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The South African personal income tax base, 2011–2018

Income and taxable income, adjusted for retirement fund and medical expense reporting changes

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Abstract: Tax administration statistics now provide considerably more complete and reliable measures of South African personal income and its distribution than the available household or other survey sources. However, there are difficulties in using tax data across time, as both policy and reporting changes influence the administrative statistics of income. This paper uses two sets of adjustments to generate a consistent personal income series for the 2011–2018 period: upward adjustments to published statistics on assessed taxpayers to provide estimates consistent with the overall tax base, and adjustments for retirement contribution and medical expense reporting changes in 2013, 2015, and 2017 that affect the calculation of taxable income and income before deductions. About half of all individuals reporting income to the South African Revenue Service are contributors to retirement funds, and just over a quarter qualify for medical scheme or medical expense tax benefits. The resulting adjusted income distribution estimates show that the tax base increased robustly relative to GDP over this period, that income shifted towards older and higher real income taxpayers, and that income inequality increased.

Key words: statistics of income, income distribution, personal income tax

JEL classification: D31

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1 Introduction and overview

The size and distribution of the South African personal income tax (PIT) base between 2011 and 2018 are examined in this paper, drawing on the *Individual Income Panel* dataset for this period derived from administrative records of the South African Revenue Service (SARS) (Ebrahim and Axelson 2019; National Treasury and UNU-WIDER 2019). Income and taxable income aggregates and their distribution by age and income group for the 2011 to 2016 years are adjusted for changes in reporting of retirement fund contributions and medical deductions in order to provide a consistent time series.

Our findings include the following:

- The number of individuals reporting income to SARS and the number of individuals with incomes above the tax threshold increased by 1.4 per cent and 2.4 per cent a year between 2011 and 2018. Real GDP growth averaged 1.7 per cent over this period. There were 14.3 million individuals who reported income in 2018, of whom 6.9 million were above the tax threshold.

- Gross personal income reported to SARS in 2017/18 amounted to 56.7 per cent of the official GDP estimate for the corresponding fiscal year, up from 50.0 per cent in 2011. Income (before deductions) and taxable income increased somewhat more slowly, mainly because of the inclusion in gross income of lumpsum retirement drawdowns which increased by a rapid 15.7 per cent a year, and which are taxed separately and excluded from taxable income.

- The tax data indicate overall participation of around 50 per cent of taxpayers in retirement funding arrangements, and substantially higher rates of participation above the tax threshold. Claimants of medical scheme and medical expense deductions represent around 27 per cent of taxpayers, also rising markedly at incomes above the tax threshold.

- After adjustments to include employer-paid pension and provident fund contributions, income (before deductions) increased by 8.1 per cent a year between 2011 and 2018, rising from 50.5 per cent of GDP to 53.0 per cent.

- After taking account of changes in reporting of the tax treatment of medical expenses and deductibility of employee/member-paid provident fund contributions, the taxable income base increased from 45.0 to 47.5 per cent of GDP between 2011 and 2018, while increasing marginally as a percentage of reported income before deductions.

- Personal income tax revenue collected increased from 7.3 to 9.0 per cent of GDP over the 2010/11 to 2017/18 period, indicating substantial tax buoyancy relative to both GDP growth and the increase in taxable income. The rise in the tax base relative to GDP accounts for part of this increase. An increase in the tax burden associated with less-than-full inflation adjustments to tax brackets (fiscal drag) and increases in PIT tax rates also contributed to revenue buoyancy.

- Both the number of taxpayers reporting income to SARS and aggregate income reported have shifted towards higher age and higher real income cohorts. Over 45 per cent of the population in the 30–34, 35–39, 40–44, and 45–49 age groups reported income to SARS

in 2011; in 2018 45 per cent of the population were in the tax system only in the 45–49 age group.

- An estimated 10.5 per cent of the population over the age of 20 and 26.3 per cent of income-reporting individuals of all ages had annual taxable incomes over R200,000 in 2017/18, accounting for approximately three-quarters of taxable income.

- Average real income before deductions and taxable income of individuals (after adjustment for changes in tax treatment of medical expenses and retirement fund contributions) increased by 7.2 and 7.6 per cent, respectively (approximately 1 per cent a year) between 2011 and 2018, and by greater percentages for higher age cohorts. The median (50^{th} percentile) income before deductions declined marginally in real terms.

- Inequality in income has increased between 2011 and 2018, as measured by the ratios of income at the 75^{th}, 90^{th}, and 99^{th} percentiles to both median and mean income and taxable income, and in estimates of the Gini coefficient of taxable income for all individuals and for those above the R30,000 a year and R80,000 a year income levels.

2 Aggregate personal income and taxable income

Three aggregate measures of personal income are reported in the PIT *Individual Income Panel* (National Treasury and UNU-WIDER 2019): 'gross income', 'income', and 'taxable income'. Gross income includes turnover (before expenses) of self-employed individuals and income that is exempt from tax, such as inheritance receipts, exempt interest income, and income earned and taxed abroad. The 'income' aggregate excludes exempt income and business expenses. Taxable income is income less deductions, which include retirement fund contributions, qualifying travel expenses, medical expense tax benefits (until 2014), and donations to public benefit organizations. Taxable income corresponds approximately to the economic concept of 'disposable income' (before tax)—after accounting for deferral through contractual savings plans.

Aggregate income reported in each year exceeds 99 per cent of aggregate gross income. It seems likely that exempt income is under-reported, as it is generally not subject to third-party verification and is of limited interest to SARS. The gross income data are not examined further in this paper.

Lumpsum withdrawals from retirement funds are included in the dataset's 'gross income' and 'income' aggregates. Lumpsum withdrawals from retirement funds amounted to R176.5 billion in 2018, or 6.1 per cent of income and 3.4 per cent of GDP. However, lumpsum withdrawals are taxed separately from normal income, and are treated as a deduction from income for the purposes of calculating taxable income. Our analysis relies mainly on a derived 'income before deductions' measure, equal to 'income' *less* lumpsum retirement fund withdrawals, thereby removing this source of divergence between 'income' and 'taxable income'.[1]

Table 1 shows these income aggregates for the 2011–18 period and the corresponding numbers of taxpayers reporting to SARS, in total and above the tax threshold each year. It is apparent that there was a steep increase in retirement fund lumpsum withdrawals during the period leading up to the 2016/17 retirement fund tax reform. Table 1 shows that taxable income has increased

[1] 'Income before deductions' as reported in the annual *Tax Statistics* published by the National Treasury and SARS (various years) similarly excludes retirement fund lumpsum income.

somewhat more slowly than gross income (as reported for tax compliance purposes), and taxpayer numbers above the tax threshold have grown more rapidly than the overall increase in numbers of individuals reporting to SARS.

Table 1: SARS reported income, taxable income, and taxpayer numbers, 2011–18

Tax-year (ending Feb) **R billion**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**Increase per annum 2011–2018**
All individuals reporting to SARS									
Gross income	**1,560.5**	**1,717.8**	**1,887.9**	**2,079.7**	**2,299.1**	**2,447.4**	**2,766.9**	**2,913.7**	9.3%
% of GDP	*50.0%*	*50.7%*	*52.0%*	*52.7%*	*54.7%*	*54.4%*	*57.3%*	*56.7%*	
Income (gross less exempt income)	1,556.2	1,713.0	1,882.4	2,074.0	2,292.5	2,438.8	2,756.2	2,899.3	9.3%
Lumpsum retirement income	63.6	80.3	88.4	115.9	152.5	160.7	163.1	176.5	15.7%
Income (before deductions)	**1,492.6**	**1,632.7**	**1,794.0**	**1,958.0**	**2,140.0**	**2,278.1**	**2,593.1**	**2,722.8**	9.0%
Taxable income	**1,358.7**	**1,484.7**	**1,689.6**	**1,840.0**	**2,038.9**	**2,175.8**	**2,322.9**	**2,440.3**	8.7%
Taxable income as % of gross income	*87.1%*	*86.4%*	*89.5%*	*88.5%*	*88.7%*	*88.9%*	*84.0%*	*83.8%*	
Number of individuals (000s)	**12,930**	**13,368**	**13,583**	**13,801**	**14,140**	**14,108**	**14,319**	**14,297**	1.4%
Mean taxable income (R pa)	105,080	111,061	124,390	133,325	144,191	154,221	162,221	170,687	7.2%
Individuals above tax threshold only									
Gross income	**1,433.2**	**1,587.6**	**1,704.7**	**1,892.1**	**2,045.9**	**2,203.6**	**2,523.0**	**2,669.1**	9.3%
Taxable income	**1,260.7**	**1,388.2**	**1,542.7**	**1,700.4**	**1,837.6**	**1,986.0**	**2,138.4**	**2,256.1**	8.7%
Taxable income as % of gross income	*88.0%*	*87.4%*	*90.5%*	*89.9%*	*89.8%*	*90.1%*	*84.8%*	*84.5%*	
Individuals above tax threshold	**5,864**	**6,032**	**6,237**	**6,315**	**6,502**	**6,614**	**6,793**	**6,917**	2.4%
Mean taxable income (R pa)	214,983	230,151	247,366	269,241	282,628	300,264	314,792	326,183	6.1%

Source: based on National Treasury and UNU-WIDER (2019).

There have been changes over time in income reporting requirements and in the definitions or coverage of these income categories, and so the outcomes for each year are not strictly comparable. This includes progress over time in broadening the tax base both through improved administration and by more fully including fringe benefits in the tax base. There have been reforms to the reporting and tax treatment of contributions to retirement (pension, provident, and retirement annuity) funds, changes in the tax treatment of medical scheme contributions and medical expenses, and adjustments to the tax treatment of travel allowances and vehicle expenses.

In the analysis that follows, adjustments are made for the 2011–16 years to generate estimates of income and taxable income consistent with the 2017 and 2018 data, in respect of the following reporting changes.

With effect from the 2013 and 2015 tax-years respectively, deductions from income for medical scheme contributions and medical expenses were replaced by medical scheme and medical expense credits. For the same level of income, prior to 2013 taxable income was reduced by medical aid contributions and qualifying expenses and in 2013 and 2014 by qualifying expenses. The current practice is to leave taxable income unaffected by medical expenses and to apply medical contribution and expense credits after calculation of normal tax. (The net effect of the change, initially, was a reduction in tax liability for lower-income medical scheme contributors or medical expense claimants, an increase for higher income taxpayers and a broadly neutral overall impact.)

With effect from the 2017 year, provident and pension fund contributions by employers were included as fringe benefits in income, resulting in a substantial increase in reported income for

employees benefiting from occupational fund membership. The deductibility of retirement fund contributions was extended to include employer contributions and employee-paid (or member-paid) contributions to provident funds, effectively standardizing the tax treatment of pension, provident fund, and retirement annuity (RA) contributions. For most contributors, the change was neutral with respect to the taxable income outcome.

'Adjusted' income and 'adjusted' taxable income refer in this paper to estimates for the 2011–16 years calculated on the basis of the 2017 and 2018 reporting arrangements—i.e. income (before deductions) *includes* employer-paid provident and pension fund contributions, and taxable income is calculated *before* medical scheme and medical expense deductions, and *after* deduction of imputed employee/member-paid contributions to provident funds (in addition to pension fund and RA contribution deductions).

Table 2: Reported income and taxable income as % of GDP and compensation of employees, 2011–18, before and after adjustments for changes in retirement contribution and medical expense deductions

Tax-year (ending Feb) **R billion**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**Increase per annum 2011–2018**
Income (before deductions)	**1,493**	**1,633**	**1,794**	**1,958**	**2,140**	**2,278**	**2,593**	**2,723**	9.0%
% of GDP	47.8%	48.1%	49.4%	49.6%	50.9%	50.6%	53.7%	53.0%	
% of compensation of employees	104.0%	103.5%	104.1%	103.6%	104.6%	102.9%	109.3%	107.8%	
Taxable income	**1,359**	**1,485**	**1,690**	**1,840**	**2,039**	**2,176**	**2,323**	**2,440**	8.7%
% of income	91.0%	90.9%	94.2%	94.0%	95.3%	95.5%	89.6%	89.6%	
% of GDP	43.5%	43.8%	46.5%	46.6%	48.5%	48.4%	48.1%	47.5%	
Income before deductions (adjusted)	**1,576**	**1,723**	**1,893**	**2,065**	**2,254**	**2,402**	**2,593**	**2,723**	8.1%
% of GDP	50.5%	50.8%	52.1%	52.3%	53.7%	53.4%	53.7%	53.0%	
% of compensation of employees	109.8%	109.2%	109.9%	109.3%	110.2%	108.5%	109.3%	107.8%	
Taxable income (adjusted)	**1,407**	**1,538**	**1,688**	**1,839**	**2,015**	**2,150**	**2,323**	**2,440**	8.2%
% of income bef deductions (adjusted)	89.3%	89.2%	89.2%	89.1%	89.4%	89.5%	89.6%	89.6%	
% of GDP	45.0%	45.3%	46.5%	46.6%	48.0%	47.8%	48.1%	47.5%	
Memo (fiscal year estimates):									
GDP at market prices	*3,123*	*3,391*	*3,634*	*3,945*	*4,201*	*4,499*	*4,831*	*5,135*	7.4%
Compensation of employees	*1,435*	*1,578*	*1,723*	*1,890*	*2,047*	*2,213*	*2,373*	*2,526*	8.4%

Source: based on National Treasury and UNU-WIDER (2019). GDP and compensation of employees: Statistics SA (2022).

The effect of these changes is apparent in the marked shifts in the ratios of taxable income to income, and in income and taxable income to GDP, in the aggregate estimates derived from the *Individual Income Panel*, summarized in Table 2:

- The changes in treatment of medical costs in 2013 and 2015 account for part of the increase in taxable income as a percentage of income, GDP, and compensation of employees between 2012 and 2015. Deductions amounting to about 1.6 per cent of GDP for medical scheme contributions were no longer allowed in 2013 and a further 0.5 per

cent of GDP in deductions of medical expenses fell away in 2015, both replaced by tax credits.[2]

- We estimate that full inclusion of pension and provident fund contributions by employers in reported income (as in 2017 and 2018) would have raised the aggregate level of income before deductions by 5.3 per cent—5.6 per cent over the 2011–16 period, or about 2.7 per cent of GDP. This change therefore accounts for a substantial part of the increase in reported income (unadjusted) as a percentage of GDP over the 2011–18 period.[3]

Table 2 shows the income and taxable income raw data aggregates for 2011–18, together with *adjusted* aggregates for the 2011–16 years in which pension and provident fund contributions by employers are imputed for the pre-2017 years, medical expense deductions are added back to taxable income for the 2011–14 years, and deductions are imputed for employee/member contributions to provident funds in the 2011–16 years. The calculation of these adjustments makes use of changes between years in age-income group ratios of taxable income to income, which provide age-income specific measures of the impact of medical expense and pension tax treatment and reporting changes.

Figure 1 illustrates the magnitude of pension and medical expense deductions in the unadjusted and adjusted aggregate income estimates.

The adjusted estimates represent a broadly consistent income and taxable income series, after taking into account pension and medical tax reforms. The adjusted estimates reported in Table 2 suggest that the personal income tax base has remained robust relative to the official national income account trends, although not as buoyant as implied by the unadjusted trends.

- Income (before deductions) has increased from 47.8 per cent of GDP in 2011 to 53.0 per cent in 2018—an increase of 5.2 percentage points, of which half is accounted for by changes in the classification and reporting of retirement fund contributions between 2011 and 2017. In the adjusted estimates, income increases from 50.5 per cent of GDP to 53.0 per cent. (Medical scheme contributions by employers were already included in income fringe benefits by 2011.)

- Taxable income has increased from 43.5 to 47.5 per cent of GDP, an increase of 4.0 percentage points, of which over half is accounted for by the 2013 and 2015 changes

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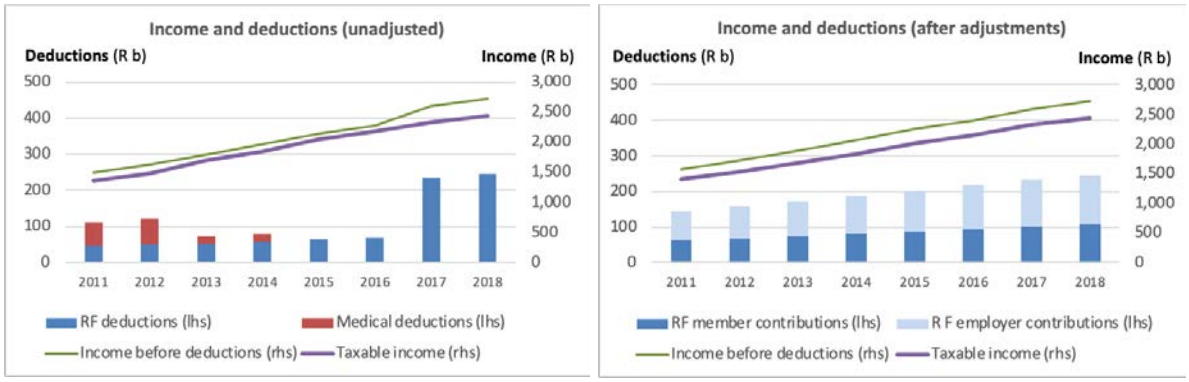
[2] Table A2.7.4 of the *2016 Tax Statistics* publication by National Treasury and SARS reported R65.6 billion in medical deductions for 3.2 million taxpayers in 2012, after assessment of 92.2% of tax-filers. We adjust these numbers upwards by income-group-specific adjustment factors to derive estimates for the full tax base (including non-filers). For the 2012 year the revised medical deductions total is about R72 billion, or 2.1% of GDP, for 3.6 million taxpayers. In the following year, medical scheme contributions were no longer deductible, but medical expense deductions of R16.1 billion were reported (87.4% assessed), adjusted upwards to R18.8 billion (0.5% of GDP). Medical expense deductions were replaced by credits in 2015.

[3] Pension and RA contribution deductions in 2017 were reported in the *2021 Tax Statistics* as R202.1 billion (assessed taxpayers only), indicative of about R236 billion in total, or 9.1% of income before deductions and 4.9% of GDP. Table A2.6.5 reports pension and provident fund 'fringe benefit' contributions amounting to R113.6 billion, indicative of about R131 billion in total, or 5.0% of income before deductions and 2.7% of GDP. The implied current contributions by individuals (i.e. excluding employer contributions) of R105 billion is 2.2% of GDP in 2017. Our estimates indicate that employer-paid contributions amounted to 2.7% of GDP over the 2011–2016 years, or between 5 and 5.3% of adjusted income before deductions. The implied total contributions to pension, provident, and retirement annuity funds declined from 9.4% to 9.1% of adjusted income before deductions over the 2011–2018 period and varied between 4.7% and 4.9% of the fiscal year GDP estimates.

in treatment of medical scheme contributions and medical expenses, partially offset by the reduction in taxable income resulting from the deductibility with effect from 2017 of provident fund contributions by employees/members.

The trends and income ratios summarized above are of similar magnitude if the analysis is limited to incomes above the tax threshold.

Figure 1: Income and deductions, unadjusted and after adjustments, 2011–18



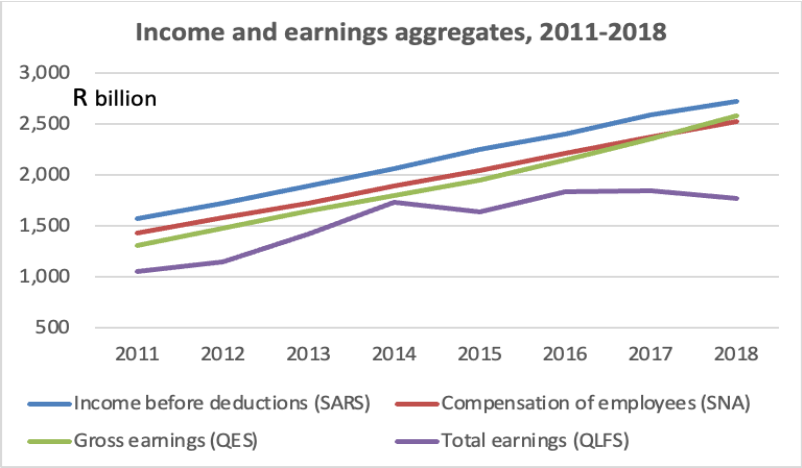
Source: based on National Treasury and UNU-WIDER (2019).

In sum, after adjusting for changes in the reporting of retirement fund contributions, income before deductions increased by about 2.5 percentage points of the fiscal year GDP estimate between 2011 and 2018. After adjustment for the change in tax treatment of medical contributions and expenses, and for deductibility of provident fund contributions, taxable income increased similarly by 2.5 percentage points of GDP over this period. The ratio of taxable income to income before deductions varied between 89.1 and 89.6 per cent. These results are shown as 'adjusted' estimates of income and taxable income in Table 2.

Figure 2 provides a comparison of the trend in income before deductions (after adjustments) with alternative aggregate income or earnings sources: compensation of employees in the national accounts, gross earnings reported in the quarterly employment statistics (QES), and total earnings derived from the quarterly labour force survey (QLFS).[4] Income reported to SARS increases broadly in line with compensation of employees and gross earnings reported in the QES survey of enterprises. Employees' compensation is the largest component but not the only component of personal income, which also includes pension and interest income and earnings from self-employment. The trends in these ratios might reflect shifts in both earnings and passive income and might also reflect estimation errors in the national accounts, the SARS income statistics, and survey data. It is also apparent from Figure 2 that total earnings reported through the QLFS is both unreliable and typically well below the broader QES, national accounts, and SARS statistics of income.

[4] Compensation of employees as reported in Statistics SA (2022). Gross earnings reported in Statistics SA (2021b). QLFS total earnings derived by Aidan Horn from Kerr et al. (2019) in February 2023.

Figure 2: Aggregate income and earnings—alternative sources, 2011–18



Source: based on National Treasury and UNU-WIDER (2019), and author's adjusted estimates of income before deductions. Compensation of employees: Statistics SA (2022). QES: Statistics SA (2021b). QLFS: Kerr et al. (2019).

3 The personal income tax base and PIT revenue collected, 2011–2018

In Table 3, we compare the overall increase over the 2011–18 period in personal income tax revenue collected with the increases in GDP and in adjusted income and taxable income reported in Table 2. We also show the trends in revenue, income before deductions, and taxable income in real (inflation-adjusted) terms.

Table 3: PIT revenue collected, GDP, and taxable income (adjusted), nominal and real, 2011–18

Fiscal year-end (R billion)	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**Increase pa 2011–2018**
PIT revenue	**226.9**	**250.4**	**275.8**	**309.9**	**353.0**	**388.1**	**424.5**	**461.0**	10.7%
% of GDP	7.3%	7.4%	7.6%	7.9%	8.4%	8.6%	8.8%	9.0%	
% of income bef deductns (adj)	14.4%	14.5%	14.6%	15.0%	15.7%	16.2%	16.4%	16.9%	
% of taxable y (adj)	16.1%	16.3%	16.3%	16.9%	17.5%	18.1%	18.3%	18.9%	
Real income and revenue (2015 prices)									
PIT revenue	**292.8**	**306.1**	**319.4**	**339.3**	**365.7**	**382.5**	**393.6**	**408.0**	4.9%
GDP (at market prices)	4,006	4,124	4,219	4,321	4,389	4,421	4,457	4,516	1.7%
Income before deductns (adj)	2,033	2,107	2,192	2,261	2,336	2,367	2,404	2,410	2.5%
Taxable income (adj)	1,815	1,880	1,954	2,013	2,088	2,119	2,154	2,160	2.5%

Note: PIT revenue, income, and taxable income deflated by consumer price index (CPI).

Source: based on National Treasury (2022) and Statistics SA (2022).

PIT revenue collected has increased from 7.3 per cent of nominal GDP in 2011 to 9.0 per cent in 2018 and has also increased as a percentage of adjusted income before deductions and taxable income. Measured in real terms, revenue collected has increased by 4.9 per cent a year over the period, GDP has increased by 1.7 per cent, and individual income by 2.5 per cent a year.

It is apparent that the rise in inflation-adjusted personal income accounts for around half of the increase in real PIT revenue, which increased by over 39 per cent cumulatively, over the 2011–18 period.

PIT revenue has also increased over this period as a result of policy decisions. Three elements stand out—the decline in real (inflation-adjusted) terms in the lower tax threshold between 2011 and 2018, the 2015/16 increase in marginal tax rates, and the addition of a further maximum tax bracket in 2017/18.

In 2011 the tax threshold for taxpayers under the age of 65 was R57,000; in 2018 the threshold was R75,750. Expressed in 2017/18 prices, the 2011 threshold was R83,085. There was therefore a real decline in the tax threshold between 2011 and 2018 of just under 9 per cent. This has both raised the number of earners who pay tax and raised the tax burden for all taxpayers in inflation-adjusted terms.

The shift from medical expense deductions to tax credits would have partially offset the implied rise in the tax burden for medical scheme contributors and medical expense claimants, though this change also increased the relative tax burden on higher income taxpayers. It is notable, however, that the real decline in the tax threshold mainly occurred between 2015 and 2018—that is, after implementation of the reform in the tax treatment of medical expenses.

The increase in PIT revenue associated with the real decline in the lower tax threshold between 2011 and 2018 can be approximated as follows: 18 per cent tax x R7,335 (difference between R83,085 and R75,750) x 6.9 million taxpayers = R9.1 billion in 2017/18 prices, or about 2 per cent of PIT revenue and 0.2 per cent of GDP. Lower-than-inflation adjustments to the higher tax bracket thresholds, particularly in the 2016, 2017, and 2018 tax-years, would have contributed rather more than this—perhaps a further R25–R30 billion.

In 2015, the upper bracket tax rates were all increased—the 25 per cent bracket to 26 per cent, 30 to 31 per cent, 35 to 36 per cent, 38 to 39 per cent, and 40 to 41 per cent. The Treasury's *2015 Budget Review* estimate of the revenue impact of these changes was R9.4 billion.

At the top end of the tax schedule, an additional 45 per cent tax bracket was introduced in the 2017/18 year, applicable to taxable incomes above R1.5 million. The Treasury estimated that this would yield an additional R4.4 billion.

It seems plausible, in sum, that tax rate increases and below-inflation adjustments to tax bracket thresholds between 2011 and 2018 generated over R50 billion in additional revenue, or about 1 per cent of GDP.

In addition to these considerations, the analysis set out below indicates that the distribution of income has shifted towards higher income taxpayers, contributing further to tax buoyancy.

4 Taxpayer numbers and distribution by age

Despite the poor economic performance over this period, the number of individuals with IRP5/IT3(a) or ITR12 tax return certificates each year has increased, as shown in Table 4. The total number of unique individuals with income reported to SARS has increased by 10.6 per cent over the 2011–18 period, and the number reporting taxable income (adjusted) above the tax threshold increased by 17.3 per cent, or 2.3 per cent a year. Individuals reporting income above the tax threshold have increased from 45.6 to 48.4 per cent of the total.

Table 4 indicates that the numbers of taxpayers over the age of 65 have increased more rapidly than for younger cohorts. The number of taxpayers over 65 reporting income above the tax threshold increased by 46.9 per cent over this period, though they remain a comparatively small percentage of the total.[5] The percentage of the population over the age of 20 reporting adjusted incomes above the tax threshold increased from 19.0 per cent in 2011 to 19.3 per cent in 2018.

Table 4: Individual headcounts of income returns to SARS, total and above tax threshold, 2011–18

Tax-year ('000s)	2011	2012	2013	2014	2015	2016	2017	2018	% increase 2011–2018
Total number of Individuals with PIT tax returns									
< Age 35	5,412	5,693	5,721	5,801	5,931	5,878	5,891	5,775	6.7%
Age 35–64	6,485	6,637	6,786	6,898	7,078	7,089	7,243	7,321	12.9%
> Age 65	1,032	1,038	1,076	1,102	1,131	1,141	1,185	1,202	16.4%
Total (A)	**12,930**	**13,368**	**13,583**	**13,801**	**14,140**	**14,108**	**14,319**	**14,297**	**10.6%**
Individuals reporting income (adjusted) above the tax threshold									
< Age 35	1,808	1,881	1,932	1,941	1,963	2,048	2,041	2,070	14.5%
Age 35–64	3,834	3,928	4,000	4,056	4,139	4,243	4,356	4,473	16.7%
> Age 65	254	260	269	287	312	323	396	374	46.9%
Total	**5,897**	**6,070**	**6,202**	**6,285**	**6,414**	**6,528**	**6,793**	**6,917**	**17.3%**
% of total (A)	*45.6%*	*45.4%*	*45.7%*	*45.5%*	*45.4%*	*46.3%*	*47.4%*	*48.4%*	
Percentage of population above the tax threshold									
Age 20–34	12.8%	13.0%	13.0%	12.8%	12.7%	13.1%	12.9%	13.0%	
Age 35–64	27.0%	27.1%	27.1%	26.9%	26.8%	26.8%	26.8%	26.7%	
> Age 65	9.5%	9.5%	9.6%	9.9%	10.4%	10.5%	12.4%	11.3%	
Total age 20+	19.0%	19.1%	19.1%	19.0%	19.0%	18.9%	19.3%	19.3%	

Source: based on National Treasury and UNU-WIDER (2019), and author's adjusted estimates of taxable income. Population estimates taken from Statistics SA (2021a) mid-year population estimates for calendar years preceding tax-years.

In Figure 3, the distribution of individuals reporting income in 2011 and 2018 by age and (adjusted) taxable income groups is illustrated, shown as percentage distributions within the corresponding population age cohorts. There are several notable features:

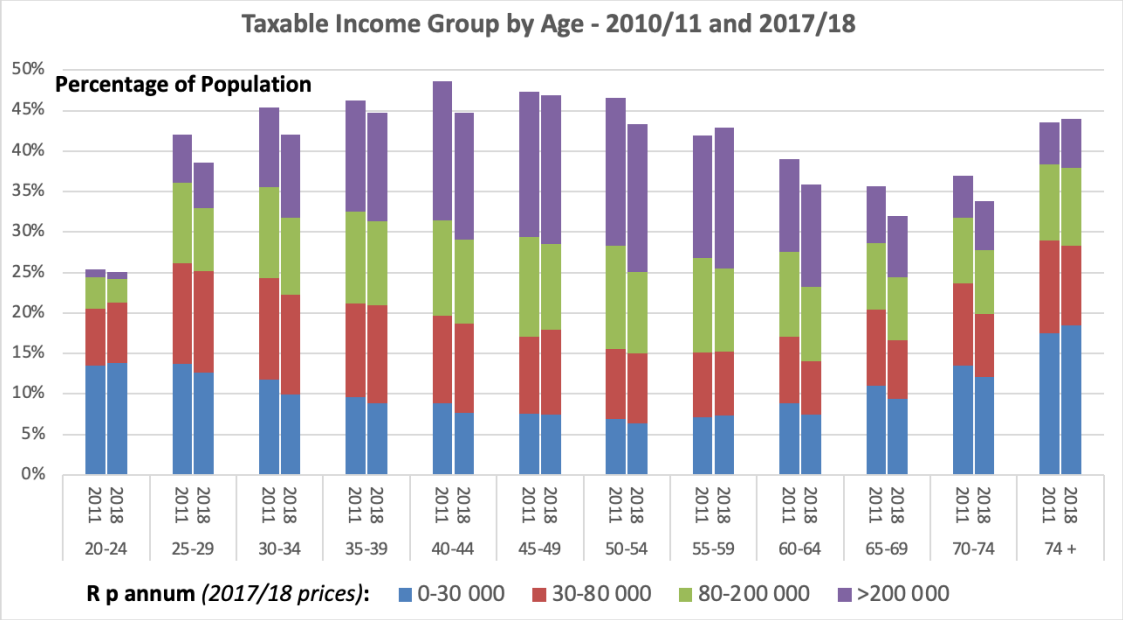
- The 40–44 age group has the highest percentage of the population reporting income to SARS in 2011, while in 2018 the peak is in the 45–49 age cohort.

[5] In estimating the numbers of taxpayers above the threshold, account is taken here of the higher tax threshold for individuals over 65 that results from the secondary and tertiary rebates.

- Higher proportions of the population report incomes less than R30,000 or R80,000 a year (in 2017/18 rands) in both younger and older age groups; incomes above R200,000 a year are highest in the 40–59 age cohorts.

- After peaking at between 45 and 50 per cent of the population in the 40s age cohorts, the population percentage reporting incomes to SARS falls to below 35 per cent in 2018 in the age group 65–69 and then rises to over 40 per cent in the 74+ cohort.

Figure 3: Taxable income by age group, 2011 and 2018



Source: based on National Treasury and UNU-WIDER (2019), and author's adjusted estimates of taxable income for 2011. Population estimates taken from Statistics SA (2021a).

Changes over this period in the distribution of the personal income tax base by age group are shown in Table 5, which sets out average adjusted taxable income by age group, expressed in real 2017/18 prices.[6]

It is readily apparent that mean incomes have increased more strongly in real terms for older-age taxpayers. Mean taxable incomes of those below age 30 and between 35 and 39 have declined over this period. Together with slower growth in the numbers of registered individuals in lower age groups reported above, this indicates a marked shift upwards by age in the size distribution of aggregate incomes.

For all reporting individuals, mean taxable income (adjusted to 2017 reporting requirements), increased from R158,600 a year to R170,700 a year in 2017/18 prices, or a cumulative 7.6 per cent.

[6] 2011–2017 tax-year incomes are adjusted upwards to 2017/18 prices using the average headline consumer price index (CPI) increase for the April–March fiscal years. The CPI increase for the full 2010/11–2017/18 period was 45.8%.

Table 5: Mean taxable income (adjusted) by age group, 2011–18 (R 000s, 2017/18 constant prices)

Age group	2011	2012	2013	2014	2015	2016	2017	2018	% change 2011–2018
20–24	49.3	47.1	47.9	47.3	45.6	47.0	44.9	44.8	-9.1%
25–29	99.9	98.6	100.3	98.8	96.7	98.2	95.4	96.1	-3.8%
30–34	141.1	142.2	143.1	143.1	143.7	146.5	143.5	144.5	2.4%
35–39	183.8	183.5	184.8	183.9	182.2	184.6	182.0	182.9	-0.5%
40–44	211.8	216.2	216.8	219.2	221.9	226.3	223.7	220.9	4.3%
45–49	231.4	234.1	239.1	243.1	245.7	247.7	250.0	248.1	7.2%
50–54	244.3	250.1	254.4	256.9	261.1	266.8	266.1	272.8	11.6%
55–59	235.5	238.1	248.1	254.6	262.7	263.7	267.0	265.1	12.6%
60–64	207.2	208.7	214.9	223.6	233.7	235.9	239.5	246.2	18.8%
65–69	148.9	150.3	159.5	167.6	173.3	172.8	178.0	173.2	16.3%
70–74	109.5	110.6	112.8	119.8	130.5	129.9	142.1	135.7	23.9%
74 +	93.8	92.8	93.3	99.0	106.0	104.8	114.7	104.5	11.4%
Total	**158.6**	**158.9**	**162.6**	**164.8**	**166.8**	**169.7**	**169.9**	**170.7**	**7.6%**

Note: individuals below age 20 excluded from age groups, included in total.

Source: based on National Treasury and UNU-WIDER (2019), and author's adjusted estimates of taxable income.

5 Retirement fund participation and medical expense deductions, 2011–2018

In preparing adjusted estimates of taxable income and income, we make use of projections of retirement fund contributions by individuals or fund members and of employer-paid retirement contribution fringe benefits. Our estimates rely on the *deductibility* of pension and RA member contributions before 2017, and of pension, provident fund, and RA contributions since 2017, and reporting to SARS of employer-paid retirement contribution fringe benefits since 2017. We also make use of data on deductions of medical scheme contributions and medical expenses up to 2014.

There are income-related limits to the deductibility of retirement fund contributions, and with effect from 2017 an overall cap of the lower of R350,000 or 27.5 per cent of taxable income has applied. Our analysis relies on estimates of deductible contributions. We take the view that the resulting under-estimation of total contributions is unlikely to be significant.

Table 6 summarizes our estimates of retirement fund participation and aggregate contributions. In generating these estimates, participation rates and average contribution rates have been calculated or assumed for 25 taxable income groups in each year, in many cases by adjustment for inflation or through linear interpolation across intervening years. Adjustments to participation rates have also been made in order to ensure consistency between overall retirement fund participation and the provident fund, pension fund, and RA sub-components. We note that the administrative data on which we rely probably under-estimate medical scheme and retirement fund participation to some extent, as contributions directly made by individuals (rather than by employers) are recorded only if a tax return is submitted. Further development of the personal income tax panel datasets, making use of IT3 submissions by medical schemes and retirement funds, would enable more reliable estimates to be derived.

Table 6: Estimated retirement fund participation and contributions, 2011–18

Tax-year	2011	2012	2013	2014	2015	2016	2017	2018	% increase 2011–2018
Number of contributors to retirement funds ('000s)									
Provident funds	3,180	3,250	3,320	3,400	3,465	3,492	3,566	3,588	12.9%
Pension funds	2,876	2,912	2,951	2,977	2,990	2,989	3,064	3,067	6.6%
Retirement annuity funds	1,628	1,669	1,704	1,735	1,759	1,771	1,819	1,834	12.6%
All retirement funds	**6,502**	**6,623**	**6,744**	**6,864**	**6,957**	**6,989**	**7,112**	**7,144**	**9.9%**
% of all taxpayers	*50.3%*	*49.5%*	*49.7%*	*49.7%*	*49.2%*	*49.5%*	*49.7%*	*50.0%*	
Contributions to retirement funds (Rb)									**% increase pa 2011–2018**
Individual/member contributions									
Provident funds	17.4	19.0	20.6	22.4	24.1	25.9	27.9	28.9	7.5%
Pension funds	30.7	33.0	35.5	38.3	41.3	44.3	48.0	51.1	7.5%
Retirement annuity funds	14.6	16.2	17.8	19.7	21.8	23.5	25.6	27.4	9.4%
Total	**62.7**	**68.2**	**73.9**	**80.3**	**87.2**	**93.7**	**101.6**	**107.3**	**8.0%**
Employer-paid contributions (fringe benefits)									
	83.2	**90.7**	**98.7**	**107.1**	**114.4**	**123.5**	**131.6**	**137.3**	**7.4%**
Total RF contributions	**145.9**	**158.9**	**172.6**	**187.4**	**201.5**	**217.2**	**233.2**	**244.6**	**7.7%**
% of income before deductions (adjusted)									
	9.3%	*9.2%*	*9.1%*	*9.1%*	*8.9%*	*9.0%*	*9.0%*	*9.0%*	

Source: based on National Treasury and SARS, *Tax Statistics* (various years), and National Treasury and UNU-WIDER (2019).

In Table 7, we summarize retirement fund participation and the numbers of medical expense claimants by taxable income group in 2011 (shown in 2017/18 prices) and show the disaggregated participation in retirement funds by income group in 2018.

Table 7: Retirement fund participation and medical deduction claimants by income group, 2011 and 2018

Taxable income (2017/18 R'000s):	<=0	1-30	30-80	80-200	200-500	500-1000	>1 000	Total
2010/11								
Retirement fund contributors ('000s)	13	401	1,361	2,104	1,968	493	163	6,502
% of all taxpayers	*5.8%*	*11.9%*	*42.9%*	*69.1%*	*84.0%*	*84.7%*	*81.1%*	*50.3%*
Medical deduction claimants ('000s)	2	56	328	944	1,612	438	158	3,538
% of all taxpayers	*1.1%*	*1.7%*	*10.3%*	*31.0%*	*68.8%*	*75.2%*	*78.9%*	*27.4%*
2017/18								
Contributors ('000s) to:								
Provident funds	10	288	1,248	1,100	684	194	64	3,588
Pension funds	1	112	277	748	1,485	358	85	3,067
Retirement annuity funds	5	59	92	325	922	313	116	1,834
All retirement funds	14	453	1,601	1,935	2,338	621	183	7,144
% of all taxpayers	*4.9%*	*13.0%*	*43.3%*	*62.9%*	*83.4%*	*84.8%*	*81.0%*	*50.0%*

Source: based on National Treasury and SARS, *Tax Statistics* (various years), and National Treasury and UNU-WIDER (2019).

It is notable that retirement fund participation is well over 60 per cent of taxpayers above the 2018 taxable income level of R80,000 and is over 40 per cent in the R30,000–80,000 income group. This analysis suggests that about three quarters of RA contributors are also contributing pension or provident fund members. Medical scheme participation and medical expense claims are a much

lower percentage of taxpayers below the tax threshold (of around R80,000 in 2017/18 prices). (Comparable data on medical claims in 2017/18 are not shown, as these deductions had been replaced by tax credits.)

6 The distribution of income, 2011 and 2018

In Tables 8, 9, and 10, we examine the shift in the distribution of taxable income by focusing on the 2011 and 2018 years only, with incomes reported in constant 2017/18 prices. Tables 9 and 10 include individuals with negative or zero taxable incomes in the total counts but exclude them from the distribution columns.

Table 8 shows that taxpayer numbers have declined as a share of the total in income cohorts below R30,000 a year and between R80,000 and R200,000 a year. Aggregate income and taxable income have fallen substantially between 2011 and 2018 in the middle R80,000–200,000 income group while rising in both lower and higher income groups. Individuals with taxable incomes above R500,000 are 6.1 per cent of the total and account for 36.4 per cent of income in 2010/11, and comprise 6.7 per cent of the total in 2017/18 with 38.2 per cent of aggregate income before deductions.

Table 8: Distribution of individuals and aggregate income by income group, 2011 and 2018

Taxable income (2017/18 R'000s):	**<=0**	**1-30**	**30-80**	**80-200**	**200-500**	**500-1000**	**>1 000**	**Total**
2010/11								
Number of individuals ('000s)	217	3,369	3,170	3,046	2,344	583	201	12,930
% of total	*1.7%*	*26.1%*	*24.5%*	*23.6%*	*18.1%*	*4.5%*	*1.6%*	
Adj Income bef deductions (R b)	(4.9)	42.6	172.7	433.6	817.3	440.7	395.0	2,296.9
% of total	*-0.2%*	*1.9%*	*7.5%*	*18.9%*	*35.6%*	*19.2%*	*17.2%*	
Adj taxable income (R b)	(7.5)	41.5	164.0	394.9	716.9	382.3	357.9	2,050.2
% of total	*-0.4%*	*2.0%*	*8.0%*	*19.3%*	*35.0%*	*18.6%*	*17.5%*	
2017/18								
Number of individuals ('000s)	291	3,476	3,695	3,075	2,801	732	226	14,297
% of total	*2.0%*	*24.3%*	*25.8%*	*21.5%*	*19.6%*	*5.1%*	*1.6%*	
Income bef deductions (R b)	(3.3)	44.6	270.6	371.9	996.4	564.9	477.6	2,722.8
% of total	*-0.1%*	*1.6%*	*9.9%*	*13.7%*	*36.6%*	*20.7%*	*17.5%*	
Taxable income (R b)	(4.1)	43.7	257.5	339.2	871.8	494.4	437.8	2,440.3
% of total	*-0.2%*	*1.8%*	*10.6%*	*13.9%*	*35.7%*	*20.3%*	*17.9%*	

Source: based on National Treasury and UNU-WIDER (2019).

Table 9 summarizes the age distribution within income groups in 2011 and 2018, illustrating an upward trend in the share going to older age cohorts in the higher income groups.

Table 10 provides an alternative view of the shift in the distribution of taxable income by age group between 2011 and 2018. Though the proportion of the population over the age of 20 with taxable incomes greater than zero declined from 41.7 to 39.8 per cent over this period, the percentage with over R200,000 (2017/18 prices) in taxable income has increased from 10.1 to 10.5 per cent. Adjusted mean real taxable income of individuals returning positive incomes has increased from R161,400 to R174,200 a year (a 7.9 per cent increase), but by larger percentages for older age cohorts. The share of aggregate real taxable income reported by individuals in the age 20–34 bracket has declined from 25.5 to 23.8 per cent, while the share attributable to individuals in the 50–64 and over 65 age cohorts has increased.

Table 9: Distribution of individuals by age and taxable income group, 2011 and 2018

Taxable income: (2017/18 rands – '000s)	1-30	30-80	80-200	200-500	500-1 000	>1 000	Total
Distribution by age within income group: 2010/11							
Age <35	58.4%	47.4%	37.5%	25.1%	20.8%	10.7%	41.9%
Age 35–49	21.1%	30.1%	34.6%	45.3%	45.9%	49.9%	32.6%
Age 50–64	10.0%	13.8%	20.4%	24.7%	28.6%	33.6%	17.5%
Age >65	10.5%	8.7%	7.6%	5.0%	4.7%	5.7%	8.0%
Share of total	26.1%	24.5%	23.6%	18.1%	4.5%	1.6%	100.0%
Distribution by age within income group: 2017/18							
Age <35	56.5%	47.3%	35.2%	26.7%	17.9%	7.6%	40.4%
Age 35–49	21.6%	32.1%	35.9%	42.3%	45.6%	49.4%	33.4%
Age 50–64	10.1%	13.2%	19.9%	25.2%	31.3%	36.0%	17.8%
Age >65	11.9%	7.4%	9.0%	5.8%	5.3%	7.0%	8.4%
Share of total	24.3%	25.8%	21.5%	19.6%	5.1%	1.6%	100 %

Source: based on National Treasury and UNU-WIDER (2019).

Table 10: Distribution of real taxable income by age, 2011 and 2018

	Percentage of population with taxable income (2017/18 prices) greater than:				Adjusted real taxable income (2017/18 prices)		
	R0	R30,000	R80,000	R200,000	Mean (R'000s)	Aggregate income (R billion)	% of Total
2010/11							
Age 20–35	36.6%	23.5%	13.1%	5.1%	100.8	**522.8**	25.5%
Age 35–49	47.3%	38.5%	27.8%	16.0%	206.7	**872.6**	42.6%
Age 50–64	43.1%	35.6%	27.2%	15.5%	232.7	**527.0**	25.7%
Age >65	38.7%	24.8%	14.5%	5.8%	117.0	**120.8**	5.9%
Total	**41.7%**	**30.1%**	**19.9%**	**10.1%**	**161.4**	**2,050.2**	**99.7%**
2017/18							
Age 20–35	35.3%	23.2%	12.4%	5.6%	103.4	**580.0**	23.8%
Age 35–49	45.3%	37.2%	25.9%	15.5%	213.6	**1,019.7**	41.8%
Age 50–64	41.2%	34.2%	26.3%	16.4%	263.9	**672.2**	27.5%
Age >65	36.5%	23.3%	15.1%	6.6%	135.9	**163.3**	6.7%
Total	**39.8%**	**29.3%**	**19.0%**	**10.5%**	**171.0**	**2,440.3**	**99.8%**

Source: based on National Treasury and UNU-WIDER (2019).

Broad measures of the shift between 2011 and 2018 in the overall inequality of income reported to SARS are provided in Table 11. On these estimates, median (adjusted) income before deductions declined between 2011 and 2018, and median taxable income increased marginally in real terms, whereas mean income and taxable income increased by 7.2 and 7.6 per cent, respectively (or about 1 per cent a year). The SARS income data suggest that relative to both the median and mean, income before deductions and taxable incomes at the 75th and 90th percentiles were higher in 2018 than in 2011. At the 99th percentile, income was higher relative to the median in 2018 but lower relative to the mean. In the bottom half of the distribution, the data suggest that income at the 25th percentile has increased slightly relative to the median. This suggests a 'hollowing out' trend, in which incomes have improved at both lower and higher levels relative to the middle of the distribution.

Table 11: Estimated shifts in distribution of (adjusted) income and taxable income, 2011 and 2018

			Income percentile				
(2017/18 prices)	R p annum	% change	25th	**50th**	**75th**	**90th**	99th
Income before deductions	**Median**		**Income before deductions as ratio to median:**				
2010/11	**81,200**		0.36	1.00	2.70	5.42	16.14
2017/18	**80,911**	-0.4%	0.38	1.00	2.95	5.99	17.18
	Mean		**Income before deductions as ratio to mean:**				
2010/11	**177,647**		0.16	0.46	1.23	2.48	7.38
2017/18	**190,444**	7.2%	0.16	0.42	1.25	2.55	7.30
Taxable income	**Median**		**Taxable income as ratio to median:**				
2010/11	**75,909**		0.37	1.00	2.60	5.06	15.36
2017/18	**76,709**	1.1%	0.39	1.00	2.82	5.51	16.22
	Mean		**Taxable income as ratio to mean:**				
2010/11	**158,564**		0.18	0.48	1.24	2.42	7.35
2017/18	**170,687**	7.6%	0.18	0.45	1.27	2.47	7.29

	Gini coefficient		
Individual taxable income (2017/18 prices):	**≥0**	**> 30,000**	**> 80,000**
	Income before deductions		
2010/11	0.66	0.57	0.48
2017/18	0.68	0.59	0.51
	Taxable income		
2010/11	0.66	0.56	0.47
2017/18	0.67	0.58	0.50

Source: based on National Treasury and UNU-WIDER (2019).

The second part of Table 11 summarizes the shift in inequality between 2011 and 2018 as measured by the Gini coefficient of both income before deductions and taxable income (adjusted), first for all non-negative incomes reported to SARS and then for taxable incomes above R30,000 a year and above R80,000 a year in 2018, and above roughly equivalent incomes in real terms in 2011. These three measures also indicate that the widening of income inequality over this period was greater at higher income levels than for the whole income distribution.

7 Conclusion

This paper sets out trends in the personal income tax base between 2011 and 2018, after adjustment for changes in 2013 and 2015 in the tax treatment of medical scheme contributions and medical expenses, deductibility from 2017 of contributions to provident funds, and the inclusion in 2017 of employer-paid retirement fund contributions in income. These adjustments reduce, but do not eliminate, the apparent rise in income and taxable income relative to GDP over the period under review.

Strong growth in the personal income tax base, relative to national income, accounts in part for the buoyancy of PIT revenue collection during this period. Revenue was also boosted by below-inflation adjustments to tax thresholds and increases in marginal tax rates, particularly over the 2015/16–17/18 period.

Our analysis provides a broad overview of retirement fund participation over the 2011–18 period and of its distribution across the income distribution. The data suggest that over 7 million

individuals contributed to retirement funds in 2018, equivalent to 50 per cent of the total number reporting income to SARS. Medical scheme and medical expense tax benefits are claimed by over a quarter of all taxpayers. Further work on this data, drawing on more detailed data extraction from the personal income tax panels (National Treasury and UNU-WIDER 2019), would permit a more complete analysis of the distribution of earned income and the contribution of contributory retirement funding and health insurance to income security.

We show that there has been a shift in the distribution of income towards higher income taxpayers and higher age groups. These shifts are associated with a widening in the inequality of distribution of both income before deductions and taxable income. The Gini coefficient of the distribution of adjusted income before deductions, for individuals reporting zero or positive taxable income to SARS, increased from 0.66 in 2011 to 0.68 in 2018.

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Appendix: Methodological notes

This paper is accompanied by an excel workbook titled 'PIT Income Analysis 2011 2018'. The spreadsheets referred to below are contained in this workbook.[7]

The analysis relies on administrative data drawn from tax returns for the 2011 to 2018 tax-years, collated in the *Income Panel* of the Personal Income Tax Individual Panel dataset (National Treasury and UNU-WIDER 2019), housed at the National Treasury. We make use of a set of age-income cross-tabulations for each year in twenty-five taxable income bands and fourteen age groups.[8]

These source data cross-tabulations, five for each year, consist of a matrix of counts in age by taxable income groups and corresponding tabulations of mean gross income, mean income, mean retirement fund lumpsums, and mean taxable income. They are marked 'Source Data' and are located in the worksheets for each year ('2011', '2012', etc), beginning in column AF for the 2011–16 years and in column A for the 2017 and 2018 years. We derive cross-tabulations of mean 'income before deductions' for taxable income by age groups by subtracting mean retirement fund lumpsum incomes from mean incomes for each cell.

We also make use of the published personal income *Tax Statistics*[9] for the years under review, as described below.

A Elimination of income outliers

In the top income group (R5,000,000+) the source data contain occasional outliers in which mean annual incomes are implausibly large—in some cases in excess of R1 billion for cells with counts of 100 or more. We regard these as likely to have arisen from data entry errors. These 'Unadjusted' '5,000,000+' columns are replaced by 'Adjusted' columns in which outliers are replaced by mean incomes ranging from R6,500,000 to R10,000,000, depending on age, with the income and gross income means set at 5 per cent above the adjusted taxable income level.

B Population estimates

In order to compare age-specific counts with the corresponding population numbers, we make use of the Statistics SA mid-year population estimates published in 2021 (P0302), reproduced in 'Population'. We take the mid-year population estimate for 2010 as the relevant comparator for the 2010/11 tax-year, *ad seriatim*.

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[7] Workbook available here: https://www.opensaldru.uct.ac.za/handle/11090/1024. The workbook was revised in December 2023.

[8] The age-income group cross-tabulations on which this analysis is based were prepared by Mlungisi Ndlovu and Bill Seota (UNU-WIDER) in December 2021, supplemented by similarly structured cross-tabulations of lumpsum payments from retirement funds prepared by Aidan Horn (SALDRU) in November 2022. The underlying dataset is the Income Panel of National Treasury and UNU-WIDER (2019), version 2019_2, housed at the Secure Data Facility at the National Treasury, Pretoria. The Python code used to construct these cross-tabulations is run in a Jupyter Notebook with an Anaconda interpreter. It is available as bill_seota_edited.ipynb, stored in aidan_horn/do_files/Archive on the Secure Data Facility computer. Access to the data was provided under a non-disclosure agreement that ensures that no individual information can be derived. The results of this analysis do not represent official statistics or views of either the National Treasury or SARS.

[9] National Treasury and SARS (various years).

C GDP and CPI estimates

The spreadsheet 'GDP & CPI' contains the national accounts and consumer price indices we use. The nominal and real GDP and compensation of employees estimates are taken from Statistics SA P0441 for 2022 Q2, computed for fiscal years (ending Q1) that correspond with tax-years (which end in February). We use headline CPI averages for the fiscal years (i.e. April year1 – March year2). 'GDP & CPI' also contains PIT revenue collection estimates for fiscal years, taken from the *2022 Budget Review* (National Treasury 2022), Table 2 of the Statistical Annexure.

D Summary estimates of taxpayer numbers, income aggregates, and mean incomes, all taxpayers and above the tax threshold only

The tax thresholds applicable in each tax-year are set out in 'Tax thresholds', together with the maximum rate and top bracket thresholds. We estimate the number of individuals above and below the tax threshold by separately applying the thresholds for individuals under the age of 65 and over 65 to the age-specific counts in the taxable income tables. (We ignore the higher threshold for taxpayers over the age of 75.)

The tax thresholds do not correspond exactly with the taxable income groups for which we have counts, and so we divide the counts and corresponding aggregate income estimates within income groups that straddle the tax threshold in proportions that depend on the position of the threshold within the income band and an assumed distribution within the income group. The proportions differ for the counts and income aggregates, as the relevant mean incomes differ. These calculations rely on cell-specific assumptions that can be inspected in the formulae applied to calculate the above-threshold income aggregates and counts, in the 'Summary Stats' sections between rows 6 and 22 in the worksheets for each tax-year. There is some room for error here, but it is not large: the income-group counts that have to be divided between below- and above-threshold estimates are less than 5 per cent of the total in each year.

The 'Summary Stats' comprise aggregate gross income, income, retirement fund lumpsum withdrawals, income before deductions, and taxable income; individual counts; and computed mean incomes, for three consolidated age groups: <35, 35–64, and >65. Corresponding calculations for narrower age bands could be done straightforwardly, by applying the same formulae for the above-threshold estimates to selected Age-cat rows. These summary estimates are set out for all individuals reporting income to SARS, and for those with taxable incomes above the tax threshold.

For the 2011 to 2016 years, the 'Summary Stats' are set out for both the original source data and for 'Adjusted Income' estimates, to enable comparisons across the years on the basis of the income definitions applicable from 2017 onwards. These adjustments are described below.

E Adjusted taxable income: medical expense deductions

We compile *adjusted* cross-tabulations of taxable income by age group for the 2011–14 years to enable comparison with later years in which medical scheme contribution and medical expense deductions from income were no longer available.

There are two main steps in this adjustment: first to estimate the number (count) of individuals in each age-income group with qualifying medical expense deductions and the quantum of these deductions, and second to reassign these individuals to the appropriate (higher) taxable income groups.

We make use of the *Tax Statistics* published annually by the National Treasury and SARS to estimate the distribution of medical expense deductions across taxable income groups in the 2011–14 years. Table A2.7.4 of the published Personal Income Tax tables provides numbers of taxpayers and aggregate amounts for medical expense deductions, by taxable income group. We adjust these numbers upwards to reflect the full taxpayer base, as the published tax statistics are derived from *assessed* taxpayers only. There are several steps in these adjustments.

Our taxable income groups correspond with those reported in the *Tax Statistics*, except for some variation in the three groups that cover incomes between R200,001 and R500,000. Where needed, we make proportional shifts between the *Tax Statistics* groups in order to eliminate these discrepancies.

By comparing the overall distributions of numbers of taxpayers by taxable income group (Table A2.1.1) in each year taken from the latest *Tax Statistics* publication covering that year, with the distribution in the cross-tabulations described above and sourced from the administrative *Income Panel* dataset, we obtain 'adjustment factors' for taxable income groups that yield an approximation of the overall tax base. These adjustment factors are calculated for each of the 2011–18 years, in the spreadsheet 'TaxStats Uprated'. They reflect the fact that high proportions of lower income earners do not file tax returns, are accordingly not recorded in the published tax statistics, and are recorded in the administrative datasets only as a result of IRP5 returns by employers (or retirement funds). The adjustment factor declines with income, from 13.6 for the lowest income group to between 1.13 and 1.15 in income groups above R150,000 in 2011, for example. A 'comparison with administrative outcomes' (in cells K-L33, K-L64, etc) indicates that these adjustment factors yield aggregate taxable incomes within 0.7 per cent of the administrative dataset totals, and implied tax assessments that are within 5 per cent of collected PIT revenue.

Taxpayers taking advantage of medical scheme contribution or medical expense deductions are more likely to file tax returns than those who do not. We therefore calculate restricted adjustment factors for medical deductions for the 2011–14 years, based on a year-by-year comparison of the estimates of 2011 medical expense deductions in the sequential 2012, 2013, 2014, and 2015 *Tax Statistics* publications. For each income group, we adjust the number of medical expense claimants and the amount claimed upwards by factors equivalent to 75 per cent[10] of the ratio of the medical expense increase to the total taxpayer number and taxable income increases between the 2014 and 2015 publications (i.e. the increase in assessments), multiplied by the overall adjustment factors to the administrative dataset totals (calculated in 'TaxStats Uprated'). The detailed year-by-year analysis of deductions for the 2011 tax year is set out in 'Uprating 2011-16'. The calculations of income group-specific medical expense adjustment factors for the 2011–14 years are set out in the 'Med exp adj' spreadsheet. For the 2011 year, these adjustments raise the number of medical deduction claimants from 3.039 million to 3.538 million, and increase the aggregate medical expense deduction amount from R58.6 billion in the *Tax Statistics* to R65.4 billion. In the 2010/11 year there were approximately 3.8 million members of medical schemes, and so these upward adjustments to taxable income are conservative, probably erring on low side.

These deduction claimants are then assigned in the 'Med exp adj' spreadsheet to a (new) adjusted taxable income group. The average deductions in 2011 in lower income groups are between R15,000 and R18,000. These lower income groups are in R10,000 bands, and so we reassign claimants to the next or second next higher group, in proportions that depend on the average amount. At higher income levels, where the income bands are wider, the reassignment is divided

[10] This adjustment parameter is a variable that can be set in cell M2 of 'Med exp adj'.

between the same income group and the next group. The reassignment algorithm applies both to the count and to a corresponding shift of aggregate taxable income between groups.

The above procedures yield adjusted estimates of numbers and aggregate taxable income by income group. We have still to distribute the adjustments by age groups. This begins with a different approach to estimating the impact of the medical expense tax change.

Tables A and B in spreadsheet 'Med exp adj' set out, for each age-income group, the change in the ratio of taxable income to income (before deductions) between 2012 and 2013, and between 2014 and 2015, as first approximations of the upward impact on taxable income of the change in treatment of medical scheme contributions and medical expenses, respectively. These increases are applied to the mean taxable incomes in the source tables for 2011 to 2014, to provide the upward-adjusted mean taxable incomes (before reassignment of individuals between taxable income groups) in Tables A1 for each year.

Within each taxable income column, we then calculate an adjusted count for each age group by distributing the increase or decrease in the total income group count, derived above, in proportion to the implied contribution of each age group to the overall change in taxable income within the group. This generates the adjusted counts in Table C1 (beginning in column BL) for the 2011–14 years.

We now have a matrix of age-taxable group counts in which the age group totals differ from the originals. This is a familiar matrix reconciliation problem, in which we have internal cell counts that are not consistent with the row (age group) and column (income group) totals. We use an iterative RAS adjustment[11] procedure through five stages to generate a satisfactorily consistent matrix of age-income counts. These iterations are in successive blocks beginning below Table C1 in column BL in the 2011–14 spreadsheets.

This generates a reassignment of medical expense claimants to higher taxable income groups, consistent with the removal of medical scheme and medical expense deductions from income. The final step in estimating the distribution of adjusted taxable income is a series of adjustments to the original age-income group means to achieve the aggregate income totals determined above, for the new counts of individuals within each income group. This is easily done on the simplifying assumption that the same adjustment to means is made in each age group within an income band. The adjusted taxable income means are set out in tables headlined in cell A87 of the '2011', '2012', '2013', and '2014' spreadsheets. That these adjustments (shown in row 106) are comparatively small provides some assurance that the procedures followed to adjust for medical expenses are robust. Downward adjustments to age-income group means of around 2-3 per cent are observed in the higher income bands in 2011 and 2012. This is intuitively plausible, as significant numbers of taxpayers who are medical scheme deduction claimants move into these bands from below the band's lower threshold, while higher income earners within the group move to the next band.

This completes the adjustments needed to reassign taxpayers between taxable income groups and to estimate adjusted age-income group means and aggregate taxable incomes for the 2011–14 years, consistent with the tax treatment of medical scheme contribution and medical expenses through tax credits rather than deductions, as has applied since the 2015 tax-year.

[11] For a description of the RAS iterative scaling method, see https://ec.europa.eu/eurostat/cros/system/files/Macro-Integration-03-M-RAS%20v1.0.pdf.

F Adjustments to taxable income counts: imputed deduction of provident fund contributions

A further set of adjustments to the distribution of individuals between taxable income groups in the 2011–16 years is needed to reflect the deductibility of employee/member contributions to provident funds, which came into effect as part of the 2017 retirement fund tax reforms. Prior to 2017 provident fund contributions by employers fell outside the tax net, but employee contributions were not deductible.

As with medical expenses, we make use of the published *Tax Statistics* to generate estimates of employee/member contributions to provident funds for the 2011–16 years. This involves some complexity, as this information does not form part of the tax return records.

- We begin with a series of income group-specific provident fund participation rates for the 2018 year, detailed as supplementary information in rows 146–149 of the '2018' spreadsheet.[12] This provides estimates of the number of provident fund contributors in 2018, distributed by taxable income group. In order to generate equivalent numbers for the 2011–16 years, we first calculate estimates of the numbers of provident fund contributors in 2018 by taxable income group *before* allowance for deduction of provident fund contributions—i.e. we shift calculated proportions of provident fund contributors to higher income groups, based on estimated provident fund contribution amounts, derived from 2016 average pension contributions by taxable income group adjusted down at higher income levels. These calculations are set out in cells BB77–BH103 in 'Uprating 2017-18'. From this we derive the provident fund participation rates for 2018 as per cent of counts before provident fund deductions, set out in column U (U7–U31) of 'RF partrates'. By inspection of these participation rates and adjustment for CPI inflation of about 46 per cent between 2011 and 2018, we set participation rates for 2011 and calculate rates by taxable income group for the intervening years by linear interpolation (in the matrix N7–T31 in 'RF partrates').

- We draw on these participation rates, applied to the administrative counts of individuals by income group, to estimate numbers of provident fund contributors by taxable income group for the 2011–16 years, in spreadsheet 'Uprating 2011-16'. These estimates, in column L beginning in rows 162 (2011), 195 (2012), 229 (2013), 263 (2014), 294 (2015), and 358 (2016) are then adjusted by shifting proportions of contributors down to lower taxable income groups, consistent with the deductibility of provident fund contributions that was introduced in 2017. The proportions shifted to lower taxable income groups depend on assumed average provident fund contribution amounts. To avoid circularity, these are estimated from calculated pension contribution amounts, adjusted up in lower income groups and down in higher income groups. The adjusted provident fund contributor numbers are in column P of 'Uprating 2011-16' and are reproduced in 'RF contr adj' beginning in row 77. For the 2017 year, provident fund contributor numbers are estimated directly from the participation rates in 'RF partrates'.

- The estimation of provident fund contributions (beginning in cell U77 of 'RF contr adj') relies on assumed *average* provident fund member contributions by taxable income group. The provident fund contribution amounts for 2017 and 2018 are calculated in 'Uprating

[12] Data drawn from National Treasury and UNU-WIDER (2019) from the Source Code Panel by Aidan Horn in November 2022. The participation rates are calculated in Stata, in a file named aggregation1_v5.do stored in aidan_horn/do_files/Archive on the Secure Data Facility computer.

2017-18' by deducting estimates of aggregate pension and retirement annuity contributions by individuals, by taxable income group, from aggregate pension, provident fund, and RA contributions by individuals/members and dividing by the numbers of contributors. For 2011–16, average provident fund contribution estimates are set to provide plausible trends by income group, relative to the 2017 and 2018 average contributions.

- The estimated numbers of individuals shifting to a lower taxable income group as a result of provident fund member contributions calculated as above are then applied to the adjusted counts of taxpayers by age and taxable income group in the '2011' to '2016' spreadsheets (matrices beginning in cell A27). The adjustment numbers are set out in rows 17–19 beginning in column AF, and are applied proportionally within each taxable income group to individuals aged 15–59 plus 50 per cent of the age 60–64 cohort.

This completes the adjustment to taxable income estimates in 2011–16 for deductibility of provident fund contributions. No changes are made to the mean taxable income by age and taxable income group, but the adjusted counts generate downward adjustments of aggregate taxable income in each year, shown in cells U109–Z110 of 'RF contr adj', that correspond closely with the estimates of aggregate provident fund member contributions derived from the product of contributor numbers and average contribution amounts.

G Estimates of pension, provident fund, and retirement annuity participation and contributions

Making use of simplifying assumptions and adjustments for consistency, this analysis generates estimates of pension, provident fund, and retirement annuity contribution rates over the 2011–18 period and estimates of aggregate retirement fund contributions.

The derivation of provident contribution numbers and aggregate individual/member contributions by taxable income group is described above.

To derive estimates of pension fund and RA contribution rates and member contribution amounts, and overall retirement fund contributions, we make use of upwardly adjusted estimates of pension fund and retirement annuity contribution deductions by members reported in Tables A2.7.2 and A2.7.3 of the personal income *Tax Statistics* for the 2011–16 years, together with adjusted estimates of *total* retirement fund (pension, RA, and provident fund) employer and employee contribution deductions for 2017 and 2018 (Table A2.7.5), and of fringe benefit contributions by employers (Tables A2.6.5).

- As in the medical expenses case, we calculate restricted upward adjustment factors (by income group) for pension fund and RA member numbers and contribution deduction amounts in 2011 and 2016, in the 'Uprating 2011 & 2016' spreadsheet. We assume an upward adjustment of 80 per cent[13] of the ratio of the contributions increases to taxpayer number increases between the 2014 and 2015, and 2019 and 2020 *Tax Statistics* publications, respectively. These upward adjustment factors are calculated in cells AY100–BB126 and AY325–BB351, respectively, yielding the pension fund and RA participation rates set out in 'RF partrates' and the numbers and amounts by taxable income group in 'RF contr adj' for 2011 and 2016.

[13] Adjustment parameters set in cells H6–I7 of 'RF contr adj'.

- For the intervening 2012–15 years, we calculate income group specific participation rates and average pension and RA contribution amounts by linear interpolation. These calculations are in the 'RF partrates' and 'RF contr adj' worksheets, respectively.

- For 2017 and 2018, we extrapolate from the 2014–16 changes to generate estimates of participation rates and average member contributions to pension funds and RAs, also calculated in the 'RF partrates' and 'RF contr adj' worksheets.

- The published *Tax Statistics* for the 2017 and 2018 years include estimates of numbers and amounts of retirement fund contribution deductions *inclusive* of member- and employer-paid contributions and estimates of employer-paid retirement fund contribution fringe benefits. We adjust these estimates upwards, based on the increase in the 2017 and 2018 numbers between the 2020 and 2021 published statistics adjusted by the overall increase in taxpayer numbers. As above, we impose proportional adjustment parameters on these upward adjustments, set marginally higher for 2018 as this year's estimates are based on the third, not fourth, year of available statistics.[14] We override some of these adjustment factors, however, by imposing overall retirement fund participation rates that are consistent with the separately calculated provident fund, pension, and RA participation rates: we assume that the overall rate must exceed the sum of provident fund and pension fund participation and cannot exceed the sum of provident fund, pension fund, and RA participation rates. These calculations are set out in 'Uprating 2017-18', and cells in which the calculated adjustment parameters are replaced for consistency are marked in yellow. The difference between overall retirement fund contribution deductions and fringe benefit amounts provides estimates of aggregate pension, RA, and provident fund employee/member contributions by income group for these two years (in cells AE76–AF103).

- For the 2011 year, we set overall participation rates beginning in cell B36 of 'RF partrates' calculated as the sum of the provident fund, pension fun, and a fixed per cent of the RA participation rate, in the lower taxable income groups. For higher income groups, we set participation rates that correspond with the 2017 rates, after taking into account inflation of about 40 per cent between 2011 and 2017. For the intervening 2012–16 years, we set the overall participation rates by linear interpolation.

H Adjusted income: inclusion of imputed employer-paid retirement fund contributions

Prior to 2017, individual income reported to SARS excluded employer-paid contributions to retirement funds. The tax statistics included employee-paid contributions to pension funds together with individuals' voluntary retirement annuity contributions as deductions (subject to limits). From the 2017 year, employer contributions have been included in income as fringe benefits, and a consolidated approach to the deductibility of pension, provident fund, and retirement annuity (RA) funds has been adopted.

In order to derive a consistent income (before deductions) series for the 2011–18 period, we calculate imputed employer-paid pension contributions for the pre-2017 years, making use of the changes between 2016 and 2017 in the age-income group specific ratios of taxable income to income.

[14] Adjustment parameters set in cells J8–M10 of 'RF contr adj'.

The first step in this adjustment is the computation of two income adjustment matrices, one for 2016–17 and one for 2011–12. The underlying assumption is that the rise in the ratio of income (before deductions) to taxable income in each age-income group between 2016 and 2017 is a measure of the pension contributions by employers that were not recorded before 2017. As the source data has some statistical noise in these ratios, we impose a *de minimus* increase of 0.2 per cent. This affects a small proportion of age-income groups, mainly in the <15 and 15–19 age brackets. For all taxpayers, there is a 5.8 per cent increase in the income before deductions/taxable income ratio between 2016 and 2017. The calculated age-income group ratio increases provide an adjustment matrix for 2016.

We then prepare an adjustment matrix for the 2011 year by applying the 2016 adjustments or their weighted averages to equivalent 2011 *real* income groups (CPI adjusted). The 2016 and 2011 adjustment matrices are in spreadsheet 'RF employer adj'.

For the intervening years, we phase in the adjustments as linearly weighted averages of the 2011 and 2016 adjustments for each age-income group. These procedures generate the adjusted mean incomes (before deductions) set out in tables headlined in cell A68 of the '2011', '2012', '2013', '2014', '2015', and '2016' spreadsheets.

This provides a complete set of upward adjustments to age-income group income (before deductions) means for the 2011 to 2016 years, with the resulting adjustments to aggregate income in the 2011 to 2016 years calculated by reference to the adjusted counts and taxable incomes determined as above, before medical scheme contribution and medical expense deductions and after imputation of provident fund deductions.