DISTRIBUTIONAL IMPLICATIONS OF HALVING POVERTY IN SOUTH AFRICA

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ABSTRACT

The South African government has set as a policy objective the halving of poverty by 2014, although the meaning of this goal has not yet been defined. This article frames government's stated target of halving poverty by 2014 in terms of specific measures of the poverty gap and poverty headcount ratio, using newly released income and expenditure survey data. With the poverty line as defined here, approximately half the South African population falls below the poverty line. Despite this, the aggregate poverty gap is surprisingly only about 3% of GDP. Projections of poverty in 2014 under various growth scenarios indicate that growth alone will be insufficient to halve poverty by that time, and that any worsening of distribution will put the target of halving poverty by 2014 beyond reach. However, projecting the effects of a range of growth and distributional scenarios indicate that halving poverty appears feasible with moderate growth rates and fairly mild pro-poor distributional change. The results are indicative as to the scale of distributional changes necessary to halve poverty under various growth scenarios.

Keywords: income distribution, poverty, inequality, South Africa.

JEL codes: D30, D31, I32.

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1. INTRODUCTION

Poverty remains very high in South Africa. Over 10% of people in South Africa live on less than $1 a day, whereas countries with similar levels of income per capita as South Africa (such as Chile, Turkey, Malaysia, or Costa Rica) typically have less than 2% of their population below the $1 a day line, and even comparable countries such as Brazil have less than 10% of people below this line. Over a third of South Africans fall below the $2 a day line, whereas in comparable countries typically between 10 and 20% of the population falls below this line.[2] Unsurprisingly, inequality in South Africa is extremely high by international standards, with a Gini coefficient of 0.67.[3]

The United Nations Millennium Declaration includes a commitment to halve extreme poverty between 2000 and 2015, measured in terms of the proportion of people living below $1 per day. The South African government has targeted the halving of poverty by 2014, although exactly what this means in economic terms is yet to be elaborated and a national poverty line is still being developed, in terms of which government's target is to be framed.

This study takes as a starting point the target of halving poverty by 2014, as set out in the Accelerated and Shared Growth Initiative – South Africa (AsgiSA) strategy announced by the South African government in 2006.[4] We use the most recently available income and expenditure data to measure current levels of poverty, and thus to quantify what the halving of poverty would actually mean. This allows for an evaluation of the feasibility of halving poverty by 2014. The intention in this article is thus not to comment on the intrinsic merit of halving poverty as a public policy objective. Rather, it is to concretise this objective in economic terms, to assess its feasibility, and to analyse under what growth and distributional scenarios the

[2] International poverty rates in this paragraph sourced from World Bank (2005).

[3] In terms of household per capita expenditure.

[4] This economic policy framework, under the auspices of the South African Presidency, has as its key pillars the expansion of public infrastructure investment; sectoral development strategies to promote private investment; a drive to improve education and skills; measures to integrate marginalised parts of the population into the mainstream economy; improved macroeconomic management; and enhancing public administration and policy implementation.

target could be achieved. Growth can potentially play an important role in reducing poverty, and we evaluate how far growth might reasonably go towards halving poverty.

The analysis has important policy implications. The South African government is currently in the process of unpacking what the target of halving poverty means, and this research is thus directly relevant to policy-makers as well as to economists concerned with issues of distribution and poverty. The projections presented here of poverty under various growth/distributional scenarios have clear analytical and policy implications. Furthermore, since no research has yet been published measuring poverty using the most recently available data, this contribution is important in bringing to light the current state of poverty in South Africa.

The existing literature points to an increase in poverty in South Africa between 1995 and 2000, with the possibility of some reduction thereafter. Hoogeveen and Özler (2005) using a normative poverty line of R322 per month find that the poverty headcount ratio remains at about 58% between 1995 and 2000. However, using lower poverty lines (such as $1 or $2 per day) they find significant increases in poverty and especially in extreme poverty. Hoogeveen and Özler characterise growth between 1995 and 2000 as not being pro-poor either absolutely or relatively, as real income growth of the poor was actually negative and was below mean real income growth.

Leibbrandt et al (2004) find a slight worsening of income poverty between 1996 and 2001, especially for Africans. Simkins (2004) uses several measures of poverty and determines that poverty unambiguously rose between 1995 and 2000. A similar conclusion is drawn by Pauw and Mncube (2007) using the same datasets. Meth and Dias (2004) find that poverty worsened in South Africa between 1999 and 2002, with up to 4.5 million additional people falling below a subsistence-based poverty line, although the increased intensity of poverty is mitigated if the 'social wage' is factored in. Ardington et al (2005) test the robustness of the general finding in the literature that poverty increased between 1996 and 2001 to various aspects of the datasets (such as missing data), and their results confirm that poverty did indeed rise.

Van der Berg et al (2005) using unofficial data (a marketing survey) observe a slight worsening in poverty between 1995 and 2000, but a decline in poverty between 2000 and 2004. The UNDP

(2003) finds a small reduction in the poverty headcount ratio between 1995 and 2002. A review recently put out by the South African government (Government of the Republic of South Africa, 2008) points to declines in both the poverty gap and the poverty headcount ratio between 1995 and 2005, and attributes this decline primarily to government's social welfare grants.

The generally unimpressive record of income poverty reduction since the advent of democracy in South Africa highlights the challenge of significantly cutting poverty. Countries such as Chile and to a lesser extent Brazil have made significant progress in reducing poverty in recent years, through dedicated programmes centred around targeting spending on the poor. Halving poverty by 2014 in South Africa, as per government's commitment, would arguably require a significant shift given the apparent stubbornness of poverty levels thusfar.

Section 2 of this paper quantifies what the 'halving of poverty' could mean, by setting out a monetary poverty line, clarifying two relevant measures of poverty, and by using the latest income and expenditure survey data to put figures to the target of halving poverty. Section 3 projects the poverty headcount ratio and poverty gap in 2014 under various growth scenarios, considering specifically whether poverty can be halved through growth under the current distributions of income and expenditure. In Section 4 we project various scenarios of equalising distributional change, and discuss the poverty outcomes under a range of growth/distributional combinations. This article does not model the causal relationship between growth and distribution, but rather looks at the effects of various combinations of growth and distributional change on poverty. Section 5 concludes.

2. FRAMING THE 'HALVING OF POVERTY' TARGET

a) Data

We utilise the various datasets of the 2005/2006 Income and Expenditure Survey (IES). These are the official national household surveys produced by the national statistical agency, Statistics South Africa (hereafter Stats SA).[5] All data were inflated or deflated to March 2006 (depending on when the household was surveyed), using monthly CPI data. Both income and

[5] The original datasets were accessed through the South African Data Archive of the National Research Foundation.

expenditure/consumption are shown in initial analysis, but we subsequently focus on expenditure/consumption since this is most relevant to poverty.[6] All calculations were undertaken on a household per capita basis, as elaborated further below.

b) The poverty line

AsgiSA does not define precisely what is meant by 'poverty' and hence what a 'halving of poverty' would actually mean. The Minister of Finance announced in his 2005 Budget Speech that a poverty line would be developed for South Africa. A process has since been underway, led by National Treasury and Stats SA, to develop a national poverty line. This line is expected to be finalised by the end of 2008, according to Stats SA. The official government targets for halving poverty are then to be framed in terms of that line.

We therefore use the proposals contained in the official Stats SA/National Treasury Discussion Document (2007) to derive an appropriate line for this study. Stats SA calculates a food poverty line at R211 [$31][7] per capita per month (in 2000 prices). This is intended to represent the minimum amount required to purchase enough food to meet an average person's basic daily food-energy requirements over a month.[8] Stats SA then estimates the non-food component of

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[6] In line with Stats SA definitions and international best guidelines (see for instance United Nations University World Institute for Development Economics Research (2008)), expenditure/consumption has been calculated to include the following categories: food and beverages; tobacco and narcotics; clothing and footwear; housing, water, electricity, gas and other fuels; furnishings, household equipment and routine maintenance of the house; health; transport; communication; recreation and culture; education; restaurants and hotels; miscellaneous goods and services (which includes personal care; personal effects; social protection services; insurance; other financial services); and other services not elsewhere classified. Income has been calculated to include the following broad categories: income from work; income from capital; pensions, social insurance, family allowances; income from other individuals; other income; and income from imputed rent on owned dwelling (calculated as 7% of the value of the dwelling per annum). Not included in either income or expenditure are the estimated values of in-kind income or expenditure respectively; savings, debts, taxes, transfers made to others; loss incurred in obtaining income; and other products not consumption (such as interest on mortgage bonds; non-refundable bursaries; and the imputed costs of home production).

[7] The conversion of figures from South African Rands to US$ in this article uses 2006 exchange rates for consistency, since the analysis is based on 2006 data.

[8] This measure is based on the daily energy requirement of 2 261 kilocalories per capita, as recommended by the South African Medical Research Council. Stats SA then calculated the cost of meeting this minimum energy requirement, in the light of the types of foods commonly available to low-income South Africans, using the 2000 IES.

a poverty line as R111 [$17] per capita per month.[9] This yields a total poverty line of R322 [$48] per capita per month in 2000 prices.

The $2 a day measure of poverty that is commonly used internationally translates to about R162 per capita per month in 2000 prices (Woolard and Leibbrandt, 2006). This is about half of the minimum poverty line which Stats SA calculates, and is significantly below even the essential food component of the poverty line calculated as being necessary to meet minimum daily energy requirements. The $2 poverty line has been widely criticised (see for example Reddy and Pogge, 2008).

Stats SA bases the household poverty threshold on a pooling of resources within households, with equal weighting given to all members of the household (i.e. without using any adult equivalence conversions, economies of scale, or other scaling). In other words, the poverty threshold for a household of five people would simply be [5 x R322 = R1610 per month] (in 2000 prices). We follow this approach in calculating poverty on a household per capita basis. It might be considered more appropriate to apply some form of equivalence scaling, such as a factor for 'converting' children to their adult equivalents and taking account of intra-household economies of scale. However, the nutritional basis for the poverty line is calculated on a per capita basis (as opposed to an adult equivalent basis) and hence the conversion of household income or expenditure into household per capita income or expenditure needs to be consistent with this.

Drawing on the Statistics SA/National Treasury Discussion Document as well as discussions on the issue with Stats SA officials involved in the process, this study uses as a basis the lower poverty line suggested in the Discussion Document (R322 per capita per month in 2000 prices). We are not necessarily of the view that this is the most appropriate measure for a poverty line, but defining a poverty line is not the focus of this study.

[9] This calculation is based on the assumption that the non-food items that are typically purchased by a household that spends about R211 per capita per month on food can be treated as essential, as such households are effectively forgoing food consumption in order to purchase these non-food items. Note that the overall poverty line is approximately one-and-a-half times the food poverty line. In Latin American countries, the poverty line is typically defined as double the food poverty line.

The R322 baseline needs to be inflated from 2000 prices to March 2006 levels for use with the 2005/6 IES data in the analysis that follows. Stats SA inflates the 2000 figures using the CPI index for metropolitan areas only. This is clearly problematic, particularly given the rural bias of poverty in South Africa. Further, given that CPI rates for the lower income quintiles tend to exceed those for the higher quintiles, the use of an overall CPI measure is inappropriate for inflating a measure which is relevant to people living in poverty, if the intention is to cost the same basic basket of goods deemed necessary in 2000.

In order to construct an appropriate inflator index, this study thus uses the CPI rates for the lowest two quintiles for all areas (metropolitan, other urban, and rural) in order to inflate the 2000 poverty line to March 2006 prices. We take the mean of these CPI rates for the lowest and second-lowest quintiles given that these are most relevant to the basket of goods consumed by the poor.

The use of this inflator indices results in the poverty line of R322 in 2000 prices being converted to a line of R450.48 [$67] in March 2006 prices (as opposed to R422.46 when the overall CPI for urban areas is used)[10]. We use March 2006 as this is the month to which the 2005/06 figures are calibrated. The baseline poverty line used in the analysis which follows is thus R450 [$67] per capita per month (or R5 400 [$800] per capita per annum) in March 2006 prices.

In some parts of the analysis we also look at the effects of using the 'food poverty line' as calculated by Stats SA. This includes only the food items needed to meet minimum energy requirements, and excludes the costs of clothing, shelter, transport, and so on. This was calculated by Stats SA at R211 per capita per month (in 2000 prices) which translates to R295 [$44] per month in March 2006, for use with the 2005/6 IES data.

c) Measuring poverty

Setting the level of a monetary poverty line answers only part of how to gauge poverty, and hence how to define what halving poverty would mean. One way of measuring poverty is the

[10] The line would convert to R555.15 [$82] in 2008 prices (utilising the inflation rates up to an including June).

poverty headcount ratio[11], and this is the measure that government seems inclined to use to quantify poverty.

The poverty headcount ratio measures the incidence of poverty, which is an important dimension of poverty. The simplicity of this measure may make it intuitively appealing from a policy perspective. However, the poverty headcount ratio gives no indication of the intensity of poverty. The actual incomes of all the people falling below the poverty line do not enter into the poverty headcount ratio in any way.

The intensity of poverty can appropriately be measured not by the poverty headcount ratio but by the aggregate poverty gap, which sums the gaps between the poverty line and the income or expenditure of everyone falling below the poverty line. [12]

The choice of poverty measure has significant policy implications, particularly insofar as specific targets for the reduction of poverty are part of government policy. The purpose of a 'target' is not only to evaluate outcomes but to inform policy design and implementation. The poorest people are highly unlikely to be lifted above the poverty line in the near future, and any increase in their incomes will have no impact on the poverty headcount ratio. To the extent that success in poverty reduction is measured exclusively in terms of the poverty headcount ratio, this could de-emphasise raising the incomes of the poorest people. This is particularly important when, as will be seen below, about half of South Africans can be classified as poor. Measuring the halving of poverty solely in terms of the poverty headcount ratio could imply a

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[11] The poverty headcount ratio *H* is the proportion of the population falling below the poverty line, and can be formally expressed as $H = \frac{1}{n}\sum_{i=1}^{n} g(y_i \mid y_p)$ where there are *n* individuals with expenditures or incomes y_i arranged in ascending order such that $0 \le y_1 \le y_2 \le \ldots \le y_n$. The poverty line can be denoted by y_p and let $g(y_i \mid y_p) = 1 \mid y_i < y_p$; $g(y_i \mid y_p) = 0 \mid y_i \ge y_p$. The poverty headcount ratio is typically expressed in percentage form, *100H*, showing the percentage of the population falling below the poverty line. The incidence of poverty can also be measured simply as a poverty headcount (i.e. the actual number of people falling below the poverty line, rather than as a proportion of the population). However this is less desirable than a ratio since it gives a less meaningful sense of the extent of poverty, and population changes can also obscure the interpretation of changes over time.

[12] Using the same notation as in the previous footnote, the poverty gap *G* can be formally expressed as $G = \sum_{i=1}^{n} g_i$ where $g_i = max\{y_p - y_i, 0\}$.

focus on the second quartile of the population (i.e. the second quarter from the bottom of the population) and not the poorest quartile.

Given the important shortcomings of the poverty headcount ratio, and the information about the intensity of poverty conveyed by the aggregate poverty gap, it seems advisable that the AsgiSA target of halving poverty be framed not only in terms of halving the poverty headcount ratio but also in terms of halving the poverty gap. While this formulation may lose some of the appealing simplicity of using only the poverty headcount ratio, it seems justified by a more comprehensive standard of measure. In the analysis that follows we use this dual measure of the 'halving of poverty', in terms of halving both the poverty headcount ratio and the aggregate poverty gap.

d) Framing the AsgiSA target of halving poverty

We have specified a monetary poverty line for the purposes of this analysis[13], and argued for the measurement of poverty in terms of both the poverty headcount ratio and the aggregate poverty gap. Finally, concretising the meaning of halving of poverty by 2014 requires the specification of a starting point. AsgiSA was however formally launched in February 2006. We use the 2005/06 IES data (which are indexed to March 2006) as the baseline and analyse the halving of poverty from there.

Using a baseline poverty line of R450 [$67] per capita per month yields a poverty headcount ratio of 52.45% (using expenditure) and 49.56% (using income) in 2006. In other words, roughly half of South Africans fall below this poverty line. The aggregate poverty gap comes out at just under R60 billion [$8.9 billion] (R59.65b using income, and R59.82 using expenditure). This is only about 3% of GDP.[14]

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[13] A full analysis of poverty would of course need to take into account the various monetary and non-monetary dimensions of poverty. These include not only the absolute level of income of expenditure, but also relative poverty, the meeting of basic needs, human dignity, and capabilities. The use of a monetary poverty line in the analysis that follows is not intended to undermine the importance of these aspects. However, the use of a specific line is necessary for the type of empirical analysis of the relationship between growth, distribution, and poverty undertaken here.

[14] With the food poverty line of R295 [$44] per month, the poverty headcount ratio would be 34.36% and the poverty gap R21 billion [$3.1] using expenditure; 33.86% and R22.3 billion [$3.3 billion] using income. Double the

Given that both the income and expenditure poverty headcount ratios are in the region of 50%, we can approximate the 'halving of poverty' target as involving the following two components:

- *Cutting the poverty headcount ratio to 25% of the population by 2014;*
- *Reducing the aggregate poverty gap to R30 billion[15] [$4.4 billion] by 2014.*

The analysis of the relationship between distribution, growth, and poverty that follows is based on how these targets can be achieved. The actual policies that could be implemented to address poverty or change distribution fall outside of the scope of this article. Rather, the focus is on what the commitment in AsgiSA to halving poverty means in terms of growth and distribution, and under what growth/distributional scenarios these targets can be achieved.

3. CAN POVERTY BE HALVED THROUGH GROWTH?

We begin by analysing whether the AsgiSA target of halving poverty can be achieved through distributionally neutral growth. This is done by applying various growth rates uniformly across each of the 47 391 192 individuals in the (weighted) dataset.

Since the poverty line is a monetary poverty line based on the cost of a basket of goods, it remains constant in real terms. This means that, with any positive growth, there will be reductions in the poverty gap and headcount ratio, so long as there is not a worsening of distribution affecting the bottom half of the population.

AsgiSA sets GDP growth targets of at least 4.5% between 2005 and 2009, and at least 6% between 2010 and 2014. We consider how poverty would evolve by 2014 with these rates and the current distributional structure. However, these rates are targets and not projections or forecasts. Furthermore, it seems unlikely that these rates will actually materialise, particularly in the light of the global economic problems.

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food poverty line – which is a poverty measure commonly used in Latin American countries in particular – yields a poverty headcount ratio of 62.27% and a poverty gap of R105.7 billion [$15.8] using expenditure; or 57.94% and R102.7 billion [$15.3 billion] using income.

[15] In March 2006 Rands.

We thus also use two sets of growth forecasts. Firstly, government's growth forecasts[16] for the years 2008-2010, combined with the actual growth rate for 2007. Since official forecasts for 2011 onwards are not available for the years 2011-2014 inclusive, we utilise the mean of Treasury's growth forecasts for the period 2008-2010, as the most recently available official growth forecasts. Secondly, we use the growth forecasts put out by the major private banks in South Africa.[17] The most recent forecasts put out by ABSA, FNB, Nedbank, and Standard Bank for the period 2008-2010 are averaged on an annual basis, and the average of this measure is used for subsequent years.

The annualised growth rates derived from these three sources (the AsgiSA targets, the National Treasury forecasts, and the forecasts by the private banks) are summarised in Table 1 below.[18]

Table 1: Growth forecasts 2006-2014

	Total growth	Average annualised growth
AsgiSA	52.71	5.43
National Treasury	40.67	4.36
Banks	33.58	3.69

For comparison purposes, GDP in South Africa grew at an average annualised rate of 4.3% between 2000 and 2007 (3.6% per annum between 1994 and 2007).[19] These rates were reached during the recent commodities boom from which South Africa benefited, and which is unlikely to continue in the near future. The recent downturn in the world economy, which is also affecting South Africa, will in all probability result in a decline in growth rates. This would of course make it even more difficult to attain the poverty targets than is shown here.

These three different growth rates are applied uniformly across the distribution to ascertain the effects on poverty.[20] Note that this only means that people gain uniformly in proportionate

[16] As contained in the 2008 Budget (National Treasury, 2008).

[17] See ABSA (2008), Bruggemans (2008), Nedbank (2008), and Standard Bank (2008).

[18] We later look a wider range of growth scenarios ranging between 3% and 7% per annum.

[19] Derived from GDP data published by the South African Reserve Bank, downloaded from www.reservebank.co.za.

[20] Note that these initial distributionally-neutral simulations of the effects of alternative growth rates on poverty are based on a uniform expansion of all incomes and expenditures, not only those derived directly from earnings

terms; in absolute terms the wealthy of course gain many times more than the poor with a uniform growth rate.

Tables 2 and 3 show what the halving of poverty would mean in terms of the poverty headcount ratio and aggregate poverty gap. Tables 4 and 5 thereafter show the same using the food poverty line. These results are shown in terms of each of expenditure and income, but in the subsequent analysis we focus on expenditure since this is most directly relevant to measuring poverty. In each case the poverty gap and headcount ratio in 2014 are projected under three growth scenarios (using AsgiSA targets, Treasury forecasts, and the banks' forecasts), given the current distribution of income or expenditure. In other words, this shows how far growth alone would take us towards meeting the targets of halving poverty, under the current distributional structure.

Even with the growth rates targeted in AsgiSA, neither the poverty gap nor the poverty headcount ratio can be halved with the current distribution of income or expenditure. Growth at the AsgiSA targeted rates would make significant inroads into poverty – cutting the poverty headcount ratio by about a third and the poverty gap by around 45%. Even with the food poverty line, growth at the rates targeted in AsgiSA would result in halving the poverty gap but not the poverty headcount ratio. If actual growth between now and 2014 is closer to the rates forecast by Treasury and by the banks, the proportion of people living under either poverty line is cut considerably but by far less than half.

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from employment. This implicitly assumes a continuation and commensurate expansion in non-earnings sources of income (such as social grants), which might not be considered to derive from 'growth' alone in a narrow sense.

Table 2: Poverty projections under alternative growth scenarios - Expenditure

	Poverty headcount ratio (%)	**Poverty gap (R billion)**
2006 actual	52.46	59.82
Target: halving poverty	26.23	29.91
Growth scenarios to 2014:		
AsgiSA targets	34.33	32.00
Treasury projections	38.00	36.77
Banks projections	40.14	39.95

Note:
The poverty gap in 2006 of ±R60bn is equivalent to ±$8.9 billion, which is about 3% of South Africa's GDP.

Table 3: Poverty projections under alternative growth scenarios - Income

	Poverty headcount ratio (%)	**Poverty gap (R billion)**
2006 actual	49.57	59.65
Target: halving poverty	24.79	29.83
Growth scenarios to 2014:		
AsgiSA targets	33.75	33.98
Treasury projections	36.99	38.44
Banks projections	39.06	41.41

Table 4: Poverty projections [using food poverty line] under alternative growth scenarios – Expenditure

	Poverty headcount ratio (%)	**Poverty gap (R billion)**
2006 actual	34.36	21.02
Target: halving poverty	17.18	10.51
Growth scenarios to 2014:		
AsgiSA targets	17.52	8.76
Treasury projections	20.46	10.58
Banks projections	22.51	11.87

Table 5: Poverty projections [using food poverty line] under alternative growth scenarios – Income

	Poverty headcount ratio (%)	Poverty gap (R billion)
2006 actual	33.86	22.31
Target: halving poverty	16.93	11.16
Growth scenarios to 2014:		
AsgiSA targets	18.57	10.57
Treasury projections	21.45	12.37
Banks projections	23.19	13.63

It can be safely concluded that it is highly unlikely that poverty can be halved through growth alone. This means that poverty will not be halved by 2014 in the absence of some form of pro-poor distributional change.

These results show the effects of alternative growth rates on poverty if distribution is unchanged; were distribution to worsen then fewer people would be lifted out of poverty at any of these growth rates.

We use TIP curves to show both the poverty gap and poverty headcount ratio under the current distributions of income and expenditure, and subsequently to explore the relationship between distribution, poverty, and growth and specifically to assess what combinations of growth and distributional change would allow for the halving of the poverty gap and poverty headcount ratio. Derived from Jenkins and Lambert (1997), 'TIP' refers to the 'Three I's of Poverty': the incidence, intensity, and inequality of poverty. TIP curves plot the cumulative sum of the poverty gaps per capita (y-axis) against the cumulative population share (x-axis).

Formally the TIP curve can be denoted (following Jenkins and Lambert) as *TIP(g; p)* where *p* is the cumulative population share with $0 \leq p \leq 1$ and *p* on the x-axis is plotted against $\sum_{i=1}^{k} \frac{g_i}{n}$. Thus $TIP(g; \frac{k}{n}) = \sum_{i=1}^{k} \frac{g_i}{n}$ for $k \leq n$ (with intermediate points derived through linear interpolation).

The slope of the TIP curve at any given percentile equals the poverty gap for that percentile. For the subset of the population falling below the poverty line, the TIP curve is an increasing concave function of *p*, while for people above the poverty line the curve is horizontal (since

their poverty gaps are zero). Insofar as the curve flattens as it approaches the poverty line, this shows the decline in the poverty gap as expenditure or income increase towards the threshold.

The extent of poverty incidence, in terms of the poverty headcount ratio, is shown by the value of *p* at the point where the curve becomes horizontal. This is shown by the length of the non-horizontal part of the TIP curve.

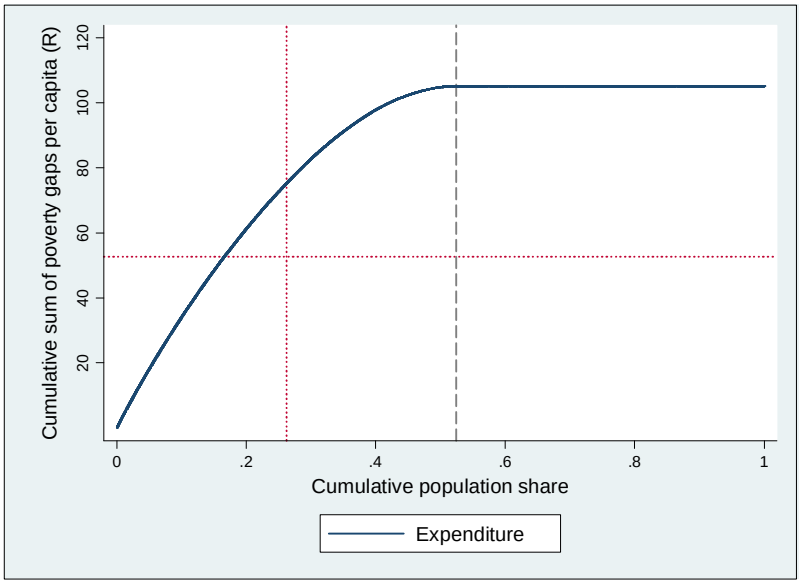
The intensity of poverty is shown by the overall height of the TIP curve, since the height of the curve (at *p=1*) is the aggregate poverty gap averaged over the entire population. The average poverty gap amongst the population falling below the poverty line is given by the slope of a ray from the origin to (*h, TIP(g; h)*).

The degree of inequality amongst the poor is shown by the degree of concavity of the non-horizontal section of the TIP curve. If all of the poor had equal incomes then the non-horizontal section of the curve would be a diagonal straight line (with a gradient equalling the difference between the poverty line and the average income of the poor).

Figure 1 shows the TIP curve for current expenditure (on a household per capita basis, per month). The picture is similar in the case of income, but we focus on expenditure here. The curve plots over 47 million individual points, the cumulative poverty gaps of every South African (weighted from the original survey data).

It can be seen that about half of the population currently falls under the poverty line of R450 per capita per month. Halving the poverty headcount ratio would mean cutting it to about a quarter. This target for the headcount ratio is shown by the dotted vertical line at around 0.26. The mean poverty gap per capita over the whole population is about R105 per capita per month. Halving the poverty gap would mean bringing it down to about R53 per capita, and this target is shown by the horizontal dashed line. Meeting the targets of halving both the poverty gap and the poverty headcount ratio would mean bringing the point of the TIP curve at which it becomes flat below the horizontal dotted line as well as to the left of the vertical dotted line.

Figure 1: TIP curve of expenditure

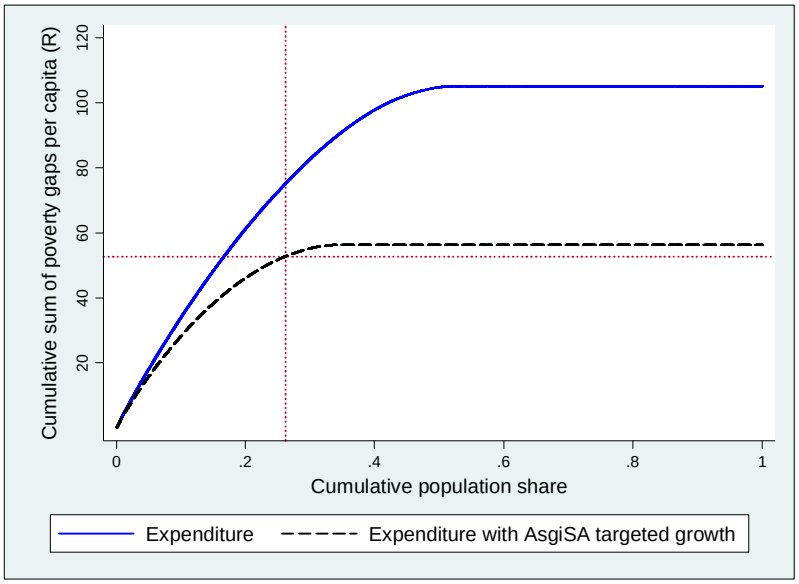


Note: Poverty line set at R450 per capita per month, as discussed in the text (Figures 1-4).

In Figure 2 below the original TIP curve for expenditure is compared with that which would result if the growth rates targeted in AsgiSA were to materialise through to 2014, given the current distribution of expenditure. The pattern of expenditure that would derive from that is shown as a dashed curve. Using the Treasury or banks' forecasts would yield TIP curves in between these two curves, but closer to the AsgiSA curve.

With the growth rates as hoped for in AsgiSA, the poverty gap is reduced drastically and the poverty headcount ratio also falls significantly. Despite this, it can be seen that neither the poverty gap nor the poverty headcount ratio is actually halved. Even if the AsgiSA-targeted growth rates were to materialise, this would be insufficient to halve poverty without some pro-poor distributional change (in the sense of distributional change that disproportionately raises the income and expenditure of the poor).

Figure 2: TIP curve of expenditure and expenditure with AsgiSA targeted growth rate



4. POVERTY OUTCOMES UNDER ALTERNATIVE GROWTH/DISTRIBUTIONAL SCENARIOS

a) Distributional changes

Having established the improbability of growth alone leading to the halving of poverty by 2014, given the current distribution of income and expenditure, we thus examine what growth-distribution scenarios could produce the result of halving poverty by 2014.

There is an almost infinite variety of hypothetical distributional changes that could result in a halving of poverty. We consider distributional changes across the entire population in the scenarios that follow, as explained below. Of course this is not how distributional change occurs in practice, and it would be very difficult to design policies to effect these outcomes with any degree of precision (and redistributional changes would of course also incur significant administrative costs and other types of transaction costs).

The concern here is not so much a direct redistribution of income through social transfers, although this could certainly be a component of distributional change. The analysis is concerned more fundamentally with an overall shift in the growth path towards more 'pro-poor growth' in the sense of growth in which the incomes of the poor increase relatively more than do those of the non-poor. The distributional changes simulated here are intended to be

indicative of the scale of 'redistribution' of incomes and expenditure that would result from a more pro-poor growth path. For instance, one in which returns to unskilled labour rose more rapidly than returns to skilled labour, and/or a relative expansion in employment opportunities. We are not suggesting that such a shift would result in the exact distributional changes analysed here. Rather, these projections are indicative in nature and are suggestive as to what combinations of growth and a more egalitarian distribution could result in a halving of poverty.

b) Method for simulating distributional changes

The methodology used in simulating alternative distributional scenarios is set out below with reference to income for heuristic purposes, but these were undertaken with each of income and expenditure. The method is explained intuitively here, and mathematically in Appendix 2.

We begin by ranking the entire South African population from highest to lowest in terms of household per capita income. The distributional changes simulated here 'revolve' around a specific point in the distribution. In the simplest case this is the median income earner. We have also used the person at the 66.6 th percentile (i.e. where a third of people have higher incomes) and the 75th percentile. This 'anchor' point is the only person whose income is unaffected by the distributional change.[21] Everyone with a higher income than this person loses from the distributional change and everyone below that person gains. The extent to which someone loses or gains depends on how far they are from the unaffected person: the highest income earner loses most while the lowest gains most. The simulated distributional change is generally rank-preserving because of the relatively small increments spread continuously over a population of over 47 million, with a small number of minor rerankings.

In the simplest case in which distributional change revolves around the median income earner, the change is symmetrical around that point. The loss of the highest income earner is the exact gain of the lowest; the loss of the second highest income earner is the gain of the second lowest; and so on. In this case the distributional change is both mean-preserving and median-preserving.

[21] Since weights are being used this is not necessarily an actual individual, but the principle is the same.

In a slightly more complex variation, the point around which the distributional change revolves is not the median income-earner (i.e. the 50th percentile), but the person at for instance the 66.6 th or 75th percentile. In these cases the distributional changes simulated are mean-preserving but not median preserving. If for example the change in the distribution of revolves around the 75th percentile, the gain of the bottom three income earners must be matched by the loss of the top income earner, the gain of the next three income earners must be matched by the loss of the second highest income earner, and so on.

One parameter of these transformations is the 'scale' of the distributional change, in terms of how much income is redistributed. The simplest way to think about this is to set by how much the income of the lowest earner should grow through the distributional change. We have run simulations in which the income or expenditure of the bottom income earner grows by amounts ranging between R50 [$7.40] and R300 [$44.4] per month. While this would constitute a very significant increase in income for someone at the lowest end of the distribution, the negative effect at the top of the distribution is but a miniscule fraction of the income of the highest earners.

For example, in the case of a distributional change in which the income of the lowest-income person rises by R50 and the distributional change revolves around the median, the income of the highest-income person would decline by R50. The income of the second-lowest-income person would rise by just under R50 and that of the second-highest-income by fall by just under R50 and so on, with the amounts falling uniformly from both sides until reaching zero at the median. In the case of a distributional change of a maximum R50 but revolving around the 75th percentile, the income of the lowest-income person rises by R50 while the income of the highest-income person declines by R150, with the absolute amounts declining from both ends (but in larger increments for the top quarter of the distribution) until reaching zero at the 75th percentile.

An alternative way of modelling distributional changes would have been simply to apply different growth rates to different parts of the distribution spectrum – for instance, that the income or expenditure of the bottom decile grows at 7%, that of the next decile at 6.5%, and so on. However, such a method is much cruder than the one we have employed. The method used

here avoids an outcome where the income or expenditure of the person at the top end of the bottom decile grows significantly more than that of the person just above them at the bottom of the next decile. In our method the growth rates vary not by income category (e.g. deciles) but by individual, resulting in a much more continuous distributional change across the distributional spectrum.

Note that the 'losers' from the distributional change, at the upper end of the distribution, do not actually suffer any net loss of income or expenditure in the scenarios set out below, as we combine these simulated distributional changes with various growth scenarios. The income or expenditure at the top still grows considerably in every scenario (and far more than other people in absolute terms), but slightly less than it would in the absence of the equalising distributional change.

This analysis does not model the causal relationships between growth and distribution. It uses micro-data to simulate distributional changes and to combine these changes with various growth rates in order to quantify the effects on poverty.

c) Projected poverty outcomes under various growth/distributional scenarios

In terms of growth, we consider growth rates averaging between 3% and 7% per annum through to 2014.[22] While the upper growth scenarios are not at all likely to materialise, they are included here for the purposes of comparing various growth/distribution combinations.

We thus simulate the effects on the poverty gap and headcount ratio of sixty different combinations of growth and distributional change, for each of income and expenditure. These scenarios combine five alternative growth rates (3%, 4%, 5%, 6%, and 7% annual average growth rates through to 2014) with four different 'intensities' of pro-poor distributional change (in which the income of the lowest-income person rises by R50, R100, R200, or R300) and in which distributional change revolves around each of the median, the 66.6 th percentile, and the

[22] We do not report here as to whether distributional change alone could deliver a halving of poverty, as we did with growth. It would be unrealistic to make projections based on zero growth between 2006 and 2014 (particularly as there has already been growth between 2006 and 2008).

75th percentile. This allows for a consideration of the effects on poverty of combining growth with change in distribution that benefits the poor.

Poverty outcomes under two such scenarios are shown in Figure 3 for illustrative purposes. The solid line shows the expenditure pattern that would result from 6% GDP average growth per annum through to 2014, combined with a progressive distributional change in which the poorest South African is just R50 better off than they would otherwise have been. The dashed line shows a scenario in which growth is fairly low at 3% per annum but there is a more intensive distributional change, with the lowest-expenditure person gaining an additional R200 per month (with decreasing amounts thereafter, as explained earlier). The poverty gap is halved in both of these scenarios (as can be seen by the fact that both curves lie below the horizontal dotted line). However, while the poverty headcount ratio is reduced in both cases, this is by less than half (both curves flatten out a bit to the right of the vertical dotted line). Neither of these particular growth/distribution combinations is quite enough to halve the proportion of people living below the poverty line.

Figure 3: TIP curve of expenditure under alternative growth/distribution scenarios

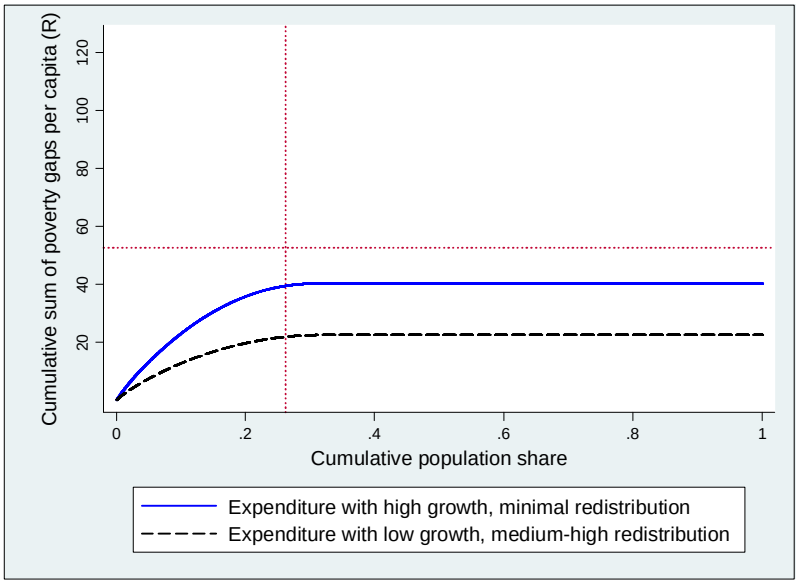


Figure 4 shows a growth/distributional scenario in which both the poverty gap and the poverty headcount ratio are indeed halved. In this scenario GDP grows at 4% per annum, while in terms

of distribution the expenditure of the poorest person is R200 per month higher than would otherwise be the case. The TIP curve for this scenario falls well below the horizontal dotted line, indicating that the poverty gap is actually cut by much more than half. It flattens out to the left of the vertical dotted line, showing that the poverty headcount ratio is cut by at least half. This growth/distribution scenario is one in which the AsgiSA target of halving poverty is achieved on both counts. Furthermore, it is in the realm of scenarios which could be regarded as feasible.

Figure 4: TIP curve of scenario halving poverty gap and headcount ratio

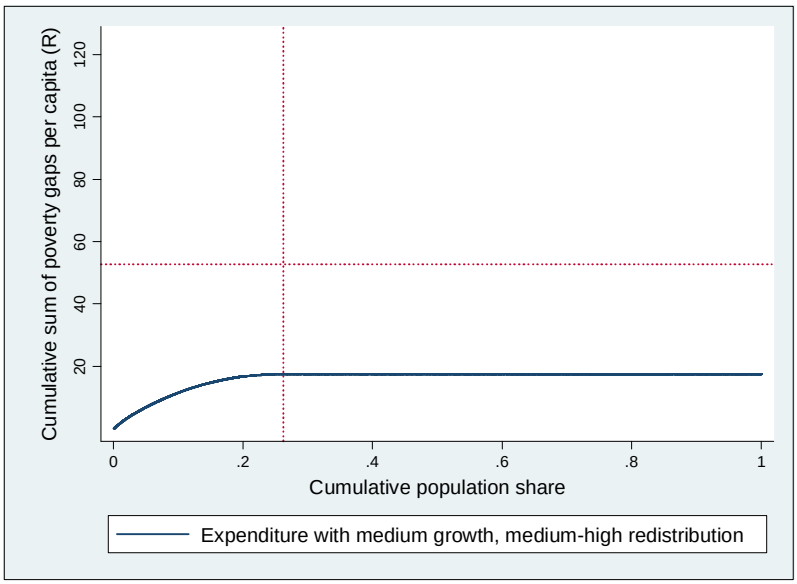


Table 6 summarises whether the targets of halving the poverty headcount ratio and the poverty gap could be met under a range of growth/distribution scenarios.[23] The effects of GDP growth through to 2014 at averages of 3%, 4%, 5%, 6%, and 7% per annum are considered. These growth rates are shown here combined with four different pro-poor distributional scenarios. Following the method described earlier, in the most 'intensive' distributional change the maximum gain is R300 per month, which benefits the very poorest person, with the gains decreasing from there. In the least 'intensive' distribution scenario shown here, the lowest-expenditure person gains by only R50 per month; intermediate scenarios of R100 and R200 are

[23] While Table 6 summarises the results in terms of expenditure, in terms of income the only difference is that under the scenario of 4% growth with a maximum distributional gain of R200 per month it is only the poverty gap that is halved, not the poverty gap and headcount ratio as shown in the table.

also shown. The results shown here are for distributional changes revolving around the 66.6 th percentile.

For each scenario Table 6 indicates whether or not the target of halving poverty is met. Since we are considering the halving of poverty in terms of halving both the poverty headcount ratio and the poverty gap, in each scenario an 'H' indicates that the poverty headcount ratio is (at least) halved while a 'G' indicates that the poverty gap is (at least) halved. The ten scenarios in which both dimensions of poverty are halved are shaded in.

Of course, the higher the growth rate, the less of a distributional change is required to meet the target of halving poverty, and vice versa. However, even under a highly optimistic (in all probability unrealistic) scenario of 7% annual growth through to 2014, the poverty headcount ratio cannot be halved without some distributional change.

Table 6: Meeting of poverty targets under alternative growth/distribution scenarios

	Distribution				
	R300	R200	R100	R50	None
Growth					
7%	H, G	H, G	H, G	- ,G	- ,G
6%	H, G	H, G	- ,G	- ,G	- ,G
5%	H, G	H, G	- ,G	- ,G	-, -
4%	H, G	H ,G	- ,G	-, -	-, -
3%	H, G	- ,G	- ,G	-, -	-, -

Notes:
Growth refers to the average annualised growth rate between 2006 and 2014 under the various scenarios.
Distribution refers to the distribution scenarios as set out in the text. R300 means that the expenditure of the lowest-income person is R300 per month higher than it would otherwise have been (with amounts decreasing from there as income rises); similarly for R200, R100, and R50.
For each scenario (growth/distribution combination), H means that the poverty headcount ratio is at least halved and G indicates that the poverty gap is at least halved; – means that those measures are not halved.

Table 7 shows what inequality of expenditure (household per capita) would look like under some of these growth/distributional scenarios. The figures shown here for the effects of distributional change are for distributional change around the 66.6 th percentile as discussed above, i.e. relative gains to the bottom two thirds of the distribution and relative losses to the upper third; these would differ somewhat if we use for example the median or the 75th percentile. The Gini coefficient of the current distribution of expenditure is 0.67, and without

any distributional change this would of course remain the same irrespective of the growth rate.[24]

Before considering growth, the last row of the table shows how much the Gini would be brought down to under each of the distributional scenarios. Distributional change in which the poorest person gains an additional R50 per month, with decreasing gains for each person as we move up the distribution, would already cut the Gini to 0.65. The most intensive distributional change which we model here, in which the poorest person gains an additional R300 per month, would bring the Gini down to 0.56. While this level of inequality would be a significant improvement on current levels, it would still be extremely high by international standards, bringing South Africa to about the current level of inequality in Brazil.

Table 7: Inequality under alternative growth/distribution scenarios

	Distribution				
	R300	R200	R100	R50	None
Growth					
7%	0.61	0.63	0.65	0.66	0.67
6%	0.60	0.62	0.65	0.66	0.67
5%	0.60	0.62	0.65	0.66	0.67
4%	0.59	0.62	0.64	0.66	0.67
3%	0.58	0.61	0.64	0.66	0.67
-	0.56	0.60	0.63	0.65	0.67

Note: Expenditure inequality, measured with Gini coefficient

.

5. CONCLUSIONS

Some important conclusions can be drawn from these scenarios concerning the meeting of the AsgiSA poverty target, and possible policy implications thereof.

[24] The only reason why the Gini varies across growth rates under a given distributional scenario is that we implemented the distributional changes after applying the growth rates, so that the value of a distributional change differs relative to the post-growth income or expenditure values. Had the distributional changes been applied prior to the respective growth rates, the Gini would be constant for any given distributional scenario, irrespective of the growth rate. However, this would mean that the scale of the distributional change would not be identical for any given distributional scenario, as the growth would also affect the size of the effective distributional change, e.g. the poorest person would gain not just R300 under the 'R300' distributional scenario, but R300 inflated by a growth rate, cumulative over the eight year period.

Firstly, the target of halving poverty by 2014 does appear to be feasible, under growth rates that are a bit lower than in recent years and with quite mild distributional change. It might be suggested therefore that this target should not be given up upon or treated as some distant goal or rhetorical aspiration. This is reinforced by the fact that the entire poverty gap in South Africa (using the poverty line specified here) is just 3% of GDP.

Secondly, however, it is highly improbable that the AsgiSA poverty reduction target will be attained in the absence of a pro-poor shift in the growth trajectory. Growth alone will not enable the halving of poverty. Furthermore, it is unlikely that the growth path would endogenously evolve in a sufficiently pro-poor way, without active policy interventions designed to achieve this shift.

Thirdly, these scenarios warn that any worsening of inequality will make the meeting of the AsgiSA poverty targets virtually impossible. Specifically, should distribution worsen for the bottom half of the population, improbably high growth rates would be needed to halve poverty by 2014. Given that income and expenditure include non-earnings sources, economic growth would in itself not necessarily be distributionally neutral in the absence of policy measures to ensure that the unemployed also benefit. Growth which failed to carry along those in the lower part of the distribution would not even have the poverty-reducing effects shown earlier for growth alone. South Africa thus cannot afford any worsening of inequality if poverty is to be halved by 2014.

Fourthly, given that government is still finalising the level of the national poverty line, the possible temptation for policymakers to set this too low should be avoided. It currently appears that, notwithstanding the background research by Stats SA into the minimum amount which could be used for a poverty line, government is considering setting it even lower than this level. This might be motivated at least in part by the realisation of just how many people would fall under such a line, and perhaps a concern that it would be difficult to halve that number of people within a reasonable timeframe. One insight that emerges from this analysis is that even middling growth with no distributional change goes a long way towards halving of poverty by 2014, and with what might be considered fairly mild pro-poor distributional change the halving of poverty appears to be feasible. While a poverty line in the region of R450 [$67] per capita per

month (as used in this analysis) means that about half of all South Africans would currently be classified as poor, this should not necessarily motivate the choice of a lower poverty line given the feasibility of dramatically cutting poverty over the next few years.[25]

While decent rates of growth could make some inroads into poverty, given the scale of poverty growth alone will fall short. Particularly if growth rates fall in South Africa over the next few years, more intensive distributional change would be required in order to halve poverty. The sustainability of the current growth path is also questionable even in its own terms, but that is another matter.

Given South Africa's levels of income per capita and status as an upper-middle income country, the scale of poverty that we are faced with is associated more with distributional patterns than with the total amount of resources available. Poverty in South Africa would be far lower than it is, were distribution to be at anything approaching a typical level of inequality by international standards. But inequality in South Africa is extreme by international standards. Higher growth would lift people out of poverty (unless that growth is actually immiserising, for instance if there were a shift towards an even more capital-intensive and exclusive growth path). However, when South Africa is considered in a global context the primary explanation for our high levels of poverty lies in the country's distributional structure.

The simulations of the effects of various growth/distributional scenarios suggest that halving poverty by 2014 requires a 'pro-poor' shift in the growth trajectory (over and above the distributional policies currently in place), such that distribution becomes less unequal. Conversely, any worsening of inequality will put the AsgiSA poverty reduction targets beyond reach.

Distributional changes would of course not in practice materialise in the manner modelled here, but these simulations are indicative of the scale of distributional changes needed to halve poverty. The most important dynamic underlying actual distributional changes is likely to be through the labour market, in terms of both employment creation (or losses) and the

[25] Nonetheless, the method developed here could be applied to the analysis of poverty using alternative poverty lines, and could indicate how poverty rates could be affected by various growth rates or distributional changes using any monetary poverty lines.

distribution of earnings amongst the employed. Social spending certainly has a role to play in ameliorating inequality and poverty, particularly in the short-medium term. However, South Africa's inequality is unlikely to be brought down to 'decent' levels – at least to 'normal' standards of inequality internationally – through social spending, but rather through increased demand for low- and semi-skilled labour and through a closing of wage gaps.

Dramatic improvements in distribution rarely come about without active measures targeted specifically at lessening inequality. Moderate decreases in inequality may well come about as a by-product of other dynamics. However, the magnitude of the reduction in inequality that would be required to bring South Africa anywhere in line with international norms is realistically not going to happen without policies dedicated to that end. The distributional changes analysed here would not even bring South Africa down to typical levels of inequality for a middle-income country, but to the range of highly unequal countries such as Brazil.

A stylised fact of distributional changes internationally, at least in recent decades, is what we might term a 'downward stickiness' of inequality.[26] Increases in inequality are much less reversible than are decreases. For instance, in countries where a government has come into power which instituted conservative economic policies that worsened income distribution, followed by the election of a government that switched to more 'progressive' policies, the distribution of income typically hardly comes down and certainly not down to the initial levels. Even where the intention is genuinely to improve income distribution, this often turns out to be far more difficult than anticipated. This is not surprising, as the wealthy are generally far better able to protect their income than are the poor, as well as being better placed to reverse any 'unfavourable' changes in distribution that do occur. This asymmetry in distributional changes underlines the point that a significant improvement in income distribution is highly unlikely to materialise without strong policy interventions geared towards that goal. Improving income distribution is possible, but it takes effort.

With the poverty line as defined here, the aggregate poverty gap is only about 3% of GDP. This suggests that poverty in South Africa should not be viewed as an insurmountable problem. In

[26] See Palma (2007).

fact, given that half of the population falls below that line, 3% of GDP is a comparatively small amount, and is smaller than what might have been expected before analysing the data. Of course the actual cost of eliminating poverty would significantly exceed this amount if considered in terms of direct transfers (given issues of targeting and administration).

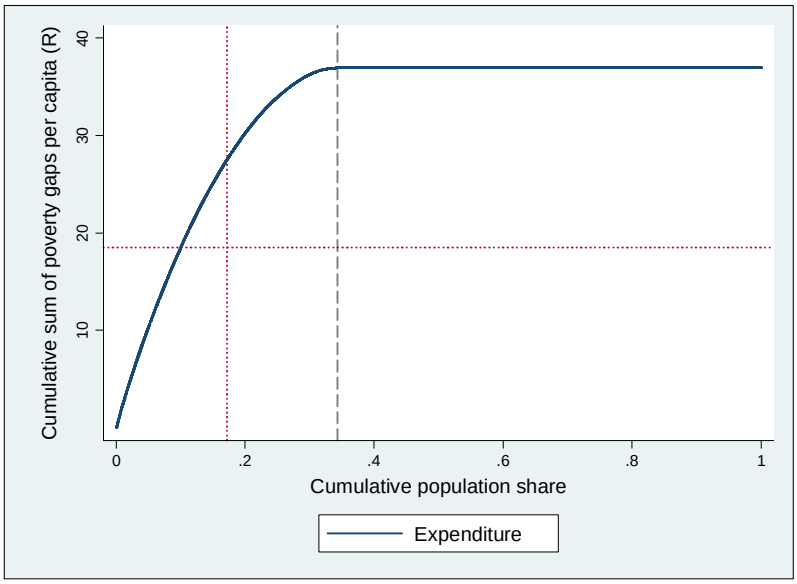
Nonetheless, considering the huge scale of poverty in terms of its incidence, in conjunction with the rather small scale when considered in terms of GDP, does suggest the feasibility of dramatic reductions in poverty. If this proves intractable through a shift in the growth path, direct transfers could prove effective (as they have been in the case of Brazil). The extreme levels of inequality in South Africa would seem to suggest that there is considerable scope for pro-poor distributional change.

In this vein it might be suggested that the reduction of inequality be placed as a more central and explicit goal of government policy than is currently the case, both for its own sake and in order to significantly reduce poverty. Whether the reduction of inequality is a desirable goal in its own right is obviously a political issue. An associated consideration, if indeed the reduction of inequality is a public policy objective, is how strongly and in what ways this is to be pursued insofar as there are tensions between this and other policy goals.

APPENDIX 1: TIP CURVE USING FOOD POVERTY LINE

For comparison purposes, Figure A1 shows the TIP curve using the food poverty line (set at R295 [$44] per capita per month). Using this lower line means that the poverty headcount ratio is significantly lower, at around 34% of the population. Furthermore, the poverty gap is significantly lower, just about R36 per capita per month when averaged over the entire population. The dotted horizontal and vertical lines show what the targets for halving the poverty gap and headcount ratio respectively if the food poverty line is used.

Figure A1: TIP curve of expenditure, using food poverty line



Notes:
Food poverty line set at R295 [$44], as discussed in the main text.
A different scale is used in this case as from the other TIP curves (in Figures 1-4).

APPENDIX 2: METHOD USED FOR SIMULATING DISTRIBUTIONAL CHANGES

To set out the method described in section 4 more formally, let x_i denote the income or expenditure of person *i* where the population is ranked from lowest to highest in terms of variable *x*, for *i = 1,2,…,n.* That is, x_1 is the lowest income or expenditure and x_n the highest. Note that this ranking will differ for income and for expenditure. In this analysis, *n* = 47 391 192.

Select ρ, the point around which the distributional change will revolve. For symmetrical distributional change around the median, $\rho = 0.5n$; for distributional change around the person at for example the 75th percentile, $\rho = 0.75n$.

Let θ_i be the value of the distributional change affecting person *i* such that:

$\theta_i > 0$ for $i < \rho$;
$\theta_i < 0$ for $i > \rho$; and
$\theta_i = 0$ for $i = \rho$.

Select ω, the value of the gain to the person with the lowest income or expenditure [*i=1*].

The range of values to be redistributed will be:

$\omega \leq \theta_i \leq |\phi|$ where ϕ is the maximum loss to the person with the highest income or expenditure [*i=n*] and $\omega > 0$ and $\phi < 0$.

For the special case of distributional change revolving around the median ($\rho = 0.5n$),

$\omega = -\phi$;

while for distributional change around points higher than the median (e.g. $\rho = 0.75n$),

$\omega < |\phi|$.

Then for $i < \rho$:

$$\theta_i = \omega - \frac{\omega(i-1)}{\rho - 1} = \frac{\omega(\rho - i)}{\rho - 1}.$$

Such that for $i > \rho$:

$$\theta_i = (\rho - i)\frac{\sum_{i=1}^{\rho-1}\theta_i}{\sum_{i=\rho+1}^{n}(i-\rho)}.$$

Note that in this exposition we have selected the maximum gain to the person with the lowest income or expenditure [*i=1*], ω, then calculated the gain to the other people in subset $i < \rho$; this allowed for the derivation of the loss to the people in subset $i < \rho$. We could equally have begun by selecting the loss to the person with the highest income or expenditure [*i=n*], ϕ, and calculating $\theta_i \ \forall \ i > \rho$ and thence deriving $\theta_i \ \forall \ i < \rho$; the results would be identical.

The post-distributional-change income of person *i* will thus be:

$$\tilde{x}_i = x_i + \theta_i$$

Such that

$$\tilde{x}_i > x_i \ \forall\, i < \rho; \quad \tilde{x}_i = x_i \ \ for\ i = \rho; \quad and\ \tilde{x}_i < x_i \ \forall\, i > \rho.$$

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