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# Universal Basic Income, Targeted Cash Transfers, and Progressive Taxation: Reducing Income Inequality in South Africa?

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## Introduction

South Africa has one of the world's most progressive tax systems, yet income inequality continues to be a major challenge for the country. Several fiscal policy initiatives have been implemented since the end of apartheid to reduce the high levels of inequality and poverty. UBI is appealing because it avoids the problems of targeting, yet there's limited evidence on the effects of UBI in developing countries. This is because they can produce substantial redistribution to the poor. Now, given that governments in developing countries target poor and vulnerable people to receive cash transfers using various targeting methods (del Ninno, Carlo, and Mills 2015). It is then imperative to compare UBI to TCT, because data on income is limited for majority of the population working in the informal sector and inclusion in the formal tax system is low. Therefore, TCT along with progressive tax framework can be more complex and possibly, may lead to poor redistribution through the tax system.

### Research Question:

UBI versus TCT, both financed through progressive taxation: Which is the most income inequality-reducing in SA.

**Main Objective:** Compares the magnitude by which UBI versus TCT funded by progressive taxation can reduce income inequality in SA

### Related Literature:

Income inequality in South Africa (Leibbrandt et al. 2010; Van der Berg, 2009; Alvaredo and Atkinson, 2010; Woolard et al., 2015; Inchauste et al., 2015). TCT (Duflo, 2003) but not on income inequality instead on nutritional status and gender. None of these studies has examined redistribution through the lens of a UBI or a TCT to reduce income inequality.

**Contribution:** Contributes to the literature by addressing income inequality using a UBI or a TCT coupled with progressive taxation.

## Methodology

### Income Prediction with Proxy Measures:

I used a regression-based proxy means tested to predict the household poverty status and for targeting purpose. In targeting, SA food and upper general poverty lines are used as thresholds. I use NIDS survey data to make out-of-sample predictions for the relevant population, where the initial sample is randomly split into equally sized calibration (training or estimating) and validation (test) samples. Using the calibration sample, I regress monthly household per-capita consumption on 56 indicator variables. These indicators include observable household characteristics such as ownership of consumer durables or assets, demographic variables, and attributes of the household head. Monthly per-capita consumption is then predicted for each household in the validation sample using the coefficients from the calibration regression, in order to check the fit of the model.

## Methodology

### Income Prediction with Proxy Measures Cont'd:

This estimate proxy-mean test (PMT) scores for each household. The OLS regression equation used:

$$y_{it} = \alpha_t + \beta_t X_{it} + \varepsilon_{it}; \quad (i = 1, \dots, N_{it}); \quad \hat{y}_{it} = \hat{\alpha}_t + \hat{\beta}_t X_{it}$$

### Baseline Inequality Measure:

- Estimate the two Theil inequality measures using the current net distribution of income under the existing progressive tax structure, without UBI or TCT
- Group decomposition property of the inequality measure into different groups - race, geographical type, province, and household head education

### Policy Simulation of Marginal Tax Rate:

The 2018 tax codes from the annual budget review report are applied to the NIDS data to create tax variables using the equation:

$$y^n = y^g(1 - t_i) + t_i L_i - F_i + r \quad (1)$$

$y^n$  is net taxable income;  $y^g$  is gross taxable income;  $t_i$  is marginal tax rate  $F_i$  is fixed tax amount;  $L_i$  is the lower bound tax base;  $r$  is tax rebate.

Now, I examine how the distribution of net taxable income would change under different tax schedule using two total budget scenarios. I simulate a 10, 22, and a 50 percent increase in the marginal tax rate of all tax brackets in the SA tax codes. Revenue generated in each scenario funds UBI or TCT program under a given total budget. Then, I analyze the impact of UBI funded by a k percent increase in taxes on the income distribution which changes equation (1) to:

$$y_k^n = y^g(1 - t_k) + t_k L_k - F_k + r \quad (2)$$

$$y_{UBI}^n = y_k^n + UBI; \quad y_k^n = y^n - R_{add} \quad (3)$$

The new distribution of net income  $y_{UBI}^n$  is used to calculate new estimates of the Theil inequality. The same approach is used for the TCT program and then, after I compare the change in the distribution of income under UBI and TCT

## Data & Measures

National Income Dynamics Study (NIDS) - the first national household panel data study in SA. This study used wave 5 (2017). The total number of individuals and households interviewed: 30,110 and 13,719. I create new variables and other data management of the raw survey data, after which a total sample of 15,169 individuals and 6,389 households was used for the analysis. The large drop in sample is due to missing income data. The data does not include tax variables, so I applied 2018 tax codes to the NIDS data to create such variables using equation (1).

## Data & Measures

The inequality measures used are first Theil entropy measure (T) and the second Theil entropy measure (L). SA Food and the upper-bound national poverty lines are used as threshold for targeting and food as transfer for UBI/TCT.

Fig 1:

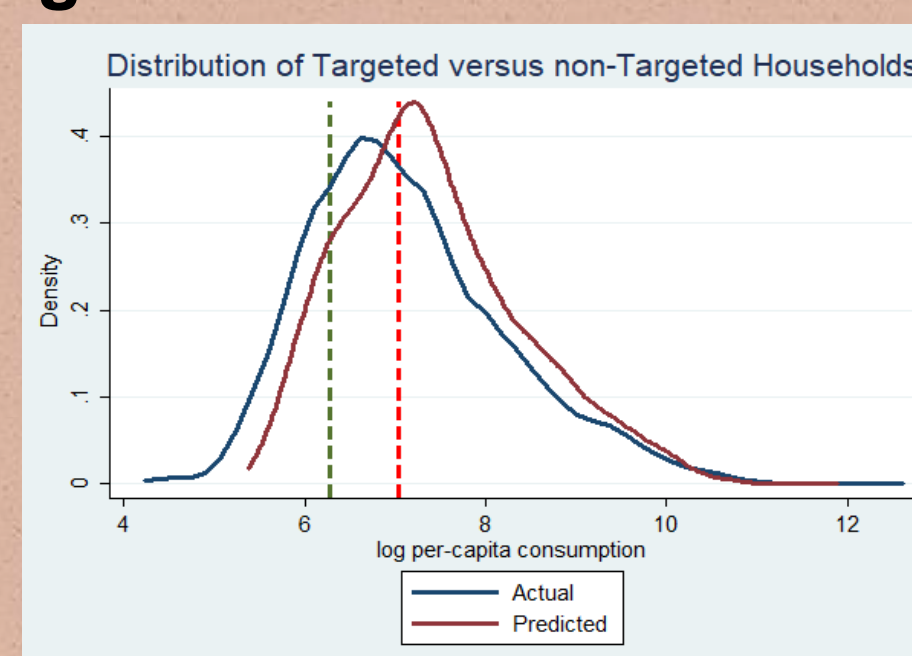
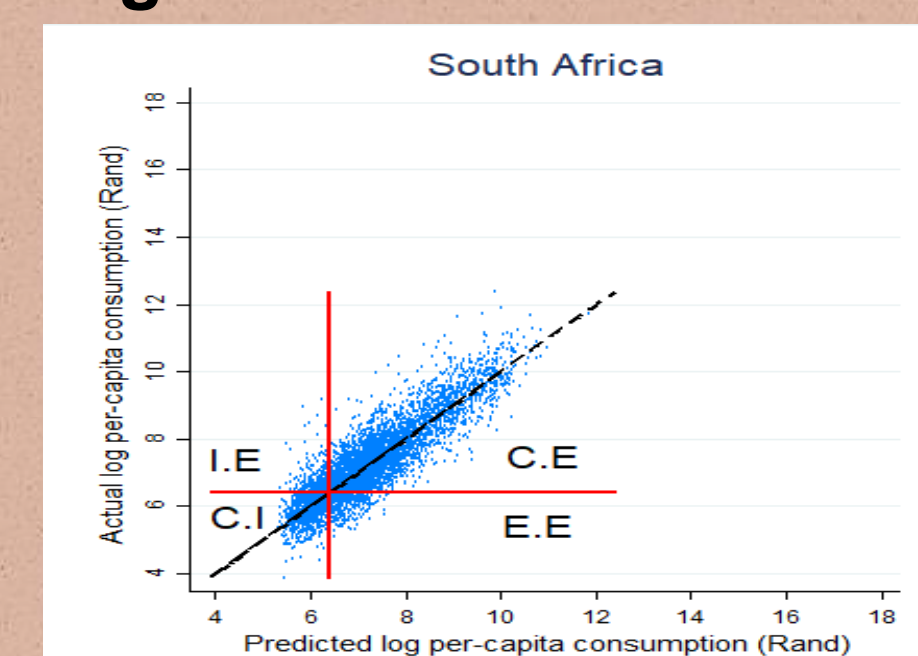


Fig 2:



## Data & Measures

Figure 1: the green line is for SA food poverty line and the orange red line is for upper poverty line. The households with predicted consumption less than the poverty lines are targeted to receive transfers under the TCT policy. The four quadrants in the figure 2: correct inclusion (CI), correct exclusion (CE), inclusion error (IE), and exclusion error (EE). This graph explores the tradeoffs in the errors of inclusion and exclusion resulting from targeting households via PMT. About 58.34% were targeted at the food poverty line and 16.05% were targeted at the upper poverty line.

## Results and Discussion

Scenario 1: Considers a UBI that requires a 50 percent increase in marginal tax rates to fully finance its total budget; then distribute the same total budget in a TCT that provides higher transfers only to those targeted by the TCT (food and upper PL).

Scenario 2: Smaller total budget for TCT that needs a 22 percent increase in marginal tax rate to fully finance those targeted by TCT; after, a smaller transfer is given to all South Africans to fund UBI, set such that the total budget for UBI equals the TCT total budget

Table 1:

Variable	Frequency	Percent
<b>Race</b>		
African	19,480,709	79.6
Colored	2,496,254	10.2
Asian/Indian	559,628	2.3
White	1,927,390	7.9
<b>Province</b>		
Western Cape	3,285,584	13.4
Eastern Cape	2,070,880	8.5
Northern Cape	623,639	2.6
Free State	1,138,909	4.7
KwaZulu-Natal	4,489,971	18.4
North West	1,261,847	5.2
Gauteng	7,581,555	31.0
Mpumalanga	2,014,299	8.5
Limpopo	1,937,295	7.9
<b>Geographical type</b>		
Rural	6,810,630	27.8
Urban	17,653,350	72.2
<b>Household head education</b>		
primary	1,073,517	9.1
lower secondary	1,770,829	15.0
upper secondary	3,874,605	32.7
tertiary (non-university)	1,299,989	11.0
tertiary (university)	3,336,824	28.2
no education	488,781	4.1

Table 2:

Decile	Mean gross income levels (Rand)	Gross taxable income (%)	Mean net income levels (Rand)	Net taxable income (%)
1	5,711	0.69	5,711	0.58
2	14,443	1.56	14,443	1.32
3	23,633	2.98	23,633	2.52
4	31,148	3.21	31,148	2.71
5	38,396	4.19	38,396	3.54
6	50,249	6.02	50,249	5.08
7	68,703	7.47	68,703	6.36
8	100,924	10.95	106,903	9.88
9	163,784	19.39	184,468	18.19
10	408,751	43.55	552,448	49.83

Table 3:

UBI (Fund both scheme)	Total tax revenue (Rand)	Additional tax revenue (Rand)
Initial value	254.7 billion	0
10% increase in MTR	286.9 billion	32.21 billion
50% increase in MTR	415.7 billion	161 billion
<b>TCT (Fund both scheme)</b>		
Initial value	254.7 billion	0
10% increase in MTR	286.9 billion	32.21 billion
22% increase in MTR	325.5 billion	70.86 billion

Fig 4:

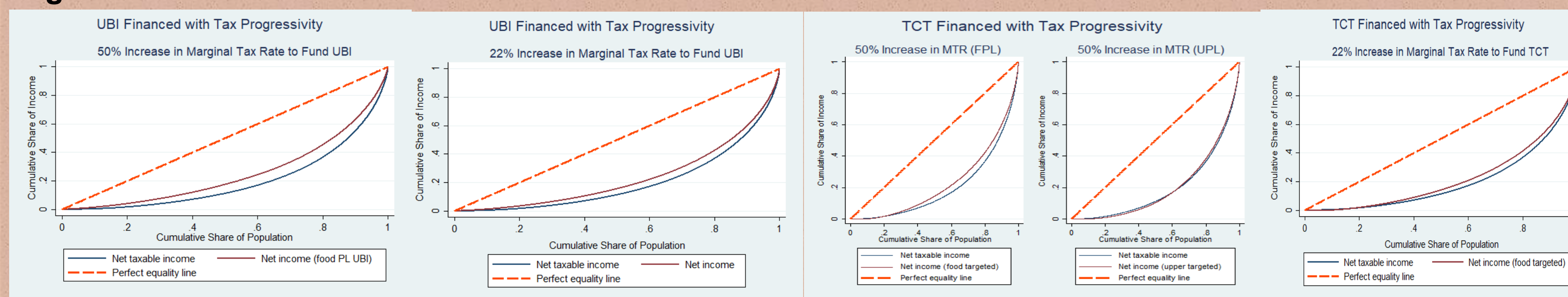


Table 4:

Race	UBI: 22% increase in MTR			TCT: 22% increase in MTR			UBI: 50% increase in MTR			TCT: 50% increase in MTR			
	Baseline	National	% Between	% Within	National	% Between	% Within	National	% Between	% Within	National	% Between	% Within
Theil L	0.797	0.546	14.68	85.32	0.579	14.4	85.6	0.431	14.52	85.48	0.522	13.38	86.62
Theil T	0.671	0.539	19.06	80.94	0.547	19.52	80.48	0.434	18.05	81.95	0.482	18.34	81.66
<b>Household head education</b>													
Theil L	0.79	0.579	25.17	74.83	0.657	22.02	77.97	0.468	24.08	75.93	0.623	19.602	80.4
Theil T	0.687	0.575	26.45	73.55	0.611	24.84	75.16	0.475	24.96	75.04	0.571	22.69	77.306

## Conclusion

Overall, UBI reduces income inequality slightly more than TCT under both total budget scenarios. Within-group inequality contributes larger proportions to overall (national) inequality than between-group inequality. Funding UBI or TCT programs at scenario two, the TCT total budget, may require less budget to fully finance than at scenario one, the UBI total budget.

TCT program may lead to imperfect targeting resulting in inclusion and exclusion error with a poor coverage rate. This may perhaps be the reason why UBI reduces income inequality slightly more than the TCT. UBI or TCT implemented alongside progressive tax reduces income inequality more than a progressive taxation without UBI or TCT.

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