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Exploring a negative income tax for South Africa: impacts on income inequality and poverty

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Exploring a negative income tax for South Africa: impacts on income inequality and poverty

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Abstract

This paper explores the potential of a negative income tax to tackle South Africa's dual challenges of poverty and income inequality. Using a static, arithmetic microsimulation model with NIDS Wave 4 as the base dataset, we simulate a negative income tax in which recipients receive an income subsidy proportional to their income if it is below a set amount and a guaranteed subsidy if they have zero income. Two different sizes for the guaranteed subsidy are simulated, both pegged to recent poverty lines. The simulations show that the negative income tax significantly reduces both inequality and poverty levels, but that this necessarily comes at a high cost.

1 Introduction

South Africa has one of the highest levels of inequality in the world. Reducing these inequalities has – in addition to collecting government revenue – been one of the primary mandates of the tax system since the end of apartheid in 1994. Comprehensive social grants aimed at low-income individuals combined with a highly progressive personal income tax have had an important impact on inequality and poverty levels[1] (see for instance Inchauste *et al,* 2015). Yet, income inequality remains very high. The most recent estimate puts the post-tax and –transfer Gini coefficient at 0.66[2], situating South Africa in a context where its inequality levels are significantly higher than other, comparable middle-income countries such as Brazil (whose same number is 0.54[3]). This begs the question: to what extent are the existing tax and social transfers effective in addressing the dual concerns of poverty and inequality in the current South African context? What can be done to more effectively reduce poverty and inequality?

A key to this may lie in the current system of social grants. South Africa's social grants are predominantly targeted at children, disabled persons, and the elderly. While the impact of these social grants should not be underestimated, this targeting leaves a large segment of those vulnerable to and living in poverty without any form of social assistance. For able-bodied adults of working age there are no social grants. This is a significant problem for several reasons. Firstly, the nature and extent of unemployment in South Africa is well-known. In the first quarter of 2017, the official (strict) and expanded unemployment rates were 27.7% and 36.4%, respectively (Statistics South Africa, 2017b). Less than 10% of unemployed persons receive unemployment insurance (Leibbrandt *et al.*, 2013), illustrating the limitations of UIF. It provides short-term unemployment insurance for previously employed persons, making it greatly lacking for the South African context where much of unemployment is long-term and many individuals have never held employment[4] (Leibbrandt *et al.*, 2013). While some government policies such as the youth employment subsidy and Public Works Programmes have been implemented to mitigate this problem, neither has been able to create the number of work opportunities required to make a significant dent in the unemployment rates. Secondly, many those in regular employment still experience poverty. Finn (2015) estimates that 5.4 million people in South Africa can be considered "working poor". This group also does not receive any social assistance. Hence there are two large groups vulnerable to or living in poverty who do not have access to social assistance, and currently fall between two chairs in the social welfare system. Addressing this could be key to significantly reducing poverty and inequality levels in South Africa.

In the South African context, proponents of this type of policy have typically proposed a basic income grant in which a set grant is given to everyone. In this paper, we look at a similar policy, a

[1]Inchauste *et al.* (2015), using a fiscal incidence analysis methodology, show that direct taxes decrease the Gini index from 0.771 to 0.75, while including both direct taxes and cash transfers reduces the Gini index to 0.694. Headcount poverty measured at the national upper bound poverty line decreases from 52.3% to 45.1% with cash transfers.

[2] Own calculations, using NIDS Wave 4 and Wave 4 survey weights

[3] From Higgins and Pereira's (2014) calculations based on data for 2008/2009 from Pesquisa de Orçamentos Familiares (a family expenditure survey for Brazil).

[4] This is especially the case for the younger demographic.

negative income tax. The negative income tax provides an income subsidy to individuals with incomes below a certain threshold which depends on their level of income (hence, the notion of a "negative income tax") to ensure a certain level of income for all individuals. It is administered through the income tax system. A negative income tax is particularly suitable for the South African context because of its ability to target individuals currently left out of the social security system through providing income support with through a system which only uses income as its only qualification. Furthermore, it is conceptually and administratively simple, and uses the existing infrastructure of a historically well-functioning branch of government for administering the transfers.

This paper starts with an introduction to the negative income tax and compares it to other income transfer programmes such as the earned income tax credit and the basic income grant. Following this, we review of the empirical literature on the negative income tax, which is separated into two main strands: the experimental literature which looks at the North American negative income tax experiments between 1960 and 1980 and the more recent microsimulation literature which has mainly focused on Europe. Having established that there is almost no South African literature on the negative income tax, we briefly recap the basic income grant debates that took place in the early 2000s for context on the South African debates on this issue. After this, the main part of the paper starts with a discussion of the data and methodology used in this study. NIDS Wave 4 is used as the base dataset to employ a static microsimulation of potential negative income tax programmes. This allows us to simulate the size, cost, and impact on individual agents of such policies. The results are then presented, followed by a discussion about labour supply effects, cost, and political viability. The paper ends with concluding remarks.

2 The negative income tax

2.1 An introduction to the negative income tax

The basic set-up of a negative income tax is described in Ashenfelter and Plant (1990) as follows: if the recipient has no income, they will receive a guaranteed subsidy G. The subsidy D given to recipients with a positive income Y, is a decreasing function of income, decreasing at rate τ. As such, the income subsidy will be given by equations 2.1 and 2.2.

$$D = G - \tau \mathrm{Y} \text{ if } \mathrm{Y} < \frac{\mathrm{G}}{\tau} \quad (2.1)$$

$$D = 0 \; if \; Y > \frac{G}{\tau} \quad (2.2)$$

The quantity B=G/τ is the "breakeven" quantity, i.e. the quantity at which the subsidy received is zero. If income equals the wage rate times the hours worked, the implicit wage rate for a low-income worker will be Y=w(1-τ), since the subsidy will decrease by wτ for each hour worked. τ can therefore be referred to as the implicit tax rate or the take-back rate.

The negative income tax shares a lot of characteristics with other income transfer programmes such as the basic income grant and the earned income tax credit. An earned income tax credit works

similarly to the negative income tax, but includes a work requirement for recipients (Rothstein, 2010), meaning that non-workers do not receive an income subsidy. As briefly explained in the introduction, the main difference between the negative income tax and the basic income grant is that while the basic income grant gives a set amount to everyone, the amount received from a negative income tax decreases with one's income (Tondani, 2009), and is only given to individuals with incomes below a set threshold. If a basic income grant is financed through progressive taxation, a negative income tax and a basic income grant could theoretically leave all recipients with the same net transfer[5].

There are two main parameters that must be decided upon when constructing a negative income tax policy and there are important trade-offs associated with both (Widerquist, 2005). The first decision is the size of the guaranteed subsidy G. If it is set too high, the programme will be fiscally unaffordable, and work disincentive effects may be high. If the guaranteed subsidy is set too low, however, the programme's ability to alleviate poverty diminishes. The second decision pertains to the implicit tax rate/take-back rate, τ. A high τ means lower programme costs, but also increases work disincentives and risks creating a poverty trap where recipients limit their work hours in order to keep their income subsidy. A low τ, while creating stronger incentives for work, increases programme costs and risks privileging the "less poor" over the poorest.

The negative income tax undeniably has much potential to reduce poverty and inequality. However, frequent concerns by its sceptics include its cost and fiscal sustainability, as well as its impact on labour supply. Another often mentioned concern is that people may manipulate their own earnings to become eligible. The issue of the negative income tax's impact on the labour supply is particularly contested. There are two channels through which a negative income tax can have a negative impact on the labour supply. Firstly, classical theory dictates that if both income and leisure are normal goods, a negative income tax will make leisure relatively cheaper. This, in turn, will lead individuals to decrease their work hours, absent any preference changes (Green, 1968, p. 280). Secondly, if increased income taxes are used to finance a negative income tax, the "price" of leisure falls leading individuals to increase their consumption of leisure. Some papers raise the concern that the negative output effects from a reduced labour supply are large enough to offset the redistributional impact of the negative income tax (Gallaway, 1966; Diamond, 1968; Golladay and Haveman, 1976; Angyridis and Thompson, 2015). Gallaway (1966) is concerned that the large labour supply response makes the negative income tax a poor policy choice for reducing poverty, except for groups with already low levels of labour force participation. So, if the policy is aimed at the unemployed, this may not necessarily be an issue. Diamond (1968) emphasises the potential disincentive effects for those above the poverty level (who do not receive an income subsidy), and that this may in the long run affect saving patterns. Similarly, Angyridis and Thompson's empirical study finds that any positive effects the negative income tax has on redistribution and poverty come "at the expense of a significant reduction of output", since tax rates must be very high to finance the policy. These disincentive effects not only have welfare implications, but will also affect the size of the transfer

[5] What is meant by this is that if individuals with incomes above a certain threshold compensate for their receipt of a basic income grant through increased taxes which exceed the amount received by the grant, a basic income grant and a negative income tax would effectively be identical.

which can be financed since reduced work hours reduces the total tax that can be collected (and thus, the total expenditure available for the negative income tax).

However, the classical theory of reduced labour supply is not unchallenged. For instance, Killingsworth (1976) considers family, rather than individual, labour supply models. These models involve couples with interdependent utility functions where one person's utility depends both on their own leisure and income and on their partner's leisure. If they can adjust their labour supply on the intensive margin, the negative income tax will, in certain instances, have a positive effect on labour supply. Saez (2002) develops a labour supply and optimal taxation model in which the government maximises a classical welfare function based on individual utilities. Labour supply is either decided on the extensive or the intensive margin. Saez (2002) finds that when labour supply is concentrated on the intensive margin, a negative income tax is the optimal social transfer programme, while a programme more similar to an earned income tax credit is optimal if labour supply effects are concentrated on the extensive margin. As such, if we expect that an income subsidy of this type will make individuals opt out of the labour market, an earned income tax credit may prove more suitable than a negative income tax. If the concern, however, is that individuals will reduce their work hours in response to an income subsidy, Saez (2002) posits that a negative income tax is the optimal income subsidy programme. The question of labour supply effects is ultimately empirical, and will be returned to later in this paper when discussing empirical work on the negative income tax.

A frequent concern about the negative income tax relates to the fact the only criterion for receiving assistance is income below a set threshold. On the one hand, this criterion may make the threshold for seeking assistance lower (Diamond, 1968), as it does not require previous work experience or any other criteria that risks excluding the most needy. However, it may lead people to decrease or manipulate their earnings to become eligible (Ashenfelter and Plant, 1990; Cox, 1998). This could be done through either reducing work hours to become eligible or underreporting one's income. Data on this is difficult to find, making it hard to estimate exactly how large of a problem this poses. However, Joulfaian and Rider's (1996) survey of U.S. tax returns in 1998 found that underreporting income to receive the earned income tax credit was modest.

2.2 Empirical literature on the negative income tax

The empirical literature on the negative income tax can be divided into two main strands: the experimental literature which discusses the North American negative income tax experiments between 1960 and 1980, and the more recent microsimulation literature which mostly looks at European countries.

Experimental literature

Between 1968 and 1980, five negative income tax experiments took place in North America: four in the United States, and one in Canada (Widerquist, 2005). These experiments were meant to investigate the impact and viability of a large-scale negative income tax policy, and in particular, to empirically estimate the labour supply effects of such a programme. While the main idea was similar for all the projects, they varied in most other factors, including sample size, recipient criteria, location, size of guaranteed subsidy, and implicit tax rate (Robins, 1985; Widerquist, 2005). The

guaranteed subsidies were all pegged against a poverty line. The income guarantee varied between 50% and 148% of the poverty level in the US experiments, and it was around the poverty level at the time in the Canadian one (Widerquist, 2005).

Much has been written about the experiments in their aftermath, and a lot of the literature has conflicting views on how to interpret the results. However, most writing on the experiments agree that there was a non-negligible labour supply decrease (on the intensive margin). Nevertheless, there was no evidence for large withdrawals from the labour force (Robins, 1985; Widerquist, 2005), nor was the work-effort response was large enough to threaten the fiscal viability of the programmes (Widerquist, 2005). Burtless and Hausman (1978) found that while the effect of a negative income tax was very small for most of the population, it was substantial for a minority. The decrease in labour supply was not uniform across demographic groups. In particular, it differed across gender and marital status, with wives, single female heads, and youth reducing their labour supply significantly more than husbands (Robins, 1985). The interpretation of differences in labour supply responses across race differed. Robins (1985) reported the black and Latino/Mexican particiants had a larger labour supply response than white participants, while (Moffitt, 1981, p. 25) stated that interracial differences "appear[ed] to be only a result of random statistical error". Another contentious topic was the relative importance of income and substitution effects in the labour supply responses. Burtlees and Hausman (1978) found that the income effect was by far more important in determining the labour supply response. Robins (1985), however, found that the relative importance varied across gender and marital status, with substitution effects and income effects dominating for wives and single female heads, respectively.

Additionally, there were also several concerns regarding the validity of the results found in the negative income tax experiments. In particular, the numbers of participants and each treatment group was relatively small due to the wish to experiment with different values of the guaranteed subsidy and implicit tax rate (Ashenfelter and Plant, 1990). This was an issue for most of the experiments except the Seattle/Denver Income Maintenance Experiment which had a larger sample size which made it possible to make more precise estimates (Robins, 1985). More concerning was the non-random assignment to treatment groups, where families with higher incomes were more likely to be placed in more generous programmes (Widerquist, 2005; Ashenfelter and Plant, 1990). This may have introduced bias into the estimates. Furthermore, attrition seemed closely related to the type of programme to which a family was assigned (Ashenfelter and Plant, 1990). Hawthorne effects and underreporting of incomes were also mentioned as potential problematic aspects of the experiments: Hawthorne effects because if individuals' changes in labour supply were a result of them being observed in an experiment rather than a "genuine" response to an income subsidy, the labour supply estimates could be biased; and underreporting, because the experimental group had incentive to underreport their income, while the control group did not. Lastly, the experiments only took place over the relative short term, making it difficult to estimate longer-term effects (Widerquist, 2005).

Microsimulation literature

There is a substantial, and fairly recent, body of work which uses microsimulation models to evaluate negative income tax policies. NIT microsimulations have been created for Denmark (Colombino *et al.*, 2008), Finland (Honkanen, 2014), Italy (Aaberge, Colombino and Strøm, 2004;

Colombino *et al.*, 2008; Narazani and Shima, 2008), Portugal (Colombino *et al.*, 2008), South Africa (Magnani and Badaoui, 2015), Switzerland (Abul Naga, Kolodziejczyk and Mueller, 2008), and the UK (Colombino *et al.*, 2008). Magnani and Badaoui (2015)'s South African study is actually a micro-macro simulation model, but is included here as empirical work on a South African NIT is sparse.

Aaberge, Colombino and Strøm (2004) use a behavioural microsimulation model to compare a negative income tax complemented with a flat tax to a workfare scheme and a flat tax scenario in Italy. Characteristics of the model include partners' simultaneous choices and constraints on choice of work hours, which the authors deem essential for the results. They find no evidence that a negative income tax creates participation disincentives or a poverty trap for the lowest two deciles. Narazani and Shima (2008) also simulate a negative income tax complemented by a flat tax for Italy. Their paper combines a static microsimulation model of EUROMOD and a labour supply model. On the intensive margin, the labour supply changes from a negative income tax are small. The work disincentives are increasing in benefit level, and larger (for males) at the lowest deciles, decreasing with income. Full-time participation on the extensive margin follows the intensive margin results. For part-time participation, however, male labour supply is neutral to transfer size, while female labour supply decreases with size. A guaranteed subsidy of 75% of the poverty line decreases the Gini coefficient from 0.25 to 0.16 in Central and Southern Italy and from 0.22 to 0.18 in Northern Italy. If it is 57%, it decreases the Gini of Northern Italy to 0.24, while the Southern Gini remains the same.

Colombino et al. (2008) use EUROMOD to simulate the effects of a negative income tax for Denmark, Italy, Portugal, and the United Kingdom. It includes a negative income tax financed by a flat tax and a negative income tax financed by a progressive tax. Similar to Aaberge, Colombino and Strøm (2004), they find that members of households with higher incomes have a less elastic labour supply, and therefore suggest that financing a negative income tax through a progressive tax better exploits these elasticities. Abul Naga, Kolodziejczyk and Mueller (2008) compare a variety of potential income maintenance schemes in Switzerland including a full and a partial negative income tax set at 100% and 50% of subsistence expenditure, respectively. The microsimulation model includes a tax-benefit model and a model of labour supply. The full negative income tax reduces income inequality most drastically of the schemes, reducing the Gini coefficient from 0.21 to 0.14, while the partial NIT reduces it to 0.16. The full and partial negative income tax would require a 62% and 51% linear tax rate, respectively, making the partial programme significantly more affordable.

Honkanen (2014) compares a negative income tax to a basic income grant using SISU, a static microsimulation model for Finland. The paper finds that redistribution is more efficient if using a negative income tax than a basic income grant, but that the two policies are otherwise quite similar, as both significantly reduce poverty and inequality. Compared to the current (2010) system, the negative income tax reduces the Gini coefficient from 0.27 to 0.23. The poverty rate – defined as under 50% of median income – more than halves from 6.9% to 2.9% with the negative income tax.

Magnani and Badaoui (2015) appears to be the only study assessing a negative income tax for South Africa, and they use a micro-macro simulation model. Their proposed policy is a combination of a flat tax rate of 20% and a lump-sum transfer of R408 to everyone. While non-workers and informal sector workers receive the full transfer, workers in the formal sector only receive a net transfer if "their income is lower than the transfer divided by the flat rate" (Magnani and Badaoui 2015, p.20).

An interesting addition is that informal sector workers are explicitly included and that their net transfer equals that of non-workers, regardless of income. Since all recipients receive the same amount, calling the proposed policy a negative income tax is a bit of a misnomer, as it more closely resembles a basic income grant. However, the study is included because of the lack of similar studies for a South African (and developing country) context. It finds that the policy reduces poverty and inequality, but not by a substantial amount: the poverty rate in the sample decreases from 34.4% to 32.6%, and the Gini coefficient decreases from 0.60 to 0.59. However, it also discourages labour market and formal sector participation while increasing the size of the informal sector.

Interjection: A (very) brief background of the basic income grant debates in South Africa

Before going into some of the specific literature on the negative income tax, which is the main focus of this paper, it is important to acknowledge that a similar idea – the basic income grant – has been debated in South Africa before. It played a particularly large role in both policy circles and academic literature in the early 2000s, but the debate has since died down. Makino (2004) and Barchiesi (2007) provide detailed overviews of the debates surrounding the idea of a South African basic income grant, from which a couple of key points are noted below. Perhaps most notable was the 2002 report by the Taylor Committee of Inquiry into a Comprehensive Social Security System for South Africa. This Committee followed the findings of a report which it commissioned from the Economic Policy Research Institute (Samson *et al.*, 2002) and recommended the phasing in of a modest basic income grant (Barchiesi, 2007). This policy suggestion was backed by many civil society organisations, most importantly the BIG Coalition which consisted of a number of major religious organisations, labour unions and human right organisations, including COSATU and Black Sash. While its popularity in civil society circles was evident, it was highly unpopular in the Treasury. The Minister of Finance at the time, Trevor Manuel, was quoted condemning the basic income grant as "populist" and "fiscally unsustainable" (Makino, 2004, p. 21). While the Department of Social Development and the then Minister of Social Development Zola Skweyiya were more supportive of the principle of a basic income grant as a means of reducing poverty, they also voiced concerns about the affordability of such a programme (Makino, 2003). In the years following this, contributions were made to an academic debate about a South African basic income grant, including by Standing and Samson (2003) and Seekings (2005). Since then, however, the idea has seemed to lose traction.

3 Microsimulation for policy analysis

This paper uses a static, arithmetic microsimulation model – more specifically, a tax-benefit model to investigate the impact of a South African negative income tax. The following section explains what microsimulations are, and the use of tax-benefit microsimulations in South Africa and elsewhere. It concludes with a summary of the specific model and methodology used in this paper.

A microsimulation model consists of three key components: a micro-dataset with economic and socio-demographic information about the economic agents, the policy rules one wants to investigate, and a theoretical model of agents' behavioural response (Bourguignon and Spadaro, 2006). The behavioural response model differentiates the types of microsimulation models. While

an arithmetic model[6] assumes no behavioural response to policy, a behavioural one incorporates a behavioural response function. Further, one can differentiate between models with one (static) or several (dynamic) time dimensions.

Microsimulation models allow for comprehensive ex-ante evaluations of policy suggestions as they make it simple to simulate a policy change and create counterfactual scenarios (Figari, Paulus and Sutherland, 2015). They are therefore extensively used by public policy researchers and government to evaluate how changes in policies impact the distribution of income and other microeconomic measures (Figari, Paulus and Sutherland, 2015)[7]. Microsimulations make it simple to investigate the underlying mechanisms behind any policy results since they rely on existing relationships between variables in the datasets (Woolard et al., 2005). Given that the sample used is (nationally) representative, microsimulation models can also be used to calculate the aggregate costs and benefits of prospective policies (Bourguignon and Spadaro, 2006). Using datasets with comprehensive information about its economic agents, such as NIDS, not only allows the model to account for the full heterogeneity in the population to give a detailed analysis of a policy (Woolard et al., 2005), but also allows for analysis of its impact on different subpopulations, income percentiles, and individuals (Wright, Noble and Dinbabo, 2012).

A tax-benefit microsimulation model simulates tax policies by applying tax codes to the incomes of the individuals in the sample. Inherent to the simulation aspect is that the model can only show what taxpayers *ought to* have paid or received, but not what they actually do – hence ignoring grant uptake and tax evasion/avoidance – which can lead to inaccurate conclusions about policy impact (Woolard et al., 2005). Still, tax-benefit microsimulation models have been used extensively to model tax policies in OECD countries. EUROMOD, a microsimulation model which covers all EU28 countries, is a notable example (Sutherland and Figari, 2013). Its framework has also been used to construct tax-benefit microsimulation models for non-EU European countries (Papova, 2012; Ranđelović and Rakić, 2013), and a group of microsimulation models for developing countries based on EUROMOD called SOUTHMOD is currently being developed (UNU-WIDER, 2017). Other developing countries such as Brazil (Immervoll et al., 2006) and Namibia (Wright, Noble and Barnes, 2014) already have their own tax-benefit microsimulation models.

In the South-African context, tax-benefit microsimulations have been used both to evaluate the personal income tax and the tax system more generally. SAMOD is a static tax-benefit microsimulation based on EUROMOD whose newest iteration (Wright et al., 2016) is underpinned by both the Living Conditions Survey 2008/09 (Statistics South Africa, 2011) and Wave 4 of NIDS (Southern Africa Labour and Development Research Unit, 2016). SAMOD has been used to evaluate existing policies, such as the child grant (Dinbabo, 2011) and the impact of the tax-benefit system as a whole on child poverty (Wilkinson, 2011). It has also been used to simulate potential policies. Ntshongwana, Wright and Noble (2010) use SAMOD to evaluate three hypothetical social grants, including a grant for primary caregivers, and an income replacement grant for low income earners.

[6]The arithmetic microsimulation model is often referred to as a "static" microsimulation model. However, to avoid any confusion with static (as opposed to dynamic) microsimulation models, this paper uses the arithmetic/behavioural distinction used in Bourguignon and Spadaro (2006) to refer to non-behavioural and behavioural models.

[7]They can also be integrated with macroeconomic models in 'micro-macro' approaches and be applied to a wider range of scenarios (Bourguignon and Spadaro, 2006).

Woolard et al. (2005) use microsimulation to evaluate the redistributive impact of taxation, and Inchauste et al. (2015) similarly evaluate the impact of the main tax and social transfer systems on inequality. Others who have constructed tax-benefit microsimulation models include Wilkinson (2009), Thompson and Schoeman (2006), and Van Heerden (2013). While tax-benefit microsimulation models have been widely used to assess the impact of a negative income tax in European countries, only one simulation has previously been done for the South African context. This is discussed in section 2.2.2.

This paper uses a static, arithmetic tax-benefit microsimulation model. Adding a time dimension is beyond the scope of this study and there is currently no reliable model for behavioural response to taxation for South Africa. A non-behavioural model measures the first round effects of policy change (Bourguignon and Spadaro, 2006, p.80), which in itself is worthwhile. However, if there is a significant behavioural response to taxation, not including one can impact the accuracy of the simulation estimates. The simulation may over- (or under-) estimate the effectiveness of the policy and cost predictions can be unreliable (Wilkinson, 2009). Furthermore, as Woolard et al. (2005) note, a complete assessment of a tax policy ought to include both equity and efficiency evaluations. The latter requires a behavioural effect model.

4 Data and methodology

4.1 Data

The base dataset in this paper is Wave 4 of the National Income Dynamics Survey (Southern Africa Labour Research and Development Unit, 2016), which was collected from September 2014 to August 2015. While a dataset which includes information on yearly gross taxable incomes for a nationally representative sample would be ideal for our purpose, this does not currently exist for South Africa[8]. Instead, tax codes from the 2016 budget report is applied to a constructed (net) taxable income variable from the NIDS dataset in order to generate a dataset of gross taxable incomes. While NIDS does not have a gross taxable income variable in its dataset, it can fairly easily be constructed as the survey includes detailed information about individual income sources. This allows us to include income sources which are currently taxed through the personal income tax, and exclude those that are not (e.g. inheritance).

The sample is restricted to households for whom there exists income data for at least one person. For individuals in these households, we construct a taxable income variable by aggregating total yearly income from employment, profit shares, and bonuses. Not included is income from social grants, UIF payments, lobola, and inheritance.[9] The income sources that make up the taxable income variable are monthly variables based on income in the previous month, and are therefore multiplied by 12 to construct a yearly variable. This may lead to bias in yearly earnings for certain households and individuals if the previous month's income sources are once-off or deviate greatly from a

[8]This is especially the case in terms of lower income households which could be eligible for a NIT – the (tax) data that does exist is for people who pay tax, i.e. are already quite far up in the income distribution.
[9]While there is no inheritance tax in South Africa, there is an estate tax. Including income from inheritance in taxable income would therefore mean taxing the estate/inheritance twice.

"representative" month. The NIDS income variables are reported net of tax and, since the purpose of the taxable income variable is to simulate a pre-tax scenario, the constructed taxable income variable must be "grossed up". This is done by applying the 2016 tax code (The National Treasury of South Africa, 2016), which covers 1 March 2015 to 29 Feb 2016, to the net taxable incomes using the equation 4.1:

$$g = \frac{(n - r + ft - ti * L)}{1 - ti} \quad (4.1)$$

Where:

$g = gross\ taxable\ income$, and
$n = net\ taxable\ income$
$r = tax\ rebate\ (dependent\ on\ age\ group)$
$ft = fixed\ tax\ amount\ that\ varies\ per\ tax\ bracket$
$ti = marginal\ tax\ rate\ for\ each\ tax\ bracket$
$L = the\ lower\ bound\ tax\ base\ for\ each\ tax\ bracket$

Additionally, the medical and medical aid deductions for 2016 are applied in reverse to ensure that our gross taxable income variable corresponds to that from which tax liability is calculated[10]. The tax code is gathered from the Budget Review for tax year 2016 (The National Treasury of South Africa, 2016), while information on medical aid tax credits and other medical deductions are from the 2016 Budget Review and the SARS 2016 tax guide (South African Revenue Service, 2016). The rebates which are given in Rands have been adjusted for inflation to 2015 prices using CPI data from Statistics South Africa (2017a) to ensure compatibility with the 2014/15 NIDS dataset. Naturally, this set-up is less complex than the actual system for deductions and exceptions, which also include aspects such as pension fund contributions and contributions to retirement annuity funds. For simplicity, these are not included in this analysis.

The final gross taxable income variable is used to calculate individuals' eligibility for the negative income tax. The resulting changes in their net incomes from the income transfers are then fed back into their household incomes as measured by $w4\_hhincome$ in the NIDS dataset. This is to analyse the proposed policies' impact on poverty and inequality for the whole household, rather than just the negative income tax recipients. All poverty and inequality calculations are done on per capita household incomes.

4.2 Methodology

In this paper we simulate two negative income tax proposals, whose set-up is as follows: each individual between 18 and 59 years of age whose taxable income *g* is less than R1309 (R670) per month receives a subsidy which equals R1309 (R670) minus their taxable income. This means that the implicit tax rate τ = 1, and the income subsidy D received will be given by equations 4.3 and 4.4.

$$D = G - \mathrm{Y} \text{ if } \mathrm{Y} < \mathrm{G} \quad (4.2)$$

[10] I.e. gross taxable income minus whatever amount is tax deductible

$$D = 0 \; if \; Y > G \qquad (4.3)$$

Individuals with zero taxable income receive the guaranteed subsidy of R1309 (R670) per month. Individuals with taxable incomes above R1309 (R670) will not receive any subsidy. The extra income from the negative income tax is added back to household income, from which poverty and inequality measures are calculated. The total costs of the potential negative income tax policies are calculated by scaling the total negative income tax subsidies up to the country level using NIDS Wave 4 survey weights.

Deciding on the size of the basic grant of the negative income tax

The size of the guaranteed subsidy is based on the poverty lines proposed in Budlender, Leibbrandt and Woolard (2015), inflated to 2015 Rands. Pegging the negative income tax to a poverty line is standard practice both in the experimental and simulation literatures: The North American negative income tax experiments set their guaranteed subsidies equal to between 50% and 150% of the poverty line (Widerquist, 2005), and most of the existing negative income tax microsimulations peg their guaranteed subsidy to a poverty line or similar measures. Abul Naga, Kolodziejczyk and Mueller (2008) set the subsidy at 50% and 100% of "subsistence expenditures", and Narazani and Shima (2008) simulate subsidies between 25% and 100% of the poverty line. De Jager, Graafland and Gelauff (1996) set the guaranteed subsidy at 50% of the minimum wage, and Honkanen (2014) sets the subsidy at a level close to the Finnish basic unemployment allowance and guaranteed pension. The only South African microsimulation of a similar policy (Magnani and Badaoui, 2016) set the income transfer at R408.

This paper explores two different negative income tax policies. The first one is a negative income tax with a guaranteed subsidy of R1309 per month, which is the upper-bound poverty line proposed in Budlender, Leibbrandt, and Woolard (2015) inflated to 2015 Rands (hereby referred to as the upper-bound negative income tax). This poverty line is used because it exists as a meaningful measure of poverty, which is what we ultimately wish to address with a negative income tax. It has transparent theoretical underpinnings and can easily be interpreted as the minimum level of expenditure required to cover basic food and non-food needs (Budlender, Leibbrandt and Woolard, 2015). While Budlender, Leibbrandt and Woolard (2015) do not encourage use of the lower-bound poverty line of R670 as it lacks any intuitive interpretations as a measure of economic well-being, the second proposal sets the guaranteed subsidy equal to it. This is to illustrate the effects of a less costly negative income tax (hereby referred to as the lower-bound negative income tax). The only microsimulation done for a policy like a negative income tax in South Africa (Magnani and Badaoui, 2015) sets the income transfer at R408 per month, significantly lower than the proposals in this paper[11]. While a monthly income of R1309 or R670 does not make one well off by any standard, it ensures a degree of income stability that can have a significant impact on a poor household.

Eligibility for receiving the negative income tax

Part of the appeal of a negative income tax is that its only eligibility criterion is income. In this paper, however, a couple of additional criteria should be clarified. Since the NIT is administered using the

[11]It is, however, similar in size to the food poverty line in Budlender, Leibbrandt and Woolard (2015) adjusted for inflation, R421.

personal income tax system, the unit of taxation for the negative income tax is the individual. Eligibility for and the size of the income subsidy received depend on one's individual income (rather than household income). Some obvious drawbacks to this is that some low- or no-income earners share households with high income earners, and may therefore not be part of the intended recipient group. While this issue could potentially be mitigated by an upper limit on total household income, as is the case with the old-age pension, the desire for simplicity and symmetry with the personal income tax system discourages this.

Furthermore, the decision has been made to administer the negative income tax only to individuals over age 18 and below age 60. This is because both the younger and older groups are already covered by social grants in South Africa - the child support grant and the old age pension, respectively. While the child support grant only gives R350 per month to recipients, the maximum amount of the old age pension is currently set at R1500 per month and is thus of a similar magnitude as the proposed negative income tax.

5 Results

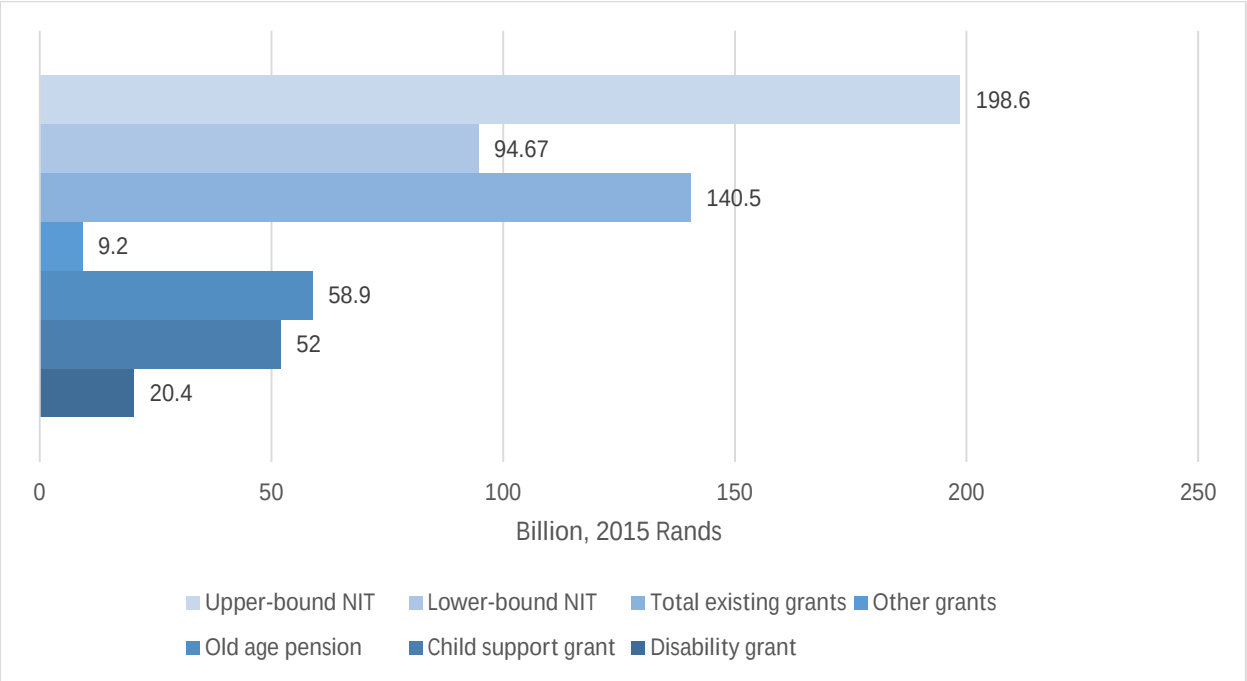
5.1 Size and coverage

By necessity, implementing a negative income tax in the South African context will be a large-scale project. Considering the proportion of the population living in poverty, any social grant or subsidy which targets the poor is costly. This is especially the case for the upper-bound negative income tax. Using the eligibility criteria previously outlined, 14.5 million individuals are eligible to receive an income subsidy through the upper-bound negative income tax. The average subsidy for a negative income tax recipient is R1 142, and 11.1 million people - or 76.8% of the eligible recipients - will receive the guaranteed subsidy of R1 309 per month. Assuming full uptake of the programme, the total cost for the upper-bound negative income tax programme is R16.5 billion per month, or R198.6 billion per year. In comparison, the combined cost of the child support grant, old age pension, and disability grant was R140.5 billion in 2016 (The National Treasury of South Africa, 2016). This means that to implement such a policy, the government would have to more than double their expenditure on social grants.

The lower-bound negative income tax differs in size, but is in all other respects identical to the upper-bound negative income tax. It is also significantly less expensive. This is mainly because the amount that eligible recipients receive is smaller. The number of eligible recipients also decreases, but not by a very large amount. This is because many of the eligible recipients are zero-income earners who in either policy scenario will receive the guaranteed subsidy. In the lower-bound negative income tax policy, 12.7 million individuals are eligible to receive and income subsidy. Of these, 11.1 million individuals (or 87.4% of eligible recipients) receive the full amount of R670 per month. The total cost for this programme totals at R7.9 billion per month, or R94.7 billion per year. Hence, the cost of the lower-bound negative income tax is less than half of the amount of the upper-bound negative income tax. To illustrate how these programmes compare to each other as well as the existing social grants, figure 5.1 below shows their costs. As is seen, due to their size, the negative income tax programmes are relatively expensive. While the financing of these programmes

is not discussed in detail here, section 6 briefly discusses the cost and viability of a negative income tax.

Figure 5.1 Cost of existing social grants and prospective negative income tax policies



Source: Budget Review 2016 (The National Treasury of South Africa, 2016) and own calculations using NIDS Wave 4 (SALDRU, 2016) and Wave 4 survey weights

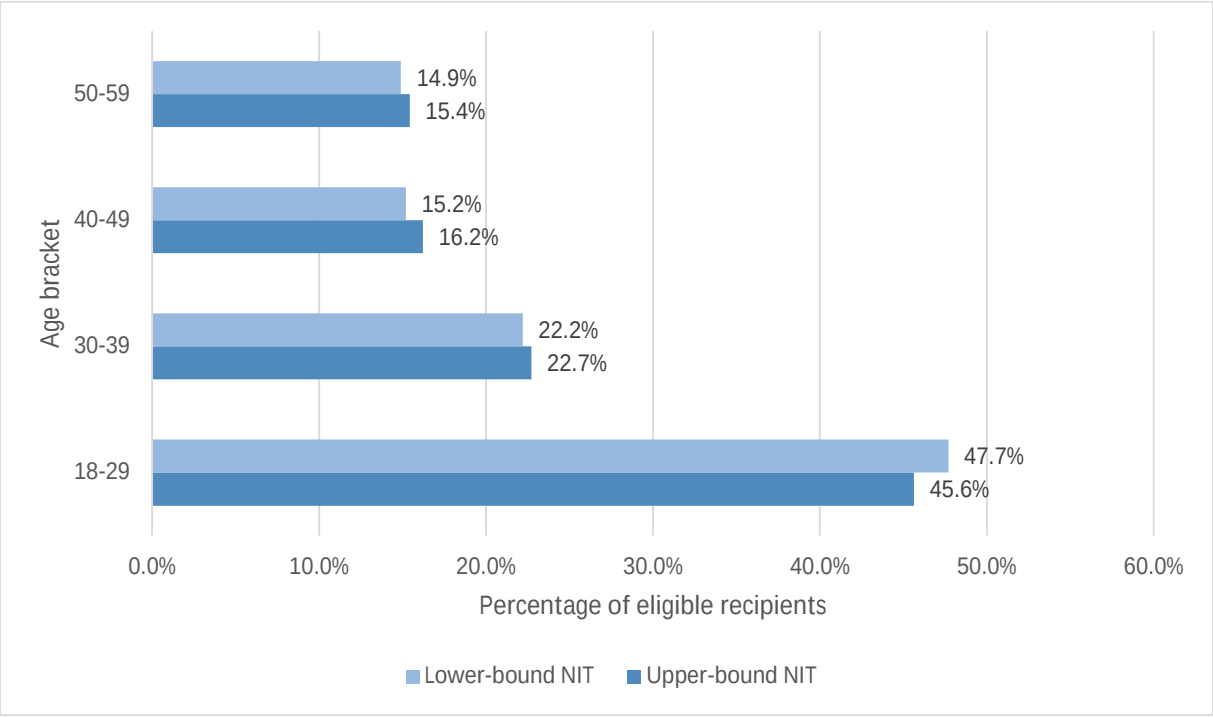
5.2 Targeting

A major reason why the negative income tax policy is useful in the South African context is its ability to target parts of the population currently left out by the social security system of grants, pensions and unemployment insurance. Its design is simple - all individuals age 18 to 59 with gross incomes less than R1309 and R670 are eligible to receive an income subsidy. Below we discuss some characteristics of the NIT recipients to illustrate how the simple targeting mechanism is successful, as seen in figures 5.2-5.6. Interestingly, they mostly do not differ significantly for the upper- and lower-bound negative income tax. The one exception is with respect to employment, where the recipients of the lower-bound NIT are almost half as likely to be employed as the upper-bound recipients.

The negative income tax reaches a fairly young subset of the population: 45.6% of eligible upper-bound NIT recipients are between 18 and 29 years old, and an additional 22.7% are between 30 and

39 years old. Considering the high unemployment rates for this group[12], this result is encouraging. Furthermore, the vast majority (85.6%) of eligible recipients are African, meaning that this group makes up more than their population share of recipients. Women make up 61.6% of all eligible recipients[13]. We also see that while the majority (57.3%) of eligible recipients stay in urban areas, they make up slightly less than their population proportion of 62.1%. Perhaps the most relevant characteristic for our purposes recipients' employment status. Only 22.2% of individuals eligible to receive the upper-bound NIT are employed, compared to 46.5% of the population as a whole. For the lower-bound NIT the proportion of employed recipients is 11.9%. Hence both the upper-and lower bound NIT effectively target unemployed and not economically active individuals.

Figure 5.2 Age brackets of eligible NIT recipients

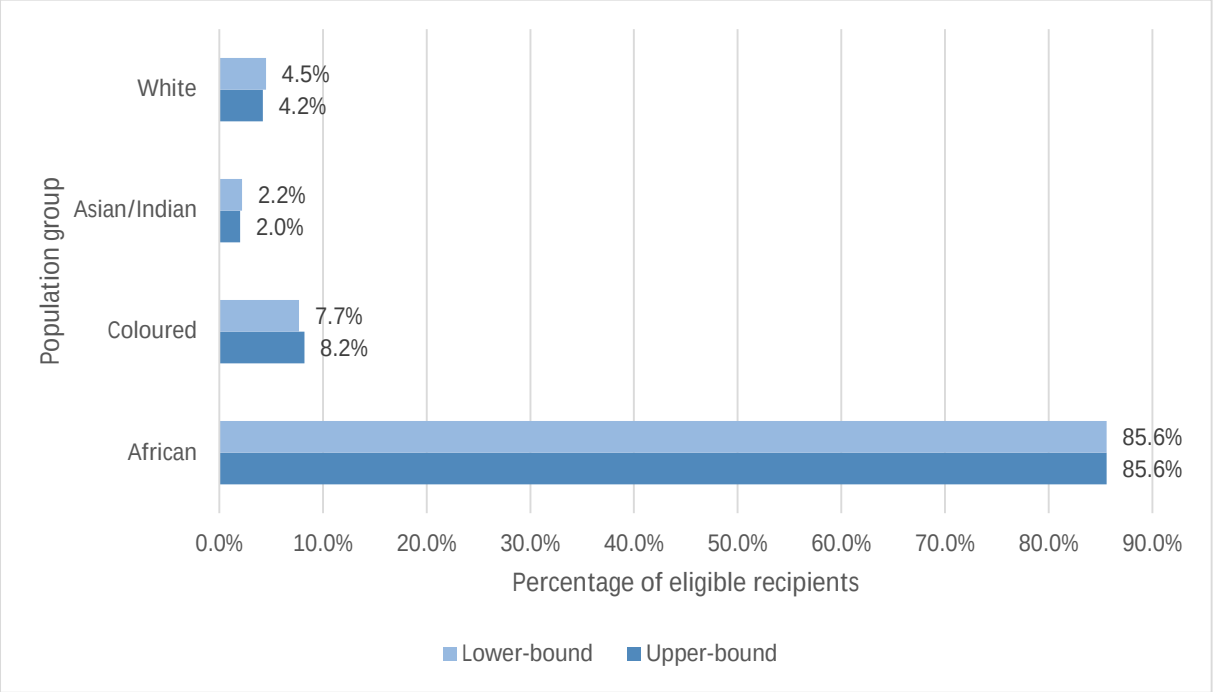


Source: own calculations using NIDS Wave 4 (SALDRU, 2016) and Wave 4 survey weights

[12] In the first quarter of 2017, the (strict) unemployment rate for individuals age 15-24 and 25-34 were 54.3% and 32.5%, respectively, while it was 27.7% for the population as a whole (Statistics South Africa, 2017b)

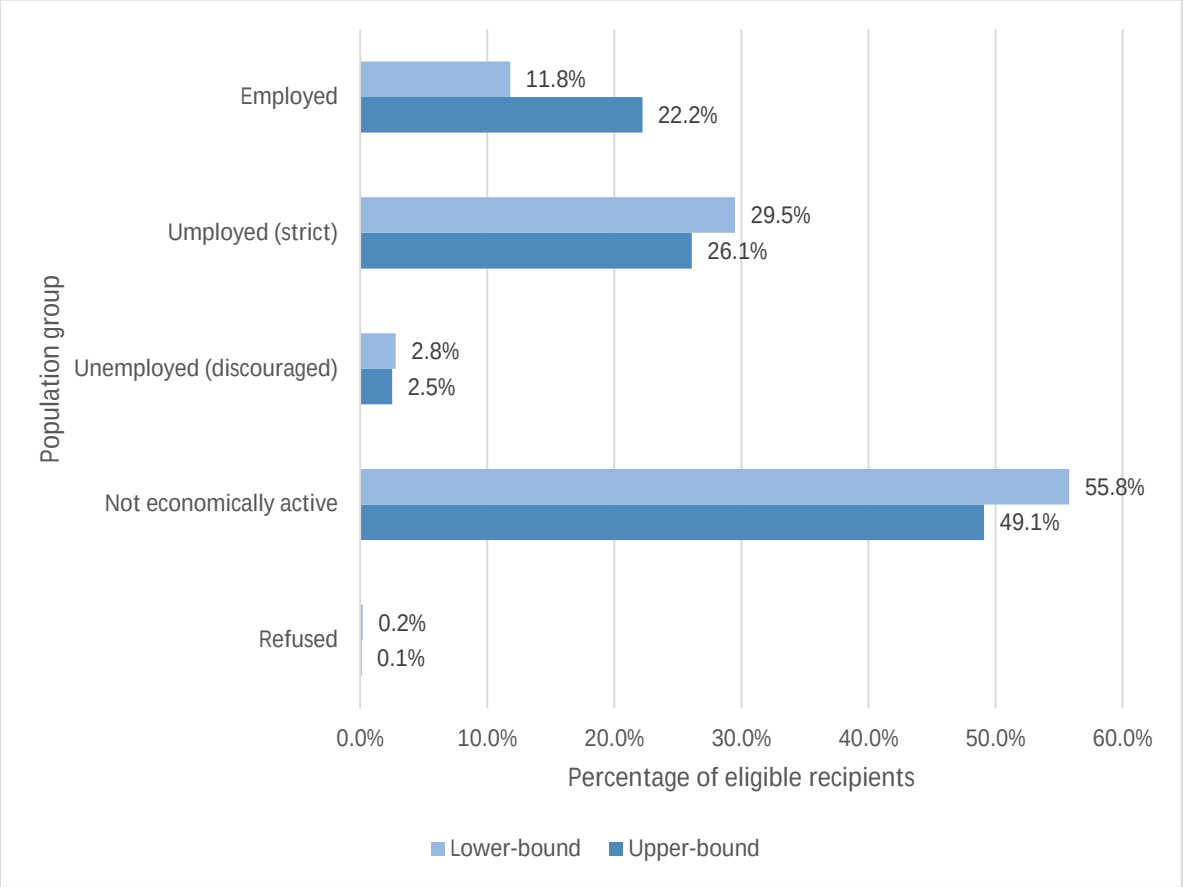
[13] This raises the potential concern that many recipients with low incomes do not actually live in low-income households. This concern is not entirely unfounded, but it is also not as gendered as one might expect. While 31.2% of female negative income tax recipients belong to households with per capita incomes above R1309 per month, so do 34.2% of male negative income tax recipients. Combined with the feature that the mean household income for negative income tax recipients belonging to households with per capita incomes above R1309 per month is R3780, this suggests that it is not a large concern.

Figure 5.3 Population group of eligible NIT recipients



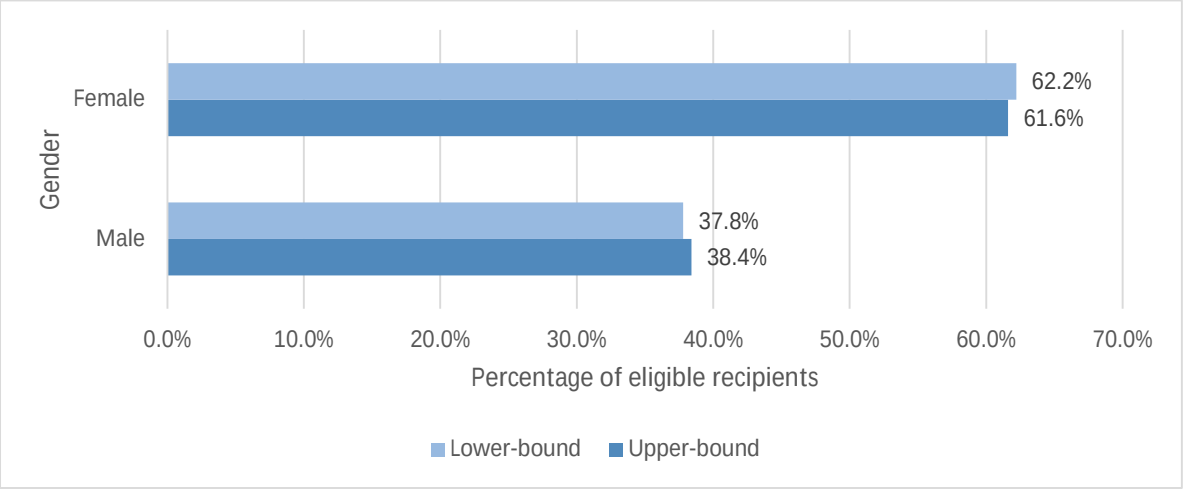
Source: own calculations using NIDS Wave 4 (SALDRU, 2016) and Wave 4 survey weights

Figure 5.4 Employment status of eligible recipients



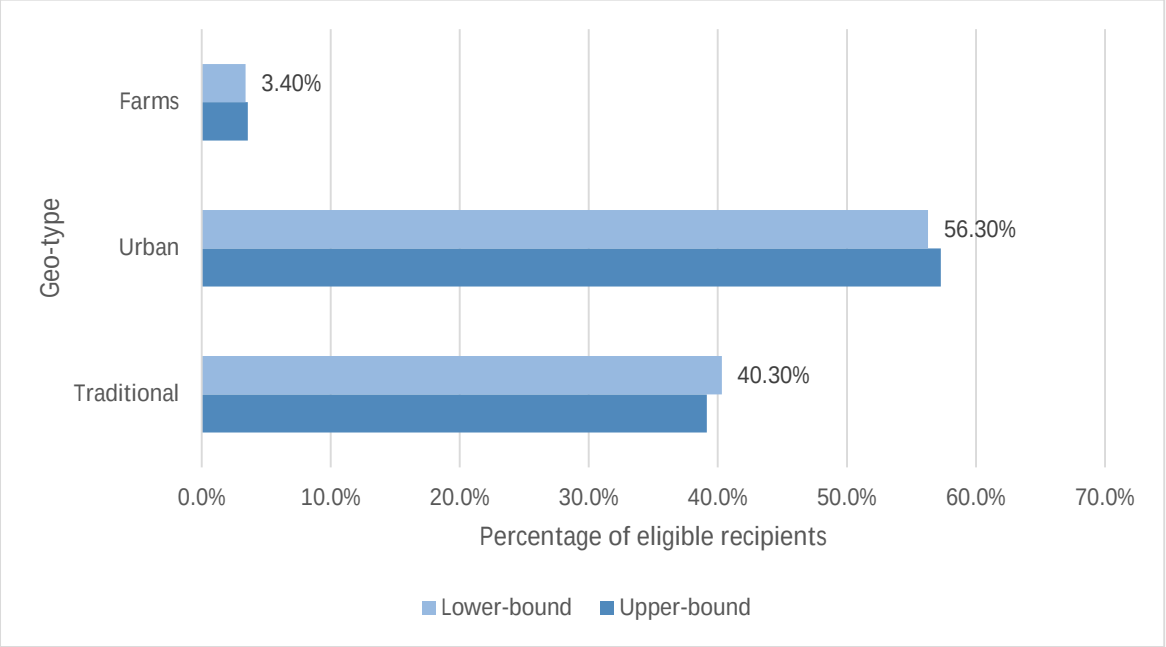
Source: Own calculations using NIDS Wave 4 (SALDRU, 2016) and Wave 4 survey weights

Figure 5.5 Gender of eligible recipients



Source: Own calculations using NIDS Wave 4 (SALDRU, 2016) and Wave 4 survey weights

Figure 5.6 Geo-type of eligible recipients



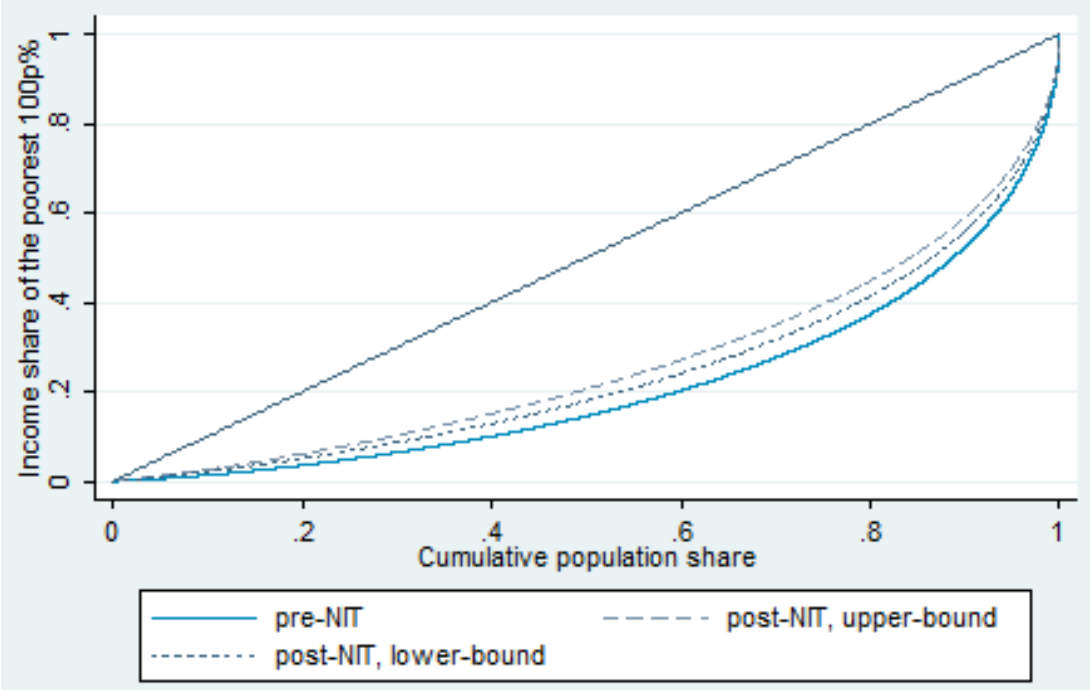
Source: Own calculations using NIDS Wave 4 (SALDRU, 2016) and Wave 4 survey weights

5.3 Impact on inequality

The Gini coefficient of household income calculated after tax and transfers, but before the negative income tax is implemented, is 0.66[14]. With the introduction of the upper-bound negative income tax it drops to 0.59, a change of 10.6%. Considering that this change results from the transfer only, it is a large difference. If the negative income tax is fully or partly financed through personal income tax, the decrease will be higher. The lower-bound negative income tax leads to a smaller, but still significant decrease in income inequality. It decreases the Gini coefficient by 6.1% from 0.66 to 0.62. Figure 5.11 shows the Lorenz curves for household incomes with and without the two iterations of the negative income tax.

[14]Own calculation using NIDS Wave 4 and the Wave 4 survey weights. This is similar to the Gini coefficient calculated in Hundenborn, Leibbrandt and Woolard (2016).

Figure 5.11 Lorenz curves of per capita household incomes before and after two types of negative income tax.



Source: Own calculations using NIDS Wave 4 (SALDRU, 2016) and Wave 4 survey weights.

Looking at the income shares in table 5.1, we can see that all but the top 3 deciles increase their income shares with a negative income tax. The bottom 10% of income earners more than double their share of total income, from 0.8% before a negative income tax to 1.7% after the upper-bound negative income tax. The income shares of the top 30% of earners decrease. Importantly, the top 10% of earners experience a decrease in their share of total income from 55.3% to 50.8% with the introduction of the upper-bound negative income tax.

Table 5.1 Impact of a negative income tax on income shares

	Income shares		
Percentiles	**Before negative income tax**	**With upper-bound negative income tax**	**With lower-bound negative income tax**
P0-10	0.8%	1.7%	1.3%
P10-20	1.4%	2.3%	1.9%
P20-30	1.9%	2.8%	2.4%
P30-40	2.6%	3.4%	3.0%
P40-50	3.3%	4.2%	3.7%
P50-60	4.4%	5.0%	4.7%
P60-70	6.0%	6.5%	6.2%
P70-80	9.1%	9.0%	9.0%
P80-90	15.2%	14.5%	14.8%
P90-100	55.3%	50.8%	53.0%

Source: Own calculations using NIDS Wave 4 with Wave 4 survey weights

5.4 Impact on poverty

The upper-bound negative income tax reduces headcount poverty by 12.8 percentage points (or by 24 percent) from 52.9% to 40.1%, as seen in table 5.2. This may be lower than expected given that the guaranteed subsidy is set equal to the poverty line. However, one must keep in mind that the NIT is given based on individual rather than household income. Hence, many eligible recipients will share a household with individuals younger than 18 or older than 60 years old and will therefore "share" their subsidy with non-recipients. The negative income tax also has a noticeable impact on the depth and severity of poverty. With the introduction of the upper-bound NIT, the poverty gap ratio[15] is almost halved from 26.1% to 13.2%. The poverty severity ratio* decreases by 10.2 percentage points from 15.8% to 5.6%. The results are even more distinct when using the lower-bound or food poverty lines. Most significantly, extreme poverty - as measured by the amount of people living below the food-poverty line - is virtually eliminated. It decreases from 14.0% before the negative income tax to 0.9% after.

[15] Also referred to as the "squared poverty gap"

Table 5.2 Impact of the upper-bound negative income tax on poverty

Poverty measure	Before negative income tax	After negative income tax
Headcount ratio (P_0)		
Upper-bound poverty line, R1309	52.9%	40.1%
Lower-bound poverty line, R670	29.7%	8.4%
Food-poverty line, R423	14.0%	0.9%
Poverty gap ratio (P_1)		
Upper-bound poverty line, R1309	26.1%	13.2%
Lower-bound poverty line, R670	10.7%	1.5%
Food-poverty line, R423	4.1%	0.2%
Poverty severity ratio (P_2)		
Upper-bound poverty line, R1309	15.8%	5.6%
Lower-bound poverty line, R670	5.3%	0.5%
Food-poverty line, R423	1.8%	0.1%

Source: Own calculations using NIDS Wave 4 with Wave 4 survey weights. Poverty lines from Budlender, Leibbrandt and Woolard (2015) have been inflated to 2015 prices. All poverty lines are per capita.

Table 5.3 shows that the impact of the lower-bound negative income tax is (naturally) smaller, yet it is still significant. It does not profoundly alter the headcount ratio when the upper-bound poverty line is used, which is unsurprising considering that the guaranteed subsidy for the lower-bound NIT is set at a lower level than the poverty line. When the lower-bound poverty line is used, however, the impact is much larger - the headcount ratio decreases by 11.3 percentage points from 29.7% to 18.4%. As with the upper-bound NIT, the lower-bound NIT virtually eliminates extreme poverty. It also decreases the depth and severity of poverty. Using the upper-bound poverty line, the poverty gap ratio decreases from 26.1% to 19.3% and the poverty severity ratio from 15.8% to 9.7% with the introduction of the lower-bound negative income tax.

Table 5.3 Impact of the lower-income negative income tax on poverty

Poverty measure	Before negative income tax	After negative income tax
Headcount ratio (P_0)		
Upper-bound poverty line, R1309	52.9%	47.7%
Lower-bound poverty line, R670	29.7%	18.4%
Food-poverty line, R423	14.0%	3.4%
Poverty gap ratio (P_1)		
Upper-bound poverty line, R1309	26.1%	19.3%
Lower-bound poverty line, R670	10.7%	4.3%
Food-poverty line, R423	4.1%	0.6%
Poverty severity ratio (P_2)		
Upper-bound poverty line, R1309	15.8%	9.7%
Lower-bound poverty line, R670	5.3%	1.5%
Food-poverty line, R423	1.8%	0.2%

Source: Own calculations using NIDS Wave 4 with Wave 4 survey weights. Poverty lines from Budlender, Leibbrandt and Woolard (2015) have been inflated to 2015 prices. All poverty lines are per capita.

6 Discussion

6.1 Labour supply effects, revisited

The microsimulations in the previous section show the large potential impact on poverty and inequality of a South African negative income tax. These simulations are static and arithmetic. While they do give much useful information, it is difficult to completely evaluate the impact of this kind of social programme without knowing how it impacts behaviour and particularly labour supply. To mitigate this lack of knowledge, one might look towards other income transfer programmes in South Africa and see how they have impacted labour supply. In particular, the old-age pension might provide some useful information. It is of a similar size to the guaranteed subsidy suggested for the negative income tax in this paper, and has received much attention in both South African and international literature. However, the impact of the old-age pension on labour supply is far from a settled matter. The findings in Bertrand, Mullainathan and Miller (2003) show that household members of old age pension recipients decrease their labour supply when a household member becomes eligible. In line with this, Ranchhod (2009) finds that loss of a pension income increases employment probabilities for resident middle-aged and older adult household members. Similarly, Klasen and Woolard (2009) show that social grants may lead the unemployed to base their location on the location of the grant recipient, rather than the most optimal location for job search. On the other hand, the results in Posel, Fairburn and Lund (2006) and Ardington, Case and Hosegood (2009)

suggest that an extra income source in the household such as the old age pension may increase labour supply, primarily through enabling migration.

This suggests that it is not obvious that an income subsidy like a negative income tax will reduce labour supply in South Africa. However, the concern may be even higher than for other grants as it directly targets the working-age population. Nevertheless, most of the unemployment in South Africa is structural (Banerjee et al., 2006), suggesting that the benefits of providing social support for this large group traditionally left behind by the social security system may outweigh the potential disadvantages of a negative labour supply effect.

6.2 Cost and viability

The impact of a negative income tax largely depends on the size of its guaranteed subsidy. The policies suggested in this paper are designed to address poverty by pegging them to a meaningful poverty line which results in a large and meaningful impact. However, this comes at a large cost. The cost is a direct function of the large number of low- and no-income earners in the sample and the South African population as a whole – using the upper-bound poverty line, an estimated 52.9% (corresponding to 29 million people) can be considered poor. Naturally, any policy targeting and transferring income subsidies to this large group will come with a hefty price tag and the cost of the negative income tax should not be seen as an indictment of the policy itself as much as it is a reminder of just how serious the issue of poverty in South Africa. There is no cheap and easy way to combat it.

This leads to the question of how a social policy such as the negative income tax will be financed. As seen in section 5 the upper-bound poverty line would cost an estimated R198.6 billion per year and more than double the current amount of government spending on social policies. Financing this through the personal income tax may not be realistic given the relatively low numbers of high income earners who pay the majority of total tax - even increasing the marginal tax rates drastically is unlikely to collect revenue of the scale necessary. Hence, policymakers have to be creative and look towards second-best ways of financing these programmes. A route worth considering is raising the value-added tax rate. The value-added tax is set at 14% and is mildly progressive (The National Treasury of South Africa, 2016) due to basic foods being zero rated (Inchauste *et al.*, 2015). As such, raising the VAT is less ideal in terms of progressivity, but has the benefit of having revenue-increasing potential. The 2016 Budget Review notes that there may be "room to increase indirect taxes, such as VAT", but that "any such changes would need to be accompanied by measures to improve the pro-poor character of expenditure" (The National Treasury of South Africa, 2016, p. 42). The negative income tax may fit that bill.

In any case, the set-up of and mindset behind a negative income tax may be useful to policymakers even if a NIT policy of the size suggested in this paper is untenable. Most importantly, perhaps, is the lesson that basing eligibility solely on income is not only less administratively costly in terms of monitoring but also works as a fairly good targeting mechanism. It might, however, also provide the biggest challenge for achieving public and political support as it disturbs notions of the "deserving" and "undeserving" poor. While it is not hard to justify giving income subsidies to children, the disabled, and the elderly, providing grants with no strings attached to able-bodied adults undeniably goes against much of the rhetoric surrounding work and poverty in South Africa. Workfare and

earned income tax credit programmes, which also target unemployed and low-income adults, may be an easier sell in this regard. However, these programmes are costly and less likely to give policymakers "bang for their buck". Furthermore, given that the chronic nature of under- and unemployment in South Africa can be considered structural, lack of willingness to work should hardly be priority. Subsidies or programmes with work requirements may therefore be ill-suited for this context. The negative income tax has a further benefit which has not been emphasised in this paper: it involves bringing many more people into the tax system than is currently the case. This can lead to increased information about earnings and incomes and, less quantifiably, potentially pave the way for future tax compliance.

7 Concluding remarks

Future research might want to attempt incorporating behavioural effects in their estimations of costs and benefits of negative income tax programmes. Furthermore, it would be interesting to explore further how different implicit tax rates impact a South African negative income tax - in particular, a low implicit tax rate to further incentivise work. Lastly, more research should be done into possible ways of financing large-scale income subsidies, including possibly the VAT.

This paper has explored the potential of a negative income tax for combatting the dual challenges of poverty and income inequality in South Africa. The microsimulations showed that it can have a significant impact on both poverty and inequality levels, but that this necessarily comes at a high cost. As such, implementing a negative income tax would necessitate serious financial and political commitment from the South African government - and a discourse moves away from whether the country can afford to make such a commitment to whether it can afford not to.

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southern africa labour and development research unit

The Southern Africa Labour and Development Research Unit (SALDRU) conducts research directed at improving the well-being of South Africa's poor. It was established in 1975. Over the next two decades the unit's research played a central role in documenting the human costs of apartheid. Key projects from this period included the Farm Labour Conference (1976), the Economics of Health Care Conference (1978), and the Second Carnegie Enquiry into Poverty and Development in South Africa (1983-86). At the urging of the African National Congress, from 1992-1994 SALDRU and the World Bank coordinated the Project for Statistics on Living Standards and Development (PSLSD). This project provide baseline data for the implementation of post-apartheid socio-economic policies through South Africa's first non-racial national sample survey.

In the post-apartheid period, SALDRU has continued to gather data and conduct research directed at informing and assessing anti-poverty policy. In line with its historical contribution, SALDRU's researchers continue to conduct research detailing changing patterns of well-being in South Africa and assessing the impact of government policy on the poor. Current research work falls into the following research themes: post-apartheid poverty; employment and migration dynamics; family support structures in an era of rapid social change; public works and public infrastructure programmes, financial strategies of the poor; common property resources and the poor. Key survey projects include the Langeberg Integrated Family Survey (1999), the Khayelitsha/Mitchell's Plain Survey (2000), the ongoing Cape Area Panel Study (2001-) and the Financial Diaries Project.

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