What Happens When You Tax the Rich? - Evidence from South Africa

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Roxanne Raabe         Nadine Riedel

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Motivation

- Vast literature on measuring elasticity of taxable income
- Meta analysis by Neisser (2021):
  Relatively few studies on MTR changes at top of distribution
  Only two studies based on data from outside of the OECD
- Elasticities may be very different in less developed economies
  - Less tax capacity & large informal sector
  - Higher levels of inequality: sharp equity-efficiency trade-off
This paper

- Testing ground: South Africa
- PIT reform in 2017:
  - Top MTR ↑ from 41 to 45%
  - Top 0.5% of income earners affected
- Aim of the reform (National Treasury 2017):
  - Raise revenue
  - Decrease after-tax income inequality
- Data: Population of PIT returns
- Methodology: Jakobsen and Søgaard (2022) with a small extension
- Key finding: High ETI around 1
Overview

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Background: South Africa

- Close to zero GDP per capita growth since the financial crisis
- Chronic budget deficit (4-5% of GDP after 2008)
- Tax take 25% of GDP, PIT share 26% of all revenues
- Very high inequality (Gini 0.62, LIS)
- Close to 99% of top1 income earners formal
  (own calculations based on survey data)
Figure: World Map - Gini Coefficient
Tax schedules

- MTR to 45% for those earning more than R1.5 million (73,000 €)

**Figure:** Tax schedules before and after the reform
Tax schedules

- Top MTR high by international comparison
Personal Income Tax Base

- **Income**: normal income, business income, investment income (interest income and capital gains)
- Hardly any **deductions** apart from pension contributions
- Dividend income: proportional tax withheld by dividend paying firm
Other Tax Changes

- 'Global' MRT increase by 1 pp in tax year 2015/2016
- Reform pension contribution deductions in tax year 2016/17
  - Aligned the treatment of different savings vehicles
  - A cap was introduced
    ⇒ Use dependent variables unaffected by change in tax base:
      - Broad income
      - Taxable income base adjusted
- Dividend tax rate increased from 15 to 20% in 2017/8
  (counteract incentive to shift across tax bases)
How many taxpayers were affected?

In 2018...

- ... **81,300 individuals** earned more than R1.5 million (0.58% of all individuals submitting a tax return)
- ... together, they paid **R78 billion in taxes** (22% of total personal income tax revenue)
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Standard estimation equation

- Typical ETI equation

\[
\Delta \ln z_{it} = \varepsilon \Delta \ln (1 - \tau_{it}) + \Delta \ln n_{it}
\]  

(1)

- IV: predicted net-of-tax rate change which assigns treatment status based only on pre-reform information:

\[
\Delta \ln (1 - \tau_{it-k}^P) = \ln (1 - T_t' (z_{it-k})) - \ln (1 - T_{t-1}' (z_{it-k}))
\]  

(2)
Issues and solution

- Two well-known challenges:
  1. Mean reversion: High $z_{it-k}$, low $\Delta \ln z_{it}$
  2. Other trends in income distribution, e.g. increase in inequality: High $z_{it-k}$, high $\Delta \ln z_{it}$

- The approach works if longer panel and one can establish constant trend differential in the absence of reform

$$E(\Delta \ln n_{it}|z_{it-k}) = g(z_{it-k}) + \delta_t$$ (3)
Graphical validation à la Jakobsen and Søgaard

**Figure:** Illustration of the Identification and Validation Region Strategy, own illustration based on Jakobsen and Søgaard (2022)
Standard Tax Reform Approach

- Regress the change in the tax units’ incomes on the change of their net-of-tax rates between two periods of time

\[ \Delta \ln z_{it} = \gamma_0 + f(z_{it-k}) + \gamma_2 D_{it}^{\text{reform}} + \gamma_3 \Delta \ln(1 - \tau_{it}) + \nu_{it} \]  

(4)

where

- \( f(z_{it-k}) \) controls for initial income
- \( D_{it}^{\text{reform}} \) is a dummy for the reform period
- IV: \( \ln(1 - \tau_{it-k}^p) \) involving a deeper lag \((k > 1)\):

\[ \Delta \ln(1 - \tau_{it-k}^p) = \ln(1 - T'_t(z_{it-k})) - \ln(1 - T'_{t-1}(z_{it-k})) \]  

(5)
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Data

- Universe of Personal Income Tax Returns
- Provided by the South African Revenue Service (SARS)
- Panel for tax year 2011 until 2020
- Combines tax returns from employers and from assessments
- Use two dependent variables
  - Broad income
    \[ = \text{normal income} + \text{business income} + \text{investment income} \]
  - Taxable income, after deductions
Revenue developments

Figure: Tax Liability for all individuals and individuals with a taxable income above R1.5 million and below R10 million (adjusted for inflation to March 2017)
Number of top income earners

**Figure:** Number of individuals with a taxable income above R1.5 million and below R10 million (adjusted for inflation to March 2017)
### Aggregate Taxpayers/Income/Tax Revenue above Threshold

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Number of individuals</td>
<td>62,660</td>
<td>62,960</td>
<td>70,000</td>
<td>72,668</td>
<td>79,180</td>
<td>80,897</td>
<td>80,352</td>
<td>79,578</td>
<td>79,424</td>
</tr>
<tr>
<td>Taxable Income (R billion)</td>
<td>160.84</td>
<td>159.86</td>
<td>178.02</td>
<td>186.67</td>
<td>206.64</td>
<td>207.95</td>
<td>210.51</td>
<td>205.11</td>
<td>203.83</td>
</tr>
<tr>
<td>Tax Liability (R billion)</td>
<td>55.53</td>
<td>57.17</td>
<td>63.13</td>
<td>66.83</td>
<td>74.24</td>
<td>74.83</td>
<td>76.38</td>
<td>77.68</td>
<td>77.62</td>
</tr>
</tbody>
</table>
**Figure:** Density of taxable income around the threshold in pre-reform tax year 2017 and reform tax year 2018
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Figure: Illustration of the Identification and Validation Region Strategy, own illustration based on Jakobsen and Søgaard (2022)
Figure: Figure shows the estimated changes in trend differentials for broad income
Graphical validation, broad income

Figure: Figure shows the estimated changes in trend differentials for broad income
Graphical validation, taxable income

**Figure:** Figure shows the estimated changes in trend differentials for adjusted taxable income.
Graphical validation, taxable income

**Figure:** Figure shows the estimated changes in trend differentials for adjusted taxable income.
Main results

**Table: Elasticity of Taxable/Broad Income South Africa**

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broad Income</td>
<td>0.7923***</td>
<td>1.2356***</td>
</tr>
<tr>
<td></td>
<td>(0.0449)</td>
<td>(0.0712)</td>
</tr>
<tr>
<td>Observations</td>
<td>516,640</td>
<td>516,640</td>
</tr>
<tr>
<td>Taxable Income adj.</td>
<td>0.7247***</td>
<td>1.1311***</td>
</tr>
<tr>
<td></td>
<td>(0.0440)</td>
<td>(0.0699)</td>
</tr>
<tr>
<td>Observations</td>
<td>517,227</td>
<td>517,227</td>
</tr>
</tbody>
</table>

*Note: Reduced form (1) and IV regression (2)*
### Table: Robustness: Shifts in Control and Treatment Period

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Reduced IV (1)</td>
<td>Reduced IV (3)</td>
<td>Reduced IV (5)</td>
</tr>
<tr>
<td></td>
<td>IV (2)</td>
<td>IV (4)</td>
<td>IV (6)</td>
</tr>
<tr>
<td>Broad Income</td>
<td>0.7403*** (0.0489)</td>
<td>0.4868*** (0.0500)</td>
<td>0.7592*** (0.0596)</td>
</tr>
<tr>
<td></td>
<td>1.1316*** (0.0757)</td>
<td>0.8641*** (0.0787)</td>
<td>1.1972*** (0.1030)</td>
</tr>
<tr>
<td>Observations</td>
<td>468,321</td>
<td>440,260</td>
<td>415,463</td>
</tr>
<tr>
<td></td>
<td>468,321</td>
<td>440,260</td>
<td>415,463</td>
</tr>
</tbody>
</table>
### Table: Robustness - Effect dynamics

<table>
<thead>
<tr>
<th></th>
<th>Three-Year Difference</th>
<th>Two-Year Difference</th>
<th>One-Year Difference</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(1)</td>
</tr>
<tr>
<td>Broad Income</td>
<td>0.7049***</td>
<td>1.0706***</td>
<td>0.595***</td>
</tr>
<tr>
<td></td>
<td>(0.047)</td>
<td>(0.0726)</td>
<td>(0.0489)</td>
</tr>
</tbody>
</table>
Validation Check

- Underlying assumption: constant relative trend differentials
- Tests of this assumption:
  - Assess trend differentials in validation region
  - Placebos in the pre-period
Placebo: Broad Income

Figure: Figure shows the estimated changes in trend differentials for adjusted taxable income.
Figure: Figure shows the estimated changes in trend differentials for adjusted taxable income
Relax Identification Assumption

- In earlier periods:
  violation of constant trend differentials for taxable income
- Relative income growth:
  Becomes stronger at the upper end of income distribution
- Estimates biased against us:
  Estimated ETI a lower bound to true effect
Relax Identification Assumption

- Use three periods of time:
  - Treatment period: 2017-2019

- Model changes in trend differentials in the pre-period: assume that this change is constant over time

- Empirical model

\[ \Delta \ln z_{it} = \delta_0 + \delta_1 D_{i}^{inc} + \delta_2 D_{i}^{inc} \cdot TIME_{t} + \delta_3 \mu_t + \rho \Delta (1 - \tau_{it}) + \epsilon_{it} \] (6)

- \( D_{i}^{inc} \): full set of percentile dummies
- \( TIME_{t} \): linear time trend
Relax Identification Assumption

<table>
<thead>
<tr>
<th></th>
<th>(1) Without time trend</th>
<th>(2) With time trend</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broad Income</td>
<td>.748684*** (.0291813)</td>
<td>.6717096*** (.0655548)</td>
</tr>
<tr>
<td>Observations</td>
<td>757,177</td>
<td>757,177</td>
</tr>
<tr>
<td>Taxable income</td>
<td>.7584071*** (.0293589)</td>
<td>.618669*** (.0650931)</td>
</tr>
<tr>
<td>Observations</td>
<td>757,961</td>
<td>757,961</td>
</tr>
</tbody>
</table>
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Additional analyses

- Results by income groups
- Role of self-employment income
- Role of investment income
Investment Income and Self-Employment Income

![Graph showing the share of individuals earning respective income over percentiles](image)

- **Investment income**
- **Business income**
Elasticities by income
### Role of self-employment & investment income

**Table: Response Heterogeneity**

<table>
<thead>
<tr>
<th>Dep. Var.</th>
<th>Broad Income</th>
<th>Broad Income</th>
<th>Broad Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Δ (1-MTR)</td>
<td>0.6142*** (0.0467)</td>
<td>0.3557*** (0.0499)</td>
<td>0.2835*** (0.0505)</td>
</tr>
<tr>
<td>Self Emp. &gt; Mean X Δ (1-MRT)</td>
<td>1.1781*** (0.0893)</td>
<td></td>
<td>0.9256*** (0.0916)</td>
</tr>
<tr>
<td>Inv. Income &gt; Mean X Δ (1-MTR)</td>
<td></td>
<td>0.9099*** (0.0612)</td>
<td>0.7682*** (0.0628)</td>
</tr>
</tbody>
</table>

Observations | 516,640 | 516,640 | 516,640
Income Components – Descriptives

Figure: Income Composition Top Income Taxpayers
Income Components – Descriptives

Figure: Income Composition Top Income Taxpayers

Figure: Income Composition Top Income Taxpayers

2016

Share third-party reported income
Share non-third-party reported income

Figure: Income Composition Top Income Taxpayers
## Responses in Different Components of Taxable Income

<table>
<thead>
<tr>
<th>Component</th>
<th>Reduced form</th>
<th>IV estimates</th>
</tr>
</thead>
<tbody>
<tr>
<td>IRP5 income</td>
<td>.2685246</td>
<td>.4129575</td>
</tr>
<tr>
<td></td>
<td>(.1564663)</td>
<td>(.2407134)</td>
</tr>
<tr>
<td>Gross inc. minus IRP5</td>
<td>2.731442 ***</td>
<td>4.207036 ***</td>
</tr>
<tr>
<td></td>
<td>(.1716683)</td>
<td>(.2657541)</td>
</tr>
<tr>
<td>Business inc.</td>
<td>.2267804</td>
<td>.387447</td>
</tr>
<tr>
<td></td>
<td>(.4082321)</td>
<td>(.6966891)</td>
</tr>
<tr>
<td>Investment inc.</td>
<td>1.344722***</td>
<td>2.287353**</td>
</tr>
<tr>
<td></td>
<td>(.4173282)</td>
<td>(.7103372)</td>
</tr>
<tr>
<td>Deductions adjusted</td>
<td>-.2993705**</td>
<td>-.4352949**</td>
</tr>
<tr>
<td></td>
<td>(.1121835)</td>
<td>(.1630173)</td>
</tr>
<tr>
<td>Fringe benefits</td>
<td>1.061827***</td>
<td>1.53094***</td>
</tr>
<tr>
<td></td>
<td>(.1112455)</td>
<td>(.1607233)</td>
</tr>
<tr>
<td>Allowances</td>
<td>1.60788***</td>
<td>2.300651***</td>
</tr>
<tr>
<td></td>
<td>(.1816518)</td>
<td>(.2606523)</td>
</tr>
</tbody>
</table>
Composition Labor Income – Top of Income Distribution

**Figure:** Composition PAYE Income
Figure: Changes in Annual Incentive and Bonus Payments
### Strong Response in "Annual" Income (Bonuses/Incentive Pay)

<table>
<thead>
<tr>
<th>Dep. Var.</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>monthly inc</td>
<td>-0.0658277</td>
<td>1.677873***</td>
<td>-0.0034068</td>
<td>0.7598315</td>
</tr>
<tr>
<td>Net-of-tax rate</td>
<td>(0.3974122)</td>
<td>(0.6371398)</td>
<td>(0.2755556)</td>
<td>(0.180798)</td>
</tr>
<tr>
<td>Observations</td>
<td>393,430</td>
<td>393,430</td>
<td>393,430</td>
<td>249,603</td>
</tr>
</tbody>
</table>
Revenue consequences

- **Mechanical Effect:** Using 2017 incomes, additional revenue from the top group should have been 8.3 bn Rand

- **Strong behavioral response:**
  Mean reduction in top incomes close to 10%
  PIT revenue collection drops by 1.1 bn Rand
Inequality consequences

- Actual after-tax Gini in 2017: 0.6264
- Drops to 0.6182 because of the tax rate change
- Further declines to 0.6097 due to the behavioural reaction
- But unclear if behavioral reaction is a real response
  - If partly evasion, inequality drops by less
  - But evasion costs → Inequality in consumption/utility ↓
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Three potential margins to capture real behavior

- Exits (relocation of tax residence)
  Not reflected in baseline estimates
- Changes in third-party reported income
- Changes in firm output and profitability
  If affected employees exert less effort / reduce labor supply
  ⇒ Output and firm income drops
Response of Firm Output and Profit

- Changes in performance (measured by sales and CIT income over total assets) of firms that are affected by the PIT reform
  - Mechanism: If key employees work less or exert less effort, sales and income earned by firm drops
  - Treatment status: firms’ employees with taxable (not necessarily labor) income $> 1.5$ Million Rand
  - Treatment indicators: binary or fraction of firms’ employees treated
**Firm Analysis**

- **Data:**
  - Population of CIT returns in South Africa, firms taxable income, total assets, MNE status, industry ...
  - PAYE reports: allows for link between PIT and CIT
  - Sample restricted to firms with PAYE reports
  - Drop MNEs from sample, potentially confounding anti-profit shifting provisions introduced during sample frame
  - Sample frame: 2014-2020
Firm Analysis

- Difference-in Differences Model:

\[ y_{it} = \alpha_0 + \alpha_1 TREAT_i \cdot POST_t + \rho_i + \delta_t + \epsilon_{it} \]  \hspace{1cm} (7)

where

- \( y_{it} \): firms' sales
- \( TREAT_i \): firms' treatment status (binary and fraction of employees with taxable income > 1.5 Million Rand)
- \( \rho_i \): firm fixed effect
- \( \delta_t \): time fixed effect

- Clustering of S.E. at firm level

- Additional analyses:
  - full set of 2-digit industry-year FE;
  - full set of firm-size year FE
  absorb differential shocks to \( y_{it} \) across industries and firms of different size
## Reform Effect on Firms’ Sales

<table>
<thead>
<tr>
<th>Treatment</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
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<tbody>
<tr>
<td>Binary</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2015-17</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Treat</strong></td>
<td>-.0395512***</td>
<td>-.0361288***</td>
<td>-.0968734**</td>
<td>-.1126264**</td>
</tr>
<tr>
<td></td>
<td>(.0095414)</td>
<td>(.0107415)</td>
<td>(.0406303)</td>
<td>(.0493088)</td>
</tr>
<tr>
<td>Firm FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
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<tr>
<td>Year FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
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<tr>
<td>Observations</td>
<td>568,804</td>
<td>568,804</td>
<td>568,804</td>
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<table>
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<tbody>
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<tr>
<td>2015-17</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Treat</strong></td>
<td>-.0497094***</td>
<td>-.0460297***</td>
<td>-.1133484***</td>
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<td>(.0101033)</td>
<td>(.0112987)</td>
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<tr>
<td>Size-Year FE</td>
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<td>Industry-Year FE</td>
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<tr>
<td>Observations</td>
<td>568,615</td>
<td>568,615</td>
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Conclusion

- **Large ETI**, close to 1, also for broad income
- Taxpayer **response increases in income** and driven by...
  - adjustments in income **not subject to third-party reporting**, investment income, and **certain forms of employment income**: allowances, fringe benefits & **bonus and incentive pay**
- Some indication for **repercussions on real economy**: drop in sales of affected firms → but effect size and set of treated firms small
- **No increase in revenue collection**; but potentially (after evasion costs) less after-tax income inequality