Who Benefits from Public Goods? Evidence from South Africa

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September 2022

PRELIMINARY AND INCOMPLETE

Abstract

This article provides new evidence on the distributional incidence of public goods. I combine newly digitized budget data with tax data, census microdata, and various surveys to estimate the distribution of all government transfers received by income group in South Africa from 1993 to 2019. My estimates account for changes in the progressivity of different types of policies and allocate all public services to individuals, including education, health-care, police services, transport infrastructure, housing subsidies, and local government services. All categories of public spending are progressive (less concentrated than income), but with large variations. About 60% of education expenditure is received by the bottom 50%, compared to only 7% of spending on transport infrastructure. There has been a dramatic rise of redistribution since the end of apartheid: the share of national income redistributed to the poorest half of the South African population rose from 11% in 1993 to 18% in 2019. The bulk of this transformation was driven by public goods, which act as a major redistributive tool. In 2019, accounting for public services lifts the share of income received by the bottom 50% from only 6.5% to almost 15%. These findings highlight the critical role played by public services in enhancing inclusive growth in developing economies.

*Paris School of Economics (Grant ANR-17-EURE-001). I am particularly grateful to Thomas Piketty for his continuous guidance, as well as to Léo Czajka for his invaluable support throughout this project. I thank Daron Acemoglu, Facundo Alvaredo, Lars Harhoff Andersen, David Atkin, Pierre Bachas, Abhijit Banerjee, Thomas Blanchet, Ronelle Burger, Lucas Chancel, Aroop Chatterjee, Raj Chetty, David Cutler, Léo Czajka, Edgard Dewitte, Carmen Durrer de la Sota, Matthew Fisher-Post, Ignacio Flores, Jonathan Gruber, Anders Jensen, Lawrence Katz, Alexia Lochmann, Rosanne Logeart, Clément Mazet-Sonilhac, Marc Morgan, Oda Nedregård, Vincent Pons, Tom Raster, Emmanuel Saez, Andrei Shleifer, Nic Spaull, David Splinter, Morten Nyborg Støstad, David Thesmar, Juliet-Nil Uraz, Duncan Webb, Ingrid Woolard, and Gabriel Zucman, as well as numerous seminar and conference participants for useful comments and suggestions.

1. Introduction

The standard concept used to track poverty and inequality within countries is posttax disposable income, defined as the sum of labor and capital incomes, plus cash transfers received, minus direct taxes paid. 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 services provided by the government. As a result, we still have a very partial picture of the ways through which government redistribution reduces inequality. This is especially true in developing countries, where cash transfers tend to only represent a tiny fraction of public spending. Instead, much of redistribution involves transfers in public goods as diverse as education, healthcare, transport infrastructure, police services, and adequate water supply.

This article makes a first attempt at incorporating detailed estimates of public goods provision in poverty and inequality statistics. The context is post-apartheid South Africa, which provides a particularly ideal case study to analyze government redistribution in kind. Since 1993, newly elected governments have massively invested in education, healthcare, and other public services, often with the explicit objective of reducing the extreme inequalities inherited from the apartheid regime of racial segregation. Drawing on numerous data sources, including various surveys, tax data, census microdata, and newly digitized budget reports, I build a comprehensive database covering the joint distribution of pretax incomes, taxes, cash transfers, and in-kind transfers every year from 1993 to 2019. Unlike existing studies, which focus on specific types of public services at a specific point in time, I allocate all public goods to individuals and account for changes in their progressivity over time. While these estimates still suffer from significant limitations, I view them as a useful first step towards more comprehensive measures of public service delivery, which can be refined as better data sources become available in the future.

I find that most government policies tend to be strongly progressive (less concentrated than income), but with large variations across functions of government. In 2019, the poorest 50% received about 77% of cash transfers, compared to 61% of education spending, 58% of public healthcare, 38% of local public goods, 38% of police services, and only 10% of transport expenditure. Overall, they benefit from about 41% of total government spending. This is less than their share in the South African population, but substantially higher than their share of pretax income, which stands at less than 3%. In other words, public services unambiguously reduce inequality.

Redistribution in kind is not only progressive; it is quantitatively substantial. In 2019, some 9% of South Africa's national income accrued to the bottom 50% in the form of in-kind transfers.

This represented about five times their average pretax income and over three times total cash transfers received. As a result, incorporating public services in measures of posttax income significantly changes estimates of poverty and inequality. The share of income received by the bottom 50% is only 6.5% in terms of posttax disposable income. After accounting for public goods, it rises to almost 15%, corresponding to a threefold increase in the average income of the poorest half of the South African population.

Finally, I find that there has been a dramatic rise in government redistribution since the end of apartheid: from 1993 to 2019, the share of national income redistributed to the bottom 50% expanded by almost two-thirds, from 11% to 18% of national income. This transformation results from the combination of three factors. First, total government expenditure rose significantly, both in real terms and as a fraction of national income. Second, the share of public spending dedicated to the most progressive types of policies also increased, in particular education and healthcare. Third, there have been significant improvements in the progressivity of most government policies, which have become increasingly targeted to low-income groups. This transformation has acted as a major driver of inclusive growth. Accounting for public goods approximately doubles the growth rate of the real income of the bottom 50% since 1993. Pretax income inequality has significantly increased, due in particular to booming incomes at the very top and declining wages at the very bottom of the distribution. Yet, this trend is reverted when accounting for government redistribution, which has more than compensated income losses among low-income households since 1993.

This article connects to a growing literature attempting to bridge conceptual gaps between surveys and national accounts in the measurement of inequality. Piketty, Saez, and Zucman (2018) estimate Distributional National Accounts (DINA) for the United States every year since 1913, yielding distributional statistics that are consistent with macroeconomic growth rates. A number of studies following this framework have been conducted on other countries since then, including detailed studies of government redistribution covering Europe (Blanchet, Chancel, and Gethin, 2022), France (Bozio et al., 2022), and Latin America (De Rosa, Flores, and Morgan, 2022).¹ The main limitation of these studies is that they do not attempt to estimate who benefits from public services; instead, they typically assume that all in-kind government expenditure is distributed proportionally to posttax disposable income.² To the best of my knowledge, this

¹See also Germain et al. (2021), Bruil et al. (2022), and Jestl and List (2022) on France, the Netherlands, and Austria, respectively. See Chancel et al. (2022) for a presentation of other studies following the DINA methodology.

²Piketty, 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. De Rosa, Flores, and Morgan (2022) allocate education and health spending based on fiscal incidence studies, as in this paper, and all other government spending proportionally to posttax disposable income.

paper is the first to build detailed estimates of the progressivity of all public services and its evolution over time. I show that public goods act as a major driver of inequality reduction, which calls for the necessity of better incorporating them in measures of poverty and inequality around the world (see Gethin (2022) for a preliminary attempt at expanding this analysis to the study of global poverty).

This paper also contributes to extending our knowledge of who benefits from public services. Some studies have attempted to estimate the distributional incidence of specific public goods, in particular health and education (see Goldman, Woolard, and Jellema (2020) in the context of South Africa)³. I depart from these studies in two ways. First, I follow the DINA methodology and allocate in-kind transfers in a framework that is rooted in the national accounts. This contrasts with the existing literature, which tends to scale down public services to match aggregates observed in surveys, in ways that tend to be variable and inconsistent with macroeconomic statistics. Second, I focus on *all* public goods, while existing studies typically restrict themselves to specific policies. In doing so, I directly follow some of the principles outlined in O'Dea and Preston (2010), who provide a set of potential guidelines to estimate the distributional incidence of all government policies.

The rest of the article is organized as follows. Section 2 describes the methodology used to estimate the distributional incidence of all taxes and transfers to individuals. Section 3 presents the results. Section 4 concludes.

2. Methodology

I now outline the methodology used to estimate the joint distribution of income, taxes, and transfers in South Africa. Sections 2.1 and 2.2 cover estimates of pretax income and taxes. Section 2.3 focuses on the distribution of cash and in-kind transfers. Section 2.4 discusses estimates of public sector productivity, used to adjust public services received for differential quality by income group and over time. I restrict the main text to the key distributional assumptions and guiding principles, and leave technical details for the supplementary online appendix.

³See for instance Benhenda (2019), Lustig (2018), Paulus, Sutherland, and Tsakloglou (2010), Verbist, Förster, and Vaalavuo (2012), and Wagstaff et al. (2014) on education and health, Aaberge et al. (2010), 2019 on local government services, and Mladenka and Hill (1978) on police expenditure.

2.1. Distribution of Factor Income and Pretax Income

I start by building a microfile covering the distribution of factor and pretax national income. This involves four main steps.

First, I build a new microdataset on the distribution of household income in South Africa. My main data source are nationally representative living standards surveys collecting detailed information on incomes and expenditure, which have been conducted on a regular basis since 1993. I combine them with tax data to better cover the top end of the income distribution, using income tax tabulations published by the South African Revenue Service. I directly incorporate these tabulations in the microfile by applying the calibration method recently developed by Blanchet, Flores, and Morgan (2022), which reweighs survey observations so as to match the distribution of top taxable incomes reported in the tax data.

Second, I proportionally rescale household income components—compensation of employees, mixed income, rental income, interest, and dividends—to match national accounts aggregates.

Third, I incorporate remaining national income components to the microfile. These include imputed rents, other property income, corporate undistributed profits, and government primary income, which I distribute following standard assumptions used in other DINA studies (Blanchet, Chancel, and Gethin, 2022; Piketty, Saez, and Zucman, 2018). Summing up all components yields factor income, which is by construction equal to net national income per capita.

Fourth, I distribute pension and unemployment insurance contributions and benefits to reach pretax national income. Social insurance systems are very small in South Africa, and mostly redistribute income within top income groups, so factor and pretax incomes are almost identical (see section 3.2).

I stress that the main results presented in this paper are very strongly robust to departing from the DINA framework and focusing only on reported survey household incomes. Although I view consistency with the national accounts as a more conceptually coherent way of studying government redistribution, it does not affect my main conclusions on the incidence of in-kind transfers.

2.2. Distribution of Taxes

I distribute all government revenue from direct and indirect taxes to individuals, based on standard incidence assumptions used in the literature (Blanchet et al., 2021). These mainly include the personal income tax (11% of national income), the corporate income tax (6%), the value added tax (8%), and other indirect taxes (2.5%).

I microsimulate the personal income tax at the individual level, based on rules and thresholds, every year from 1993 to 2019.

I consider that the corporate income tax is paid by shareholders and distribute it proportionally to equity, accounting for equity held both directly and indirectly through pension funds.

I distribute total VAT revenue proportionally to consumption, accounting for the fact that a number of "basic goods" are VAT-exempt in South Africa, and excluding goods that are purchased on the informal market, following Bachas, Gadenne, and Jensen (2022).

Other indirect taxes include the general fuel levy, distributed proportionally to fuel expenditure; other excise taxes, distributed proportionally to tobacco and alcohol expenditure; and taxes on international trades, which I allocate proportionally to expenditure on goods whose production relies more heavily on imports, estimated using input-output tables.

2.3. Distribution of Transfers

The bulk of my analysis focuses on allocating government expenditure to individuals, which is where I most significantly improve upon existing DINA and fiscal incidence studies. In broad strokes, I first identify different functions and policies of the South African government, and collect new budget data on spending in each of them. I then combine different microdata sources to estimate who benefits from spending on these functions alongside the income distribution. Finally, I incorporate these estimates into the microfile to derive individual-level measures of posttax national income. Table 1 provides information on spending by function as a share of national income, the microdata and macrodata sources used to allocate them to individuals, and the corresponding distributional assumptions.

2.3.1. Cash Transfers (5.3% of national income in 2019)

Cash transfers include the old age grant, the disability grant, the child support grant, and other social grants, whose beneficiaries are reported in surveys. However, the number of recipients and total amounts received tend to be slightly lower than in administrative data. I impute additional beneficiaries to the microfile, until reaching consistency with budget data on grant disbursements.

2.3.2. In-Kind Social Protection (1.1% of NNI)

Other social protection expenditure brings together a number of social programs run by provinces, including projects dedicated to reducing HIV prevalence, centers for the treatment and prevention of drug abuse, or policies aiming to prevent violence against women and children. I distribute it proportionally to cash transfers.

2.3.3. Education (9% of NNI)

To distribute education expenditure, I combine census microdata covering income and educational attendance with newly digitized budget data on education expenditure by province and program. I distribute education expenditure to individuals following the corresponding programs on a lump sum basis, assuming that each pupil receives the same transfer within a given province-program cell.⁴

2.3.4. Health (5.1% of NNI)

I distribute health expenditure proportionally to the intensity of use of the public healthcare system. As in the case of education, I do so by combining surveys covering healthcare use with budget data on health spending by province and function. I then allocate public health expenditure to individuals who recently visited a public health institution in each province, separately for clinics and hospitals, assuming that each individual received the same amount within a given province-institution-visit cell.

2.3.5. Housing (0.9% of NNI)

The bulk of housing expenditure in South Africa corresponds to public housing provided to households in the context of the Reconstruction and Development Programme (RDP), which aims to provide eligible households with newly built subsidized dwellings. I identify RDP beneficiaries in the General Household Survey and allocate housing expenditure accordingly on a lump sum basis.

⁴Administrative data on the distribution of education expenditure in South Africa shows that this is a reasonable 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).

2.3.6. Local Government (9.6% of NNI)

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. 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.⁵ To allocate local government expenditure, I combine census microdata with newly harmonized local budget series. I then distribute local expenditure on a lump sum basis, assuming that each individual receives the same transfer in each geographical unit.⁶

2.3.7. Public Order and Safety (3.7% of NNI)

Expenditure on public order and safety includes visible policing, which aims to "Enable police stations to institute and preserve safety and security"; Detective Services and Crime Intelligence, whose objective is to investigate and solve crimes; law courts; and prisons (South African Treasury, 2022). I propose to group these four categories into two functions: an "insurance" function equal to visible policing, and a "use" function equal to all other expenditure. The insurance function thus 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 incarceration.

I distribute expenditure on each of these functions using South African Victims of Crime Surveys. I consider that the insurance function benefits households in proportion to the frequency at which they see a police officer in their neighborhood.⁷ I distribute the use function proportionally to the total number of crimes reported to the police, consistently with the idea that victims of crimes benefit from greater services in the form of detective services or trials (O'Dea and Preston, 2010).

⁵See appendix figure A.6.1, which plots the level and composition of total local government expenditure from 2001 to 2019.

⁶This amounts to accounting for geographical differences in spending across municipalities, but not for the relative progressivity of spending within each of them, for which data is unfortunately lacking. On the one hand, one may expect richer households within a given unit to receives a greater transfer, given that they consume greater quantities of electricity or water. On the other hand, municipalities do spend significant amounts on policies specifically targeted to the poor, such as free basic services and other social programs.

⁷This strategy can be motivated by the large 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).

2.3.8. Transport (2.5% of NNI)

Transport expenditure can be split into public transport and infrastructure. Public transport expenditure corresponds to train and bus services; I allocate it proportionally to household expenditure on public transport, which is reported in living standards surveys.

Infrastructure expenditure includes all expenditure on the construction and maintenance of roads, railroads, and other infrastructure. I consider that it benefits households in three different ways: directly through their use of private vehicles; indirectly through their use of public transport; and indirectly through their consumption of goods that are transported. I allocate the first two components proportionally to personal fuel expenditure and personal public transport expenditure, respectively. For the third component, I rely on input-output tables to derive measures of the "transport intensity" of different types of goods consumed by households, and allocate it proportionally to "transport-intensive" personal consumption accordingly.

2.3.9. Other Economic Affairs (2.8% of NNI)

Expenditure on economic affairs mostly includes subsidies directed to different goods and sectors of the economy, such as fuel and energy, manufacturing, or agriculture. I map each of these functions to broad categories of consumption, and assume that households benefit from these subsidies in proportion to their expenditure on the corresponding baskets of goods.

2.3.10. Other Expenditure (3.7% of NNI)

Other government expenditure in South Africa consists in spending on general public services (2.5%) and defense (1.2% of NNI). I consider two polar scenarios: one in which they are distributed on a lump sum basis, and one in which they are distributed proportionally to posttax disposable income (that is, in an extremely regressive way).

2.4. Accounting for Quality

Estimates presented above correspond to the distribution of the cost of pprovision and do not account for the quality of services received. Following Gethin (2022), I adjust in-kind transfers to account for two productivity parameters: aggregate productivity, which refers to the overall efficiency of the South African government at providing public goods, and heterogeneous productivity, which captures inequality in the quality of services received by income group.

2.4.1. Aggregate Productivity

To account for potential inefficiencies in public goods provision in South Africa compared to other countries in the world, I rely on estimates by Gethin (2022), who combines a number of data sources to estimate levels and trends in public sector productivity around the world since 1980. First, data is collected on spending, outcomes, and other auxiliary variables covering four functions of government: education, healthcare, transport, and police services. Second, an efficient frontier is estimated for each of these functions, corresponding to the maximum output obtained for each level of expenditure. Finally, four alternative indicators of productivity are derived. The first two compare outcomes obtained for a given level of expenditure (output efficiency), either using only government expenditure as an input (single-input estimates), or incorporating other auxiliary variables in the model, to account for the fact that other factors may explain lower outcomes obtained (multiple-input estimates). The other two follow the same principle, but compare expenditure to the minimum expenditure that would be required to obtain the same outcome (input efficiency). The resulting four measures range from 0 to 1, with 0 corresponding to a completely useless government, and 1 corresponding to the most efficient government observed.

I multiply transfers received in South Africa by the corresponding estimates of aggregate productivity on these four indicators, taking single-input, output-oriented measures as a benchmark, unadjusted figures as an upper bound, and the lowest of the four estimates as a lower bound.

2.4.2. Heterogeneous Productivity

The final step of the estimation consists in accounting for heterogeneity in the quality of public services received by income group. This is an extremely challenging task, as it would ideally imply deriving monetary indicators of how the value added of each type of government service varies by income group.

In the absence of better information, I combine a number of data sources to get a sense of how important variations in the quality of public services alongside the distribution of income might be in South Africa. Table 2 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 in most dimensions of government intervention. 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 quality. They tend to live further away from public institutions, in particular police stations and hospitals (but not public schools and public transport services).

Second, despite these differences, inequalities in access to public services remain relatively small. In particular, the data point to clear bounds on the maximum potential 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 some of these indicators do not account for the fact that higher quality might be the result of greater resources, which are already captured in estimates of progressivity. For instance, estimates of school teachers' knowledge of mathematics are based on the entire South African population, including private and fee-paying schools, which are disproportionately concentrated 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 3), which are not accounted for here either. Correcting for differential resources would thus lead to revising inequalities in access to public services downwards. In this context, estimates of heterogeneous productivity 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 aggregate these different subjective and objective measures by government function, and correct the transfer received by each income group accordingly.

3. Results

I now turn to the analysis of government redistribution in South Africa. Section 3.1 provides novel evidence on the progressivity of in-kind transfers and how it varies by government function. Section 3.2 studies the incidence of in-kind transfers on inequality and the distribution of growth.

3.1. Who Benefits From Public Goods?

How large is government redistribution in South Africa, and how has it evolved since 1993? Table 3 provides a first answer to this question by documenting the share of total government expenditure, the share of national income, and the average transfer received by the poorest 50% by government function in 1993 and 2019. Figures correspond to the distribution of cost and do not account for aggregate or heterogeneous productivity.⁸ Three main conclusions can be drawn.

1) In-Kind Transfers Are Large and Strongly 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 to be very highly progressive: in 2019, over 40% of public spending accrued to the poorest half of the population, while its share of pretax national income stood at only 2.7%. Every single category of government spending was relatively progressive, both in 1993 and 2019. In other words, government transfers systematically reduce inequality.

In-kind transfers also appear to be very large. In 2019, total transfers received by the bottom 50% amounted to about \$3200 at PPP after excluding social protection, corresponding to about five times their average pretax income (\$630). Spending on education alone represented twice their average income, and was about 35% higher than total social protection expenditure. Overall, in-kind transfers accounted for almost 80% of total expenditure accruing to the bottom 50% in 2019.

2) Progressivity Varies Significantly Across Functions of Government Beyond this general result, there are major differences in progressivity across types 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 most cash grants are means-tested and thus explicitly targeted towards the poor.⁹

⁸Appendix table A.1.1 presents the same results after adjusting in-kind transfers received for lower bounds on government aggregate and heterogeneous productivity. Appendix table A.1.2 presents the same table, but focusing on the bottom 20% instead of the bottom 50%. The conclusions are unchanged in both cases.

⁹The bulk of social protection expenditure in South Africa consists in the old age grant, the child support grant, and the disability grant, all of which are means-tested (see appendix figures A.3.1).

Public education and healthcare also appear to be slightly progressive in South Africa, for two main reasons. First, both services are used more extensively by poor 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 groups, who tend to have more children and visit health institutions more frequently.¹⁰

Local government spending is regressive in absolute terms. This is a direct consequence of richer municipalities having access to greater resources through larger local tax collections, which enables them to spend more on public services.¹¹

Public order and safety expenditure is absolutely regressive too. This is true of spending on both visible policing and law enforcement. It reflects the fact that richer households are more likely to suffer from crimes and report them to the police, as well as to live in neighborhoods with greater police presence.¹²

Transport expenditure and expenditure on economic affairs are the most regressive of all functions of government (although there are still progressive in relative terms). Only about a fifth of public transport expenditure accrues to the bottom 50%, mainly because public transport is more intensively used by middle-class households in richer urban areas.¹³ Infrastructure scarcely benefits the poor at all, with only 7% of expenditure accruing to the bottom 50% in 2019. 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.

3) Government Redistribution Has Increased There has been a dramatic rise in redistribution since the end of apartheid. Between 1993 and 2019, the average transfer received by the bottom 50% grew by 125%, from \$1840 to \$4140 at purchasing power parity. This increase was the

¹⁰In 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 A.4.4). 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 A.4.5). 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 A.5.4). 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 A.5.5 and A.5.6).

¹¹Appendix figure A.6.1 shows that these strong spatial inequalities extend to all parts of the distribution: in 2019, the top 10% thus benefited from nearly PPP \$1700 per capita in local government expenditure, compared to less than 700\$ for the bottom 10%.

¹²See appendix figures A.8.3 and A.8.4, which plot the average number of crimes reported to the police and the intensity of police presence in the respondent's neighborhood by income quintile, respectively. Both indicators are increasing in income, although only moderately.

¹³See appendix figures A.9.3 and A.9.4: the average number of bus and train trips realized per week is highest among the second, third, and fourth quintiles, and is lowest among the top 20%.

outcome of three factors. First, the average national income per capita expanded by 37% in real terms.¹⁴ Second, general government expenditure grew as a share of national income, from about 37% to 43% of NNI. This rise was concentrated in functions of government that are most equally distributed, in particular social protection, education, and health (see table 1). Third, the progressivity of transfers increased: from 1993 to 2019, the share of total government expenditure accruing to the bottom 50% expanded from 29% to 41%. The rise of progressivity happened in 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.¹⁵ The outcome of these three forces has been a large increase in the real value of transfers received by the bottom 50%, which extends to all categories of public spending.

Figure 1a provides a more detailed perspective on the rise of in-kind transfers at the bottom of the distribution since 1993, before and after accounting for the quality of services received.¹⁶ The top line shows that the total in-kind transfer received by the bottom 50%, estimated at cost of provision, grew from about \$1700 to \$3600 from 1993 to 2019. In the benchmark scenario, I adjust this transfer for aggregate productivity, estimated using the cross-country approach with single-input, output-oriented measures, as well as for heterogeneous productivity. This reduces the total transfer received in 2019 to \$2900: by this measure, government inefficiencies and inequality in access to public services imply that the value of total transfers is about 80% that of their cost. The bottom line further reduces this transfer by correcting it for single-input, input-oriented measures of aggregate productivity, which picture the South African government as extremely inefficient. The total transfer becomes \$2050, which puts the value of in-kind transfers at only 45% of their cost. In all three scenarios, in-kind transfers received by the poorest half of the population have substantially increased. To conclude that they have not, one would have to assume that the South African government moved from being fully efficient and perfectly egalitarian in access to public services, to levels of inefficiency and unequal access even higher than those estimated in the most conservative estimates presented here.

Figure 1b introduces taxes into the picture by representing the net transfer operated by the tax-and-transfer system between income deciles in 1993 and 2019, before and after adjusting for quality. There are two key results. First, government redistribution strongly benefits low-income

¹⁴Appendix figure A.1.1 displays the real evolution of net national income and GDP per capita in South Africa from 1993 to 2019.

¹⁵See for instance appendix figure A.4.4: 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 A.6.3 and A.6.4 show that there has been a dramatic convergence of local government spending across municipalities, as the rise of overall expenditure was strongly driven by the catch-up of low-spending municipalities.

¹⁶Appendix figure A.1.5 shows that the same conclusions hold when focusing on the bottom 20%.

groups, both in 1993 and 2019. The net transfer received by each decile within the bottom 70% ranges from 1% to 3%, depending on the year and the productivity adjustment made. This transfer is almost entirely financed by taxes paid by the top 10%, which displays a net negative transfer as high as 20% of national income in 2019. Second, total redistribution has become significantly more progressive over time: every decile within the bottom 90% saw an increase in net transfers received, financed by an even more negative transfer for the top 10%. These results are robust to accounting for different estimates of the quality of in-kind benefits received.

3.2. The Incidence of Public Goods on the Distribution of Growth

I now turn to analyzing the distributional impact of redistribution on income and growth. I derive two main conclusions: in-kind transfers substantially reduce inequality, and they have significantly contributed to income growth at the bottom since 1993.

1) Public Goods Substantially Reduce Inequality Given that in-kind transfers are large and progressive, it naturally follows that they strongly contribute to reducing inequality. To get a sense of their redistributive power, consider table 4, which provides information on the contemporary distribution of income in South Africa before and after taxes and transfers. Pretax income is extremely unequally distributed. In 2019, the top 0.1% captured over 8% of pretax income, more than three times the share of income received by the bottom 50% as a whole. The top 10% income share stood at almost 69% (compared to about 47% in the US: see Piketty, Saez, and Zucman, 2018). Meanwhile, 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, as already highlighted by existing studies (e.g., 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 increases the average income of the poorest half of the population by over 50%. Both the middle 40% and the top 10% see their average incomes decrease, due to higher direct taxes paid than cash transfers received.

Columns 6 to 11 remove all remaining taxes and add in-kind transfers to reach posttax national income, using the same three scenarios on the value of public goods as those reported in figure

1a. In all three cases, in-kind transfers substantially reduce poverty and inequality. In the benchmark scenario, moving from posttax disposable to posttax national income multiplies the average income of the bottom 50% by a factor of more than 2.5. As a result, the bottom 50% income share nearly doubles, from about 6.5% pretax to 12.8% posttax. The bottom 20% average income increases from \$410 to \$1500; in other words, over 70% of the final income of the poorest quintile consists in income received in the form of in-kind transfers. The impact of in-kind transfers is even stronger when they are valued at cost (columns 6 and 7), and remains very large even after making extreme assumptions on government productivity (columns 10 and 11).

2) Public Goods Have Boosted Bottom Income Growth 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 2a 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.¹⁷ Average factor incomes grew by 14% over this period, which is only about 40% of the average national income growth rate. Adding pensions and unemployment benefits leaves this picture unchanged, since these transfers are very small and almost entirely received by top-income groups.¹⁸

Accounting for other cash transfers pushes 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.¹⁹ Accounting for in-kind social protection further increases this figure to 67%, due to the development of various provincial social development programs.

Education, health, and local government spending account for the bulk of in-kind government redistribution. Adding education transfers pushes the average income of the bottom 50% from about \$1,500 to \$2,500, and its growth rate from 67% to 79%. Health transfers add about another \$500, and local government and housing expenditure bring the bottom 50% average

¹⁷Figures A.1.6 and A.1.7 reproduce figure 2a but allocating in-kind transfers at cost and using lower bounds on government productivity, respectively. The main results are unchanged.

¹⁸See appendix figures A.2.1, A.2.2, and A.2.3. 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.

¹⁹See appendix figure A.3.1, which shows that the bulk of the rise of social protection expenditure since 1993 has been driven by the child support grant. The growth of cash transfers cannot be explained by increases in the value of grants allocated per beneficiary: in fact, their real monthly value has stagnated or even decreased (see appendix figure A.3.3). Instead, there has been a significant increase in coverage: by 2019, about 10% of the adult population received an old age grant from the government, and almost two-thirds of all South African children benefited from a child support grant (see appendix figure A.3.4).

income to some \$3,500. Finally, accounting for spending on public order and safety, transport, and other economic affairs increases it to almost \$4,000. The total growth rate of the bottom 50% after all transfers reaches 95%, which is nearly 7 times that of factor income and about 80% higher than that of pretax income plus cash transfers. Notice that this figure mechanically underestimates the true contribution of in-kind transfers to bottom real income growth, since it adds them after market income and cash transfers in the analysis.

Figure 2 provides a more granular picture on the distribution of growth in post-apartheid South Africa by plotting the total income growth rate by percentile from 1993 to 2019, before and after adding government transfers. Individuals earning less than 1% of the median income are excluded from this figure, to avoid growth rates diverging to infinity at the bottom of the distribution, which explains why pretax income growth rates appear larger among the bottom 50% than in figure 2a. Pretax income growth has been relatively flat throughout the distribution, ranging from 30% for upper-middle income groups to 75% for the top 1%. Adding cash transfers significantly increases growth for all percentiles within the bottom 90%, with the greatest gains being concentrated at the very bottom of the distribution. Public goods have thus played a consequential role in increasing the living standards of low-income households, not only for the bottom 50% as a whole, but also for the very poor. After accounting for cash and in-kind transfers, the distribution of growth in post-apartheid South Africa has been unambiguously progressive.

4. Conclusion

Public services remain largely absent from standard poverty and inequality statistics, despite representing the bulk of government redistribution in developing countries. This article showed that incorporating in-kind transfers in measures of posttax income leads to a much more nuanced view of the evolution of income disparities in post-apartheid South Africa. Not only are public services strongly progressive; they have become increasingly so, contributing to ensuring a much more inclusive distribution of growth than generally thought.

These results call for future research in at least two directions. First, the fact that wages have remained so low at the bottom of the income distribution bears the question of how useful these public services have been at all. Arguably, they have strongly contributed to improving the quality of life of South African citizens in a number of dimensions, from greater access to electricity and water to better education and health outcomes. At the same time, the fact that better access to these services does not seem to have enabled a fairer distribution of employment and pretax incomes is puzzling. One possibility is that pretax income inequality would have grown even faster in the absence of the rise of government redistribution. Another possibility is that of "redistribution without inclusion," whereby the legacy of apartheid and spatial segregation continues to weigh so heavily in access to economic opportunities that public services have failed to truly enable low-income households to escape the poverty trap.

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, in particular health and education (Khemani, Habyarimana, and Nooruddin, 2019; Thesmar and Landier, 2022). Answering this question would require new methods and data sources that go far beyond those mobilized in this article.

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Notes. Author's computations using distributional national accounts microfile. The figure represents the level and composition of in-kind transfers received by the bottom 50% from 1993 to 2019. Unadjusted figures correspond to allocation at cost ($\theta^j = 1$). The benchmark scenario reduces government transfers by accounting for both aggregate and heterogeneous productivity; aggregate productivity is measured using the cross-country benchmark with single-input, output-oriented estimates. The lower bound corresponds to figures corrected with single-input, input-oriented estimates. General public services and defense are distributed proportionally to posttax disposable income. The unit of observation is the individual. Income is split equally between all household members.

Figure 1 – In-Kind Transfers and Redistribution in South Africa

(b) Net Transfer Operated by the Tax-and-Transfer System Between Income Deciles, 1993-2019

432101234567890 Net Transfer Received/Paid % of National Income) 1 23 4 5 -16 -18 1993 Unadjusted 9 -20 -21 -22 -23 2019 Lower bound D2 D3 D5 D7 **D**8 D1 D4 D6 D9 Top 10% **Income Decile** Notes. Author's computations using distributional national accounts microfile. The figure plots the share of national income transferred between pretax income deciles in 1993 and 2019, calculated as the difference between average posttax national income and average pretax national income. Unadjusted figures correspond to allocation at cost ($\theta^{j} = 1$). The benchmark scenario reduces

government transfers by accounting for both aggregate and heterogeneous productivity; aggregate productivity is measured using the cross-country benchmark with single-input, output-oriented estimates. The lower bound corresponds to figures corrected with single-input, input-oriented estimates. General public services and defense are distributed proportionally to posttax disposable income. The unit of observation is the individual. Income is split equally between all household members.



Figure 2 – In-Kind Transfers and Real Income Growth in South Africa

(a) Bottom 50% Average Income Before and After Transfers, 1993-2019

Notes. Author's computations using distributional national accounts microfile. 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. All in-kind transfers are corrected for aggregate and heterogeneous productivity; aggregate productivity is measured using the cross-country benchmark with single-input, output-oriented estimates. Other expenditure corresponds to general public services and defense, distributed proportionally to posttax disposable income. The unit of observation is the individual. Income is split equally between all household members.



(b) Real Income Growth Rate by Percentile, 1993-2019

Figure 2 – In-Kind Transfers and Real Income Growth in South Africa

Notes. Author's computations using distributional national accounts microfile. The figure displays the total real income growth rate for each percentile of the distribution from 1993 to 2019 for different income concepts. All in-kind transfers are corrected for aggregate and heterogeneous productivity; aggregate productivity is measured using the cross-country benchmark with single-input, output-oriented estimates. Capped spikes cover other scenarios on the productivity of public goods. General public services and defense are distributed proportionally to posttax disposable income. The unit of observation is the individual. Income is split equally between all household members. Excludes individuals with incomes lower than 1% of the median income in a given year.

	Method	Microdata	Macrodata	% ľ	ΝNI
				1993	2019
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%
Education	Lump sum per student,	Census	Provincial Budgets	7.8%	9.0%
	by function and province				
Health	Proportional to healthcare	GHS/OHS	Provincial Budgets	4.0%	5.1%
	use, by function and province				
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%
Visible Policing	Proportional to police presence	VCS	National Budget	1.9%	1.8%
Law Enforcement	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-	IES/LCS	National Budget	1.5%	1.9%
	intensive consumption		Input-Output Tables		
Other Economic Affairs	Proportional to sector-	IES/LCS	National Budget	3.5%	2.8%
	intensive consumption		Input-Output Tables		
All Others	Lump sum / proportional to income	Microfile	National Budget	6.5%	3.7%
Total				37.1%	42.6%

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

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 in 1993 and 2019. GHS: General Household Surveys; IES: Income and Expenditure Surveys; LCS: Living Conditions Surveys; OHS: October Household Surveys; VCS: Victims of Crime Surveys.

	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 (R 1,000)	177	178	267	308	305	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

Table 2 – Indicators of Heterogeneous Public Service Delivery by Income Quintile in South Africa

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. $q^j(Q_1)$ is the corresponding measure of 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 the scale of the variable is inverted). 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).

	Share of Total Expenditure Received (%)		Share of National Income Received (%)			Average Transfer Received (2021 PPP USD)			
	1993	2019	1993-2019	1993	2019	1993-2019	1993	2019	1993-2019
Social Protection	74%	77%	+3%	2.3%	4.0%	+79%	390	950	+146%
Education	49%	61%	+25%	3.8%	5.5%	+45%	650	1290	+99%
Health	50%	58%	+17%	2.0%	3.0%	+51%	340	700	+107%
Housing	45%	57%	+26%	0.3%	0.5%	+101%	40	120	+176%
Local Government	26%	38%	+46%	1.6%	3.6%	+122%	280	850	+205%
Public Order and Safety	35%	38%	+10%	1.2%	1.4%	+18%	210	330	+62%
Visible Policing	38%	38%	+1%	0.7%	0.7%	-7%	120	160	+27%
Law Enforcement	31%	38%	+22%	0.5%	0.7%	+56%	80	170	+113%
Transport	7%	10%	+38%	0.1%	0.2%	+70%	20	60	+134%
Public Transport	14%	21%	+51%	0.1%	0.1%	+62%	10	30	+122%
Infrastructure	5%	7%	+38%	0.1%	0.1%	+77%	10	30	+143%
Other Economic Affairs	10%	13%	+33%	0.3%	0.4%	+5%	60	80	+44%
Total	29%	41%	+43%	10.7%	17.6%	+64%	1840	4140	+125%
Pretax Income				3.3%	2.7%	-20%	570	630	+10%

Table 3 – Government Redistribution in South Africa, 1993-2019: Level, Composition, and Progressivity of Transfers Received by the Bottom 50%

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 to 4 show the share of total transfers received by the bottom 50%. Columns 5 to 7 report the corresponding share of net national income received. Columns 8 to 10 report the average annual transfer received by the bottom 50%, expressed in 2021 PPP USD. The unit of observation is the individual. Income and transfers are split equally between all household members. "Total" adds spending on defense and general public services to other rows, assuming that these two components are distributed proportionally to posttax disposable income. The last row shows the pretax income share and the average pretax income of the bottom 50%.

						F	Posttax Natio	nal Incom	e	
	Pretax National Income		Posttax Disposable Income		Unadjusted		Benchmark		Lower Bound	
	Average Income	Income Share	Average Income	Income Share	Average Income	Income Share	Average Income	Income Share	Average Income	Income Share
Full population	\$ 11,800	100%	\$ 7,780	100%	\$ 11,800	100%	\$ 11,100	100%	\$ 9,860	100%
Bottom 50%	\$ 630	2.7%	\$ 1,020	6.5%	\$ 3,500	14.9%	\$ 2,830	12.8%	\$ 1,960	9.9%
Bottom 20%	\$ 45	0.1%	\$ 410	1.1%	\$ 2,060	3.5%	\$ 1,500	2.7%	\$ 730	1.5%
Next 30%	\$ 1,020	2.6%	\$ 1,420	5.5%	\$ 4,460	11.4%	\$ 3,710	10.1%	\$ 2,780	8.5%
Middle 40%	\$ 8,410	28.6%	\$ 6,530	33.6%	\$ 10,300	34.9%	\$ 9,580	34.6%	\$ 8,360	33.9%
Top 10%	\$ 80,700	68.7%	\$ 46,600	59.9%	\$ 59,000	50.2%	\$ 58,200	52.6%	\$ 55,400	56.2%
Top 1%	\$ 329,000	28.0%	\$ 170,000	21.9%	\$ 219,000	18.6%	\$ 216,000	19.5%	\$ 209,000	21.2%
Top 0.1%	\$ 970,000	8.3%	\$ 519,000	6.7%	\$ 633,000	5.4%	\$ 626,000	5.7%	\$ 612,000	6.2%

Table 4 – The Distribution of Income in South Africa in 2019

Notes. The table reports statistics on the distribution of income in South Africa in 2019 for different income concepts. Posttax disposable income is the sum of primary incomes, minus direct taxes, plus cash transfers. Posttax national income deducts all taxes and adds all transfers. Unadjusted estimates add in-kind transfers at cost of provision. Benchmark estimates adjust in-kind transfers for aggregate and heterogeneous productivity; aggregate productivity is measured using the cross-country benchmark with single-input, output-oriented estimates. Lower bound estimates adjust in-kind transfers for aggregate and heterogeneous productivity; aggregate productivity benchmark with single-input, input-oriented estimates. General public services and defense are distributed proportionally to posttax disposable income. The unit of observation is the individual. Income is split equally between all household members.

Who Benefits from Public Goods? Evidence from South Africa Supplementary Online Appendix

Amory Gethin*

Abstract

This appendix supplements my article. It contains additional methodological details and all supplementary figures and tables.

*World Inequality Lab – Paris School of Economics.

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A Construction of South African Distributional National Accounts

This section provides additional details on the methodology used to build South African Distributional National Accounts. Section A.1 lists the data sources used to estimate macroeconomic aggregates, including national accounts, population estimates, and other government budget and administrative data. Section A.2 describes the combination of available survey and tax data to build a microfile covering the distributions of factor national income every year from 1993 to 2019. Section A.3 explains how taxes and transfers are allocated to reach posttax national income.

A.1 Harmonization of Macroeconomic Aggregates

A.1.1 National Accounts Data

Main Aggregates Estimates of national income, wealth, and expenditure aggregates come from the South African Reserve Bank (SARB) quarterly bulletin.¹ The published files provide detailed decompositions of national accounts components, which I directly match with the microfile to estimate distributional national accounts. The exceptions are mixed income and corporate undistributed profits, which I decompose further to refine the imputation.

Decomposition of Mixed Income and Imputed Rents The SARB data does not publish separate series for mixed income, rental income, and imputed rents, instead providing a single aggregate for [B2N + B3N, S14]. To derive an estimate of total rental income received by households, I combine all income surveys (1993, 1995, 2000, 2005, 2008, 2010, 2015: see section A.2) and General Household Surveys (GHS, 2016-2019), which have collected information on rents paid by South African tenants.² The resulting total rental income represented 1.9% of national income (14% of [B2N + B3N, S14]) in 2019, up from 1.4% (12%) in 1993. Following recommendations by the South Africa Reserve Bank, I assume that imputed rents represent a fixed 20% of the total, and I compute mixed income (*i.e.*, self-employment income excluding rental income) as the residual of these two categories.

¹See https://www.resbank.co.za/en/home/publications/quarterlybulletin1/download-information-from-xlsx-data-files.

²I first aggregate all rent payments recorded in income surveys. I then interpolate the series linearly between years to cover the entire 1993-2015 period. Finally, I use GHS growth rates in rent payments to extrapolate series forward to 2019.

Decomposition of Corporate Undistributed Profits To allocate corporate retained earnings to individuals, one has to decompose them between the part that belongs to households (distributed proportionally to equity ownership) and the part that belongs to the government (distributed proportionally to factor income). I do so by relying on a preliminary estimate published by the SARB on the equity assets and liabilities of the household and government sectors in 2011 (see Beer and Kock, 2017). Dividing the sum of the equity assets held by the government by the total equity liabilities of the corporate sector, I estimate that about 93% of retained earnings can be attributed to households. In the absence of better data, I assume that this share has remained stable over the 1993-2019 period.

A.1.2 General Government Revenue and Expenditure Data

To move from factor income to pretax income and then posttax income, I collect data on general government revenue and expenditure from three main sources: the SARB, the OECD, and the South African National Treasury.

Government Revenue Yearly data on consolidated government revenue and its decomposition are available from the public finance series published in the SARB Quarterly Bulettin. I complement these harmonized series with OECD public revenue data to further decompose revenue from direct taxes into the personal income tax, the corporate income tax, and other taxes on income and wealth.³

Government Expenditure Data on the composition of general government expenditure by function are available from the Treasury Budget Reviews.⁴

Social Security Data To make the DINA microfile more representative of Unemployment Insurance Fund (UIF) and private pension contributions and benefits, I collect data on total contributions/benefits and number of contributors/recipients to the UIF and private pension funds in South Africa. Data on total UIF revenue and expenditure (2001-2019) and on the number of UIF recipients (2008-2012) are reported in various issues of the Treasury Budget Review. The number of individuals earning private pension income is estimated from the income tax panel microdata (2011-2017) available from the South African Revenue Service (see Ebrahim and Axelson, 2019), and extrapolated to 1993 assuming that it has remained

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<sup>3</sup>See https://stats.oecd.org/Index.aspx?DataSetCode=REVZAF.
<sup>4</sup>See http://www.treasury.gov.za/documents/national%20budget/default.
aspx.
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a constant share of the adult population.⁵ Total contributions to private pension funds and total private pension income are also estimated from the income tax panel, and extrapolated to 1993 using the growth rates of social contributions received by financial corporations and social benefits paid by financial corporations, respectively (both available from SARB national accounts data).

Social Protection Data I also collect data on the number of recipients and the monthly values of social grants from various issues of the Treasury Budget Reviews. Data on grant values are available every year since 1993 (or since the year the grant was implemented) for all major cash transfers in South Africa (including the old age grant, the disability grant, the child support grant, the foster care grant, and the care dependency grant). Data on the number of recipients of each grant are available since 1996.

Provincial Education and Health Expenditure To allocate public education and health expenditure to individuals, I digitize data on spending by province and function from the Provincial Budget Reports (2002-2021) published by the National Treasury.

Education expenditure is decomposed into five functions: Administration, Public Ordinary Education (itself decomposed into Public Primary Education, Public Secondary Education, and Other since 2001), Independent School Subsidies, Public Special School Education, Further Education and Training, and Adult Basic Education. The data is available in each province of South Africa and covers the 1998-2019 period.

Health expenditure is decomposed into eight functions: Administration, District Health Services, Emergency Medical Services, Provincial Hospital Services, Central Hospital Services, Health Sciences And Training, Health Care Support Services, and Health Facilities Management. As for education, the data is available in each province of South Africa and covers the 1998-2019 period.

In both cases, I extrapolate the series backwards to 1993 by assuming that the distribution of expenditure across provinces and across functions within each province have remained constant over the 1993-1998 period, and rescaling each province-function cell so as to match total consolidated education and health spending at the national level.

⁵This is a reasonable assumption to the extent that the number of pension recipients has also remained stable in income surveys, although at a lower level than in the tax microdata.
A.2 Construction of DINA Microfile

A.2.1 Combination of Survey Data Sources

The main data source used to estimate the distributions of income, consumption, and wealth at the micro level are household surveys that have collected detailed information on the earnings and expenditures of households in South Africa. Seven such surveys, which I refer to as "income surveys" in what follows, have been conducted since 1993: the Project for Statistics on Living Standards and Development (1993), the Income and Expenditure Surveys (1995, 2000, 2005, 2010), and the Living Conditions Surveys (2008, 2015). Drawing on representative samples of households, they ask individuals to report earnings from various sources (such as wages, self-employment income, and property income), as well as other information such as contributions to private pension funds, taxes and transfers received, the market value of the home individuals live in, or expenditures on specific goods and services.

I create a harmonized microfile covering the entire 1993-2019 period by combining all available surveys (1993, 1995, 2000, 2005, 2008, 2010, and 2015) and filling missing years in the following way. For a given missing year (for instance 1997), I create a new dataset by appending all observations from the two surveys available in surrounding years (1995 and 2000), and then reweight observations so as to give a weight to each survey that is proportional to the distance from the year considered. To approximate the distribution of income in 1997, for instance, I append the 1995 and 2000 IES surveys, and then multiply existing sample weights by 1/2 in the former and 1/3 in the latter. This is similar to a linear interpolation strategy: it amounts to considering that in 1997 the distribution of income was somewhere between that of 1995 and that of 2000, and was closer to that of 1995. The resulting microfile thus combines all available surveys to cover individual-level data every year from 1993 to 2019.

A.2.2 Combination of Surveys with Tax Data

I correct surveys for misreporting of income at the top of the distribution by combining them with tabulated income tax returns. This correction is performed in three steps, following the methodology developed by **Blanchet2018**.

First, I define an income concept, "merging income", that can be consistently measured in both survey data and the income tax panel microdata (2011-2017). This income concept is equal to the sum of gross wages, business income, interest, rental income, and private pension income.

Second, I generate a "taxable income" variable in the survey microfile by multiplying merging income by the ratio of taxable income to merging income by percentile observed in the tax

microdata. This effectively amounts to incorporating deductions (that is, the gap between merging income and taxable income) in the survey microdata.⁶

Third, I calibrate the survey microfile on the tabulated income tax returns available from SARS, which report the number of taxpayers and total taxable income by income tax bracket every year since 2002 (as well as in 1993). I first recover full distributions from the tax tabulations using Generalized Pareto Interpolation (Blanchet, Fournier, and Piketty, 2017).⁷ I then calibrate the survey microdata on the tax tabulations using the algorithm developed by **Blanchet2018**, which reweights survey observations so as to match the distribution of top taxable incomes reported in the tax data. The resulting survey microfile is thus perfectly representative of the distribution of taxable income reported in the income tax tabulations.

A.2.3 Combination of Survey and Tax Data with Macroeconomic Aggregates

After combining surveys with tax data, I rescale reported household income components to macro totals, and distribute components of the net national income that are not directly received by individuals.

First, I proportionally scale up household income components to their corresponding totals reported in the national accounts:

- Gross wages proportionally to compensation of employees.
- Self-employment/business income proportionally to mixed income (excluding rental income, see section A.1)
- Rental income proportionally to total rents paid by households
- Interest income proportionally to total interest received by households
- Dividends proportionally to total dividends received by households

Second, I distribute unreported income components proportionally to proxy variables available in surveys:

• Imputed rents proportionally to the reported market value of the home of owner-occupiers

⁶For simplicity, I take the overall average of this ratio by percentile observed in 2011-2017 and apply it to the entire period. This corresponds to assuming that the profile of deductions has remained relatively stable between 1993 and 2019.

⁷For missing years (1994-2001), I assume that the extent of the under-representation of top incomes in survey data has evolved linearly, that is, I create synthetic income tax tabulations by linearly interpolating the correction by percentile observed in 1993 and 2002.

- Property income attributed to insurance holders and pension entitlements proportionally to the value of pension and life insurance assets
- Interest paid by households proportionally to the factor income of debtors
- Private corporate undistributed profits proportionally to directly and indirectly held stock ownership
- Government primary income and other remaining national income components proportionally to factor income

A.3 Distribution of Taxes and Transfers

A.3.1 Pension and Unemployment Systems

Pension and unemployment contributions and benefits are recorded in income surveys, so I distribute macro aggregates proportionally to values reported by respondents. In order to reach pretax national income, I distribute 50% of the deficit or surplus of each system proportionally to contributions paid, and 50% proportionally to benefits received.

A.3.2 Taxes

Personal Income Tax I microsimulate the personal income tax every year from 1993 to 2019. To do so, I first collect data on taxable income thresholds, marginal tax rates, and rebates at each income level from various reports published by the South African Revenue Service. I then apply the corresponding rules in the microdata to calculate the tax burden of each individual. Because I have calibrated top taxable incomes directly on income tax tabulations (see section A.2.2), the estimates of total personal income tax revenue derived from microsimulation match almost perfectly actual revenue statistics. I close the residual gap between micro and macro estimates by proportionally rescaling the income tax burden of each individual.

Dividends Tax I distribute the dividends tax proportionally to dividends reported in income surveys.

Corporate Income Tax I distribute the corporate income tax proportionally to equity ownership, including both directly held equity and equity held indirectly through pension funds (see Chatterjee, Czajka, and Gethin, 2022). **Skills Development Levy** The Skills Development Levy (SDL) is a 1% additional levy paid by wage earners who already contribute to the Unemployment Insurance Fund. I simulate it following this rule, and proportionally rescale the total to match total SDL revenue throughout the period.

Other Direct Taxes Other direct taxes include a number of minor taxes and levies, which have represented less than 1% of national income from 1993 to 2019. I distribute them proportionally to pretax income.

Transfer Duties The Transfer Duty is a tax levied on the value of properties acquired by individuals in South Africa. In the absence of information on property transactions, I distribute it proportionally to housing wealth (including both owner-occupied and tenant-occupied housing: see Chatterjee, Czajka, and Gethin, 2022).

Securities Transfer Tax The Securities Transfer Tax is a small tax that applies to the purchase and transfers of listed and unlisted securities. I distribute it proportionally to equity ownership.

Estate Duty and Donations Tax The Estate Duty and the Donations Tax are taxes on inheritance. In the absence of data on these transactions, I distribute them proportionally to total household wealth.

Value Added Tax I distribute total VAT revenue proportionally to household consumption expenditure, excluding both VAT-exempt goods and goods purchased on the informal market. Following the tax legislation, I directly identify VAT-exempt goods in income surveys and exclude them from taxable consumption. To identify goods purchased on the informal market, I derive a profile of informal consumption by income rank using the 2010 Income and Expenditure Survey, which reports the type of store at which the household purchased different kinds of goods. I extrapolate this profile to all years, assuming it has remained constant over the period. Expenditure in the informal sector is very small in South Africa, so that accounting for informality only has a negligible impact on the estimated distributional incidence of indirect taxation.

General Fuel Levy The General Fuel Levy is an excise tax charged on petroleum products. I distribute it proportionally to total transport expenditure reported by households in income surveys.

Other Excise Taxes Other excise duties mainly consist in excises applied to alcohol and tobacco products. In the absence of data on the decomposition of these taxes category by type of product, I distribute total revenue from non-GFL excises proportionally to combined alcohol and tobacco expenditure, as reported in income surveys.

Other Taxes on Goods and Services Other taxes on goods and services include a number of other small taxes, which have represented less than 0.5% of national income from 1993 to 2019. I distribute them proportionally to overall consumption expenditure.

Taxes on International Trade Import duties are effectively paid by households consuming a greater proportion of goods imported from abroad. Accordingly, I distribute taxes on international trade proportionally to import-intensive household expenditure, which I estimate using input-output tables available from the OECD (2005-2015).

Other Taxes Other taxes consist in a number of other small taxes and levies such as stamp duties. They have represented less than 0.5% of national income since 1993. I distribute them proportionally to pretax income.

Other Government Revenue I distribute all other government revenue, including non-tax revenue, proportionally to pretax income, so as to match total consolidated general government revenue in South Africa throughout the 1993-2019 period.

Local Government Revenue See section A.3.6.

A.3.3 Social Protection

Social protection expenditure in South Africa mainly consists in the old age grant, the disability grant, the child support grant, other small cash transfers, and other social protection expenditure.

Old Age Grant The old age grant is a means-tested benefit paid to South African citizens who are 60 years or older. Old age grant beneficiaries are directly reported in income surveys, but their number is slightly below that reported in administrative data sources, suggesting a tendency to under-report. To correct this bias and ensure that my microfile matches both the true number of beneficiaries and total expenditure on the grant as reported in government budgets, I impute additional beneficiaries in two steps. First, I estimate the probability of surveyed

individuals to receive the grant using a saturated linear probability model with the following explanatory variables: pretax income percentile, household expenditure percentile, gender, age, race, province or residence, and rural-urban location. Second, I rank individuals according to the predicted probability to receive the grant, and recursively allocate additional grants to those individuals most likely to receive it, until reaching the true number of beneficiaries every year from 1993 to 2019.

Disability Grant The disability grant is a means-tested benefit given to South African citizens who have a physical or mental disability that makes them unfit to work for a period of longer than six months. As in the case of the old age grant, it is reported in income surveys. I follow the same two-step strategy to impute additional beneficiaries when necessary, so as to match administrative statistics on both number of beneficiaries and total grant expenditure.

Child Support Grant The child support grant is a means-tested benefit given to low-income South African families to assist parents with the costs of the basic needs of their children. As in the case of the old age and disability grants, it is reported in income surveys. I follow the same imputation strategy as for these two grants, so as to match administrative statistics on both number of beneficiaries and total grant expenditure. The child support grant was first implemented in 1998, so I set grant expenditure and beneficiaries to zero before that year.

Other Social Grants Other small cash grants in South Africa include the foster care grant, the care dependency grant, the grant-in-aid, and social relief. I distribute them proportionally to their values reported in income surveys.⁸

Other Social Protection Expenditure Other social protection expenditure mainly consists in "provincial social development" expenditure, which brings together a large number of heterogeneous subnational policies targeted to poor 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 social grants received.

⁸Most income surveys do not report receipts from these grants separately, so I derive an aggregate for "other social grants" in each survey and distribute total expenditure on these grants proportionally to this aggregate.

A.3.4 Education

To distribute public education, I combine census microdata with provincial data on education expenditure by function (see section A.1.2). The 1996, 2001, 2011, and 2016 censuses, as well as the 2007 community survey, provide information on school attendance, current grade, and the type of school (private/public) attended.⁹ I match them with provincial budget data to allocate expenditure to individuals following public education by five levels: early childhood development, primary education, secondary education, tertiary education, and adult basic education. I assume that each individual within a given province-function cell receives the same transfer, equal to the per-student expenditure on this function. Finally, I proportionally rescale education transfers received so as to match total national education expenditure.

I incorporate these estimates into the DINA microfile by aggregating expenditure received by cells of pretax income ventile and province of residence in the census microdata; interpolating and extrapolating these cells so as to cover the entire 1993-2019 period; and finally merging these cells with the harmonized DINA microfile.

A.3.5 Health

I estimate the distributional incidence of public health expenditure by combining two different sets of surveys: the October Household Surveys (1995-1996) and the General Household Surveys (2004-2019). Both surveys have collected data on (1) whether household members have used the public healthcare system in the past month (2) the type of institution (private/public) usually visited by household members and (3) whether the institution usually visited is a clinic or a hospital.

First, I combine these variables to generate cells of public hospital and public clinic use intensity by pretax income ventile, race, and province. Second, I interpolate and extrapolate these cells so as to cover the entire 1993-2019 period. Third, I merge these cells with the harmonized DINA microfile, so as to a get a measure of the intensity of use of public clinics and public hospitals by group. Finally, I allocate health expenditure proportionally to these cells, so as to match total national health expenditure.

⁹The 1996 census microfile unfortunately does not provide information on type of institution, so I assume that all individuals attending school benefit from public education expenditure.

A.3.6 Local Government

The local government in South Africa consists of local, metro, and district municipalities. To distribute local taxes and transfers from 1993 to 2019, I first collect new historical budget data from a number of sources. I then allocate them to individuals by matching budget series with survey and census microdata. Finally, I incorporate these estimates into the DINA microfile.

Harmonization of Local Government Budget Data I combine data on local government revenue and expenditure from several sources. I collect data on local government expenditure at the municipal level, while I only collect data on total local government revenue at the national level.¹⁰

For local government revenue, I rely on three sources. The first one is the financial census of municipalities published by Stats SA, which provides detailed information on the composition of aggregate municipal operating revenue from 2006 to 2020. The second one consists in tables published in the 2008 Local Government Budgets and Expenditure Review prepared by the South African Treasury, which covers the 2003-2006 period. Finally, I digitize additional data on aggregate municipal revenue covering the 1996-2003 period from various issues of the National Budget Review and the Local Government Budgets and Expenditure Reviews. This yields consistent series on the level and composition of total municipal revenue from 1996 to 2019. I extrapolate these series backwards to 1993, assuming that total revenue has remained constant as a share of national income.

For local government spending, I rely on four sources. The first one are tables A2 published by the National Treasury in the context of the Medium Term Revenue and Expenditure Framework (MTREF), 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. As above, I interpolate and extrapolate total expenditure as a share of national income, so as to cover every year from 1993 to 2019.

¹⁰Revenue and expenditure of South African municipalities are traditionally decomposed into their operating and capital components, the latter mainly corresponding to infrastructure investments. In the absence of consistent data on capital revenue and expenditure throughout the period of interest, I limit my analysis to operating revenue and expenditure, which represent the bulk of municipal budgets.

The last step of harmonization consists in incorporating local government expenditure series into general government expenditure. Indeed, part of local expenditure is already accounted for in consolidated budgets: the part that is financed by transfers to municipalities from the central government. While most of these transfers are included in the "Community Development" function, some transfers, especially in recent years, consist in conditional grants that appear indirectly in other consolidated government functions. Unfortunately, exact estimates of which fraction of each function is spent through municipalities are not available. For simplicity, I assume that all transfers are spent through either Community Development or Water Supply, that is, I completely remove these two expenditure items from the national budget and replace them by the series of total local government spending estimated above.

Allocation of Local Government Revenue Local government revenue in South Africa consists mainly in property rates, service charges for the provision of electricity, water, and other services such as refuse removal, and transfers received from the central government. Since the latter are financed by central government revenue, I do not allocate them to individuals (doing so would lead to double counting, as transfers to municipalities are indirectly financed by national taxes). Property rates, electricity charges, and water charges are directly reported by households in income surveys, so I allocate budget totals proportionally to these reported values. I distribute the remaining components of municipal operating revenue proportionally to the total municipal tax burden of each individual, so as to match total revenue reported in municipal budgets.

Allocation of Local Government Expenditure I allocate local government expenditure to individuals by matching these newly constructed budget series with census microdata. To do so, I rely on the 1996, 2001, 2011, and 2016 censuses, as well as the 2007 community survey. I incorporate municipal expenditure into the microfile in three steps.

First, I match budget and census data at the municipal level in each census, recoding municipality names and codes when necessary. I do so for both local/metro and district municipalities, so as to distribute these two layers of local government one after the other. For 1996, I match individuals at the district level, given that I have no information on expenditure at a lower geographical level.

Second, I distribute local/metro and district municipal expenditure on a lump basis to individuals, assuming that all adults living in a given municipality benefit from the same transfer. I compare this strategy to a more complex one, in which I distribute 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 compare the results to

those obtained by allocating municipal expenditure at the district level instead of the municipal level, using either census (2001-2011) or NIDS (2008-2016) data. I find that these three alternative strategies yield virtually identical results in terms of the distribution of municipal expenditure by income, race, and province.

Finally, I incorporate these estimates into the DINA microfile. First, I aggregate municipal expenditure by 540 cells crossing 20 pretax income ventiles, South Africa's 9 provinces, and 3 racial groups (Black, White, and Others) in the census data. Second, I interpolate and extrapolate average expenditure received by each cell so as to cover the entire 1993-2019 period. Third, I match these cells with the DINA microfile. Finally, I rescale proportionally the average transfer received by individuals in each year so as to perfectly match yearly aggregate municipal operating expenditure at the national level.

A.3.7 Housing

Housing development expenditure in South Africa 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 and provided 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. First, I aggregate the share of individuals who declared having received a subsidy by cells of consumption decile and province. Second, I merge these cells with the DINA microfile. Third, I proportionally rescale each cell so as to match total government housing expenditure.

A.3.8 Transport

Expenditure on transport services can be decomposed into two components: public transport and infrastructure.

Public Transport Public transport expenditure corresponds to expenditure on the public transport system, including buses and commuter rail, and represents about 20-25% of total transport expenditure.¹¹ I distribute total public transport expenditure proportionally to house-hold expenditure on public trains and buses, which is directly reported in income surveys

¹¹Unfortunately, budget reports only provide a decomposition of transport expenditure into public transport and infrastructure from 2007 to 2019, so I assume that this decomposition was the same throughout the 1993-2006 period.

(COICOP codes 07311110 to 07321210).

Transport Infrastructure Infrastructure expenditure corresponds to expenditure on roads, railroads, and other infrastructure used by households, firms, and publicly owned vehicles to transport goods and people. Accordingly, I decompose the benefit received by individuals into a household part, a firm part, and a government part.

First, I use input-output tables to derive an estimate of what fractions of transport infrastructure are used by the household, corporate, and government sectors.

Second, I distribute each of these fractions to their ultimate beneficiaries.

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

For the corporate sector (mainly corresponding to the transport of goods), I use input-output tables to derive measures of the "transport intensity" of household consumption by COICOP, and I then allocate infrastructure expenditure proportionally to this intensity. 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 public sector fraction proportionally to the public transport transfer received by each individual, as estimated above. This amounts to assuming 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.

A.3.9 Other Economic Affairs

Expenditure on other economic affairs mainly include 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 taxes on international trade and transport infrastructure expenditure, I allocate

expenditure on these different sectors proportionally to their consumption intensity.¹² 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 proportionally more from energy subsidies provided to firms.

A.3.10 Public Order and Safety

Expenditure on public order and safety includes police services, law courts, and prisons. Police services are in turn broken down by the South African government 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.

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 thus 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. To do so, I rely on Victims of Crime surveys (1998-2017), which have consistently asked individuals about the frequency at which they see a police officer in uniform or on duty in their area or neighborhood.¹³ First, I aggregate police presence intensity by cells of income decile in Victims of Crime surveys. Second, I interpolate and extrapolate between years to cover the full 1993-2019 period. Finally, I match these cells with the DINA microfile, and distribute expenditure on the insurance function proportionally to police presence intensity in each cell.

I distribute the use function of public order and safety proportionally to crimes reported to the police by income group. This corresponds to the fact that individuals directly benefit from government services, in the form of police investigations and law courts, when they are victims of a crime. I rely again on Victims of Crime surveys, which record all crimes suffered by survey

¹²The 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.

¹³Respondents 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).

respondents in the past year. First, I aggregate total crimes reported by the police by cells of income decile. Second, I interpolate and extrapolate between years to cover the full 1993-2019 period. Finally, I match these cells with the DINA microfile, and distribute expenditure on the use function proportionally to the number of reported crimes in each cell.

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B Additional Figures and Tables

B.1 Additional Key Results



Figure A.1.1 – 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 A.1.2 – Government Expenditure in South Africa, 1993-2019

Notes. Author's computations combining data from the South African Reserve Bank, the South African National Treasury, and Local Government Budget Reports.



Figure A.1.3 – Government Revenue in South Africa, 1993-2019

Notes. Author's computations combining data from the South African Reserve Bank, the South African National Treasury, and Local Government Budget Reports.



Figure A.1.4 – Government Transfers Received by Pretax Income Decile, 2019

Notes. Panel (a) represents the level and composition of total government transfers received by pretax income decile in 2019. Panel (b) plots the share of national income transferred between pretax income deciles in 1993 and 2019, calculated as the difference between average posttax national income and average pretax national income. The unit of observation is the individual. Income is split equally among all household members. General public services and defense are assumed to be distributed proportionally to posttax disposable income.



Figure A.1.5 – Level and Composition of In-Kind Transfers Received by the Bottom 20%, 1993-2019

Notes. The figure represents the level and composition of in-kind transfers received by the bottom 20% from 1993 to 2019. Unadjusted figures correspond to allocation at cost ($\theta^j = 1$). The benchmark scenario reduces government transfers by accounting for both aggregate and heterogeneous productivity; aggregate productivity is measured using the cross-country benchmark with single-input, output-oriented estimates. The lower bound corresponds to figures corrected with single-input, input-oriented estimates. General public services and defense are assumed to be distributed proportionally to posttax disposable income. The unit of observation is the individual. Income is split equally among all household members.



Figure A.1.6 – Bottom 50% Average Income Before and After Transfers, 1993-2019: Unadjusted

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. All in-kind transfers are unadjusted, that is, allocated at cost of provision. Other expenditure corresponds to general public services and defense, distributed proportionally to posttax disposable income. The unit of observation is the individual. Income is split equally among all household members.



Figure A.1.7 – Bottom 50% Average Income Before and After Transfers, 1993-2019: Quality-Adjusted, Lower Bound

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. All in-kind transfers are corrected for lower bounds on aggregate and heterogeneous productivity; aggregate productivity is measured using the cross-country benchmark with single-input, input-oriented estimates. Other expenditure corresponds to general public services and defense, distributed proportionally to posttax disposable income. The unit of observation is the individual. Income is split equally among all household members.

	Share of Total Expenditure Received (%)			Share of National Income Received (%)			Average Transfer Received (2021 PPP USD)		
	1993	2019	1993-2019	1993	2019	1993-2019	1993	2019	1993-2019
Social Protection	74%	77%	+3%	2.3%	4.0%	+79%	390	950	+146%
Education	48%	60%	+25%	2.3%	3.5%	+50%	400	830	+105%
Health	46%	54%	+18%	0.6%	1.1%	+95%	100	260	+168%
Housing	40%	51%	+29%	0.1%	0.3%	+107%	20	60	+184%
Local Government	22%	33%	+51%	0.8%	1.9%	+129%	140	440	+214%
Public Order and Safety	30%	34%	+11%	0.7%	0.8%	+16%	110	180	+59%
Economic Affairs	7%	9%	+31%	0.3%	0.4%	+39%	50	90	+90%
Total	27%	39%	+43%	6.4%	11.1%	+72%	1100	2610	+136%
Pretax Income				3.3%	2.7%	-20%	570	630	+10%

Table A.1.1 –	The Distribution	n of Government	Expenditure in	n South	Africa
	(Bottom 50%, Q	uality-Adjusted,	Lower Bound))	

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. In-kind transfers are adjusted for lower bounds on aggregate and heterogeneous government productivity; aggregate productivity is measured using the cross-country benchmark with single-input, input-oriented estimates. Columns 2 to 4 show the share of total transfers received by the bottom 50%. Columns 5 to 7 report the corresponding share of net national income received. Columns 8 to 10 report the average annual transfer received by the bottom 50%, expressed in 2021 PPP USD. The unit of observation is the individual. Income and transfers are split equally among all household members. "Total" adds spending on defense and general public services to other rows, assuming that these two components are distributed proportionally to posttax disposable income. The last row shows the pretax income share and the average pretax income of 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	1993-2019	1993	2019	1993-2019
Social Protection	44%	45%	+3%	1.3%	2.4%	+80%	230	560	+147%
Education	19%	23%	+23%	0.9%	1.3%	+47%	160	320	+102%
Health	18%	16%	-9%	0.2%	0.3%	+52%	40	80	+108%
Housing	14%	19%	+38%	0.0%	0.1%	+121%	10	20	+203%
Local Government	6%	11%	+70%	0.2%	0.6%	+157%	40	140	+253%
Public Order and Safety	11%	12%	+4%	0.3%	0.3%	+9%	40	60	+49%
Economic Affairs	2%	3%	+18%	0.1%	0.1%	+25%	10	30	+72%
Total	12%	16%	+41%	2.7%	4.7%	+70%	470	1100	+133%
Pretax Income				0.2%	0.1%	-65%	40	20	-52%

Table A.1.2 – The Distribution of Government Expenditure in South Africa (Bottom 20%, Quality-Adjusted, Lower Bound)

Notes. The table reports the level and composition of government transfers received by the bottom 20% of the pretax income distribution in South Africa in 1993 and 2019. In-kind transfers are adjusted for lower bounds on aggregate and heterogeneous government productivity; aggregate productivity is measured using the cross-country benchmark with single-input, input-oriented estimates. Columns 2 to 4 show the share of total transfers received by the bottom 20%. Columns 5 to 7 report the corresponding share of net national income received. Columns 8 to 10 report the average annual transfer received by the bottom 20%, expressed in 2021 PPP USD. The unit of observation is the individual. Income and transfers are split equally among all household members. "Total" adds spending on defense and general public services to other rows, assuming that these two components are distributed proportionally to posttax disposable income. The last row shows the pretax income share and the average pretax income of the bottom 20%.

B.2 Pension and Unemployment Systems





Notes. Author's computations combining surveys, tax, and national accounts data.





Notes. Author's computations combining surveys, tax, and national accounts data.



Figure A.2.3 – Net Transfers Operated by the Pension and Unemployment Insurance Systems Between Income Deciles, 2019

Notes. Author's computations combining surveys, tax, and national accounts data.

B.3 Social Protection



Figure A.3.1 – Level and Composition of Social Protection Expenditure in South Africa, 1993-2019



Figure A.3.2 – 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 A.3.5 – Average Social Protection Transfer Received by Income Group, 1993-2019

Notes. Author's computations combining surveys, tax, and national accounts data.



Figure A.3.6 – Average Social Protection Transfer Received by Income Decile, 1993-2019

Notes. Author's computations combining surveys, tax, and national accounts data.

B.4 Education



Figure A.4.1 – Level and Composition of Education Expenditure in South Africa, 1993-2019

Notes. Author's computations combining data from South African National Treasury Budget Reports (1994-2020) and Provincial Budget Reports (2002-2020).



Figure A.4.2 – The Rise of Education Expenditure in South Africa, 1993-2019: The Role of Basic Education



Figure A.4.3 – Real Education Expenditure Per Kid by South African Province, 1993-2019

Notes. Author's computations combining data from South African National Treasury Budget Reports (1994-2020) and Provincial Budget Reports (2002-2020).



Figure A.4.4 – Average Number of Children Attending Public Schools by Income Group, 1996-2016

Notes. Author's computations using census sample microdata.



Figure A.4.5 – Average Share of Children Attending Private Schools by Income Group, 2001-2016

Notes. Author's computations using census sample microdata.


Figure A.4.6 – Average Education Transfer Received by Income Group, 1993-2019

Notes. Author's computations combining surveys, tax, and national accounts data.



Figure A.4.7 – Average Education Transfer Received by Income Decile, 1993-2019

Notes. Author's computations combining surveys, tax, and national accounts data.

B.5 Health



Figure A.5.1 – Level and Composition of Health Expenditure in South Africa, 1993-2019

Notes. Author's computations combining data from South African National Treasury Budget Reports (1994-2020) and Provincial Budget Reports (2002-2020).



Figure A.5.2 – Level and Composition of Health Expenditure in South Africa, 1993-2019: Clinics Versus Hospitals

Notes. Author's computations combining data from South African National Treasury Budget Reports (1994-2020) and Provincial Budget Reports (2002-2020).



Figure A.5.3 – Real Health Expenditure Per Capita by South African Province, 1993-2019

Notes. Author's computations combining data from South African National Treasury Budget Reports (1994-2020) and Provincial Budget Reports (2002-2020).



Figure A.5.4 – Intensity of Use of the Public Healthcare System by Income Quintile, 1995-2019

Notes. Author's computations using General Household Surveys (GHS, 2004-2019) and October Household Surveys (OHS, 1995-1996). 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. 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 go so.



Figure A.5.5 – Private Healthcare Use by Income Quintile, 1995-2019

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



Figure A.5.6 – Private Health Insurance Coverage by Income Quintile, 1995-2019

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



Figure A.5.7 – Average Health Transfer Received by Income Group, 1993-2019

Notes. Author's computations combining surveys, tax, and national accounts data.



Figure A.5.8 – Average Health Transfer Received by Income Decile, 1993-2019

Notes. Author's computations combining surveys, tax, and national accounts data.

B.6 Local Government



Notes. Author's computations combining data from Local Government Budget Reports.





Notes. Author's computations combining data from Local Government Budget Reports.



Figure A.6.3 – The Decline of Spatial Inequalities in Local Public Goods: Total Expenditure in 2003 Versus 2003-2019 Growth Rate

Notes. Author's computations combining data from Local Government Budget Reports.



Figure A.6.4 – The Decline of Spatial Inequalities in Local Public Goods: Kernel Density of Local Municipality Total Expenditure, 2001-2019

Notes. Author's computations combining data from Local Government Budget Reports.



Figure A.6.5 – Average Local Government Transfer Received by Income Group, 1993-2019

Notes. Author's computations combining surveys, tax, and national accounts data.



Figure A.6.6 – Average Local Government Transfer Received by Income Decile, 1993-2019

Notes. Author's computations combining surveys, tax, and national accounts data.



Figure A.6.7 – Access to Free Basic Electricity by Income Group, 2004-2019

Notes. Author's computations combining data from General Household Surveys. The figure represents the share of individuals who declare benefiting from free basic electricity in their municipality of residence. Income groups are defined based on household expenditure per capita.

B.7 Housing





Notes. Author's computations combining General Household Surveys. 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."



Figure A.7.2 – Average Housing Transfer Received by Income Group, 1993-2019

Notes. Author's computations combining surveys, tax, and national accounts data.



Figure A.7.3 – Average Housing Transfer Received by Income Decile, 1993-2019

Notes. Author's computations combining surveys, tax, and national accounts data.

B.8 Public Order and Safety



Figure A.8.1 – Level and Composition of Public Order and Safety Expenditure in South Africa, 1993-2019

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



Figure A.8.2 – Level and Composition of Public Order and Safety Expenditure in South Africa, 1993-2019: Insurance Versus Use

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





Notes. Author's computations combining data from Victims of Crime Surveys.

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Figure A.8.4 – Intensity of Local Police Presence by Income Quintile, 1998-2017

Notes. Author's computations combining data from Victims of Crime Surveys. Figures correspond to the average number of days per month that the respondent declares seeing a police officer in uniform or a police vehicle in her area.



Figure A.8.5 – Average Public Order and Safety Transfer Received by Income Group, 1993-2019

Notes. Author's computations combining surveys, tax, and national accounts data.



Figure A.8.6 – Average Public Order and Safety Transfer Received by Income Decile, 1993-2019

Notes. Author's computations combining surveys, tax, and national accounts data.

B.9 Transport and Other Economic Affairs





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

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

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Figure A.9.3 – Public Transport Use Intensity by Income Quintile: Buses

Notes. Author's computations combining General Household Surveys.



Figure A.9.4 – Public Transport Use Intensity by Income Quintile: Trains

Notes. Author's computations combining General Household Surveys.



Figure A.9.5 – Average Transport Transfer Received by Income Group, 1993-2019

Notes. Author's computations combining surveys, tax, and national accounts data.





Notes. Author's computations combining surveys, tax, and national accounts data.



Figure A.9.7 – Average Transfer on Economic Affairs Received by Income Decile, 1993-2019

Notes. Author's computations combining surveys, tax, and national accounts data.