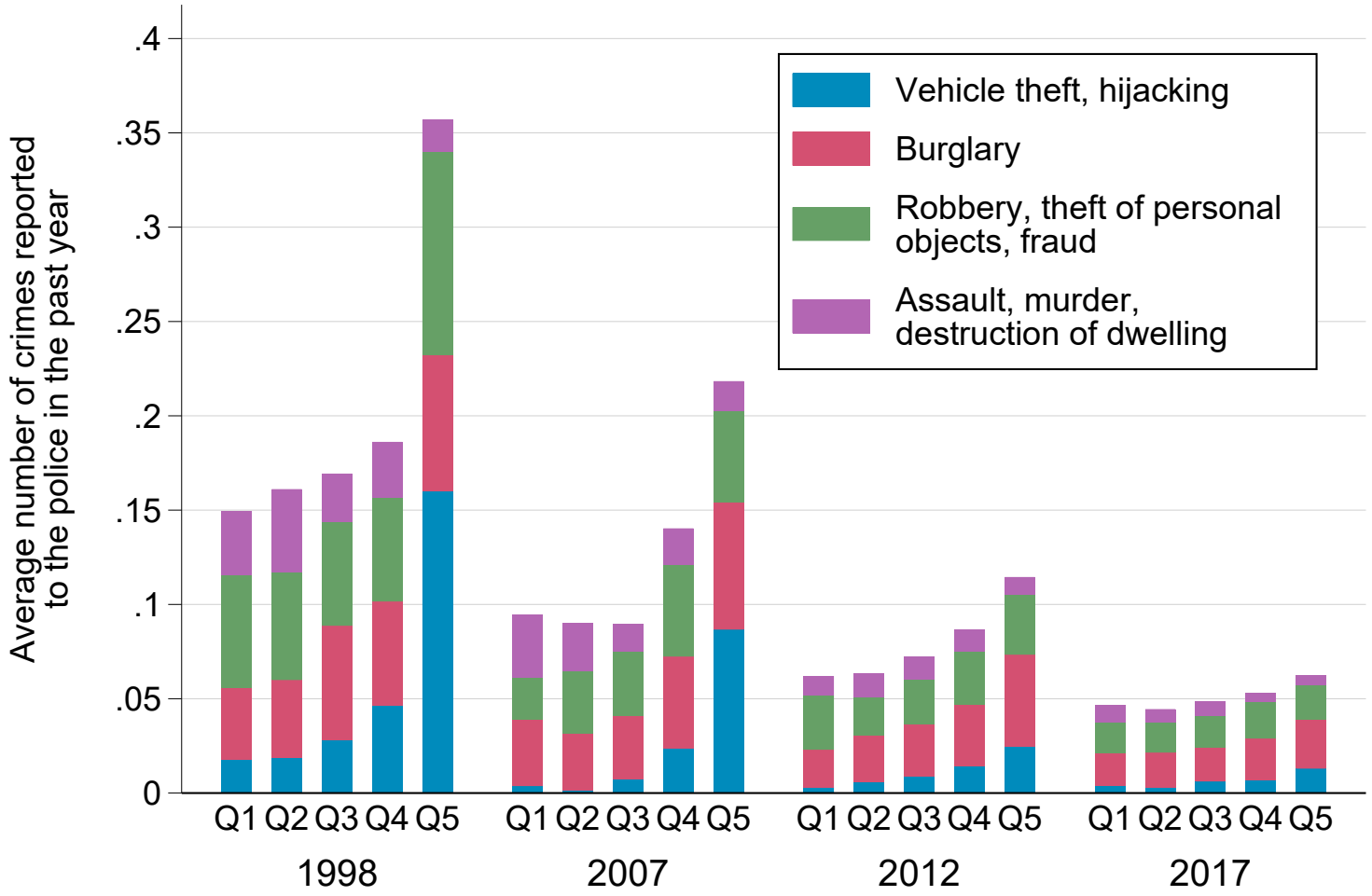
Notes. The figure plots the level and composition of public order and safety expenditure from 1993 to 2019. Author's computations combining data from South African National Treasury Budget Reports (1994-2020).

Figure H2 – Level and Composition of Public Order and Safety Expenditure in South Africa, 1993-2019: Insurance Versus Use



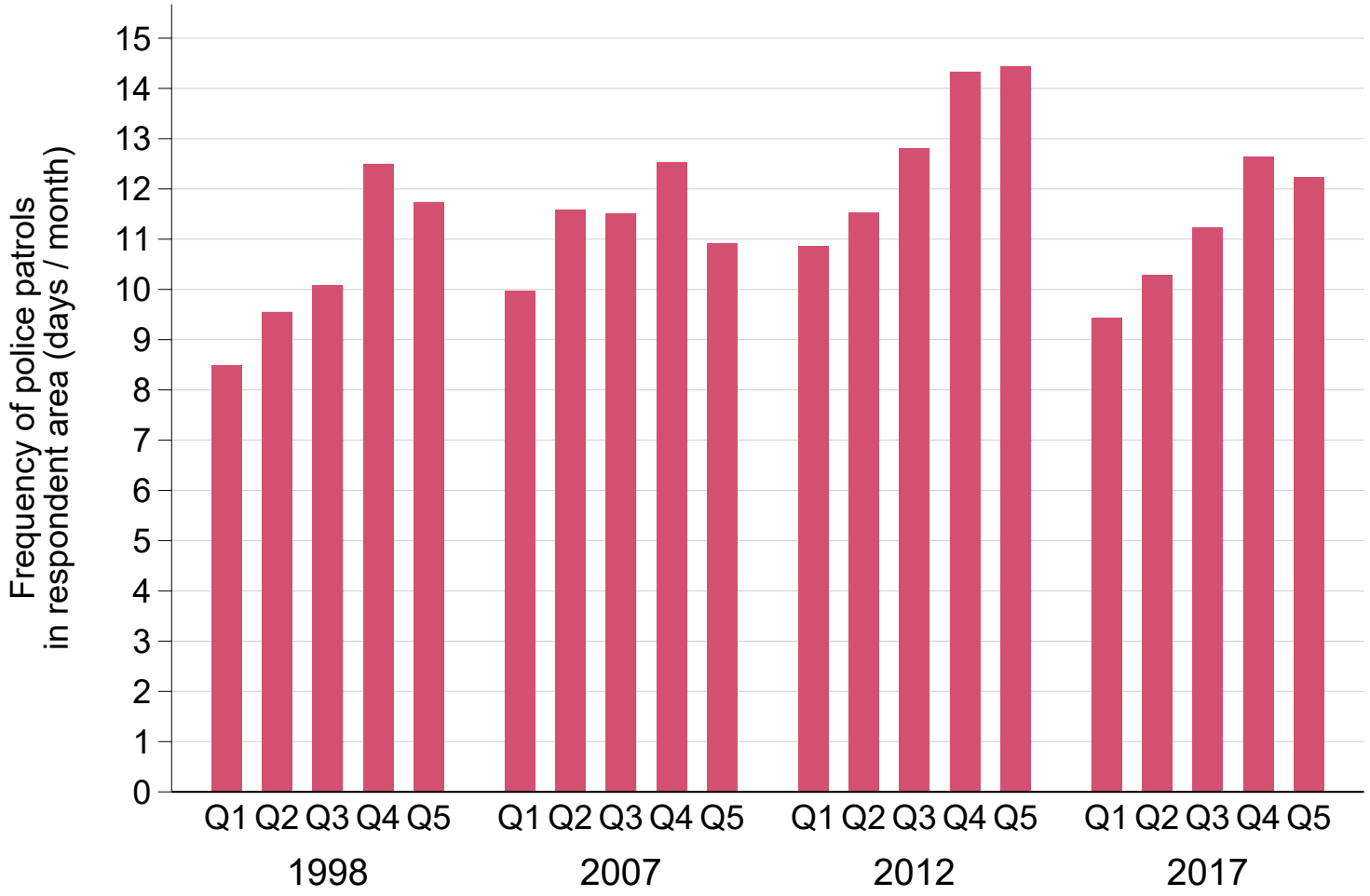
Notes. The figure plots per-capita public spending on the insurance (visible policing) and use (law enforcement, law courts, and prisons) components of public order and safety expenditure from 1993 to 2019. Author's computations combining data from South African National Treasury Budget Reports (1994-2020).

Figure H3 – Number of Crimes Reported to the Police by Income Quintile, 1998-2017



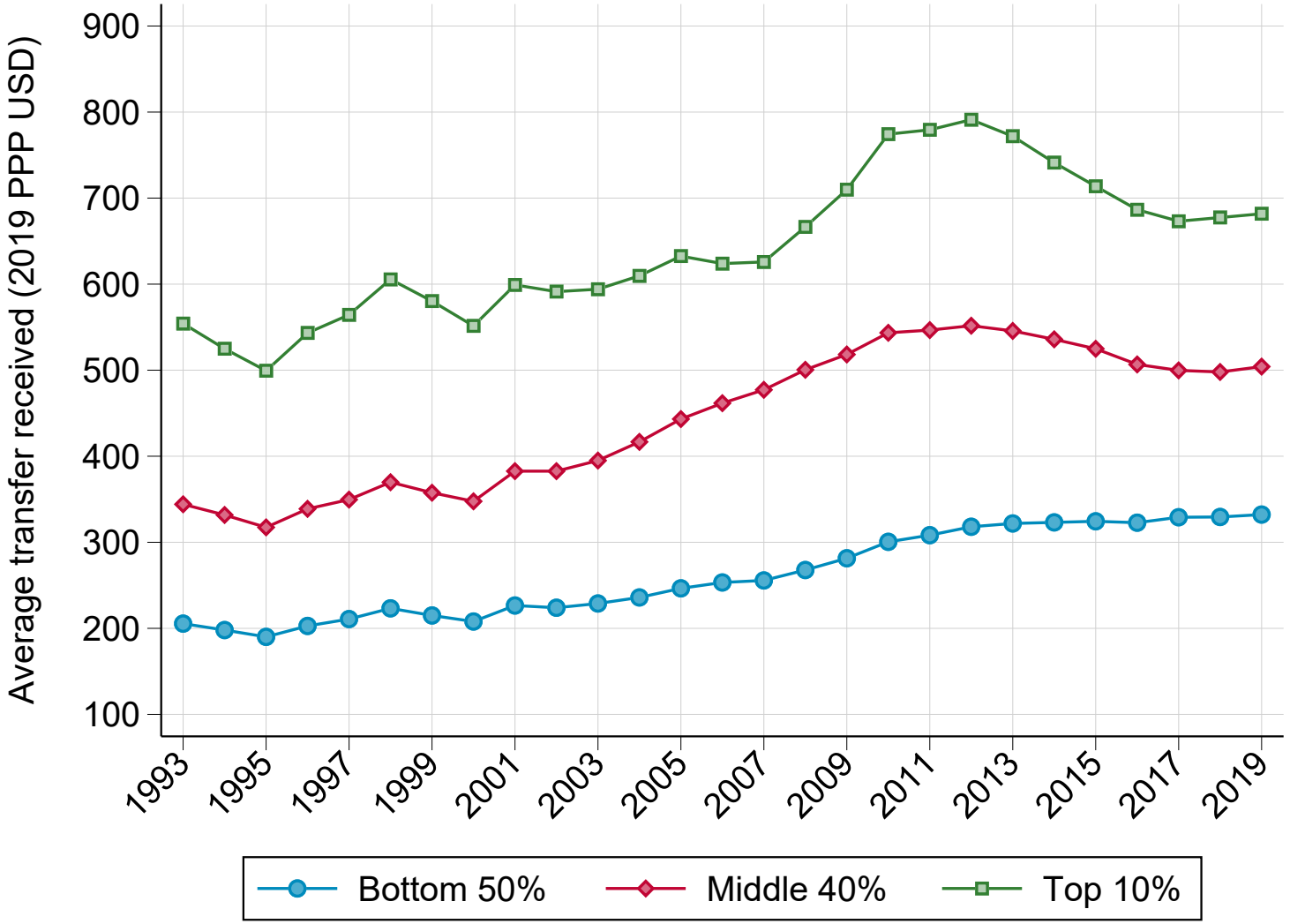
Notes. The figure plots the average number of crimes reported to the police by pretax income quintile, as well as their composition. Author's computations combining data from Victims of Crime Surveys.

Figure H4 – Intensity of Local Police Presence by Income Quintile, 1998-2017



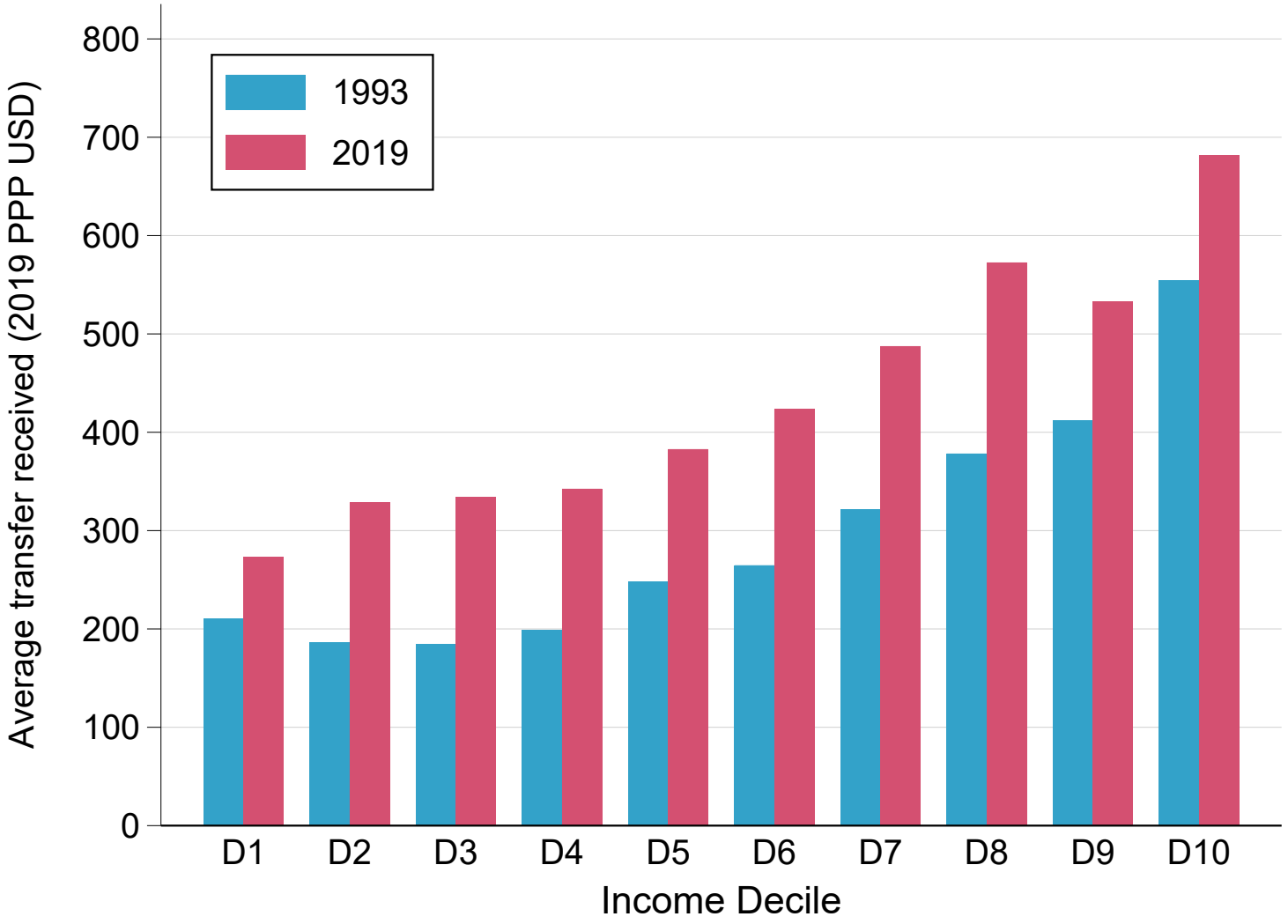
Notes. The figure plots the average intensity of police presence by pretax income quintile, measured as the average number of days per month that the respondent declares seeing a police officer in uniform or a police vehicle in their area. Author's computations combining data from Victims of Crime Surveys.

Figure H5 – Average Public Order and Safety Transfer Received by Income Group, 1993-2019



Notes. The figure plots the average public order and safety transfer received by pretax income group from 1993 to 2019. Income and transfers are split equally between all household members.

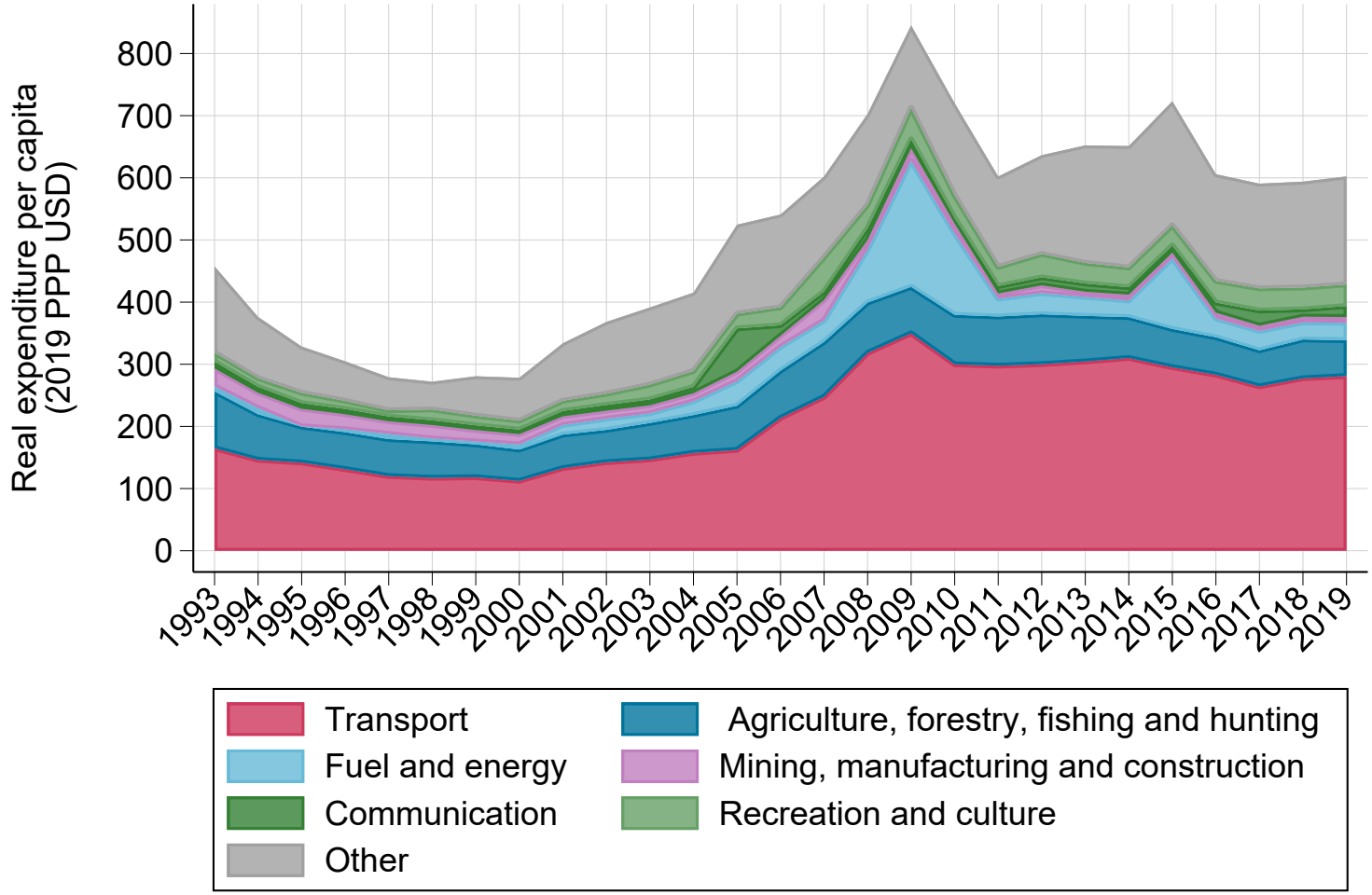
Figure H6 – Average Public Order and Safety Transfer Received by Income Decile, 1993-2019



Notes. The figure plots the average public order and safety transfer received by pretax income decile from 1993 to 2019. Income and transfers are split equally between all household members.

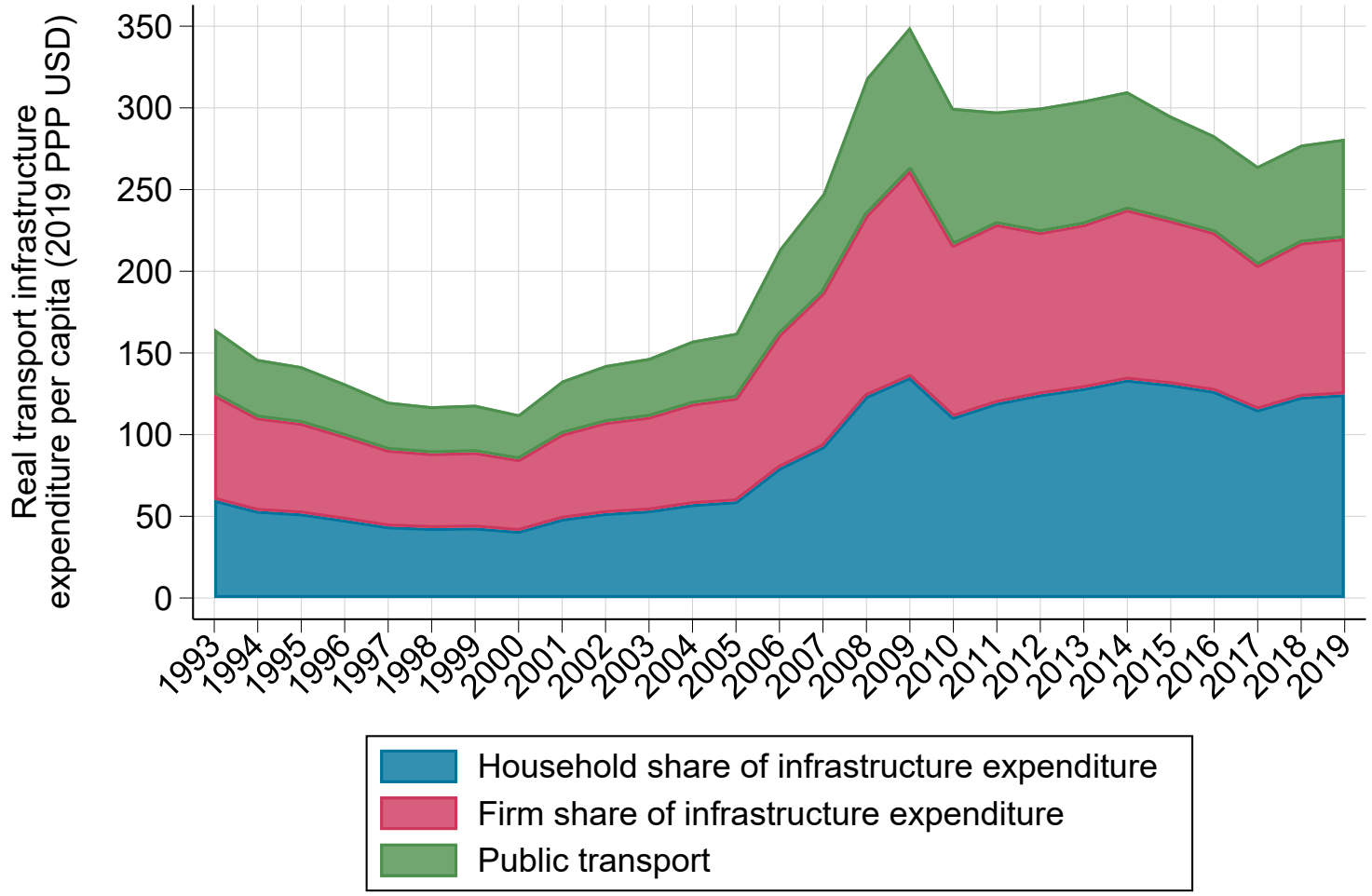
I. Transport and Other Economic Affairs

Figure I1 – Level and Composition of Expenditure on Economic Affairs in South Africa, 1993-2019



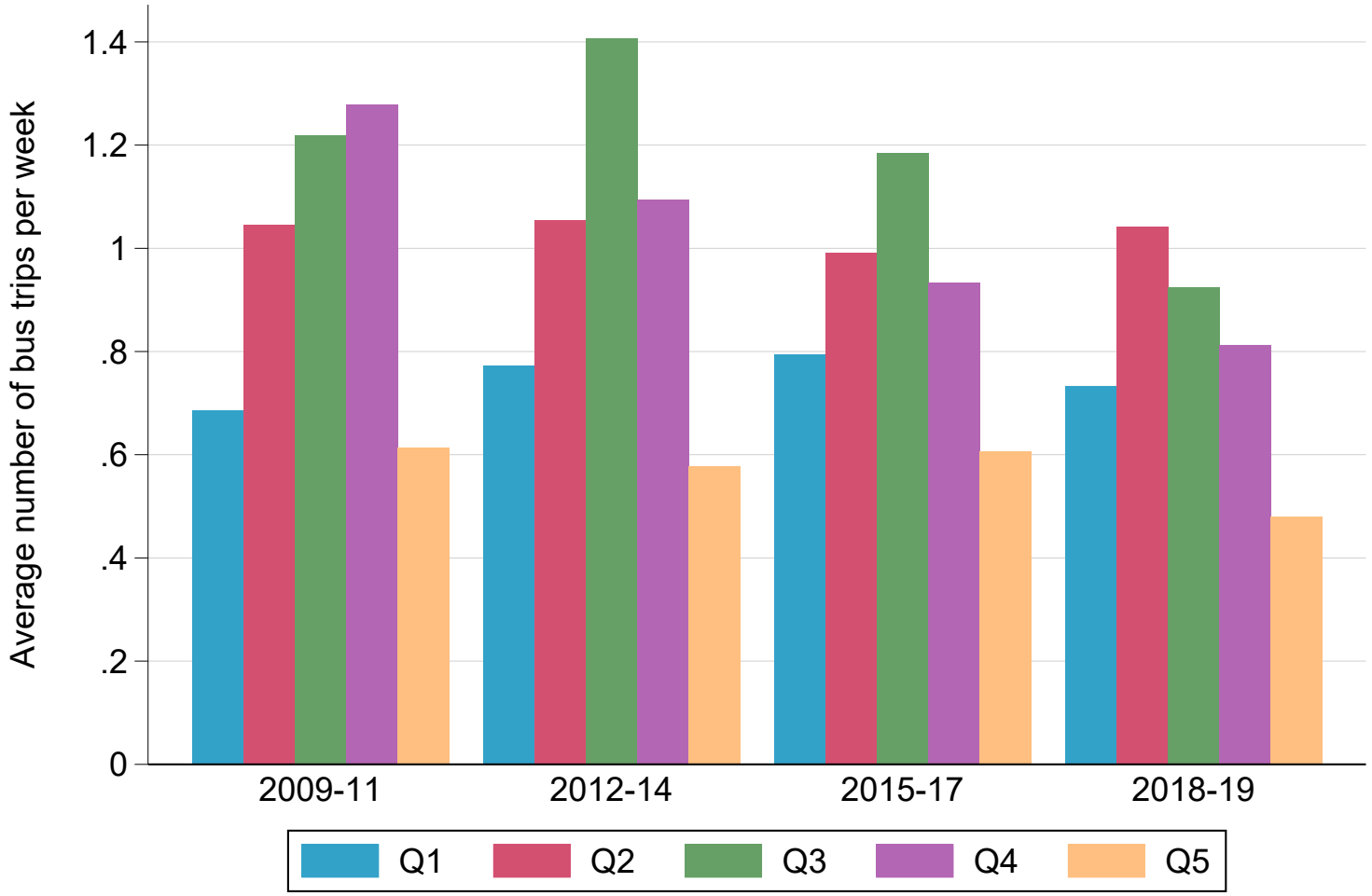
Notes. The figure plots the level and composition of public spending on economic affairs in South Africa from 1993 to 2019. Author's computations combining data from South African National Treasury Budget Reports (1994-2020).

Figure I2 – Level and Composition of Transport Expenditure in South Africa, 1993-2019



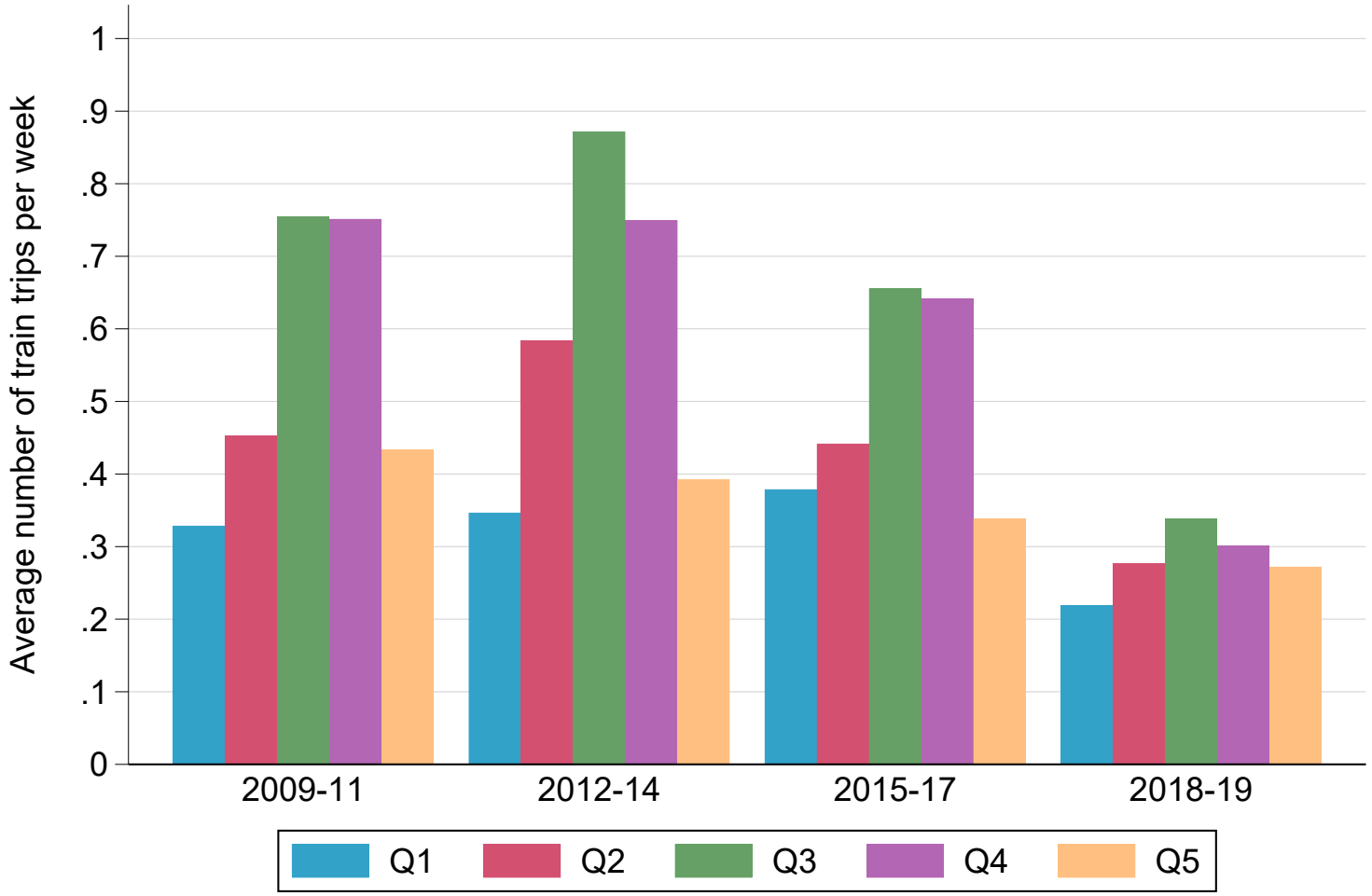
Notes. The figure plots the level and composition of public transport expenditure in South Africa from 1993 to 2019. Household share of infrastructure expenditure: share of spending indirectly received by households through their use of infrastructure expenditure for personal transport. Firm share of infrastructure expenditure: share of spending indirectly received by firms through their use of infrastructure expenditure for the transport of goods and persons. Public transport: expenditure on both public transport and transport infrastructure used by public transport vehicles. Author's computations combining data from South African National Treasury Budget Reports (1994-2020) with input-output tables available from the OECD and Stats SA.

Figure I3 – Public Transport Use Intensity by Income Quintile: Buses



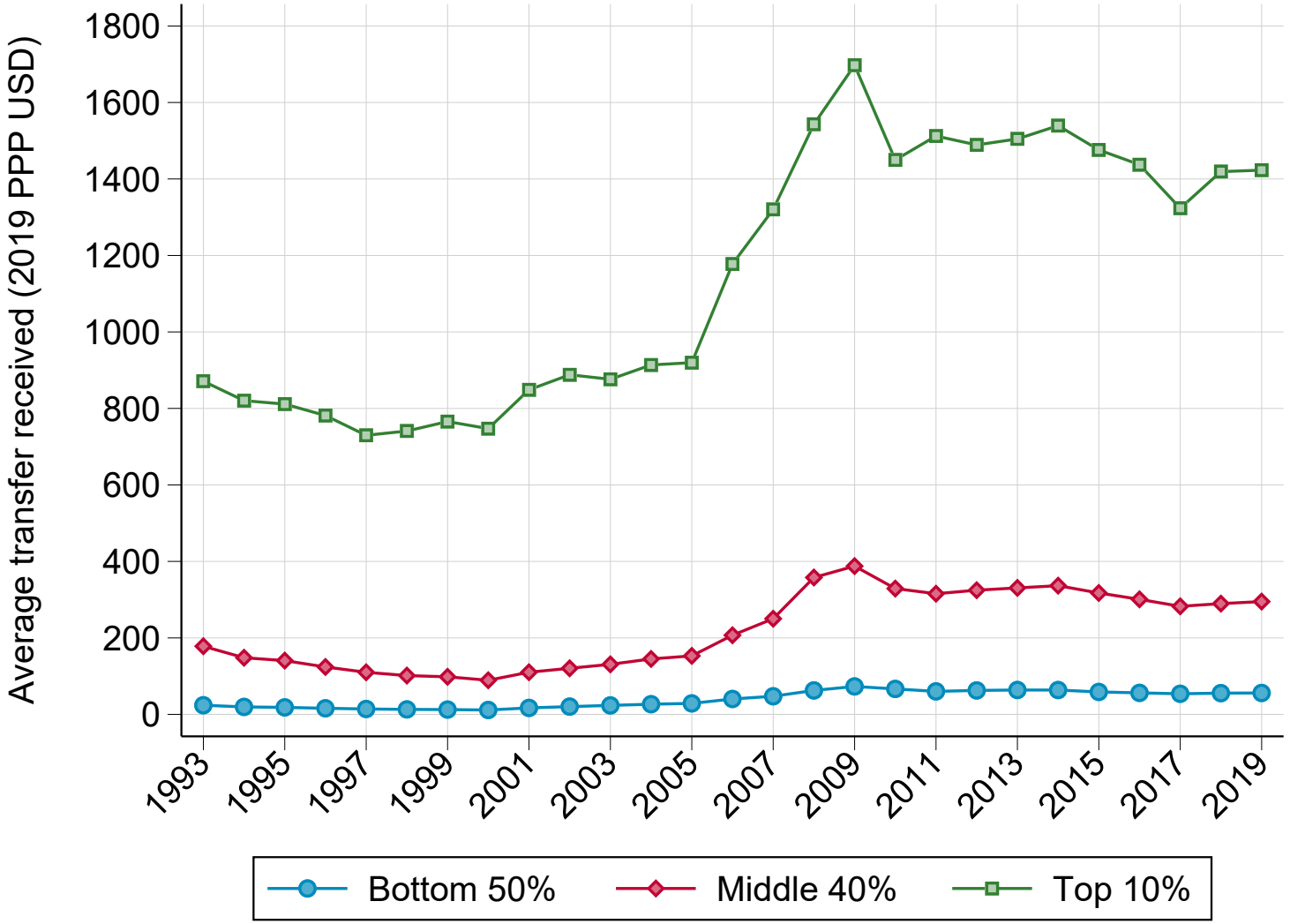
Notes. The figure plots the average number of bus trips made per week by pretax income quintile. Author's computations combining General Household Surveys.

Figure I4 – Public Transport Use Intensity by Income Quintile: Trains



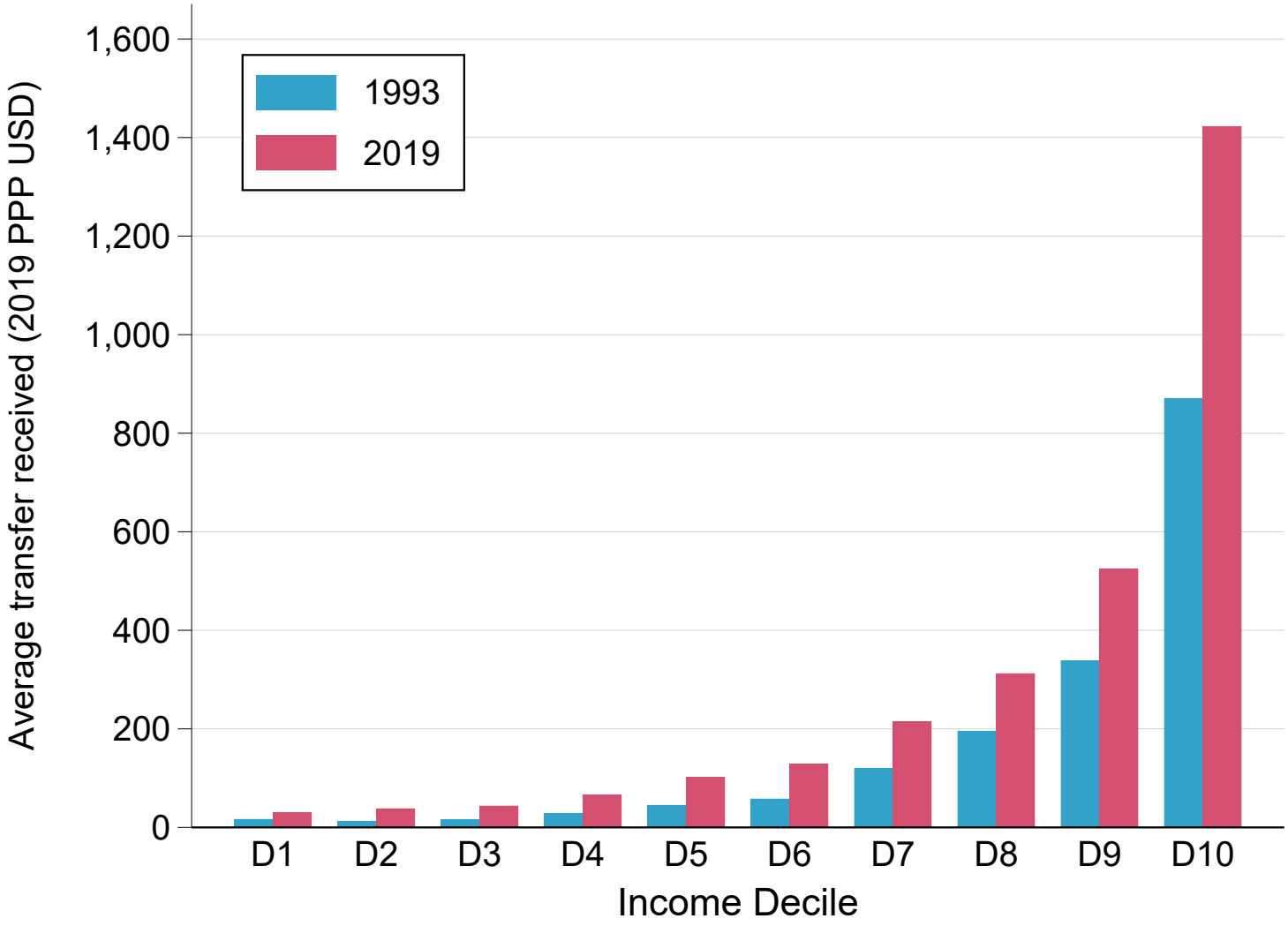
Notes. The figure plots the average number of train trips made per week by pretax income quintile. Author's computations combining General Household Surveys.

Figure I5 – Average Transport Transfer Received by Income Group, 1993-2019



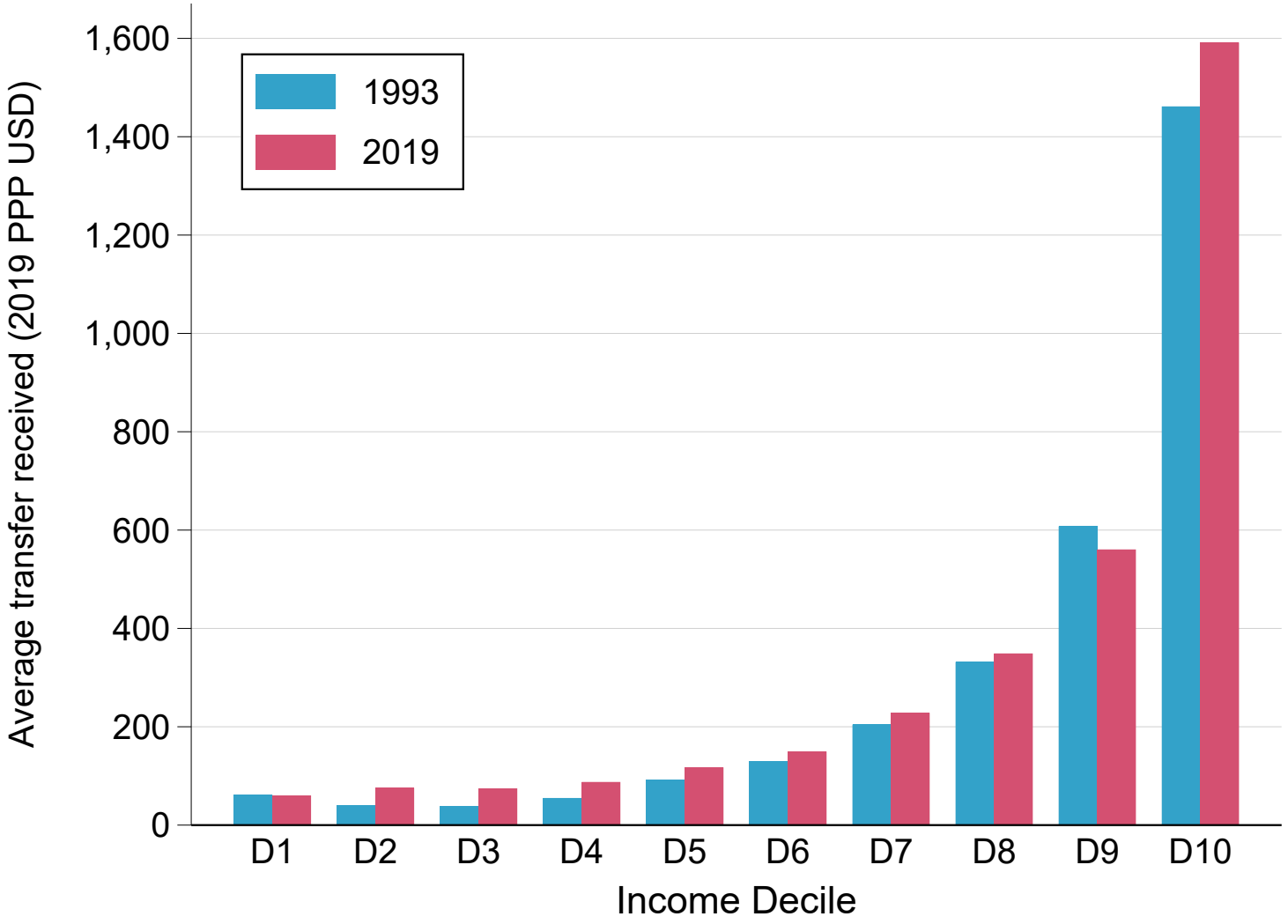
Notes. The figure plots the average transport transfer received by pretax income group from 1993 to 2019. Income and transfers are split equally between all household members.

Figure I6 – Average Transport Transfer Received by Income Decile, 1993-2019



Notes. The figure plots the average transport transfer received by pretax income decile in 1993 and 2019. Income and transfers are split equally between all household members.

Figure I7 – Average Transfer on Other Economic Affairs Received by Income Decile, 1993-2019



Notes. The figure plots the average transfer in terms of other economic affairs received by pretax income decile in 1993 and 2019. Public spending on economic affairs corresponds to expenditure on economic affairs other than transport, such as subsidies to agriculture, energy, manufacturing, and recreation and culture. Income and transfers are split equally between all household members.