

ONLINE APPENDIX for “Taxing Top Incomes in the Emerging World – Fiscal and Economic Impact under the Microscope”

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A Institutional Background

As indicated in the main text, South Africa’s top marginal tax rate is high, compared to other countries at the same development stage – already before, but even more so after the marginal tax rate increase in the tax year 2018.

Figure A.1 draws on country-level data on economies’ top marginal income tax rate and their economic development as measured by GDP per capita. The figure shows that top marginal tax rates in the personal income tax scheme are positively correlated with countries’ economic development. The graph is closely linked to Jensen (2022), who documents a positive correlation between countries’ economic development and their income tax-to-GDP ratio. He shows that economic development raises the fraction of incomes subject to third-party withholding, which, in turn, improves countries’ ability to enforce income taxation. Figure A.1 suggests that better enforcement extends to the upper end of the income distribution and allows economically more developed countries to levy higher taxes on high-income earners. South Africa’s top marginal tax rate is at the top end of countries of its development stage after 2018.

Note, moreover, that, during our data frame, there were three other reforms of the personal income tax system, which we account for in our empirical analysis.

A first potential confounding tax policy shock is an increase in marginal income tax rates across the PIT schedule in March 2015 by 1 percentage point (with an exception of the very first income tax bracket). The first treated tax year is 2016. In a prior working paper version, we show that accounting for this reform by expanding the post-treatment frame does not materially impact our main estimates of interest.

A second reform that is of relevance for our analysis is that the South African government, in February 2017, parallel to the announcement of the increase in the top marginal PIT tax rate, also increased the flat tax on dividend income from 15 to 20%. The purpose of this reform was to neutralize taxpayers’ incentives to shift income from the PIT

Figure A.1: Top Marginal Tax Rate and Country Development: International Comparison



The figure shows countries' top personal marginal tax rates plotted against GDP per capita (constant 2010 US\$). South Africa (ZAF) is highlighted in red. Source: Own depiction based on PWC tax summaries for top personal marginal tax rates and the World Bank Development Indicators for GDP per capita.

to the CIT base to shield it from the increased 45% personal income tax rate (a behavioral response that has been documented in other countries, see for example Gordon and Slemrod 2000, Thoresen and Alstadsaeter 2010 and De Mooij and Nicodème 2008). No matter whether income is earned as personal or corporate income, it is subject to a tax rate around 5 percentage points higher after the reform. Individuals in the treated region thus face no incentive for (additional) income shifting across tax bases.¹ For individuals in the control region (that is for individuals who are unaffected by the top marginal PIT increase), the incentive to earn PIT income increased, in turn. In a prior working paper version (Axelson et al. 2024) and below (cf. Appendix C), we account for this point by showing that excluding individuals, who (may have) received dividends within our data frame, does not change our estimates of interest.

Third, in 2016, the South African government changed pension-related tax deductions in the PIT system. The reform became effective in March 2016 and affected tax years from 2017 onwards. The aim of the reform was to simplify and harmonize the pension-related deduction system, making pension-related deductions fairer and providing better incentives for retirement saving (see Redonda and Axelson (2021) for details).

The following key changes were implemented: Before March 2016, contributions by employers and employees to different funds (pension, provident, and retirement annuity funds) were treated differently. Employee contributions to pension and retirement annuity funds were tax deductible (up to a certain threshold, namely pensions funds up to

¹Individuals could, in principle, still try to shift income from wages to capital gains by keeping money in a business to then sell at a higher profit and pay the lower capital gains tax rate of 18%. We do consider this type of shifting to be of second order importance as it involves significantly higher hurdles and uncertainties than shifting between wage and dividend income.

7.5% of their retirement-funding employment income and retirement annuity funds up to 15% of their non-retirement-funding employment income), while employee contributions to provident funds were not deductible. Employer contributions to pension and provident funds were not treated as fringe benefits and, therefore, not part of employees' taxable income, while employer contributions to retirement annuity funds were classified as fringe benefits and hence taxable. In 2016, the system became more generous and was harmonized as employee contributions to all three funds were made deductible up to 27.5% of either taxable income or gross remuneration (whichever is higher), with a cap of R350,000 (Redonda and Axelson 2021).

To avoid that our findings are affected by the described changes in the pension-deduction scheme, we – in our empirical analysis – use two income measures that abstract from pension deductions in the South African personal income tax scheme. The first is a measure for monetary income, which comprises monetary labor income, business and investment income earned by taxpayers. The second is a measure for taxable income, which abstracts from any income and deduction components that might be affected by the reform. Specifically, we make two adjustments: First, we add employee provident fund contributions to our taxable income measure after 2017 to accommodate that they were not deductible beforehand. Second, we add taxpayers' retirement annuity contributions as well as pension fund contributions back to the taxable income measure for the whole sample frame as the 2017-reform raised the limits for this deduction substantially, thus increasing tax deductible contributions after the reform. The sketched adjustments neutralize any effect on the taxable income variable in our empirical analysis. In addition, we adjust fringe benefits and deductions for the same reasons. We only look at deductions unrelated to retirement contributions and fringe benefits are adjusted by subtracting employer provident and pension fund contributions from tax year 2017 onwards, since they were not included before the reform.

We only consider deductions which are not related to retirement contributions.

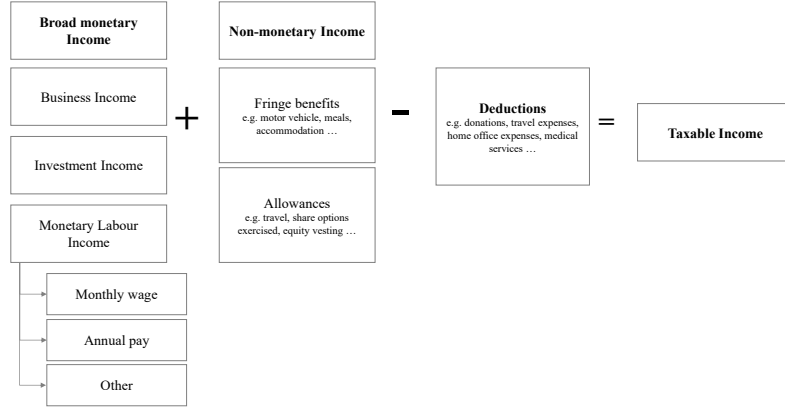
These deductions tend to be low and their relative importance (as a fraction of gross income) declines across the income distribution (around 2%-5% in the treated region for taxpayers with taxable income > 1.5 million Rand).

B Data and Descriptive Statistics

As explained in the main text, our data allows us to track taxpayer income granularly by income components. See Figure B.1 for a graphical depictions.

Figure B.2 further presents the density of taxable income across the 1.5 million Rand threshold in the pre-reform period 2017 and in the post-reform period 2018. We see mild bunching in both years – likely reflecting round-number bunching. In line with a treatment response, there is more mass on the kink in the marginal tax rate schedule

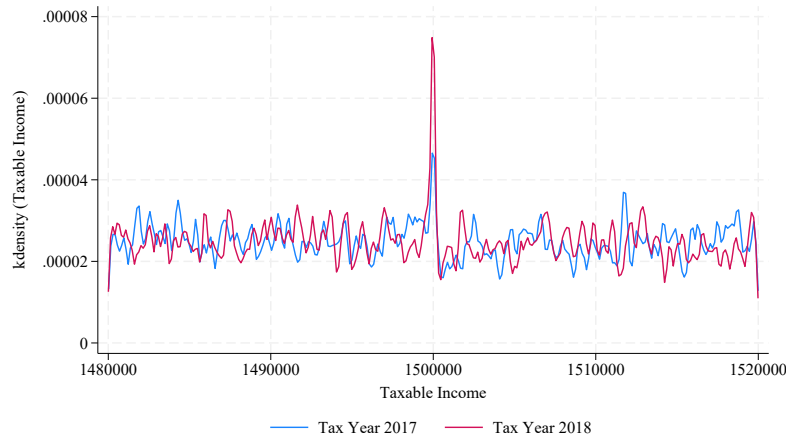
Figure B.1: Income Categories



The figure illustrates the income categories used in our analysis.

after the reform. But quantitatively, this translates into a limited response – consistent with many other prior estimates, which yielded small ETIs based on bunching estimators, likely reflecting optimization frictions (see e.g. Kleven 2016).

Figure B.2: Density zoomed in around threshold



The figure shows the density distribution zoomed in around the highest tax bracket threshold (1.5 million Rand) in tax year 2017 (blue line) and tax year 2018 (red line).

Table B.1 presents summary statistics for various income concepts utilized in our empirical analysis. The overview covers data for the tax years which enter our base analysis (2013, 2016, 2017, 2020). Importantly, this means that only taxpayers with incomes above the (second) highest tax kink before (after) the tax year 2017 enter the descriptive analysis.

Table B.1: Summary Statistics

	Observations	Mean	Standard Deviation
Monetary Income	2413000	859074	969760
Monetary Labor income	2413000	761880	853039
Business Income	2413000	42030	349671
Investment Income	2413000	57630	396040
Non-monetary Income	2413000	116950	380265
Fringe Benefits	2413000	32521	135996
Allowances	2413000	84569	344561
Deductions	2413000	20742	78738
Taxable Income	1740341	1305666	1049390

Monetary income consists of monetary labor income, business income and investment income. Non-monetary income consists of fringe benefits (adjusted for the pension reform) and allowances. Deductions and taxable income are also adjusted for the pension reform. The observations include our sample income period and time frame (2013, 2016, 2017 and 2020). All income variables are top-coded at 10 million Rand in real terms. Missing values are replaced with zeros.

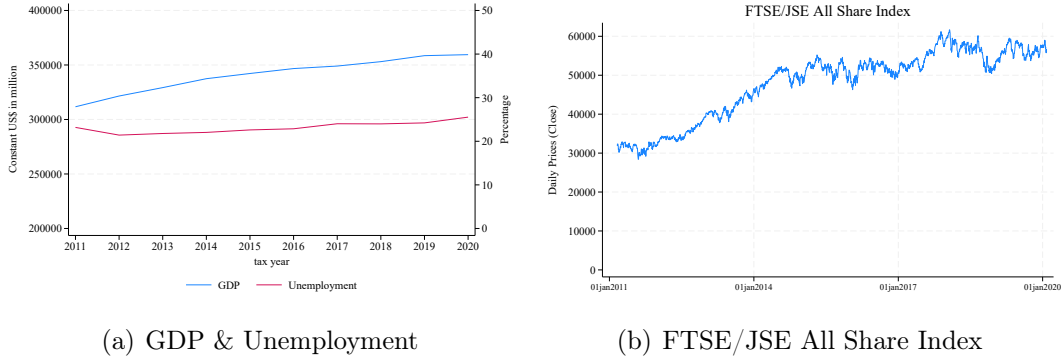
C Specification Checks

We run a number of specification checks to assess the validity of our empirical design. As laid out in the main text, the key assumption underlying our empirical approach is that trend differentials between higher and lower incomes remain constant within our data frame. The main text presents a number of tests, which support the validity of this assumption. Specifically, we show that trend differentials remained largely unchanged in the validation region of the income distribution in the reform period, and we show that trend differentials remained largely unchanged across the full income distribution prior to treatment. While this pattern is indicative, the validity of the common trend differential assumption is genuinely untestable.

In this appendix, we thus present further macro-economic evidence, which corroborates this assumption. In Figure C.1, we show that economic development was steady within the sample frame and did not show any major breaks (which is of relevance as economic disruptions and downturns might hit high-income earners harder than their lower-income counterparts as they, on average, bear more income risk), as indicated by GDP, unemployment rate and stock market development.

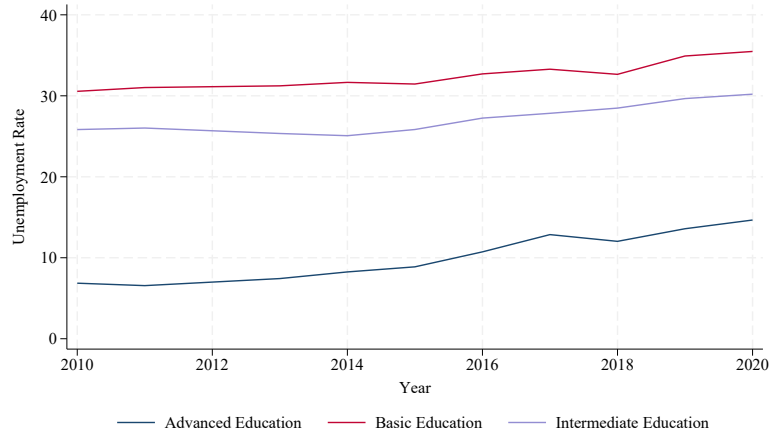
Complementary, Figure C.2, moreover, presents the development of taxpayers with advanced/intermediate/basic education (drawn from the World Bank Indicator database) during our data frame, also not pointing to differential labor market trends for individuals at the upper and lower end of the skill distribution.

Figure C.1: Economic development



The figure on the left-hand side depicts the GDP development (in million US\$ (constant)) and the level of unemployment (in %) over our sample period. The figure on the right-hand side illustrates daily closing prices of the JSE All Share Index on the Johannesburg Stock Exchange. Source: Own depictions based on World Bank Development Indicators and Wall Street Journal (2025).

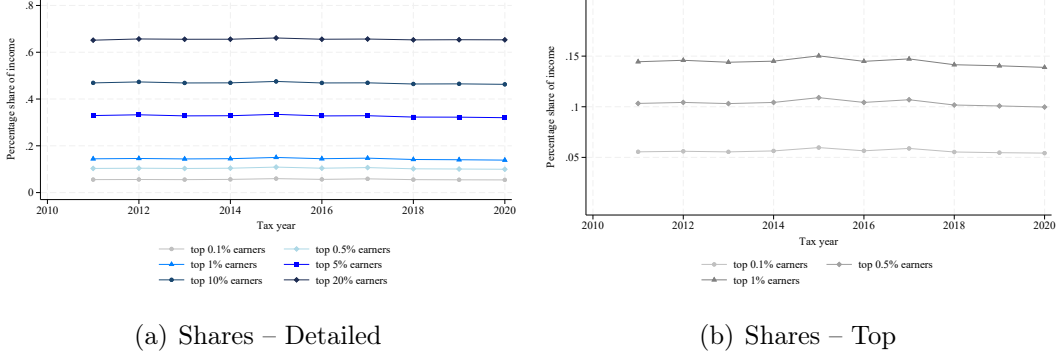
Figure C.2: Unemployment by Education Level



The figure depicts the development of unemployment rates in South Africa by education level over our sample period. For each skill level, unemployment is defined as the unemployed share of total labor force within the same education level. Source: Own depiction based on World Bank Development Indicators.

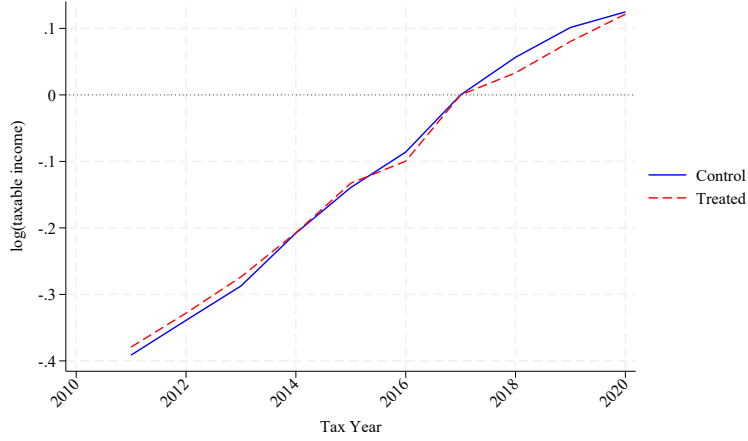
Figure 3(a) presents the share earned by the top 0.1%/0.5%/1%/5%/10%/20% income taxpayers. Analogous to our base analysis, we winsorize very high real incomes above 10 million Rand (in 2017 values) to dampen the impact of outliers (corresponding to about the top 0.01%). The right-hand graph zooms in on the income shares of the very top incomes (top 0.1%/0.5%/1%). The graph indicates a mild drop in top income shares in 2018, consistent with our baseline findings. This is also in line with the smaller mean taxable income growth for those earning more than 1.5 million (Figure C.4).

Figure C.3: Evolution of Income Shares



The figures show the evolution of income shares by different percentiles over our sample period. On the left-hand side, we show the income share by the top 0.1%, 0.5%, 1%, 5%, 10% and 20% of earners. On the right-hand side, we zoom in on the income shares of the top 0.1%, 0.5% and 1% earners.

Figure C.4: Evolution of Mean Taxable Incomes



The figure depicts the evolution of the average taxable income (in logs) in our treated (in red) and control group (in blue) over our sample frame.

Note that even though we find a large taxable income elasticity, our results are consistent with only a small tax reform-induced change in the top income share. To see this, decompose total income z into top income z^T and a remainder z^{NT} . The change in the top income share $ds = s_1 - s_0$ (where subscript 1 refers to the post-reform, subscript 0 to the pre-reform period) can be expressed as

$$ds = \frac{z_1^T}{z_1} - \frac{z_0^T}{z_0} = \frac{z_1^T}{z_0} \cdot \frac{z_0}{z_1} - \frac{z_0^T}{z_0}.$$

Post-reform top income is given by $z_1^T = z_0^T \cdot (1 + g_z + e \cdot \Delta t/t)$, where g_z denotes the general income growth rate and the product of the elasticity of taxable income with respect to the tax rate e and the percentage change in the top income tax rate $\Delta t/t$ captures the

tax-reform induced change in top incomes. Using $z_1^{NT} = z_0^{NT} \cdot (1 + g_z)$, we obtain

$$\frac{z_0}{z_1} = \frac{1}{1 + g_z + s_0 \cdot e \cdot \Delta t/t}$$

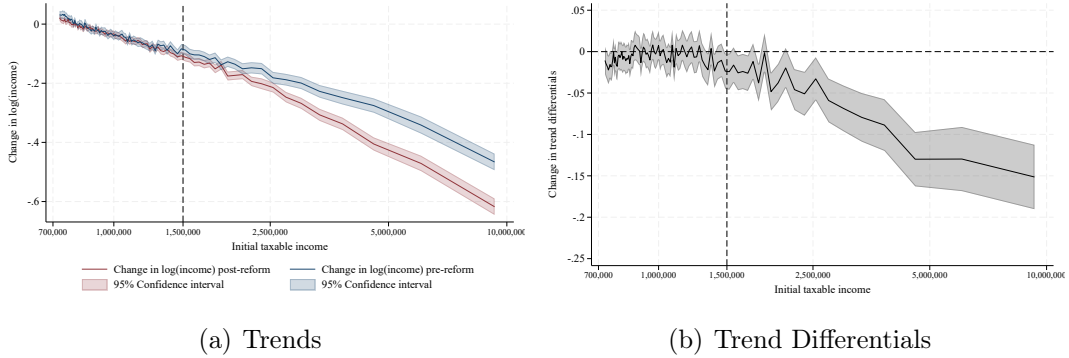
and so

$$s_1 - s_0 = \frac{1}{z_0} \left(z_1^T \cdot \frac{z_0}{z_1} - z_0^T \right) = s_0 \left(\frac{1 + g_z + e \cdot \Delta t/t}{1 + g_z + s_0 \cdot e \cdot \Delta t/t} - 1 \right)$$

We insert $g_z = 0.01$ (referring to the real income growth in South Africa during our data frame) and $s_0 = 0.15$ (referring to the income share of the top 1% of taxpayers). We further reestimate our baseline model, not determining the net-of-tax-elasticity of taxable income but the tax-elasticity of taxable income with $e = -0.7$ and the net change in the marginal tax $\Delta t/t = 0.0976$, the predicted change in the top income share is approximately -0.009 , i.e. a decline from $s_0 = 0.15$ to a value slightly above 0.14.

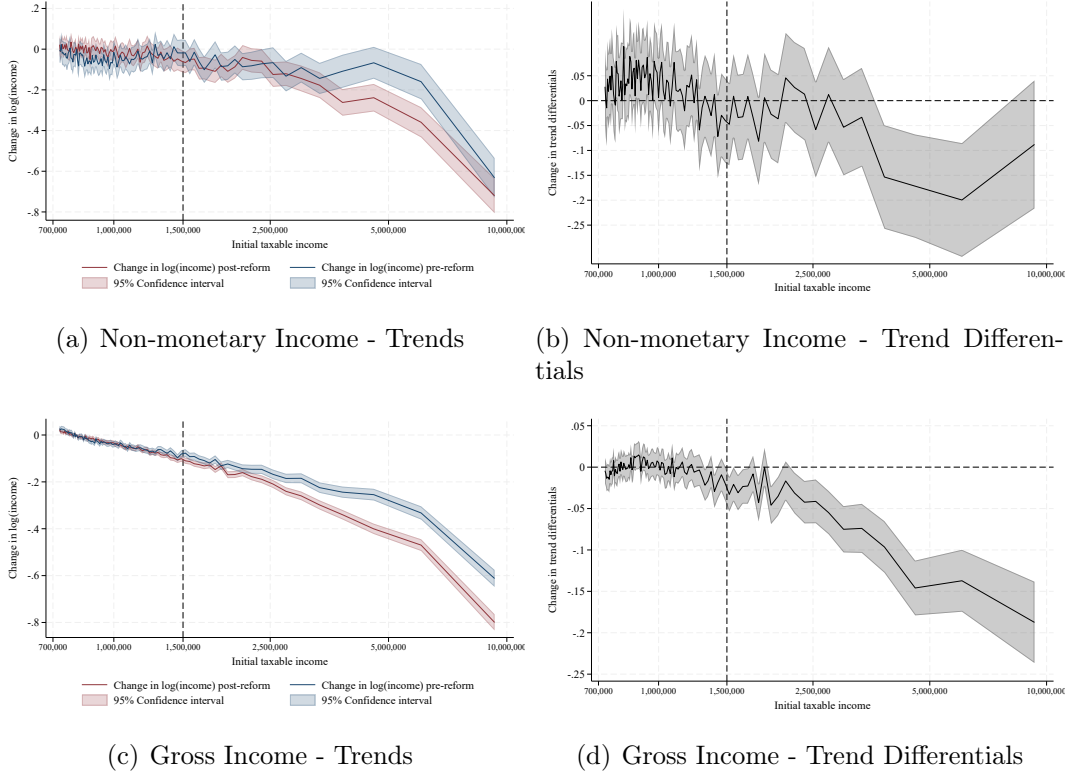
We furthermore run various robustness checks on our main analysis. Complementary to the baseline findings presented in the main text on the PIT reform effect on taxable income and the broad monetary income, we re-estimate the baseline model using, broad monetary income, non-monetary income separately as well as overall gross income (defined as the sum of monetary and non-monetary income), see Figures C.5 and C.6. Both feature no changes in the validation region and a significant reduction in the treatment period for the taxpayers facing the tax increase.

Figure C.5: Broad Monetary Income



The panel on the left-hand side shows the estimated trends for broad monetary income (a) for 2013–16 (in blue) and 2017–20 (red) relative to a base category (incomes of around R800,000). The panel on the right-hand side shows the estimated changes in trend differentials for broad monetary income (b).

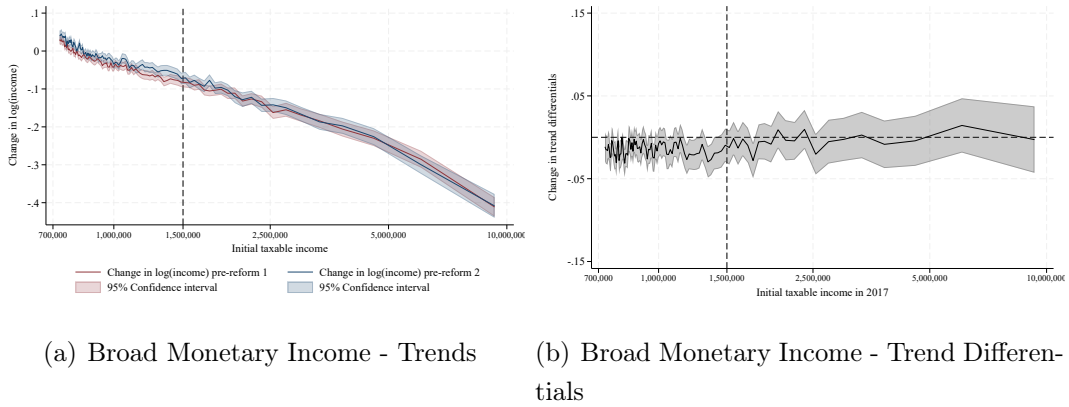
Figure C.6: Non-monetary and Gross Income



The panel on the left-hand side shows the estimated income trend differentials for non-monetary (a) and gross income (c) for 2013–16 (in blue) and 2017–20 (red) relative to the average growth rate for incomes around R800,000. The panel on the right-hand side shows the estimated changes in trend differentials for non-monetary (b) and gross income (d).

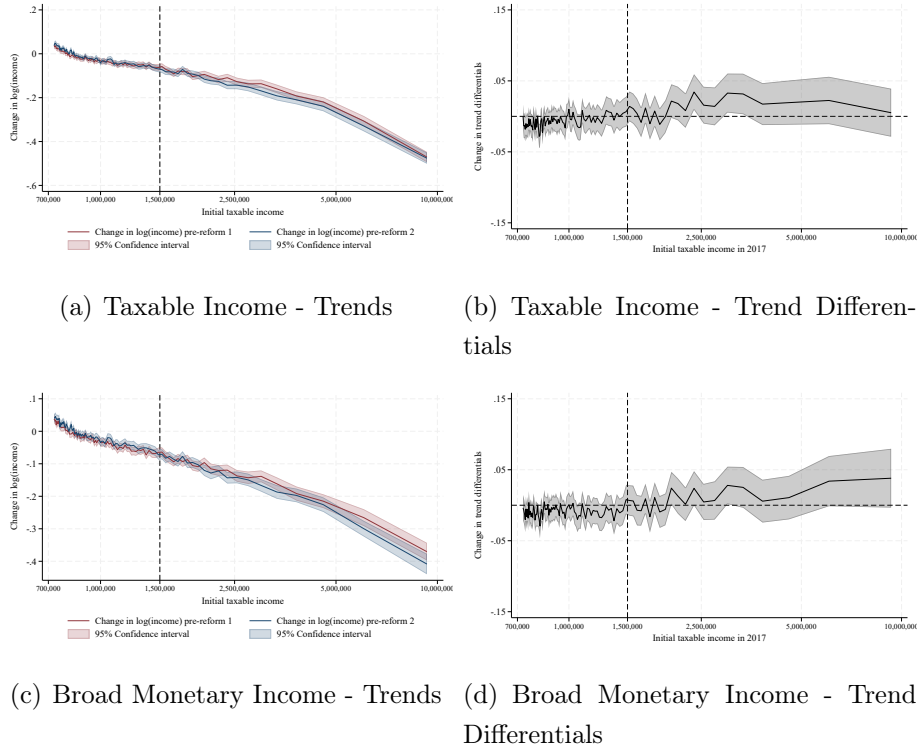
We also run placebo tests for broad monetary income, see Figures C.7. Figure C.8, moreover, reruns the placebo analysis in the main text for the pre-reform periods of 2011–2013 and 2013–15. Similar to our main findings, relative trend differentials remain largely unchanged across the two periods.

Figure C.7: Placebo Tests



Comparison of trends of two unaffected periods 2011–2013 (blue) and 2014–2016 (red) using broad monetary income (a) as the dependent variable. Panel (b) on the right-hand side shows the respective trend differentials.

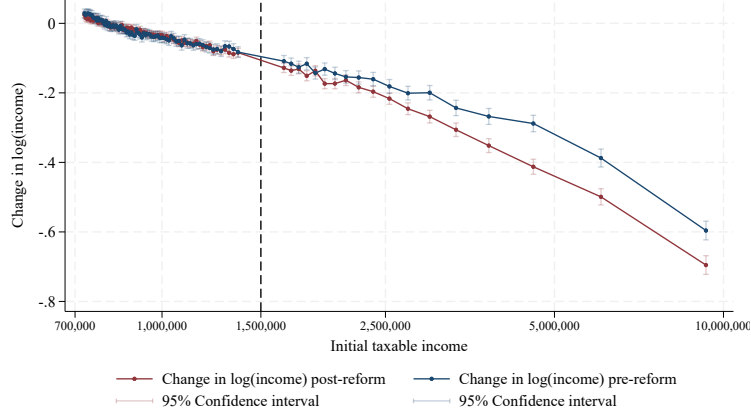
Figure C.8: Placebo Test – Pre-Reform and Reform Period



This figure presents placebo tests where we compare two-year income differences in the pre-period between 2011 and 2013 (blue) and 2013 and 2015 (red), using taxable income (top) and broad monetary income (bottom) as the dependent variable. Figures on the right-hand side show the respective trend differentials.

Another concern is that taxpayers below the treatment threshold may also be impacted by the reform and may lower their income growth to avoid passing the 1.5 million Rand threshold and become subject to the new increased top tax rate. We account for this possibility along several lines. We re-estimate our base model disregarding the income percentiles close to the threshold. This leaves our estimates largely unchanged, see Figure C.9 and Figure C.10; the latter presents estimates (reduced form in blue and IV in red) where we exclude incomes around the threshold (1.45-1.55/1.4-1.6/1.4-1.5 million Rand).

Figure C.9: Drop Percentiles Around Threshold



This figure shows the trends in income for pre-reform (blue) and post-reform (red) time periods over the income distribution in our sample. In this specification, we drop percentiles located around the 1.5 million Rand threshold from the regression.

In a further set of robustness checks, we follow Weber (2014) and define treatment not based on 2017 (and hence with a one-year lag to the policy reform) as in our baseline specification but rather based on deeper lags. Figure C.10 presents estimates for $k = n+3$, which resemble our baseline findings.² We furthermore re-estimate our baseline model, shifting the treatment period to 2016-2019 (instead of 2017-2020). This accounts for potential anticipation effects of the reform. As laid out in Section I.C, the reform was announced on February 22 in 2017 and hence six days before the end of the tax year 2017. Taxpayers' scope for income adjustments in the tax year 2017 was thus limited. In line with this notion, we find that estimates turn out similar to our baseline findings.³

In an additional robustness test, we show that our findings are robust to dropping taxpayers from the estimation who (likely) received dividend income, cf. Figure C.10. As laid above, the South African government increased the dividend tax in parallel to the studied reform. While the difference between effective tax costs on marginal capital and labor income of top earners remained largely unaffected for top earners (with labor income being taxed at a top tax rate of 41% prior to the reform and 45% thereafter and capital income being taxed at a corporate tax rate of 28% and a dividend tax of 15% before and 20% after the reform; this translates into an effective tax burden on business income of 38.8% before the reform and 42.4% thereafter in the 'classic' South African corporate tax system). The effective difference in the tax burden on business and labor income hence remained largely unaffected by the tax reform for treated taxpayers. For owner-managers in the validation region (with taxable income below the 1.5 million threshold), this may, however, have created incentives to pay out more business income as labor income. We

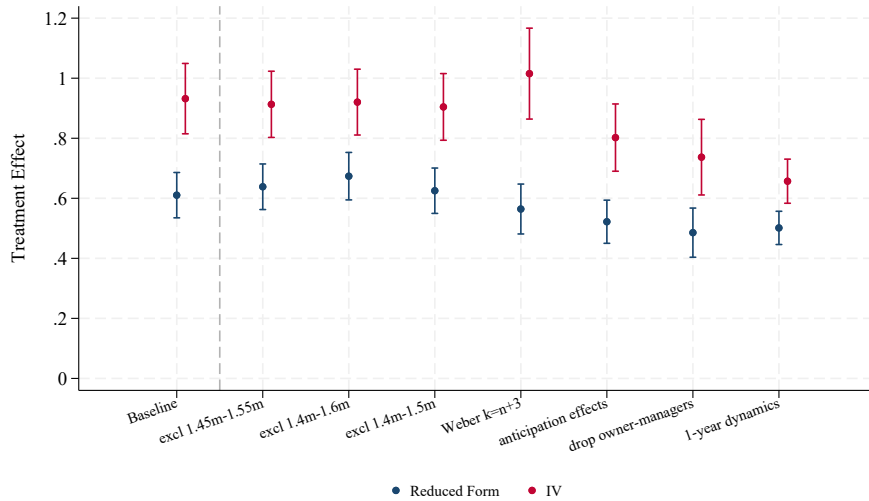
²Similar results are also obtained for $k = n + 2$ (not reported).

³Reestimating the placebo analysis, accounting for a one-year frame between 2016-2017 (vs. 2013-2014) yields a small and statistically insignificant coefficient estimate.

test for this concern by rerunning our estimation model but dropping all individuals who are the highest earner in a South African corporation and may thus be a manager-owner. As laid out in Figure C.10, this yields sizable ETI estimates – point estimates are somewhat smaller than the baseline findings, however (albeit 95% confidence bounds overlap). One interpretation for the smaller size of the estimate is that owner-managers are taxpayers who, on average, tend to show somewhat larger tax responses than other taxpayers. In a prior working paper version, we, moreover, find similar estimates when we drop all taxpayers who at least once within the available time frame (2016-2020) received dividends from a South African firm as logged by third-party reports (this data is, not available any more for research purposes and can thus not be included in this publication), see Axelson et al. (2024).

We, furthermore, shed some light on effect dynamics and re-estimate our baseline model with one-year differences, accounting for income changes between 2017 and 2018 as reform period and income changes between 2013 and 2014 as control period. The estimates suggest that taxpayers (in line with the findings in the main paper that the response largely roots in tax avoidance and evasion) adjust to the reform rather quickly: two-thirds of the estimated three-year-effect already had built up in the first post-treatment year, see Figure C.10.

Figure C.10: Robustness Checks – Main Model



This figure depicts a variety of specification checks. For each specification, we report reduced form (blue) and IV estimates (red). The outcome is taxable income. The left-hand specification repeats our baseline results. We then drop individuals from our regression that are very close to the 1.5 million Rand threshold ($\pm 50,000$; $\pm 100,000$; $-100,000$). We then follow Weber (2014) and define deeper lags (in particular $k = n + 3$). We also shift our treatment and control periods to 2016-19 and 2012-15, respectively. In the next specification, we exclude individuals we deem as owner-managers from the estimation. In the last specification, we investigate one-year differences in taxable income. Vertical bars represent 95% confidence intervals.

Moreover, note that the size of the estimates declines only moderately when we winsorize the dependent variable, the change of taxable income across periods ($\Delta \ln z_{itn}$).

Results are available upon request. This indicates that our findings are not (solely) driven by taxpayers with large income adjustments.

Finally, we assess the sensitivity of our findings to alternative assumptions on possible error correlation. While the base analysis allows for serial correlation, Table C.1, complementarily, presents 95% confidence intervals from specifications where we allow for clustering at the level of income groups (namely percentiles of our estimation data) as well as clustering at 2-digit industries of taxpayer’s main job and firm locations (namely the employer’s host municipality) respectively.⁴

Table C.1: Baseline Estimates for the ETI (95% Confidence Intervals)

Cluster Level	Taxable Income	Broad Monetary Income	Non-monetary Income	Deductions
Reduced Form	0.6104	0.6706	1.0425	-0.7413
Individual	[0.5349 0.6859]	[0.5921 0.7491]	[0.7740 1.3110]	[-1.0681 -0.4146]
Income Percentile	[0.3867 0.8342]	[0.4100 0.9313]	[0.6372 1.4478]	[-1.2043 -0.2784]
Industry	[0.3706 0.8503]	[0.4645 0.8767]	[0.0378 2.0472]	[-1.3042 -0.1785]
Location	[0.4456 0.7753]	[0.4739 0.8673]	[0.3974 1.6875]	[-1.4673 -0.0153]
Instrumental Variable	0.9319	1.0232	1.4881	-1.0699
Individual	[0.8148 1.0491]	[0.9015 1.1449]	[1.1039 1.8723]	[-1.5413 -0.5986]
Income Percentile	[0.6224 1.2414]	[0.6627 1.3836]	[0.9401 2.0361]	[-1.7175 -0.4223]
Industry	[0.5648 1.2990]	[0.7061 1.3402]	[0.0594 2.9167]	[-1.8569 -0.2830]
Location	[0.6812 1.1827]	[0.7145 1.3319]	[0.5683 2.4079]	[-2.0915 -0.0484]
Observations	561355	561114	447831	181322

This table repeats our baseline but allows for clustering of standard errors at different levels. 95% confidence intervals are presented. The upper panel reports reduced form estimates and the lower panel IV estimates. For both sets of estimates, we report confidence intervals (i) clustering standard errors at the individual level (baseline), (ii) bootstrapping the standard errors at the level of income percentiles, (iii) clustering standard errors at firms’ 2-digit industry, and (iv) clustering standard errors at the individual’s location (municipality).

D Additional Data

The results from the heterogeneity analyses presented in the main text and in the following appendix section, draw on three additional pieces of information: 1) information on the use of professional tax advisory services, 2) information on foreign wealth holdings as drawn from information reports in the course of the so-called common reporting standard (CRS) and 3) information on detected non-compliance as drawn from the universe of taxpayer audits. In the following, we briefly describe the respective data and the institutional background.

D.1 Tax Preparer

Tax practitioners play a central role in the tax system, assisting individuals and businesses in fulfilling their tax obligations. Their importance is formally recognized under the Tax

⁴In case firms operate plants in multiple municipalities, we assign the municipality of the largest plant as measured by employment numbers in 2017.

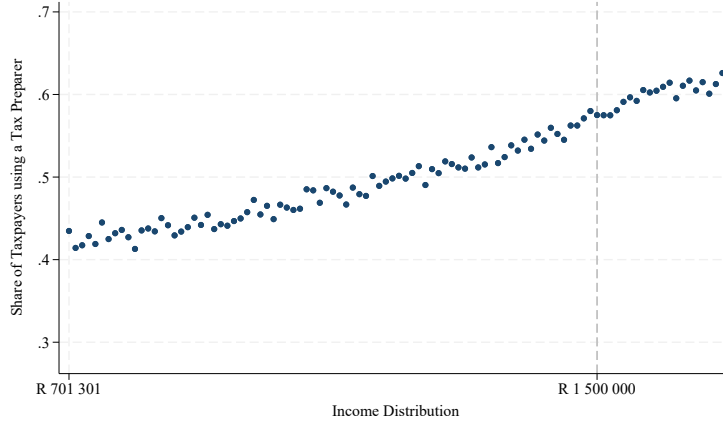
Administration Act 28 of 2011, which provides a broad definition of the term “tax practitioner” as individuals who provide advice on the interpretation or application of tax law or assist others in preparing and submitting tax returns. This definition includes a range of professionals, such as accountants, tax advisers, and legal practitioners specializing in taxation.

To ensure a high standard of professional conduct, the act imposes strict requirements on those seeking to operate as tax practitioners. All individuals offering tax-related services must register with the South African Revenue Service (SARS) within 30 days of beginning such activities. Since July 2013, it has also been mandatory for tax practitioners to register with a “Recognized Controlling Body” (RCB). This dual registration process is designed to enhance oversight and ensure professional accountability.

To qualify for registration, tax practitioners must complete the SARS Tax Practitioner Readiness Program, meet specified educational requirements, and demonstrate relevant work experience. In addition to these qualifications, practitioners are required to remain compliant with their own tax obligations and to adhere to the ethical standards set by their respective controlling bodies. These requirements help to maintain the integrity of the profession and ensure that taxpayers receive competent and trustworthy service.

Taxpayers need to indicate the use of professional tax advice (by a unique tax practitioner references number) on their tax return. We draw on this information to assign if a given individual drew on the services of a professional tax advisor in the preparation of his/her tax return. Specifically, we define a dummy variable equal to 1 if a taxpayer made use of professional tax advice at least once within the post-treatment period (the tax years 2018-2020). Figure D.1 depicts the fraction of taxpayers who make use of tax advisory services along the income distribution. Consistent with the notion that tax advisory services are associated with fixed costs, the use of professional tax advisors increases along the income distribution. In the treatment region (taxpayers with taxable income above 1.5 million South African Rand), around 60% of the taxpayers make use of professional tax advice at least once in the post-treatment frame.

Figure D.1: Tax Preparer



This figure shows the average share of taxpayers using a tax preparer for their income tax return in the years 2018-2020 (y-axis) across the income distribution in our regression sample (x-axis).

D.2 Common Reporting Standard

Moreover, we make use of two proxies for taxpayer non-compliance. The first is data on foreign financial wealth and income as obtained by SARS through international tax cooperation agreements —specifically, the Foreign Account Tax Compliance Act (FATCA) and the Common Reporting Standard (CRS). In these agreements, banks and other financial institutions are obligated to share information on the wealth and income of customers with the tax authorities of residence countries. Around 100 countries embarked on the CRS, including most tax haven countries and secrecy jurisdictions.

These reports enable SARS to make use of detailed information about offshore accounts held by South African residents. In this paper, we draw on the preparation of the CRS report for research purposes in Johannesen, Larsen and Riedel (2025), see this prior work for details. Our analysis focuses on the universe of CRS and FACTA reports received by SARS for the taxyears from 2018 to 2020 and hence our post-treatment period.

Each FATCA and CRS report corresponds to a single foreign account owned by a South African individual or entity. These reports contain detailed financial information, including the total interest income, dividend income, gross proceeds from sales, and other forms of income that accrued to the account over the course of the year. They also record the account balance at the end of the reporting year.

These information reports are designed to include a taxpayer identification number (TIN), which allows SARS to link the foreign account to the corresponding domestic tax record. However, in practice, matching these reports to tax returns remains a significant challenge. Many reports either lack a TIN or include a number that does not correspond to any existing SARS record. As a result, the match rate between foreign account reports and domestic tax records remains limited. Although the proportion of foreign account balances that can be successfully matched to a domestic tax return increases over time,

it was still below 60% in 2020.

Roughly half of the unmatched cases are due to missing tax identification numbers in the reports. During a transitional period, financial institutions were granted some flexibility to omit TINs for existing customers if the number was not already on file. Over time, this issue has diminished, and the share of account balances with missing TINs has declined significantly. The other half of the unmatched reports contain non-missing TINs that do not match any existing entry in SARS’s tax records, possibly due to data quality issues or incorrect reporting.

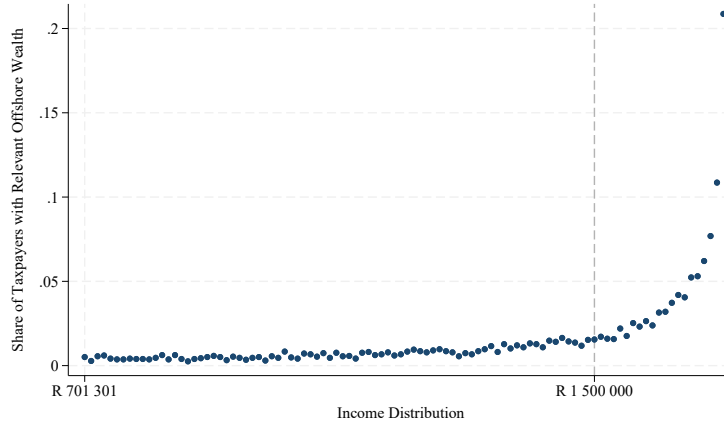
In both types of mismatch cases—missing or non-matching TINs—SARS can, in principle, attempt to link the foreign accounts to individuals using alternative identifying information, such as name, date of birth, and place of birth. However, this process is considerably more complex and not always successful.

In 2019, South Africa received approximately 1.1 million FATCA and CRS reports from foreign financial institutions concerning personal accounts held by South African taxpayers. On average, each account had a balance of about \$67,000, annual income flows of around \$1,300, and gross proceeds from asset sales amounting to roughly \$9,400. Notably, nearly one-third of these accounts had a zero balance, and about one-sixth of them were jointly owned by more than one individual.

The characteristics of these accounts vary significantly depending on whether the account includes a matchable tax identification number. Most strikingly, accounts with valid, matchable TINs have much higher reported values—average balances are more than four times greater than those without a matchable TIN, and the income flows show similar differences. This pattern likely reflects the regulatory framework governing foreign account reporting: banks are required to apply more rigorous due diligence procedures to accounts with balances exceeding \$1 million (Förster, Llana-Nozal and Nafilyan 2014). These procedures make it less likely that high-value accounts are reported without the necessary identifying information, suggesting that the wealthiest and most sophisticated account holders are not successfully evading detection by omitting their TINs.

In our empirical analysis, we log foreign offshore wealth and income in the post-treatment period in tax havens and secrecy jurisdictions, which prior research shows to go largely unreported in residence countries (see Alstadsæter, Johannesen and Zucman (2019)). To avoid picking up minor foreign wealth holdings, we, moreover, only account for individuals with relevant foreign financial income above the mean of the distribution. The fraction of taxpayers in our estimation data with relevant offshore according to this definition is depicted in Figure D.2. The data shows that offshore wealth holdings are largely concentrated at the very top of the income distribution. Around 5% of the treated taxpayers own offshore wealth – with a skewed distribution, however: in the highest percentile of our sample data, more than every fifth taxpayers holds relevant offshore wealth.

Figure D.2: Foreign Wealth (CRS)



This figure shows the average share of taxpayers reporting significant amounts of offshore wealth (y-axis) across the income distribution in our regression sample (x-axis).

D.3 Taxpayer Audits

A second piece of information on taxpayer non-compliance is drawn from taxpayer audits. Specifically, our analysis relies on the universe of taxpayer audits conducted by SARS in the personal income tax base. The data provides detailed information for each audit, including the audited taxpayer, the adjustment amount—which indicates whether money is owed to SARS or the taxpayer—and additional details such as the duration of the audit and the location of the audit center.

There are two main types of audits conducted by SARS: verification (or regular) audits and specialized audits. Verification audits serve as initial reviews of tax returns or declarations and are largely automated. SARS uses a system that flags potential risks based on predefined criteria. Once risks are flagged, auditors follow a standard operating procedure to review the relevant information. These audits are typically completed within 90 days. Specialized audits, in contrast, are more in-depth and are conducted by trained SARS officials. These are usually initiated based on automated risk flags but involve a much more detailed examination of financial records. They aim to uncover potential tax evasion or discrepancies and often result in more significant outcomes such as penalties, additional assessments, or even legal action.

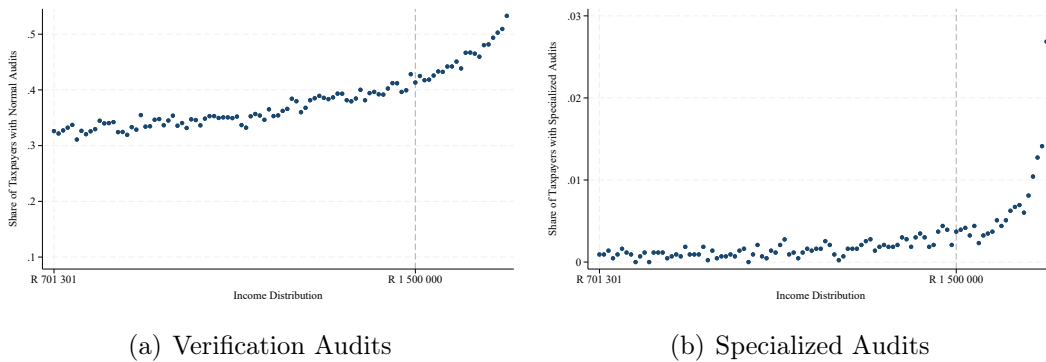
Our analysis can draw on the universe of verification audits for our full data frame (tax year 2011 onwards), while specialized audits are only consistently available for the post-treatment period (tax year 2018 onwards).

SARS targets a relevant fraction of personal income tax returns by verification audits, which are, moreover, strongly targeted towards the upper end of the income distribution. While the propensity to be targeted is very low at the lower end of the income distribution, it rises significantly with taxable income. At the very top of the income distribution (top 0.05% of taxpayers), target rates can be up to 80%. 95% of the treated taxpayers

are targeted at least once by a verification audit within our data frame, implying that the data offers a comprehensive perspective on taxpayer compliance. Panel (a) of Figure D.3 presents the propensity of taxpayers in our estimation data to receive an upward adjustment of tax payable in the course of a verification audit, along the income distribution. The data indicates that almost every second treated taxpayer in our data receives such an upward adjustment.

Specialization audits, in turn, are much less frequent. Only 949 (of the around 86,000) treated taxpayers are targeted by a specialized audit at least once within our data frame. Panel (b) of Figure D.3 presents taxpayers' propensity to be subject to an adjustment in a specialization audit: while upward adjustment rates, conditional on being audited, are high, the low target risk, renders the fraction of taxpayers with an upward adjustment in a specialized audit rather small.

Figure D.3: Share of Taxpayers with an Audit Adjustment



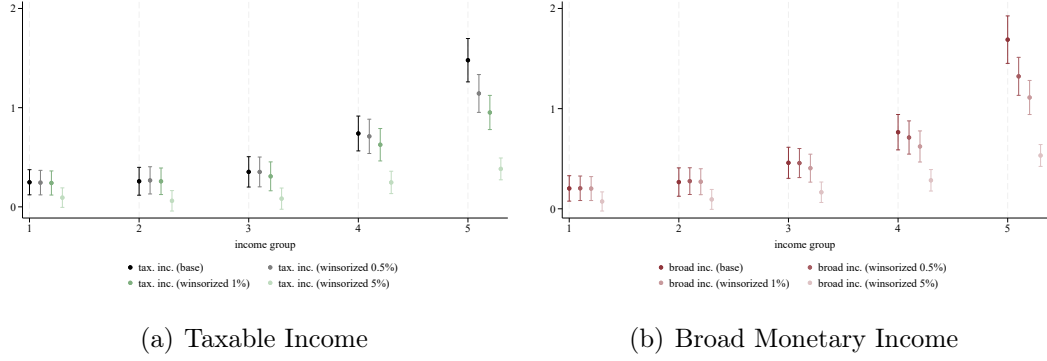
This figure shows the average share of taxpayers having their income adjusted by a tax audit (y-axis) across the income distribution in our regression sample (x-axis). The figure on the left-hand side depicts data for standard (verification) audits and the one on the right-hand side for specialized audits.

E Effect Heterogeneity

In this section, we explore possible heterogeneity in the ETI across taxpayers in the treated region. In a first step, we rerun our base analysis, allowing the treatment effect to vary in pre-reform (2017) taxpayer income, defining quintiles of the treatment region. The results – for models, where taxable income and broad income serve as dependent variables respectively – are presented in Figure E.1. The figure shows that ETI estimates are positive and statistically different from zero throughout the treatment region. In the lower three income quintiles of the treatment area, the tax response is significantly smaller than for taxpayers in the upper two quintiles, amounting to about 0.25 to 0.35 vs. significantly larger ETIs of 0.74 and 1.48 in the fourth and fifth quintile respectively.

Complementarily to the analyses in the main text, we, moreover, assess the impact of taxpayers' income composition on the size of the ETI. The approach follows Equation (4)

Figure E.1: Results by income groups



The figure allows the ETI estimate to vary within the treatment region, accounting for five groups. Estimates in different colors come from specifications where the dependent variable is non-transformed and winsorized at the 0.5%, 1% and 5%-level respectively. Vertical bars represent 95% confidence intervals.

in the main paper. In the base specification, we allow the ETI to vary with the ratio of investment income, business income, pension income and deductions, all relative to gross income, respectively (measured in the pre-reform year 2017). All estimates suggest that the higher the respective income and deduction ratios, the larger the estimated ETIs, consistent with the notion that (certain types) of investment incomes, business incomes and pension incomes and deductions offer scope for tax evasion and avoidance and may thus induce more sensitive taxpayer responses to tax hikes. The estimates are presented in the second panel of Figure E.3. The point estimates (and confidence bounds) are evaluated at one standard deviation of the respective income composition variable ($\hat{\gamma}_4^q \cdot se_q$). For taxpayers' share of investment income, $\hat{\gamma}_4^q$ is e.g. estimated with 4.958. A by one standard deviation higher investment share (0.195) thus translates into an by 0.97 elevated ETI (see estimate depicted in green). Analogously the figure depicts the impact of a one-standard-deviation-increase in the other income characteristics, which show elevated ETIs as well – albeit quantitatively somewhat smaller in size (0.25 for business income, 0.08 for deductions and 0.13 for pension income). The third panel reestimates these base findings, also allowing the ETI to vary in the taxpayers' gross-income share of allowances and fringe benefits. The fourth panel shows that these insights also hold with a binary modeling of taxpayers' income composition (share of respective income component is larger than among all treated taxpayers). The fifth panel repeats this estimation additionally showing that the ETI is elevated for taxpayers with access to share options (as measured by taxpayers reporting share option income at least once within our data frame). Also see Figure 2 in the main text and Figure E.2 in the appendix (the latter depicts the fraction of treated taxpayers with non-zero income/deductions in 2017 in the indicated income components/in deductions).

In further analyses (not presented), we show that these estimates are robust to controlling for other taxpayer characteristics (gender, age, status as a foreigner) as well as

characteristics of the taxpayers’ host location (namely local municipality): municipalities’ population density (drawn from the CENSUS in 2011), ethnic composition (municipal fraction of black population, drawn from the CENSUS in 2011), public good provision (municipal property crime rates in 2016/17 as taken from the Crime Hub database of the Institute for Security Studies in South Africa) and political preference (municipal vote share for the incumbent ANC in the national election of 2019 obtained from the IEC election result portal). We also run regressions, where we, moreover, additionally, control for treatment region income, defining quintiles of the treatment region in the base year and allowing the ETI to vary in these income quintiles. This again leaves the estimates largely unaffected. These estimates are available upon request.

As a further complement to analyzing treatment effect heterogeneity by taxpayers’ income composition, Figure E.5 reestimates the specifications in Figure 7 of the main text, with the difference that, for all specifications where labor-related income serves as the dependent variable, we do not restrict our view to earners who remained with the same firm in the considered time frame but also account for workers who switched employers during this time frame. This yields estimates which are similar to our baseline findings.

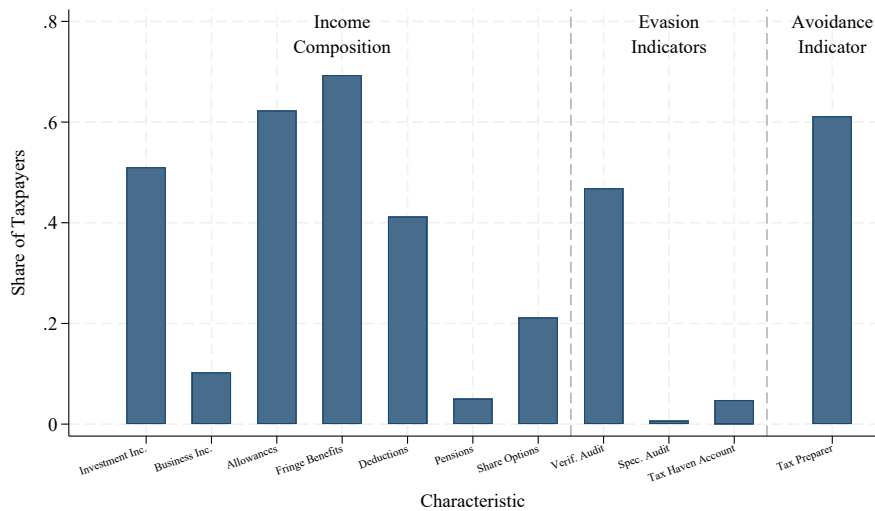
Figure E.4, in turn, is a complement to the analyses in Figure 8 of the main text, which document elevated ETIs for taxpayers who are associated with tax-non-compliance (upward adjustments in tax liability in the course of an audit or relevant offshore financial income) or tax avoidance activities. Figure E.4a documents how the estimates for the interaction coefficients for the marginal net-of-tax rate with upward tax adjustments in verification audits, specialized audits and offshore financial wealth change from the base analysis without additional control variables (presented in panel “Interactions”) to allowing the ETI to also vary in the set of taxpayer and local control variables described in the previous paragraph (presented in panel “Controls”), in the income composition (share of investment income, business income, pension income as well as the share of tax deductions, presented in panel “Income Comp.”), in the use of a professional tax preparer (presented in panel “Tax Preparer”). The second last panel allows for ETI variation in all of these control factors simultaneously, the last panel additionally allows the ETI to vary across income quintiles in the treatment region. Figure E.4b presents analogous estimates for tax preparer use. While point estimates for the evasion and avoidance ETI-contribution tend to drop when respective control variables are included in the set of regressions, the coefficient estimates of interest remain sizable and statistically significant.

Table E.1, moreover, adds to the base analysis by allowing the elasticity of taxable income to vary by age group. In line with our baseline findings, the estimates suggest that older workers show a higher tax elasticities than younger individuals. Understanding the role of taxpayer age in shaping the ETI is particularly important when assessing top income taxation as many high income earners are – reflecting the life-cycle-income paths – older, many being close to retirement age (cf. Figure E.6).

The fact that we find greater responses among older income-earners is in line with prior evidence documenting that labor supply is more elastic among older workers (see, for example, Keane 2022). Also note that the positive link between taxpayer age and the ETI may root in various underlying mechanisms: Older workers may show stronger real and avoidance/evasion responses to tax hikes. Human capital losses from reductions in work effort and labor supply are less costly for them than for younger workers, given their shorter remaining life span. They can draw on a larger stock of tax knowledge accumulated over their lifespan – on the tax code and enforcement behavior of authorities – which may make it easier to effectively engage in (and adjust) tax avoidance. Older workers may also receive an overproportional fraction of income from sources with above average scope for flexible tax adjustments (e.g. pension income).

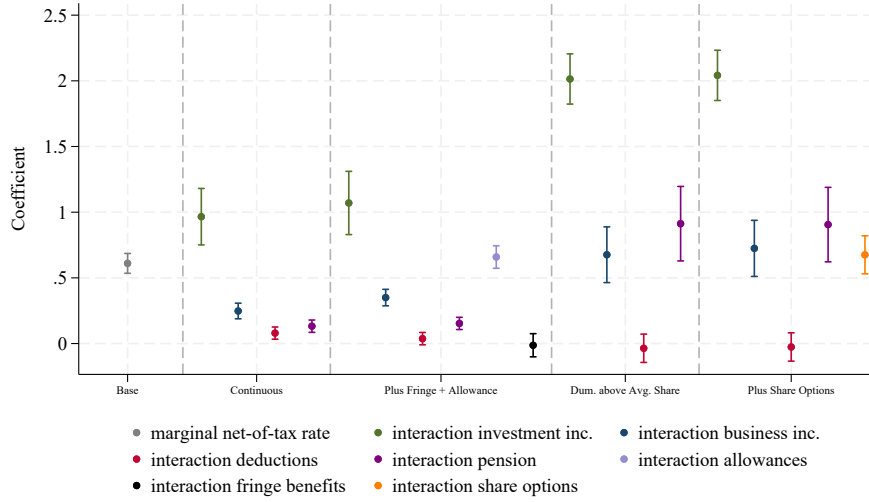
The higher ETI of foreigners – identified in the main text – may reflect a greater degree of footlooseness: their international ties may facilitate avoidance and evasion behavior as well as real responses like relocating abroad. Lesser social ties and cultural identification and more limited perceived benefits from public good provision may also add to the increased tax responsiveness, possibly lowering taxpayers’ tax morale.

Figure E.2: Treated Tax Payer Characteristics



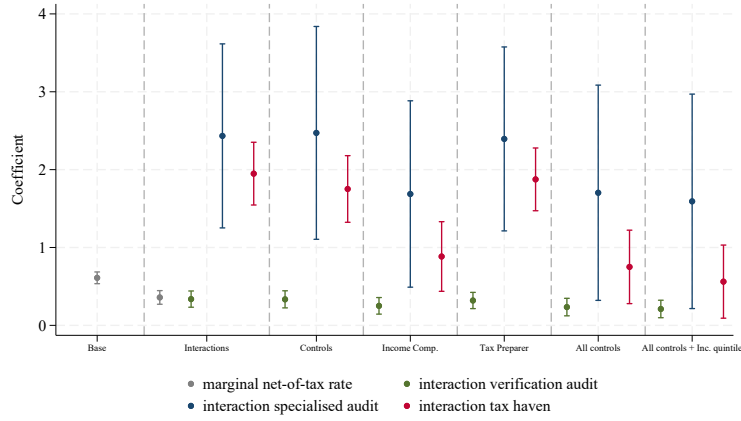
The figure displays the share of taxpayers falling in certain categories, which we exploit when investigating effect heterogeneity. The first seven columns show the share of taxpayers receiving certain types of income (investment income, business income, allowances, fringe benefits, deductions, pensions and share options). The next columns capture taxpayers that show certain tax-evasion indicators, namely being subject to a standard (verification) audit, being subject to a specialized audit and reporting above-average amounts of foreign wealth. The last columns shows the share of taxpayers making use of a tax preparer.

Figure E.3: Income Composition

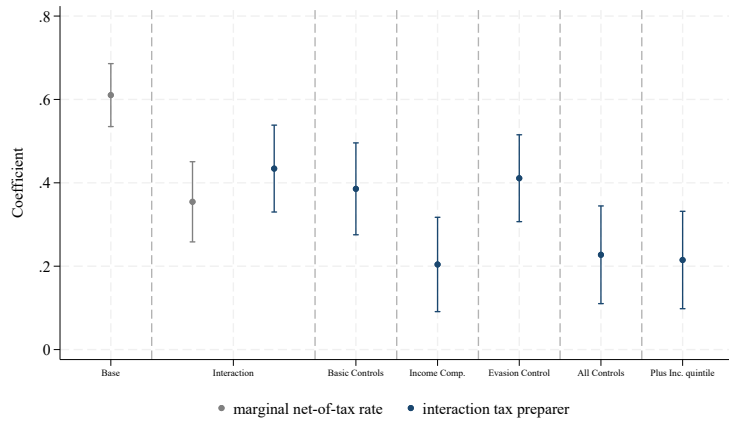


The figure depicts estimation coefficients for different specifications including interaction terms between the simulated change in the marginal net-of-tax rate and different types of income. The different specifications are plotted along the x-axis and separated by dashed lines. Gray dots indicate coefficients for the marginal net-of-tax rate. Green dots show coefficients of interaction terms between the marginal net-of-tax rate and investment income. Blue dots show coefficients on interaction terms between the marginal net-of-tax rate and business income. Red dots indicate coefficients of interaction terms between the marginal net-of-tax rate and deductions. Purple dots indicate coefficients of interaction terms between the marginal net-of-tax rate and pensions. Light purple dots indicate coefficients of interaction terms between the marginal net-of-tax rate and allowances. Black dots indicate coefficients of interaction terms between the marginal net-of-tax rate and fringe benefits. Lastly, orange dots indicate coefficients of interaction terms between the marginal net-of-tax rate and share options. 95% confidence intervals are depicted by vertical lines. The first specification repeats the baseline estimate from the main table. For the second specification, we add the income types and their interaction effects as continuous variables. In the third specification, we add allowances and fringe benefits as income types. In the fourth specification, we replace the continuous variables with an indicator for an above-average share of the income type in total income. In the last specification, we again use continuous income variables and add share options as a type of income. For a clearer depiction, we show the estimates evaluated at their standard deviation for specifications two (continuous) and three (plus fringe benefits and allowances). The original estimates for the second specification are (standard errors in parentheses): investment inc. 4.958 (0.563), business inc. 1.121 (0.137), deductions 2.217 (0.662) and pensions 2.208 (0.400). The original estimates for the third specification are (standard errors in parentheses): investment inc. 5.495 (0.630), business inc. 1.584 (0.145), deductions 1.040 (0.668), pensions 2.558 (0.397), allowances 4.957 (0.329), and fringe benefits -0.211 (0.724). 95% confidence intervals are depicted by vertical lines.

Figure E.4: Evasion and Avoidance Channels



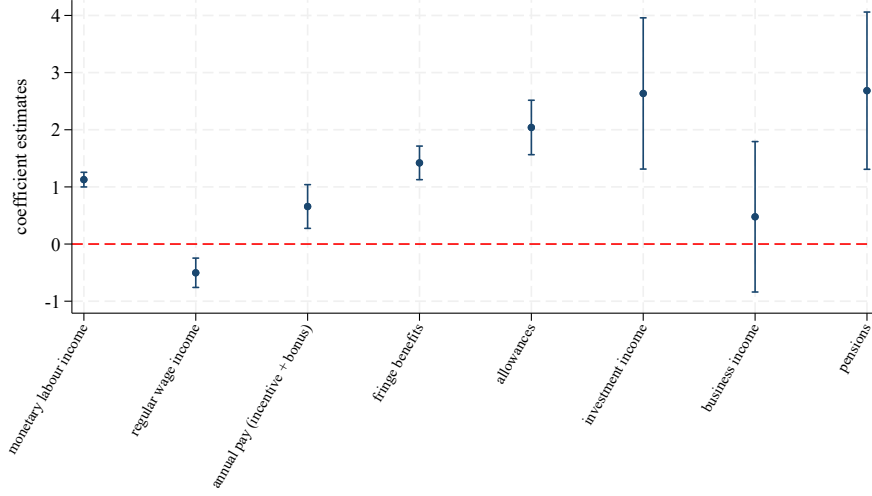
(a) Evasion



(b) Avoidance

Panel (a): The figure depicts estimation coefficients for different specifications including interaction terms between the simulated change in the marginal net-of-tax rate and different indicators for tax evasion. Gray dots indicate coefficients for the marginal net-of-tax rate. Green dots show coefficients of interaction terms between the marginal net-of-tax rate and the presence of a so-called verification audit. Blue dots show coefficients on interaction terms between the marginal net-of-tax rate and so-called specialized audits. Lastly, red dots indicate coefficients of interaction terms between the marginal net-of-tax rate and an indicator for above average amount of wealth held in a tax haven. Panel (b): The figure depicts estimation coefficients for different specifications including interaction terms between the simulated change in the marginal net-of-tax rate and an indicator for tax-preparer use. Gray dots indicate coefficients for the marginal net-of-tax rate. Blue dots show coefficients of interaction terms between the marginal net-of-tax rate and the use of a tax preparer post reform. The different specifications are plotted along the x-axis and separated by dashed lines. 95% confidence intervals are depicted by vertical lines. The first specification repeats the baseline estimate from the main table. For the second specification, we add the evasion/avoidance channels and their interaction effects as detailed above. For the third specification, we furthermore add individual and municipality level controls (age, gender, foreign status, population, crime rate, the ANC vote share and the population share of black people). In the fourth specification, we control for the income composition of taxpayers (amount and share of investment inc., business inc., deductions, and pensions). In the fifth specification, we control for the use of tax preparers (Panel (a)) or evasion channels (Panel (b)). In the next specification, we include all control variables used in specifications three to five. In the last specification, we additionally include taxpayers' income quintile. 95% confidence intervals are depicted by vertical lines.

Figure E.5: Reform Effect by Income Category



The figure complements Figure 7 in the main text and displays the coefficient estimates when reestimating our baseline IV model separately for different income categories: total monetary labor income, monthly wages, annual pay (incentives and bonuses), fringe benefits and allowances, investment income, business income (accounting for all taxpayers with non-zero business income) and pensions. In the specifications pertaining to the labor income components, we restrict the sample to individuals who are workers aged between 15 and 65. We, moreover, disregard PAYE records that display inconsistencies, e.g. reported employment spells outside the considered tax years. 95% confidence intervals are depicted by vertical lines.

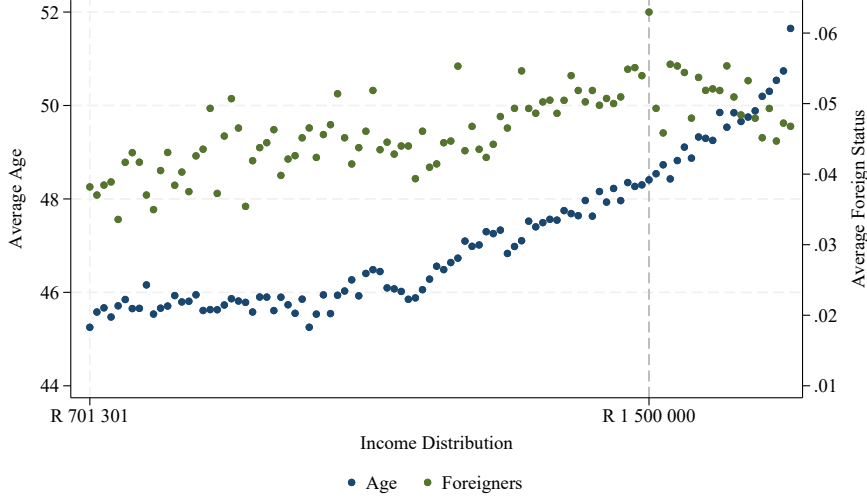
Table E.1: Reform Effect by Age Group

Age	Reduced Form	Instrumental Variable
30-39	0.3282 (0.1894)	0.5154 (0.2987)
40-49	0.2674 (0.0655)	0.3979 (0.0980)
50-59	0.6507 (0.0610)	0.9381 (0.0894)
60-69	1.0747 (0.0938)	1.7472 (0.1588)
70+	0.9158 (0.1884)	1.6364 (0.3478)

This table shows estimates for our baseline reduced-form and IV specifications, separately for different age categories. The dependent variable is adjusted taxable income.

Importantly, in Table E.2, we rerun the base model, where we allow the ETI to vary along income quintiles in the treatment region. Specification (1) presents the baseline model, which documents that the ETI increases in treated taxpayers' income. Specifications (2) to (4) show how this effect emerges when we allow the ETI to vary in other taxpayer and tax return characteristics. In Specification (2), we allow the ETI to vary in characteristics of taxpayers' income composition (in the pre-reform year): share of investment income, business income, fringe benefits, allowances, pension income, share of deductions, accounting for a second order polynomial. In Specification (3), we additionally allow the ETI to vary in the tax compliance and avoidance characteristics described

Figure E.6: Age and Foreigners



This figure shows the average age (left-hand scale, in blue) and foreign status (right-hand scale, in green) over the income distribution in our estimation sample.

in the main text. Specification (4), moreover, further allows the ETI to vary in all personal taxpayer characteristics and characteristics of the taxpayer's host location, again accounting for up to a second order polynomial for continuous characteristics. These characteristics turn out to almost fully explain variation in the size of the ETI across lower and higher-income taxpayers in the treatment region, cf. Specification (4). This, in line with intuition, suggests that higher income taxpayers tend to feature elevated ETIs because of their underlying personal and tax return characteristics.

Table E.2: Percentile of Treatment Region

	(1)	(2)	(3)	(4)
Base (Quintile 1)	0.2479 (0.0647)	0.3138 (0.0839)	0.1247 (0.0924)	-0.0087 (0.1429)
Additional Effect Quintile 2	0.0101 (0.0956)	0.0806 (0.0962)	0.0662 (0.0960)	0.0062 (0.1010)
Additional Effect Quintile 3	0.1047 (0.1004)	0.1188 (0.1005)	0.0985 (0.1003)	-0.0142 (0.1057)
Additional Effect Quintile 4	0.4918 (0.1100)	0.4219 (0.1098)	0.3839 (0.1097)	0.2169 (0.1154)
Additional Effect Quintile 5	1.2305 (0.1280)	0.6774 (0.1282)	0.5729 (0.1292)	0.1084 (0.1370)
Income Controls		X	X	X
Evasion/Avoidance Controls			X	X
Local/Socio-Economic Controls				X

Column (1) in this table presents results where we reestimate the base model allowing the ETI to vary in quintiles of the treatment region. The remaining specifications, simultaneously, allow the ETI to vary in characteristics of the taxpayers' income composition (Specification (2)), tax evasion and avoidance indicators (Specification (3)) and other personal characteristics (Specification (4)). All income and taxpayer characteristics described in the previous analyses are accounted for, in case of continuous variables with a second order polynomial. Standard errors account for clustering at the individual level and are presented in brackets.

F Firm Analysis

This section contains a number of robustness checks to the firm-level analysis in the main part of the paper. Table F.1 present some basic descriptive statistics for our main estimation data, comparing firms in the treated group (featuring at least one worker who is treated by the top tax increase in 2017 and simultaneously belongs to the top 10% of wage earners within the firm) to control firms (featuring at least one worker who earns high taxable income below the treatment threshold (900,000-1.45 million Rand) and simultaneously belongs to the top 10% of wage earners within the firm), for firms with fewer than 100 and fewer than 25 workers respectively.

Complementarily, Figure F.1 depicts kernel density estimates for the wage of top earners in treated and control group firms. While treated firms, naturally, feature higher top worker wages than control entities, the two distributions overlap along a considerable wage income range, allowing empirical identification of the treatment effect of interest even when conditioning on top worker wages (cf. our discussion in the main text).

We, moreover, assess the presumption that our findings are driven by smaller enterprises and responses by owner-managers, who are treated by the reform. As illustrated in the main text, there were no incentives to shift income between wages and dividends for treated owner-managers after the reform. And while treated individuals had increased incentives to underreport their income in the PIT base, this does not hold true for firm output in the CIT base.

Exceptions might be very small firms, which are dominated by treated owner-managers. Here, treated individuals may have a stark position within the firm, relative to other stakeholders, which might allow them to adjust firm operations to hide income from the tax authorities. Specifically, they might – in response to the reform – decide to draw part of their business activity from the official sector to the black market, resulting in lower sales and, in consequence, in lower wage and income tax payments. But even in small firms, incorporation and the accounting duties that come with it, may hinder this type of evasion. Figure 2(a) shows that our findings remain largely unchanged when we drop small firms, with only one worker, from the data. Similar results, moreover, also emerge when we restrict the estimation data to firms which are registered for value-added taxation. This robustness check follows the notion that the VAT undermines sales underreporting by creating a paper trail on transactions (see e.g. Pomeranz 2015).

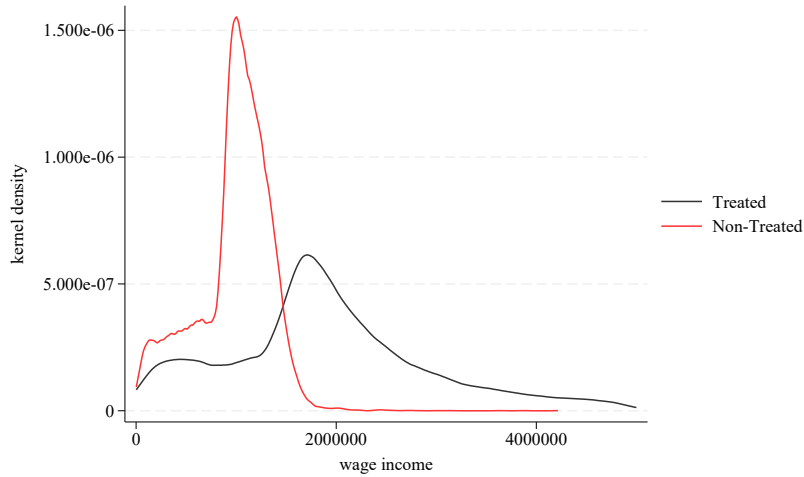
Last but not least, Figure 2(b) presents estimates, where we reestimate our baseline model allowing for clustering at different levels: at the level of the firm; 2-digit-industry; 3-digit industry and host municipality respectively.

Table F.1: Summary Statistics by Group

	<25 Workers		<100 Workers	
	Treated	Control	Treated	Control
Sales	3.74e+07	2.89e+07	6.39e+07	4.03e+07
Total assets	2.70e+07	1.41e+07	4.10e+07	1.92e+07
Employees	9.60	9.63	27.23	24.30
Accounting profit	1.09e+07	6.98e+06	1.84e+07	1.09e+07
Province (most frequent)	Gauteng	Gauteng	Gauteng	Gauteng
Province (second)	Western Cape	Western Cape	Western Cape	Western Cape
Province (third)	KwaZulu-Natal	KwaZulu-Natal	KwaZulu-Natal	KwaZulu-Natal
Industry (most frequent)	6	6	6	4
Industry (second)	4	4	4	6
Industry (third)	7	7	7	7

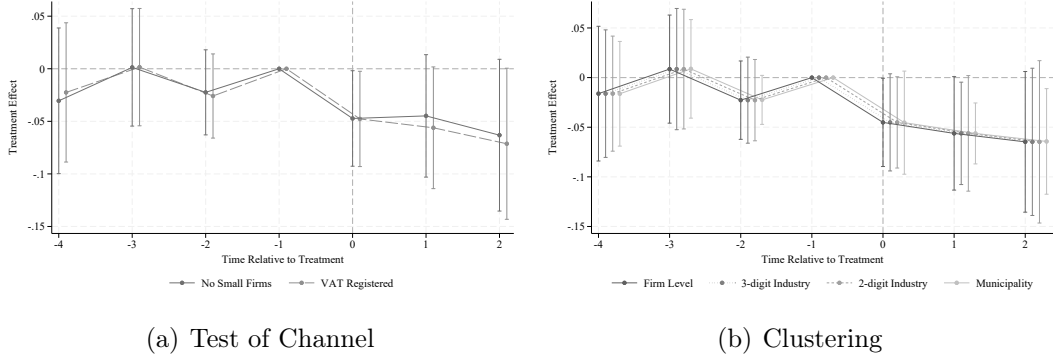
This table compares descriptive statistics for our treatment and control group, with individuals in the top 10% of earners at their firms. It shows mean wages, sales, total assets, employees and accounting profits, as well as the most prevalent industries and provinces of location. We show these statistics for the year 2017, and firms with fewer than 25 workers in columns (1) and (2) and fewer than 100 workers in columns (3) and (4). The industry codes relate to the following: 4 – Transport, Communication, Electric, Gas, and Sanitary Services; 6 – Finance, Insurance, and Real Estate; 7 – Services.

Figure F.1: Wage of Top Worker – Treated vs. Control Firms



The figure depicts kernel density estimates for the wage of the highest-earning worker per firm in 2017, differentiated by treated firms in black and control firms in red.

Figure F.2: Further Robustness Firms

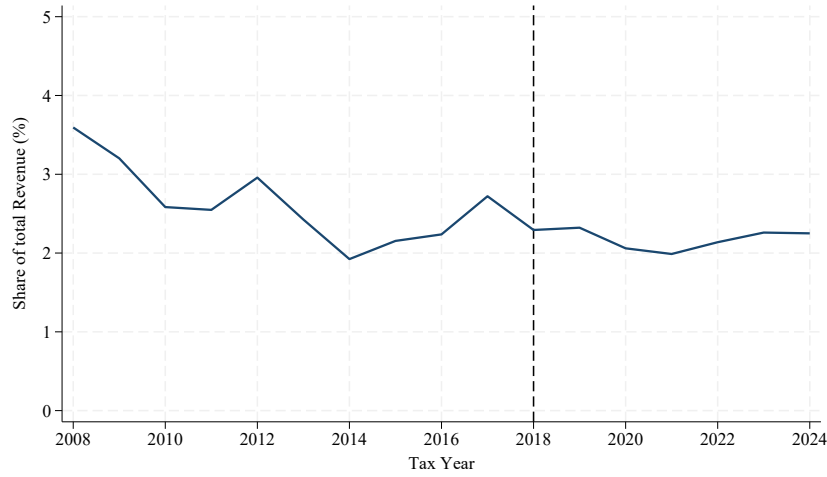


Dependent variable: log sales. Panel (a): The figure depicts estimates from specifications where the set of firms is restricted to (i) exclude small firms and (ii) VAT registered firms only. Number of observations: 18,746 (no small firms); 19,411 (VAT firms). Panel (b): Treatment is based on individuals subject to the reform and being in the top 10% of earners at their firm. The set of firms is restricted to those with fewer than 25 workers. The lines show different levels of clustering the standard errors: at the firm level, at the 2-digit industry, at the 3-digit industry, and at the local municipality level. Number of observations: 20,181 (firm); 20,181 (3-digit industry); 20,181 (2-digit industry); 20,160 (location). 95% confidence intervals are depicted by vertical lines in both figures.

G Dividend Revenue

Figure G.1 presents dividend revenue as a share of total revenue, illustrating that collections have been rather flat around the reform period.

Figure G.1: Dividend Tax Revenue over Time



The figure depicts the share of dividend tax revenues in total tax revenues raised in South Africa over the tax years 2008-2024. Source: Own depiction based on tax statistics by SARS.

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