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Poverty, inequality, and prices in post-apartheid South Africa

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Poverty, inequality, and prices in post-apartheid South Africa

Arden Finn,¹ Murray Leibbrandt,¹ and Morné Oosthuizen²

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Abstract: Post-apartheid poverty and inequality trends have been the subject of intensive analysis, yet relatively little attention has been devoted to the impact of differential price movements on the measurement of poverty and inequality. This paper aims to tell the story of the evolution of both money-metric and non-money-metric poverty and inequality in post-apartheid South Africa, and to assess the effect of prices on this story. Our results show that inflation over the latter half of the 2000s has been anti-poor and that accounting for differential price movements dampens the measured improvements in poverty and inequality.

Keywords: inequality, poverty, prices, South Africa

JEL classification: E31, D63, I32.

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1 Introduction

Trends in poverty and inequality during the post-apartheid period have been the subject of intensive analysis in South Africa. The widespread poverty and extreme inequalities prevalent at the time of the democratic transition represented one of the key areas of policy focus for the first democratic government, as well as one of the sets of outcomes against which its performance has often been judged. While little data on household incomes and expenditures existed prior to the transition, regular nationally representative household surveys—collecting detailed income and expenditure data—have been undertaken since the early 1990s by both Statistics South Africa and other institutions.

The effect of prices on purchasing power is typically given only passing attention in the South African literature on poverty and inequality: incomes or expenditures are deflated by a scalar derived from some version of the Consumer Price Index (CPI) in order to make comparisons over time. One of the key gaps in this literature with respect to the analysis of trends in poverty and inequality is, therefore, the effect of differential price movements across the distribution. It is hoped that this paper will contribute towards filling this gap by more purposefully considering the impact of prices on estimates of poverty and inequality.

The paper starts by briefly reviewing the received wisdom on post-apartheid growth and poverty well-being using secondary literature, income data, and non-money-metric sources. This narrative is that poverty has gone down over the post-apartheid period in such a way that growth has been pro-poor, but that inequality has remained stubbornly fixed at the very high levels characterizing the start of the post-apartheid period. Section 3 reviews the available nationally representative expenditure data covering the past almost 20 years, with a view to choosing appropriate datasets for the analysis. It also considers the relevant available price data. Adding value to this story is the central task of the fourth section of the paper, which assesses the sensitivity of poverty and inequality estimates to differential price movements. Section 5 is the conclusion.

2 Existing evidence on the evolution of post-apartheid well-being

2.1 The narrative

South Africa's economy has undergone substantial changes since the fall of apartheid and the first democratic elections in April 1994. Economic growth stagnated during apartheid due to sanctions on international trade and investment, uncompetitive local industries, rigid exchange controls, restricted skills development, and high levels of poverty and inequality (Aron et al. 2008). After the first democratic election, economic sanctions were dropped, labour restrictions were lifted, and policies were put in place to advance the interests of African workers, who had been marginalized for many decades. Since the first democratic election, South Africa has had stable macro management and, as shown in Table 1, South Africa's economy has grown steadily both in real and per capita terms.

Table 1: South African macroeconomic trends, 1993–2012

	GDP (ZAR million)	GDP growth (%)	GDP per capita	GDP per capita growth (%)
1993	1,065,830	1.2	28,277	-0.9
1997	1,214,768	2.6	29,582	0.5
2001	1,337,382	2.7	30,024	0.8
2005	1,571,082	5.3	33,176	3.9
2008	1,814,594	3.6	36,392	2.3
2010	1,842,052	3.1	36,079	1.9
2012	1,954,303	2.5	37,476	1.5
Avg. 1993–2012	1,470,001	3.2	32,031	1.5

Source: Updated from Leibbrandt et al. (2010), South African Reserve Bank (2013).

Over the same period, the schooling system transformed from one characterized by highly skewed spending across racial groups to one based on equitable government funding. School enrolment rates rose, though learning achievements remain very poor in previously disadvantaged schools (Van der Berg 2007). The new, young labour market participants have more education, on average, than their parents had a generation ago. Two in five young adults graduate with Matric certificates (which is the qualification awarded for those who pass a set of nationally set, standardized exams at the end of the final years of secondary schooling).

Other countries, such as Brazil and India, have seen education gains translate into productivity and employment growth, and large decreases in poverty and inequality. Job creation in a dynamic labour market served as the key pathway through which these societies generated high social returns to improved education and second-round effects to social transfers.

South Africa has not made similar gains. Over the post-apartheid period poverty has fallen only sluggishly. Eighteen years after the first democratic election, the share of people living below a US\$2 per day poverty line has declined by no more than 4 percentage points from 34 per cent in 1993 to 30 per cent in 2008. These gains are often attributed to social policy reforms (i.e. a massive expansion of cash grant transfers) rather than economic development (Leibbrandt et al. 2010). Of equal concern is the fact that inequality has risen further from its very high levels under apartheid (Leibbrandt et al. 2010).

Just as the labour market was the key intermediary in the successes in Brazil and India, so the unsatisfactory performance of the labour market sits centre-stage in South Africa's disappointing development outcome. A total of 2.74 million jobs (net) were created between 1993 and 2008, of which 2.5 million were targeted at skilled labour, while unskilled workers lost a total of 770,000 jobs (net). Over the same period, unemployment rates more than doubled from 14 per cent in 1993 to a peak of 29 per cent in 2001, before declining to 23 per cent in 2008. By the time of the economic crisis in 2010, the unemployment rate had reversed to 25 per cent, using the narrow definition of unemployment (National Treasury 2011).¹ If discouraged workers—who have stopped looking for work 'because they do not anticipate finding any' are included in this definition—the figure is substantially higher at about 32 per cent (Statistics South Africa 2012c).

Of the total population of 4 million unemployed, 75 per cent are long-term unemployed and many young job seekers report having limited or no formal work experience, even at age 30 (National

¹ It should be noted, however, that the narrow unemployment definition changed slightly with the introduction of the Quarterly Labour Force Survey (LFS) in 2008, affecting estimates of the unemployment rate.

Treasury 2011). The informal sector is small, with only 6 per cent of South Africans in self-employment. The supply of labour is therefore primarily directed at jobs in the formal sector.

In general, the labour market has not had a positive impact on poverty because of the failure to pull individuals from poor households into employment. This unemployment situation worsened between 1993 and 2008, especially for those in the poorest households. The number of no-worker households has increased by 3 per cent in the last 15 years, pushing up the number of households relying on assistance, especially child grants, as their main form of income. Indeed, the improved aggregate poverty situation is due to increased support from social grants, and not from the labour market. Even in one-worker households, the poverty incidence remains high. Because of high living costs and the fact that many workers are in low-paid employment, the presence of an employed person in a household is not a guarantee of escaping poverty.

The poverty impacts of pervasive unemployment are compounded by a social protection gap that exists for unemployed adults, as social cash grants target people who are not expected to be economically active: children, pensioners, and people with disabilities. This leaves unemployed adults deeply dependent on goodwill transfers from within their communities, placing a large care burden on communities and deepening poverty.

Leibbrandt et al. (2010) go further to show that labour markets play a dominant role in driving inequality. Even though the average share of wage income in total income has remained constant at around 70 per cent over the post-apartheid period, wage income has contributed between 85 per cent and 90 per cent of the total inequality in household income over the years 1993, 2000 and 2008. In contrast, state transfers are shown to make up less than 1 per cent of the overall Gini coefficient. Reducing unemployment and creating a better-functioning labour market is the major economic and social challenge in South Africa, which is explicitly recognized by the South African government. Indeed, employment creation has emerged as a top policy priority of the ANC-led government. Its New Growth Path strategy aims to create 5 million jobs by 2020, with ‘the creation of decent jobs at the centre of its economic policy’ (Zuma 2011). In his 2011 State of the Nation Address, President Zuma (2011) declared year 2011 to be the year of job creation and announced the government’s intention to spend R9 billion on job creation. Despite this commitment and like many other countries around the world, there is a lack of solid evidence to back this commitment.

2.2 Trends in money-metric poverty and inequality

As already noted, most of the analysis of poverty and inequality in post-apartheid South Africa has used income as the welfare measure. Studies using household consumption spending per capita have generally been restricted to one or two points in time (for example see Klasen 1997). Leibbrandt et al. (2010) use household income per capita to track changes in inequality and poverty between 1993 and 2008, and include a short section on the comparability of income and expenditure in the datasets that were used for analysis. The authors conclude that income and expenditure track each other closely in the 2008 first wave of the National Income Dynamics Survey (NIDS), but are significantly different in the 1993 Project for Statistics on Living Standards and Development (PSLSD) data. Leibbrandt et al. (2012) find that the Gini coefficients are the same in 2008 (0.66) whether measured by adult equivalized income or expenditure, but are very different (0.61 compared to 0.51) in the 1993 data. It is understood that the expenditure data in 1993 are not as reliable as the income data, thus motivating the focus on an income-based comparison.

Before presenting findings based on expenditure data, we briefly present some of the quantitative analysis that has been undertaken in support of the above narrative using income data from national household surveys. Figure 1 shows three post-apartheid real income per capita densities

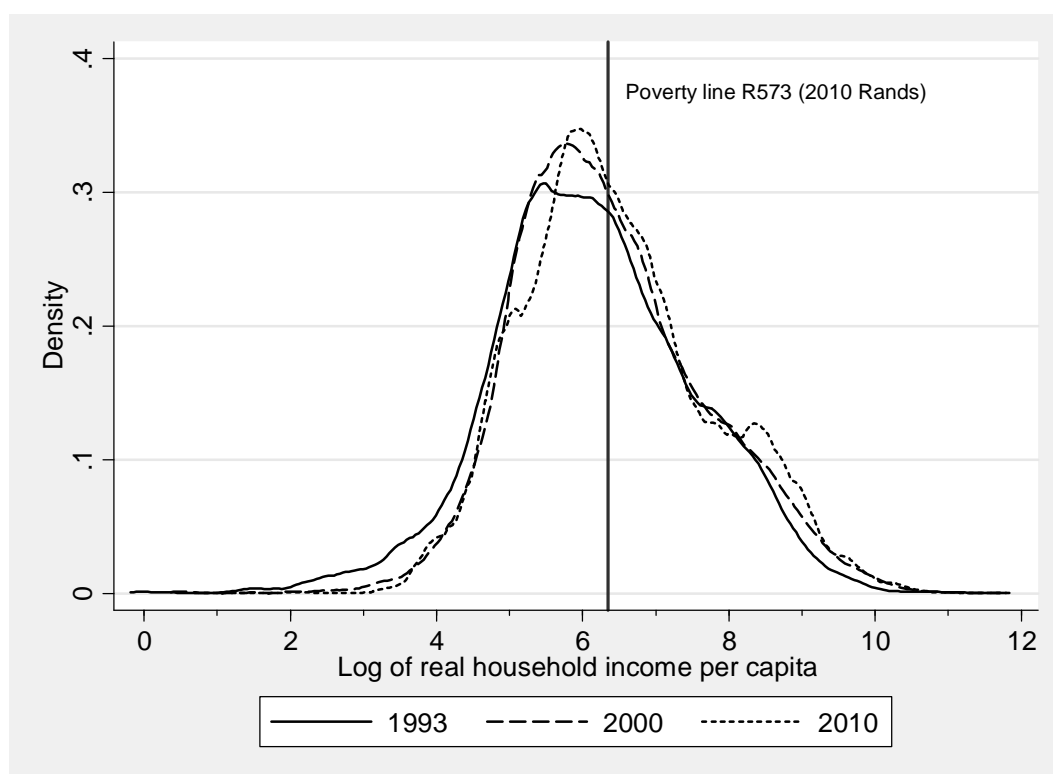
as an example of extensive empirical work that has been undertaken on the distribution of income (Fedderke et al. 2003; Hoogeveen and Özler 2006; Simkins 2004; Van der Berg et al. 2006, 2008). It provides a representative snapshot of the weight of evidence that has been marshalled in support of the above narrative.²

We begin by considering changes across the entire income distribution between 1993 and 2010. In Figure 1, the income distributions for 1993, 2000, and 2010 are all plotted on the same set of axes. A poverty line is inserted on the graph as a reference point. It is a cost-of-basic-living poverty line developed by Hoogeveen and Özler (2006). This means that we have a lower poverty line of ZAR573 per person per month and an upper poverty line of ZAR1,056 per person per month in real 2010 Rands. The lower poverty line of ZAR573 is superimposed on the graph. The graph shows that the distribution of income shifted rightwards at almost all points between 1993 and 2010. This is in line with the generalized Lorenz curves presented in Figure 2 (Panel B) which show that average real income increased for the population as a whole over the period. At the bottom of the distribution, the major shift took place between 1993 and 2000, with relatively little movement between 2000 and 2010. This pattern is reversed as we move up the distribution (but remain below the poverty line) where we see that there was a significant rightward shift from 2000 to 2010.

There is evidence of a significant rightward shift at the very bottom of the distribution and poverty dominance analysis confirms a reduction in poverty. However, this shift does not represent a dramatic decrease in poverty. According to the poverty head count ratio—simply the proportion of the population living below the poverty line—the poverty rate at the lower poverty line stood at 56 per cent in 1993 and remained steady at around 54 per cent for the later years in our analysis. The reduction in poverty incidence using the upper poverty line also stands at 2 percentage points—from 72 per cent in 1993 to 70 per cent in the late 2000s. The rightward shift at the bottom of the distribution is reflected by consistent decreases in the poverty gap rate, which gives us a broad measure of the depth of poverty in society. The main driver behind increasing incomes at the bottom of the distribution is the rapid expansion of the government social support programme. The importance of state grants in raising these incomes is highlighted in Leibbrandt et al. (2010), who note that in 1993 one-fifth of households were beneficiaries of state grants, while in 2008 this proportion had climbed to one-half and Leibbrandt and Levinsohn (2011), Bhorat and Van der Westhuizen (2011), and Woolard and Leibbrandt (2011) show clearly that social grants reduced both poverty and inequality.

² This section is based on Finn et al. (2013a).

Figure 1: Distributions of income 1993, 2000, and 2010



Source: Finn et al. (2013a, from own calculations using PSLSD 1993, Income and Expenditure Survey [IES] 2000 and NIDS wave 2 2010).

The expansion of government grants was not complemented by a reduction in the unemployment rate. The labour market is by far the most important factor to consider when decomposing poverty (see Leibbrandt et al. 2010). While the expansion of state support has helped to lower poverty, the persistently high levels of unemployment have prevented poverty reduction on a substantial scale. Decomposing poverty rates by the labour market status of household members emphasizes the crucial role of finding employment in reducing poverty. In 1993, almost 90 per cent of individuals living in a household where nobody had a job were living below the poverty line. This reduced somewhat to around 80 per cent in the period under study, but it remains very high. In fact, almost half of all the poor in the country live in a household where not one person is employed. This is in contrast to the poverty share of those living in households with two or more workers, which stands at around 17 per cent.

Decomposing poverty by different groups reveals some interesting trends. Leibbrandt et al. (2010) find that the decrease in poverty in post-apartheid South Africa is driven mainly by a fall in the poverty incidence among Africans, and particularly African males. Poverty rates for this group fell from 66 per cent to 60 per cent, while the corresponding figures for African females are 72 per cent and 68 per cent. Despite these changes, the African share of overall poverty remained constant at 93 per cent in 1993, 2000, and 2010. This far outweighs the African share in the overall population, which is close to 80 per cent.

A great deal of rural-urban migration took place in South Africa in the period under study. Our data reflect that the share of urban residents in the population rose from 49 per cent in 1993 to 60 per cent in the late 2000s. As a result of this movement, the urban share of total poverty rose from 30 per cent to about 43 per cent. That said, the poverty rate in rural areas was higher than in urban areas for any choice of poverty line.

We now move now to a discussion of inequality. South Africa has been recognized for a long time as having among the highest levels of inequality in the world and, of all countries that have reasonably good survey data, the only countries with similar levels of inequality are a handful of comparable countries from the two ‘extra-high’ inequality regions of the world, namely Latin America and Southern Africa. In panel A of Figure 2, we plot three corresponding Lorenz curves. In panel B, we do the same but with generalized Lorenz curves. The former gives a graphical measure of income inequality while the latter provides a graphical measure of social welfare through its inclusion of both inequality and mean income.

The Lorenz curves suggest a high level of inequality. The richest 20 per cent of people earn about 70 per cent of the total income, and the second richest about 20 per cent of total income. Thus the poorest 60 per cent together only earn about 10 per cent of the total income in the population. This is approximately true regardless of which dataset is being used, and is exceptionally low by international standards. The primary observation is that the distributions do not vary much with time. In this case, the 2000 graph lies slightly below 1993, and the 2010 distribution almost perfectly overlaps with 1993. The big picture conclusion is that inequality has remained mostly stable and stubbornly high over the post-apartheid era (see Leibbrandt et al. 2010; Van der Berg 2011).

Whereas Lorenz curves are unaffected by the mean of the income distribution, the generalized Lorenz curves of panel B are shifted up by mean income. If everyone in a society earned twice as much as they previously did, the new generalized Lorenz curve would rotate upwards, whereas the corresponding Lorenz curve would remain unchanged. What we observe from panel B is that the 1993 distribution is always below the 2000 distribution, which in turn is always below the 2010 distribution. Thus, panels A and B together reflect a society with stable inequality but with rising mean incomes amounting to an improvement in aggregate welfare over this time period.

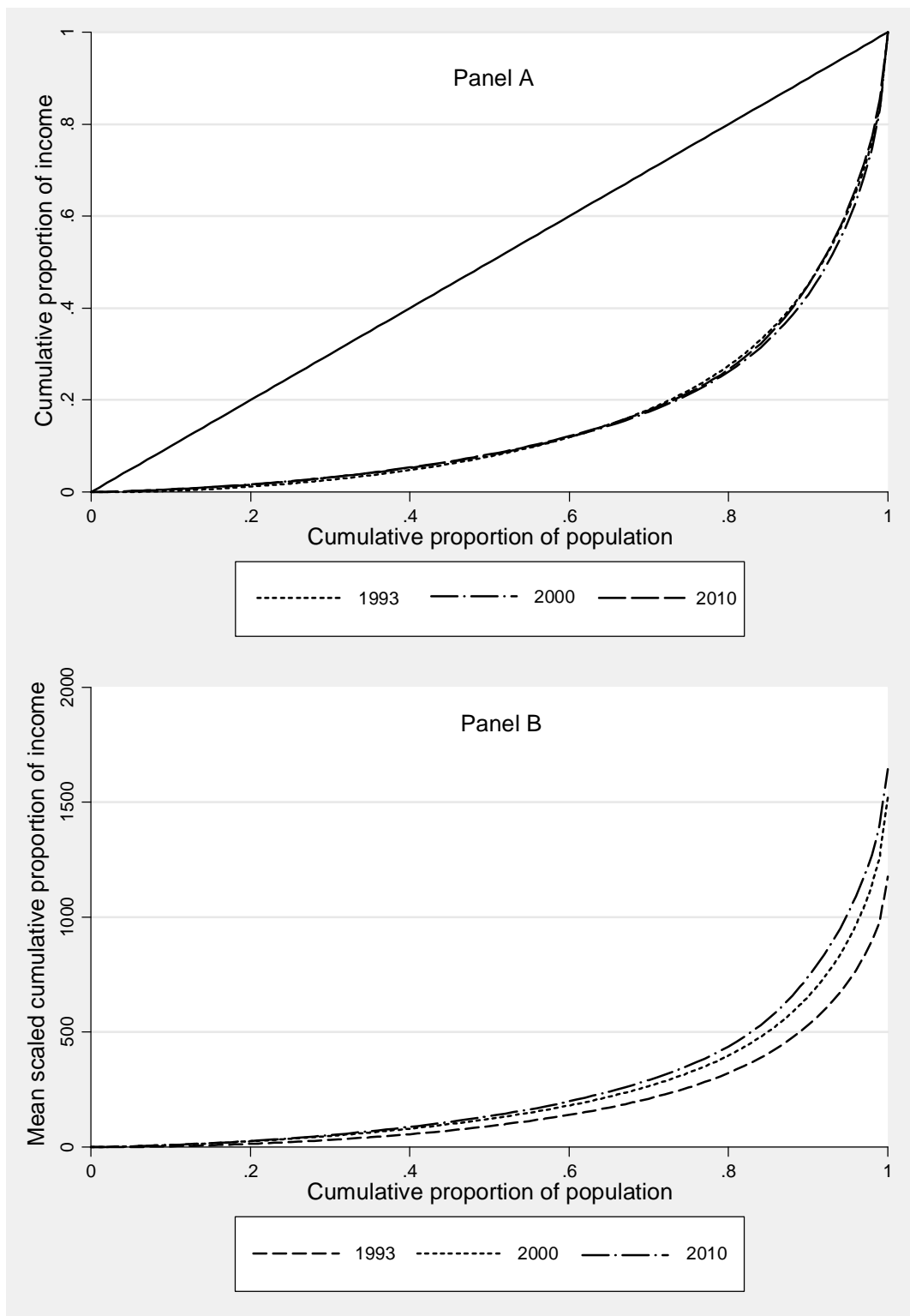
However, an increasingly pressing policy focus has developed as to why South Africa’s inequality seems to be so stubbornly persistent. Some of the evidence points to the emergence of a small but well-paid black professional class.³ Some researchers have emphasized the importance of unemployment and earnings.⁴ A third line of thinking has considered the high rates of return to tertiary qualifications in conjunction with wide variations in the quality of primary and secondary schooling.⁵

³ Hooegeveen and Özler (2006) find increases in inequality between 1995 and 2000, and attribute this mostly to increases in inequality among the African subpopulation. They also observe that the returns to education increased during this time period, particularly for Africans with high levels of education. See also Van der Berg and Louw (2004). Leibbrandt and Levinsohn (2011) support the contention that the share of within racial group inequality has risen over the post-apartheid period, but caution that the between group component remains exceedingly high by international standards.

⁴ See Leibbrandt and Levinsohn (2011) for decomposition work supporting this argument and Leibbrandt et al. (2010) for a review of the literature on this issue.

⁵ See, for example, Van der Berg (2009), Branson and Leibbrandt (2013a, 2013b) and Pellicer and Ranchhod (2012).

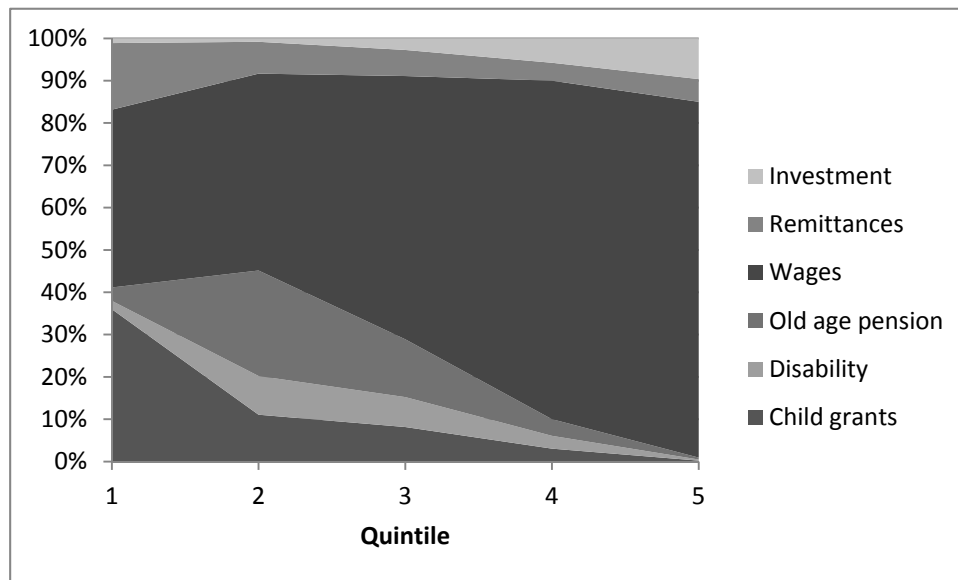
Figure 2: Lorenz curves 1993, 2000, and 2010



Source: Finn et al. (2013a, from own calculations using PSLSD 1993, IES 2000 and NIDS wave 2 2010).

Figure 3 follows on to provide a representative snapshot of the empirical work that has been undertaken to understand the drivers of these changes in the densities. It shows the share of income sources in total household income by income quintile in 2008. The proportion of income derived from wages increases linearly by income quintile. If a person is a member of a household situated in the poorest five deciles, the person is likely to receive relatively little wage income and to depend quite heavily on government grants and subsidies.

Figure 3: Share of household income from various sources, 2008



Source: Leibbrandt et al. (2010).

2.3 Trends in non-money-metric poverty

Most studies in the post-apartheid era have focused on the assessment of trends in money-metric poverty and inequality, using income and/or expenditure data. Money-metric measures of welfare are extremely important in terms of our understanding of poverty and inequality in South Africa, and have the distinct advantage of being measured in consistent and easily comparable (currency) units. However, the concept of welfare extends beyond the simple flow of income or expenditure into and out of a household and includes, among other things, the various assets accumulated by households over time. Further, in the context of public policy, many government interventions involve the transfer of assets and provision of services to households that are not picked up in income measures and are not necessarily easily valued in currency terms. Such assets include, for example, the provision of sanitation services or housing.

The assessment of trends in non-money-metric welfare is less commonly attempted in South Africa when compared with the volume of publications dedicated to the assessment of income/expenditure poverty and inequality. One reason for this is that the aggregation of various disparate assets and services into a single measure of welfare for comparison is a complex task. Fortunately, although various methods have been devised to allow such comparisons, very few published analyses that cover the period after 2005 have been located.

The non-money-metric welfare story of the post-apartheid era is considerably more straightforward than the money-metric story. Not least among the reasons for this is the fact that measures of non-money-metric welfare include a large number of services and assets that are directly impacted by the state's roll-out of services as it addresses some of the infrastructural and other inequalities inherited from apartheid. Thus, the provision of low-cost housing, the provision

of access to water, improved sanitation, and massive electrification of particularly poor township areas has been prioritized and has boosted access rates. As a result, all the studies located point to declines in non-income⁶ poverty and inequality irrespective of the period within the last 20 years since 1993.

Bhorat and Van der Westhuizen (2013), using factor analysis, construct an asset index and find significant declines in non-income poverty and inequality between 1993, 1999, and 2004. Non-income poverty rates and the non-income poverty gap declined across a number of demographic covariates, with the results robust to the choice of poverty line (Bhorat and Van der Westhuizen, 2013: 18). The non-income measure included dwelling type (formal or not); construction materials for roofs and walls; water access; power sources for lighting and cooking; sanitation; access to telecommunications, to a vehicle, and to a television. While well-established South African patterns of vulnerability are reaffirmed in the study—Africans, females, and rural dwellers are typically worst off—the authors find that improvements in asset poverty and inequality were concentrated in the immediate post-apartheid period, rather than in the latter half of the period.

Bhorat et al. (2007) construct a so-called Comprehensive Welfare Index, as well as separate private and public asset indices. The Comprehensive Welfare Index is constructed to include both private and public assets, wage and non-wage income, and education levels. The analysis reveals that while poverty across all three of these indices declined between 1993 and 2005, the decline was more rapid for the Comprehensive Welfare and Public Asset indices between 1993 and 1999, and more rapid for the Private Asset Index between 1999 and 2005 (Bhorat et al. 2007: 48). The former trend, which occurred despite growth in fiscal allocations for such activities over time, may be related to the issue of ‘low-hanging fruit’, where earlier interventions were simpler, cheaper, and had higher numerical impact. The latter trend relates to the relatively good economic and, particularly towards the end of the period, labour market performance that would have facilitated the accumulation of private assets.

Finn et al. (2013b) construct a multidimensional poverty index (MPI) and compare measures of multidimensional poverty from the 1993 PSLSD and the second wave of NIDS in 2010/11. The index comprises three dimensions—education, health, and living standards—which themselves contain nine indicators. Some examples of indicators include school attendance, child mortality, nutrition, access to water and electricity, as well as an asset index. Using an MPI poverty line of deprivation in at least one-third of weighted indicators, the authors calculate multidimensional headcount rates of 37 per cent in 1993 and 8 per cent in 2010. The proportion of the population in severe MPI poverty also dropped substantially from 17 per cent to 1 per cent. This strong decrease is reflected in the MPI measure itself (the MPI headcount multiplied by the intensity of poverty), which fell from 0.17 to 0.03 over the period. The largest drivers of the reduction in multidimensional poverty were access to water and electricity. The authors compare the drop in MPI poverty to money-metric poverty between 1993 and 2010, and demonstrate that MPI improvements were far more robust.

This finding is complemented by Schiel et al. (2013), who compare income poverty to asset poverty. The authors construct asset indices using both the principal components and factor analysis approaches. They find that it is hard to make comparisons of asset indices over the post-apartheid period because a standard asset bundle changes substantially between the beginning and the end of the period. Nonetheless after extensive sensitivity checks, it is clear that real welfare gains for South Africans over the period were higher when non-money-metric measures were used.

⁶ In this section, income and expenditure are taken as synonyms. The term ‘non-income’ therefore implies ‘non-expenditure’.

The consensus is that non-income measures of poverty and inequality tell a more positive story of the post-apartheid period, and one that does not appear to be materially impacted by the choice of base year for comparison. Asset poverty and inequality levels have declined as the state actively intervened to uplift poor and marginalized communities through the provision of basic services and improved housing. Importantly, the evidence suggests that demographic and locational markers of disadvantage are being eroded quite significantly over time, as within-group differences explain an increasing proportion of inequality.

Our review of an extensive literature and our new calculations have shown a post-apartheid poverty and inequality picture that is very consistent. Up to this point, our data work has made use of income data as a way to show the centrality of the labour market—wage income and the lack of it—in driving inequality, and the importance of social grants in driving the improvements in poverty. However, our review of the secondary literature includes studies that have told the money-metric story using expenditure data, deflated using a simple aggregate consumer price index.

In order to lay the foundation for an analysis of differential price changes across the distribution, we need a much more detailed discussion of expenditure data by category, as well as the available price data. Here there is only a thin South Africa literature to draw on, requiring us to proceed to fairly detailed discussions of the available expenditure and price data. However, we relegate much of the detail to appendices.

3 South African expenditure and price data

3.1 Expenditure data

Various household surveys collecting information on household expenditures have been conducted in the past 20 years in South Africa. These surveys have varied in level of detail, geographical coverage and representivity. For the purposes of this analysis, we have considered seven of the key nationally representative surveys that collect detailed expenditure data. These are:

- The 1993 Project for Statistics on Living Standards and Development (PSLSD) survey, conducted by the Southern Africa Labour and Development Research Unit (SALDRU) at the University of Cape Town;
- The 1995 Income and Expenditure Survey (IES), conducted by Statistics South Africa;
- The 2000 IES, conducted by Statistics South Africa;
- The 2005/06 IES, conducted by Statistics South Africa;
- Wave 1 (2008) of the National Income Dynamics Survey (NIDS), conducted by SALDRU;
- The 2008/09 Living Conditions Survey (LCS), conducted by Statistics South Africa; and
- The 2010/11 IES, conducted by Statistics South Africa.

These seven datasets are spread out across the almost 20 years since the end of apartheid and are some of the most widely used datasets for work on incomes and expenditures. Wave 2 of NIDS was not considered because of issues of comparability of the expenditure data between the first and second fieldwork phases of the wave. The datasets used here are discussed in more detail in Appendices A and B.

The seven chosen datasets differ from each other in a variety of ways, not least of which is the format of the expenditure variables. Therefore, before any analysis could take place, the datasets needed to be recategorized and the expenditure aggregates reconstructed. This would, hopefully, allow for direct comparisons across datasets, but should ideally also allow a direct match with the

available price data.⁷ The expenditure categories presented in Table 2 are, therefore, taken from the official weighting structure and have been consistently applied, as far as possible, across each of the datasets.

Most of the classification is relatively straightforward. Savings, debt repayments, and investments were excluded from the aggregates. There was, however, an important complication relating to the housing expenditure category, which requires some explanation. The 1993 PSLSD questionnaire asked households that were not paying rent (i.e. home owners, as well as those living rent-free in a dwelling they do not own) to estimate the rent that they would normally have had to pay. Where there were missing values, an annual value was imputed as 5 per cent of the value of the dwelling.

Across the four IESs, two different methods of valuing owner-occupied housing were employed. In 1995 and 2000, the IES asked questions about mortgage payments of owner-occupiers, breaking the mortgage payment into the interest and capital components. Interest on mortgage bonds was then added to total expenditure. However, these three variables—interest component of repayment, capital component of repayment, and total repayment—are of such poor quality that a value for interest on mortgage bonds cannot be reconstructed, with Statistics South Africa relying on external data sources to estimate a value. In 1995, households were asked to report the value of the dwelling (although the quality of the data is not clear), while in 2000 this question was not asked at all. In 2005/06, imputed rent was calculated as 7 per cent of the value of the dwelling. In the LCS, imputed rent was calculated as 6.32 per cent of the value of the dwelling. In the 2010/11 IES, Statistics South Africa followed a ‘segmented approach’, applying ‘rental yields ... by type of housing and province’, using average rental yields published by a third party (Statistics South Africa 2012a: 27).⁸

In wave 1 of NIDS, home owners were asked what rental income they could receive if the main property were to be rented out on a monthly basis. Those households that fell into the category of ‘don’t own, don’t rent’ were asked what they would pay per month if they had to. Although these different questions were asked to different types of households, there are no comparability issues. As with most questions of this nature, missing data problems arise, and these are imputed using a single regression approach while controlling for the usual individual, household, and neighbourhood characteristics.

Normally, there would be two options available to construct an expenditure aggregate for housing. First, one could gloss over the differences in the questionnaires and use the data as they are, with owner-occupied housing being valued either as a percentage of the dwelling value or as the interest payment on mortgage bonds, depending on the dataset. This is not possible, however, since we are unable to reconstruct the interest on mortgage bonds variable. Alternatively, we could calculate imputed rent for each of the datasets. However, the datasets that have imputed rent variables used different percentages and, given rapid change in the South African housing market over the period, it is unclear whether imputed rent should be calculated as a constant proportion of the dwelling value at different points in time and, if not, what values would be appropriate in the years for which imputed rent should be calculated. Indeed, Statistics South Africa’s implementation of differentiated rental yields for this purpose in the 2010/11 IES suggests the need for a more nuanced approach. For this reason, the cost of owner-occupied housing could not be included within our expenditure aggregate.

⁷ South African price data is detailed in Section 3.2 and Appendix D.

⁸ Since the published rental yields did not cover Limpopo and the North West, a national average rental yield was applied in these two provinces.

However, excluding the cost of owner-occupied housing introduces a bias in the data, since expenditures on actual rent paid are included within the housing category. Excluding the cost of owner-occupied housing, while leaving actual rent in the expenditure aggregate, would result in renters appearing better off than owners and biasing poverty rates for home owners upwards. The only real option then was to exclude both the cost of owner-occupied housing and actual rent from the expenditure aggregates calculated below. This means that any poverty measures presented below are likely to be higher than measures calculated on the basis of the published aggregate expenditure variables in each dataset.

Next we look at the structure of expenditures from each of the surveys in order to further interrogate comparability of the datasets over time. By looking at the structure of expenditures from each of the surveys, we hope to identify potential problems that may have implications for the analysis that follows. These aggregate expenditure shares are presented in Table 2. Unfortunately, there appear to be significant issues that may compromise the comparability of the surveys in terms of the structure of expenditure. First and foremost is the very high food share within the 1993 aggregate and the very low shares in 2005/06 and 2010/11. Food is by far the largest of the expenditure categories in all but two of the surveys. There is a difference of almost 14 percentage points in the food shares in 1993 and 1995, while this share drops by nearly 10 percentage points from 2000 to 2005/06, and jumps 5.5 or 9.2 percentage points to 2008, depending on the dataset. At the very least, it is highly improbable that these shifts are true reflections of changing behaviour at the household level. Given what we know about the economy during the period, though, the food shares in the most recent three years are not inconsistent. Other expenditure categories with relatively high 1993 shares and relatively low 2005/06 shares include non-alcoholic beverages, alcoholic beverages, and cigarettes, cigars, and tobacco. In 2005/06, data on expenditures in these three categories, as well as food, were collected via the weekly diary, which was judged to have led to an under-reporting of expenditures in these categories.

Transport is typically the second-largest expenditure category, accounting for between 10 per cent and 16 per cent of total expenditure. However, the latter two IESs and the LCS reveal far higher transport expenditure shares, ranging between 21 per cent and 25 per cent. The very high expenditure share in 2005/06 coincides with a very low share for food in that year and was subject to considerable debate at the time of the data's release.

The impact of excluding actual and imputed rent is immediately evident in the low share of housing within total expenditure across all the surveys. Normally, housing would have been the second-largest category within total expenditure, but now essentially consists of property rates, utilities (excluding power), and expenditures related to maintenance or building. That said, housing's expenditure shares in 1993 and especially 2008 (NIDS) appear to be somewhat out of line with the shares in the remaining years, with the 2008 (NIDS) share being particularly low, less than half the share in 2005/06 and significantly lower than the share in the LCS.

The relatively high shares of food, non-alcoholic and alcoholic beverages, cigarettes, cigars, and tobacco, household operation, and education in 1993 are compensated for by low shares for housing, medical care and health expenses, recreation and entertainment, and other goods and services.

Overall, then, relatively few expenditure categories exhibit clear trends across the five datasets. Household fuel and power sees its share of total expenditure rise from 1993 to 2000, and then fall thereafter, while medical care and health expenses see a gradual rise over the entire period. Perhaps most concerning, though, is the instability exhibited by the expenditure shares of the food subcategories, which should be easily categorized. This is true across virtually all subcategories.

However, it appears that, as a proportion of food, expenditure shares for the food subcategories are more stable.

Given that we are concerned about distributional issues, it is important to consider expenditure shares across the distribution. For this purpose, Figure 4 presents expenditure shares across five expenditure quintiles for food, housing, and transport. By presenting each quintile separately, it is easier to identify whether there are trends over time within a given quintile, while still allowing for comparisons across quintiles for a given year. Food, housing, and transport were chosen as these are generally the three main expenditure categories, although medical care and health costs do have a slightly higher mean weight across the five datasets than housing.

The first point to note here is that, for all three expenditure categories, shares of total expenditure vary across the quintiles in the expected way. Thus, food is a larger component within total expenditure for poorer households than in richer households, while housing and transport account for a larger proportion of total expenditure as per capita expenditure levels rise. In this sense, the datasets are internally consistent in terms of yielding expected patterns of expenditure shares across the distribution, and this general pattern is repeated in all of the datasets used.

However, there are concerns when one considers the pattern of the expenditure shares over time for a given quintile and it is in this sense that the data are not externally consistent. In terms of food, for quintile 5, there seems to be a gradual downward trend in the share of food in total expenditure. This is consistent with the view that incomes at the upper end of the distribution have risen over time, putting downward pressure on the food share. However, as one moves down the distribution, the trend becomes less clear: for quintile 3, the 2008 (NIDS) food share rises back above the 2000 share, while for quintiles 1 and 2 it rises above the food share in 1993, which was noted above to have been unusually high (the overall food share in 1993 was nearly twice that of 2008 [NIDS]).

Housing increases as a share of expenditure as one moves up the distribution, particularly between quintiles 4 and 5. However, over time, quintile-specific expenditure shares bounce around: the 1995 shares are particularly high for the bottom four quintiles while the 1993 shares appear particularly low for the lower quintiles. A rising share of housing within total expenditures from 1993 can be explained as the result of extension of municipal services—municipal services such as water, sanitation, and refuse removal are important components within our housing aggregate—but it is not clear that the 1995 shares can be explained as part of this roll-out of services. Most disturbingly, housing's share of total expenditure in quintile 5 collapses in 2008—from 8.3 per cent in 2005 to 3.4 per cent using the NIDS data or to 6.5 per cent using the LCS data—which cannot be reconciled with the reality of generally above-inflation increases in the costs of municipal services and property taxes for this group.

Table 2: Composition of total expenditure, 1993–2010

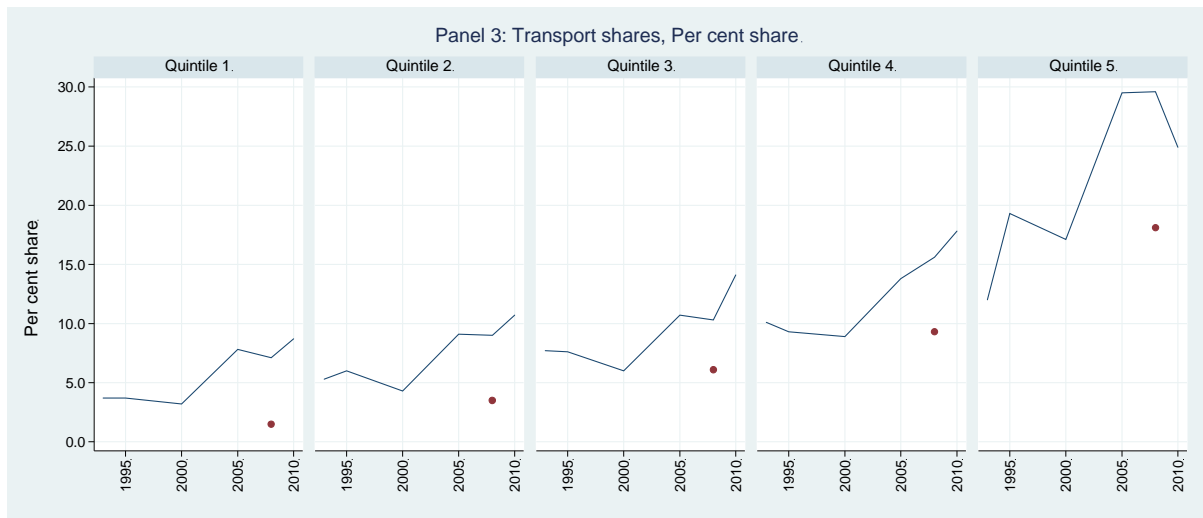
Category	1993	1995	2000	2005	2008 NIDS	2008 LCS	2010
Food	39.2	25.8	25.7	15.8	21.3	25.0	16.5
Grain products	9.7	6.0	6.7	3.6	5.3	7.4	4.0
Meat	8.5	7.0	6.5	5.2	5.0	6.5	5.1
Fish and other seafood	1.1	0.9	0.9	0.6	0.8	0.5	0.4
Milk, cheese, and eggs	5.4	2.5	2.5	1.8	2.1	2.8	1.8
Fats and oils	2.0	1.3	1.1	0.6	1.4	1.3	0.7
Fruit and nuts	1.5	1.3	1.4	0.7	0.6	0.6	0.6
Vegetables	4.7	2.6	2.8	1.6	2.0	2.6	1.6
Sugar	1.6	1.2	1.0	0.5	0.9	1.4	0.5
Coffee, tea, and cocoa	-	1.0	0.9	0.3	0.6	0.6	0.3
Other food products	4.7	1.9	1.8	0.9	2.6	1.3	1.7
Non-alcoholic beverages	1.6	0.9	1.0	0.7	0.7	1.6	0.7
Alcoholic beverages	2.0	1.2	1.1	0.6	1.1	0.8	0.7
Cigarettes, cigars, and tobacco	1.9	1.3	1.4	0.8	1.2	0.7	0.7
Clothing and footwear	5.5	7.2	5.5	5.8	6.0	6.8	5.7
Clothing	3.9	5.4	3.7	4.1	-	4.9	3.8
Footwear	1.6	1.8	1.7	1.7	-	1.9	1.9
Housing	5.0	7.8	6.9	7.0	3.3	5.6	6.6
Household fuel and power	4.0	4.4	4.8	4.0	3.6	3.7	4.9
Furniture and equipment	5.5	5.8	3.3	4.7	4.2	4.1	3.0
Furniture	4.3	3.3	1.6	2.3	2.7	1.3	1.1
Appliances	0.6	1.4	1.0	1.2	0.7	1.4	0.9
Other HH equipment and textiles	0.6	1.1	0.8	1.3	0.7	1.3	1.0
Household operation	7.6	4.7	5.2	3.4	6.9	3.3	3.5
Household consumables	1.1	2.0	1.6	1.0	1.4	1.3	0.8
Domestic workers	3.2	2.3	3.5	2.4	2.0	1.9	2.6
Other household services	3.3	0.5	0.1	0.1	3.5	0.0	0.0
Medical care and health exp.	2.4	6.0	5.6	7.8	9.3	7.9	12.3
Transport	10.2	15.4	14.0	24.5	15.0	23.3	21.8
Vehicles	0.0	5.2	4.5	13.6	6.4	10.5	10.0
Running costs	6.1	6.1	6.7	7.0	6.1	9.0	7.9
Public and hired transport	4.1	4.1	2.8	4.0	2.5	3.8	4.0
Communication	2.6	3.3	2.8	3.6	4.2	4.8	3.3
Recreation and entertainment	1.6	2.4	2.6	4.5	4.9	3.0	3.3
Reading matter	0.7	0.7	1.0	0.6	0.5	0.9	0.5
Education	4.5	2.3	5.0	4.1	8.0	5.6	4.5
Personal care	2.5	3.5	4.6	1.5	1.7	1.7	1.6
Other goods and services	3.2	7.3	9.4	10.6	8.2	1.3	10.4
Total expenditure (2008 ZAR billion)	443.6	523.0	474.0	722.8	721.6	769.2	851.7
Mean per cap. expenditure (2008 ZAR)	9,303	12,385	11,212	15,253	13,168	15,724	16,890
Median per cap. exp. (2008 ZAR)	5,127	5,342	4,178	5,533	3,744	6,516	6,745

Source: Own calculations.

The share of transport within total expenditure initially remained relatively constant over the period for the lower four quintiles, although the latter part of the period saw some significant increases. Transport accounted for a particularly high share of total expenditure in quintile 5 in 2005 and 2008 (LCS). As noted earlier, the overall share for transport in 2005/06 was 9 to 10 percentage points higher than the proportions in each of the other surveys apart from 1993. Statistics South Africa explained this high proportion of transport within total expenditure as a result of the boom in vehicle sales that occurred during the mid-2000s (and had cooled off by the start of the recession), but Figure 4 indicates that this spike was experienced across all quintiles. It is, therefore, unlikely that vehicle purchases would explain this spike across all quintiles. The low overall share in 1993 is explained by the fact that, for the top quintile, transport accounted for just 12.0 per cent of total expenditure, compared with between 17 per cent and 30 per cent in the other surveys.

Figure 4: Selected expenditure shares by quintile, 1993–2010





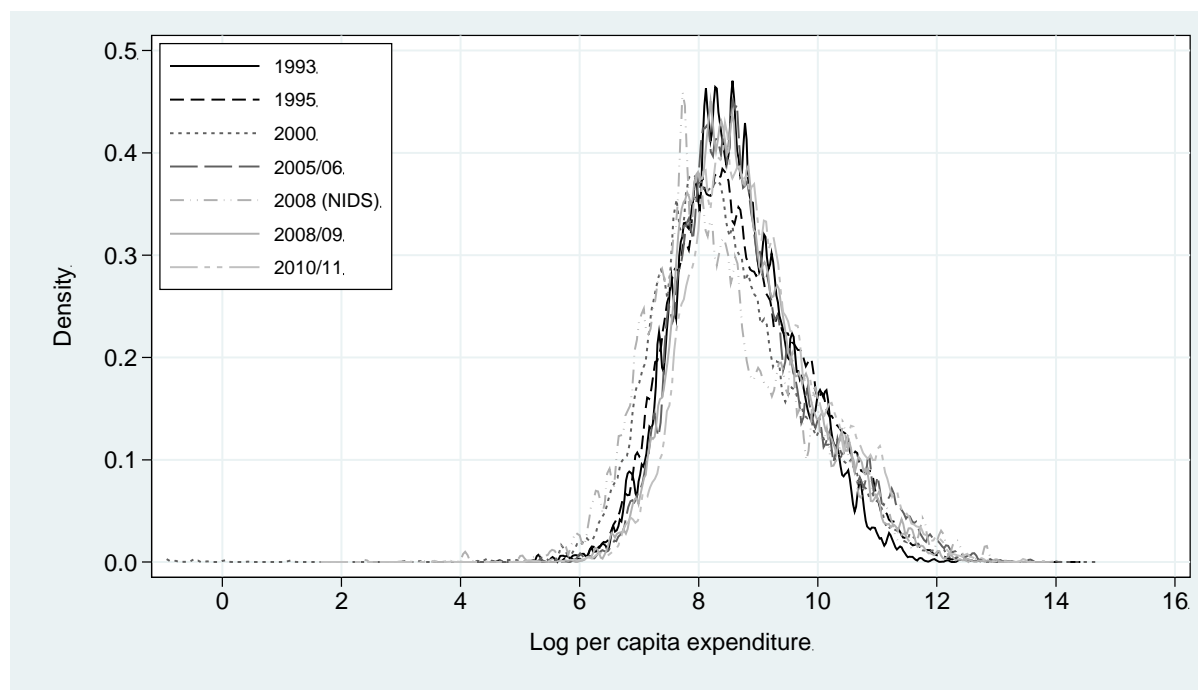
Note: The dot in each graph represents the NIDS 2008 data.

Source: Own calculations.

This discussion of expenditure shares across quintiles over the 18-year period has unfortunately not done much to convince us that the seven datasets are comparable. From the perspective of expenditure shares, the datasets appear to be internally consistent in that the shares vary across the distribution in a way that one would expect. The datasets, however, do not appear to be externally consistent in that they are, in most expenditure categories, unable to tell a coherent story over the period.

In terms of the actual distributions of real per capita expenditures, Figure 5 presents kernel densities for each of the five datasets. There are a few notable differences between the five distributions. In 2008 (NIDS), there is a far larger proportion of individuals with zero expenditures. In fact, of the 305 observations with zero expenditures across the five datasets, 292 are from the 2008 NIDS dataset. The 2008 (NIDS) distribution is also located slightly towards the left of the other distributions, peaking at a somewhat lower per capita expenditure than the others. Similarly, the 2000 distribution is located slightly to the left of all the other distributions except the 2008 distribution. This would be consistent with the relatively low aggregate expenditure figure for 2000. Interestingly, the 2005/06 distribution appears most similar to the 1993 distribution, particularly up to expenditures of around ZAR10,000 per capita ($\ln 10,000 = 9.21$).

Figure 5: Log of per capita expenditure distributions, 1993–2010



Note: Zero expenditures are omitted in this figure. Of the 305 individual level observations with zero expenditures, 292 were in the NIDS 2008 data, while only 9 are found in the PSLSD 1993 data and 4 in the IES 2010/11 data.

Source: Own calculations.

All in all then, the expenditure data reveal some awkward anomalies for use in making comparisons over time. These anomalies are not benign. In Appendix C, we take all of these expenditure datasets at face value and spell out the post-apartheid poverty and inequality story that they reveal. The result is a volatile picture that lacks plausibility when benchmarked against the post-apartheid story that we have told above, drawing on an extensive money-metric and non-money-metric literature. That said, given the similarities in methodology, the three latter surveys conducted by Statistics South Africa—the IES 2005/06, the LCS 2008/09, and the IES 2010/11—seem to provide a coherent and plausible picture of the most contemporary period. Therefore we use them for the analysis below. Before we undertake this analysis, we introduce the price data that we have available to twin to the expenditure data.

3.2 South African price data

South Africa’s official measure of the price level is the All Items CPI. The CPI is calculated and released on a monthly basis by Statistics South Africa and is one of the key pieces of data considered by the South African Reserve Bank’s Monetary Policy Committee in its decisions around interest rates. The construction of the CPI relies on two key types of data: household expenditure data, used to construct the CPI expenditure weights, and price data. As already noted, the IESs are conducted as a basis for the construction of the weights, while Statistics South Africa continually surveys a wide variety of prices.⁹

The key challenge that exists in terms of this research is being able to pull together a consistent series of price data for the post-apartheid period. The first reason for this is that, since the early 1990s, Statistics South Africa has revised the geographical unit of analysis. Prior to 1997, the CPI was defined in terms of so-called ‘historical metropolitan areas’, which essentially covered only the

⁹ For more detail on the South African CPI, see Appendix D.

country's major urban areas. In 1997, Statistics South Africa added indices that covered 'historical metropolitan and other urban areas', expanding coverage to a greater number and wider variety of urban areas around the country. Finally, in 2008, revisions to the CPI saw the replacement of these geographical designations with primary and secondary urban areas. As a result, indices for metropolitan areas cover most of the post-apartheid era but are geographically most restrictive. Provincial-level CPIs are only available from 2002 onwards, although it is not clear whether this was due to the timing of the changes in provincial boundaries that occurred in the mid-1990s or to Statistics South Africa not seeing a need at the time to calculate them.

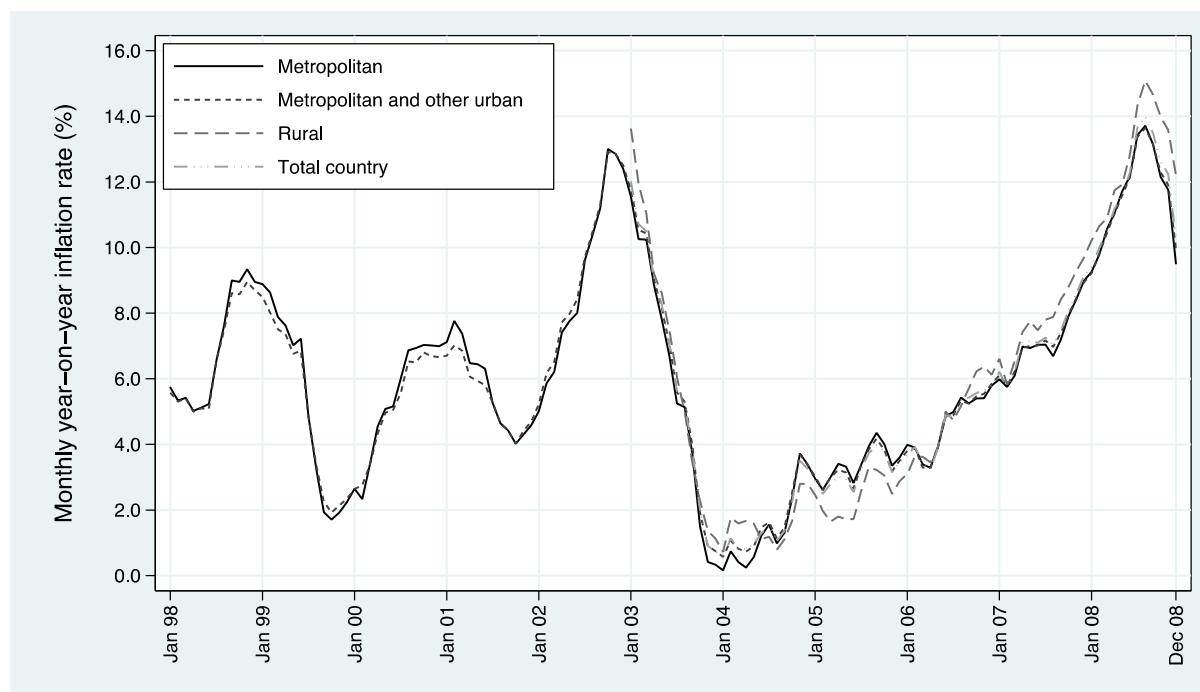
The second reason is that the CPI underwent a significant methodological change in 2008, with Statistics South Africa choosing to use the Classification of Individual Consumption According to Purpose (COICOP), rather than the Standard International Trade Classification used up until that time. As a result, various items were shifted from one expenditure category to another within the CPI, meaning that sub-indices before and after 2008 are not always comparable even though they may have the same names.

Finally, although rural (and total country) price indices have been published since January 2007, they are calculated on the basis of urban prices and rural (total country) expenditure weights. Technically, if prices faced by rural households move in tandem with those faced by urban households, then the ability of these indices to track rural and national inflation rates is not compromised. One way that this can be ascertained is by looking at where rural households purchase goods, since it is possible that the bulk of their purchases are actually made in urban areas, despite them residing in rural areas. Such information is asked for in both the 2000 and 2005/06 IESs, but only the 2000 data were released. According to the data, 75.6 per cent of rural households in 2000 reported doing most of their shopping for at least half of the product categories in urban areas, rather than in local shops in the rural area.¹⁰ Thus it seems, for 2000 at least, that the use of urban prices for the rural index is not inappropriate.

To give some sense of the variation in inflation rates according to these different geographies, Figure 6 shows that the exact choice of geographic coverage of the All Items CPI—whether metropolitan areas, metropolitan, and other urban areas, or total country—should have only minor implications for the analysis. It is only the rural areas inflation rate—data for which are published only from 2002 onwards—that differs markedly from the others' inflation rates, the result of relatively high expenditure weights for food and household fuel and power among rural households who are predominantly poor. A correlation matrix for the four variables confirms the very high degree of correlation between all four CPIs, with correlation coefficients above 0.98.

¹⁰ Statistics South Africa asked households to indicate the location where they do most of their shopping for each of 22 product categories, broadly corresponding to the CPI expenditure categories. If a rural household indicated 'urban area' for at least 11 product categories, irrespective of total expenditure on the product category, it forms part of the 75.6 per cent reported above.

Figure 6: Inflation rates for different geographical definitions, 1998–2008



Notes: The inflation rate is calculated as a monthly year-on-year inflation rate. The graph covers only that period of time for which there is an alternative definition to metropolitan areas (i.e. from 1998 onwards).

Source: Own calculations, Statistics South Africa online data.

Based on our analysis of the expenditure data, we have chosen to limit our analysis to the IES 2005/06, the LCS 2008/09, and the IES 2010/11. This decision is further affirmed by the fact that it also coincides with a period in which the geographical coverage of the CPI is generally consistent and price data are available according to the COICOP classification. Going forward, we make use of the price indices for all urban areas.

In sum then, at the outset it was our hope that we would be able to conduct our analysis using expenditure and price data spanning the post-apartheid period. However, our detailed analysis of the expenditure and price data has shown that neither the expenditure data nor the price data are consistent enough to undergird such a full period analysis. We have found that three datasets covering the period 2005 to 2010 are up to the demands of such comparative work and we will use them to explore in detail the sensitivity of poverty and inequality estimates to price changes in contemporary South Africa.

4 Sensitivity of poverty and inequality estimates to price changes

The above story of slight declines in money-metric poverty, stronger declines in asset poverty, and persistently high inequality is consistent with a large body of evidence and is pretty settled. However, we have seen that expenditure patterns differ considerably across the distribution as do the price indices for different consumption components. The impact of these relative price changes and relative inflation rates is a near unexplored aspect of these changes in well-being. We move on to exploring these now.

Money-metric measures of poverty rest on the assumption that a given level of expenditure (or income) can be mapped directly to well-being. In a single-period setting, poverty measurement is straightforward in the sense that household (or individual) rankings are clear: more income or

expenditure is associated with higher utility. However, in a multi-period setting, the impact of prices needs to be taken into account. The way in which price changes are accounted for may impact on the observed rankings themselves, as well as the rankings relative to the poverty line, distorting the chosen measures of poverty. The same can be said for the measurement of inequality. As Goni et al. (2006: 4) put it: '[when] inflation rates differ across individuals the distributions of nominal and real consumption may follow different paths'.

Typically, the impact of price changes is controlled for through the use of a single price deflator. This paper, for example, has used the headline CPI to deflate nominal household expenditures to 2008 prices. However, this means that each expenditure item or category within the aggregate is assumed to have experienced price changes of the same magnitude and in the same direction. This is not true, as a cursory glance at the various product indices published by Statistics South Africa will confirm. In combination with differences in consumption bundles across households, this means that a single deflator is unable to adequately account for the impact of price changes for all households. Indeed, household-specific inflation rates (calculated on the basis of the expenditure patterns of individual households) can vary quite substantially in a given period. Between January 1998 and December 2008, for example, it is estimated that an average of one-third of urban South African households actually experienced rates of inflation within 1 percentage point of the overall urban inflation rate (Oosthuizen 2013).

While it is technically possible to deflate each expenditure item using its specific deflator, such detailed price data are not publicly available and may cause difficulties where items do not exist in a particular survey. The approach taken here will be to use price indices at the most detailed level of disaggregation published by Statistics South Africa. Typically, these indices are 'second tier' indices. In other words, while an index is published for food, we use the component indices for grain products; meat products; fish and other seafood; milk, cheese, and eggs; fruits and nuts; and so on. However, some categories do not have more detailed component indices. These include non-alcoholic beverages; cigarettes, cigars, and tobacco; housing; household fuel and power; communication; and personal care, among others.¹¹

4.1 Sensitivity of poverty estimates to the choice of deflator

Given the fact that different households consume different baskets of goods and experience differing rates of inflation over time, the question asked in this section is what was the impact of price changes on headcount poverty rates in South Africa between 2005 and 2010? In answering the question of how important price changes were for the poverty landscape, we begin by comparing CPI-adjusted cumulative distribution functions (CDFs) to percentile-specific price inflation indices (PCPI) CDFs. This requires us to deflate each percentile of the expenditure distribution for each period by its own price index, rather than simply deflating the entire distribution by headline CPI. We then consider how adjusting for percentile-specific inflation affects Growth Incidence Curves (GICs) between 2005 and 2010. Finally, we compare the results of a Datt and Ravallion (1992) decomposition of poverty with a more recent innovation introduced by Günther and Grimm (2007), where the inflation rate underlying the poverty line is taken into account.

Constructing the PCPI involves two steps. First, we calculate the share of each expenditure item in total consumption expenditure for each percentile, and then assign this share as the weight for each relevant item. This is done at the most detailed level of disaggregation for which Statistics South Africa publishes price indices. Second, we multiply the weight by the price change for each

¹¹ In terms of the COICOP naming conventions, the indices used here are at the 3-digit ('class') or 4-digit ('group') level (see Statistics South Africa 2009b: 5).

item, then sum across each item for each percentile to arrive at PCPI. So, for example, the percentile-specific inflation faced by percentile x at time t across items i to k is

$$PCPI_{x,t} = \left[\sum_i^k w_{i,x} \frac{p_{i,t-1}}{p_{i,t}} \right]^{-1}$$

where $w_{(i,x)}$ is the weight of expenditure item i for percentile x and p_i is the price of item i . The weights were not adjusted for each of the years of the study, and were based on the shares derived from the 2008 LCS dataset.

A quick way of graphically assessing the impact of percentile-specific price changes on poverty is to compare CDFs where expenditure is deflated by CPI in one case and by PCPI in the other. This is what is shown in Figure 7. In both panels consumption expenditure is deflated to the base year of 2008. In the upper panel, the red line, corresponding to the PCPI deflator, is nowhere below that of the blue line which corresponds to the CPI deflator. This indicates that headcount poverty rates would be higher at the poverty line of ZAR6,084 if percentile-specific price changes were to be taken into account. The conventional use of the CPI as the deflator therefore provides us with a lower bound of the poverty line. This situation is somewhat different in the IES 2010 data, where the CPI and PCPI CDFs overlap almost perfectly over the range R0 to ZAR15,000 household expenditure per capita per year.

While CDFs provide a snapshot of how using a PCPI deflator affects poverty in a single time period, GICs, following Ravallion and Chen (2003), allow us to assess how growth rates varied by each percentile over two time periods. We compare GICs where consumption expenditure is deflated by headline CPI versus where it is separately for each percentile of the expenditure distribution. Borrowing notation from Günther and Grimm (2007), the CPI-deflated GIC between time t and $t-1$ where expenditure is deflated by CPI is given by:

$$g_{t(p)} = \frac{y_{t(p)} \frac{1}{1+i_t}}{y_{t-1(p)}} - 1$$

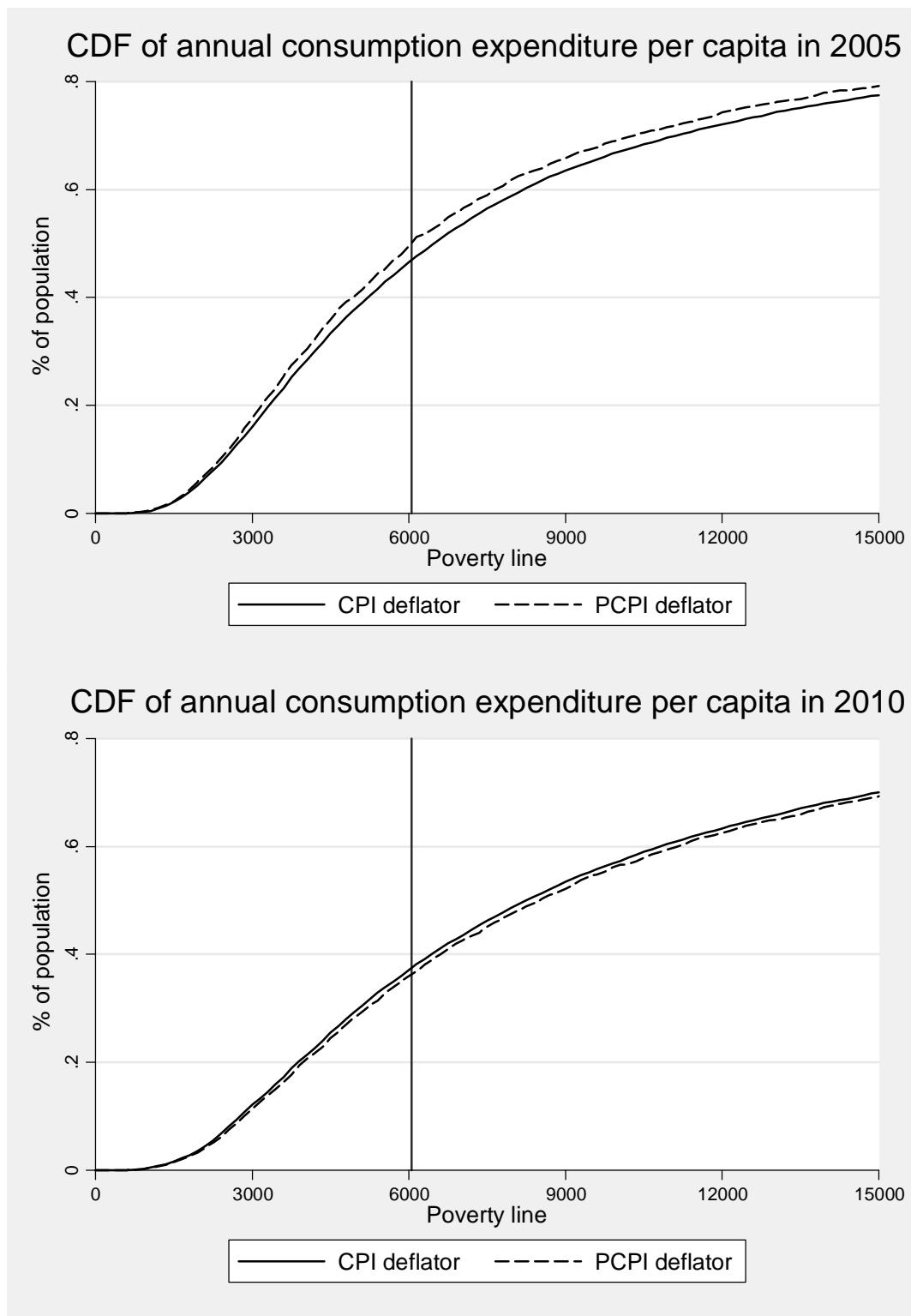
where $y_{t(p)}$ is household per capita expenditure in time t for percentile p and i_t is CPI between t and $t-1$.

We are also interested in percentile-specific inflation, and so the equation above is modified so that:

$$g_{t(p)} = \frac{y_{t(p)} \frac{1}{1+i_{t(p)}}}{y_{t-1(p)}} - 1$$

where $i_{t(p)}$ is the inflation rate specific to percentile p between t and $t-1$.

Figure 7: Impact of prices on poverty as demonstrated by CDFs

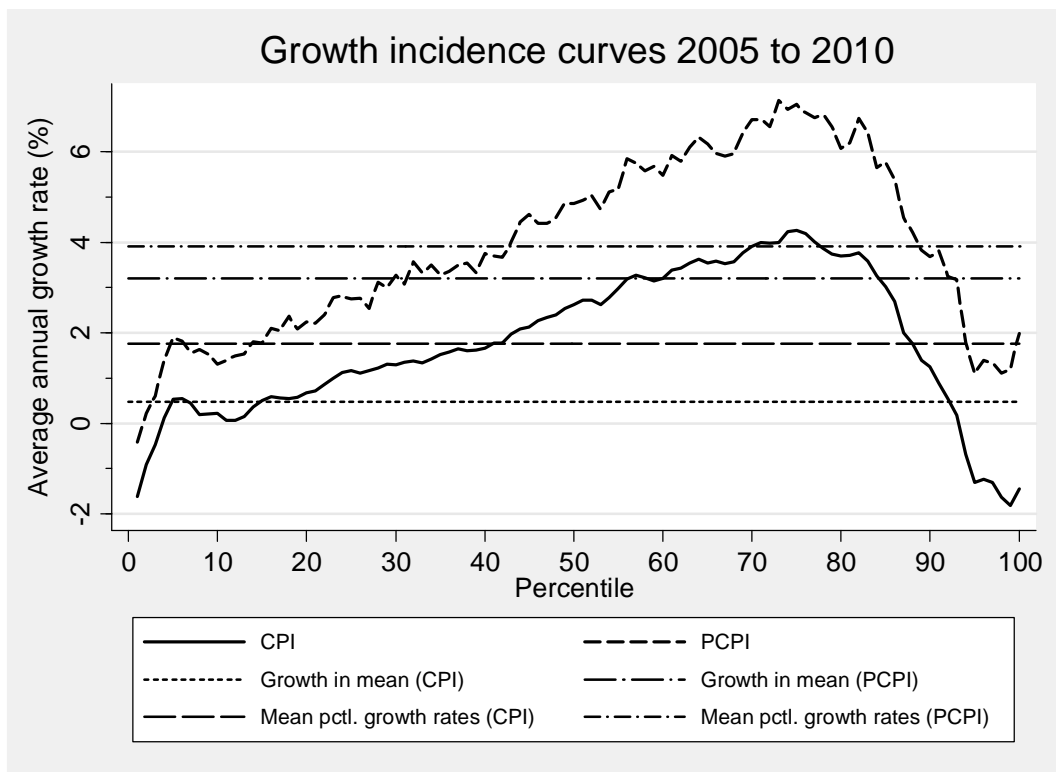


Source: Own calculations, IES 2005/06, LCS 2008/09, IES 2010/11 and published price indices.

Figure 8 plots GICs for CPI and PCPI-deflated household expenditure per capita between 2005 and 2010. As is immediately clear, the PCPI curve always lies above the CPI curve. This suggests that growth rates as measured when expenditure is deflated by CPI underestimate the growth rate at each percentile by ignoring price effects that are specific to that percentile.

The annual growth rate in the mean is just under 0.5 per cent if we deflate using CPI, and this rises to just over 3 per cent when the PCPI is used as the deflator. The same pattern is true of the mean of the percentile-specific growth rates, which stand at 1.76 per cent and 3.90 per cent for the CPI and PCPI, respectively. As the curves do not cross at any point, it must be the case that the weighting and basket of goods used in the construction of the CPI are not aligned to any particular percentile in the distribution. We saw that in 2005 using the PCPI there were more people with lower expenditures and so the CDF moved up compared to the CPI case. By 2010, the PCPI and CPI cases were very similar. Given that we are using 2008 weights per percentile, the difference in the GIC between the PCPI case and the CPI case has to be due to changes in the prices per percentile. Figure 8 shows sizeable increases in expenditures associated with the same percentile bundle of goods, which therefore have to be driven by price changes in the percentile consumption bundles rather than by increases in real consumption (well-being).

Figure 8: Impact of prices on poverty as demonstrated by CDFs



Source: Own calculations, IES 2005/06, IES 2010/11, and published price indices.

Figures 7 and 8 showed the impact of percentile-specific deflators on static poverty and on growth rates across the expenditure distribution. In this section we expand that analysis by decomposing poverty changes into a growth component, a redistribution component, and a price component. This echoes Günther and Grimm (2007), who extend the well-known Datt and Ravallion (1992) poverty decomposition by allowing the poverty line to adjust by its own implicit inflation rate, rather than by CPI.

If $P(\mu_t, L_t, z_t)$ is headcount poverty at time t with mean societal expenditure μ and Lorenz curve (L) for poverty line z , then the Günther and Grimm (2007) ‘triple’ decomposition of changes in poverty is given as follows

$$\Delta P_{t+1,t} = [P(\mu_{t+1}, L_t, z_t) - P(\mu_t, L_t, z_t)] + [P(\mu_t, L_{t+1}, z_t) - P(\mu_t, L_t, z_t)]$$

$$\begin{aligned}
& + [P(\mu_t, L_t, z_{t+1}) - P(\mu_t, L_t, z_t)] \\
& + [R_{t+1,t}]
\end{aligned}$$

where the change in poverty between $t + 1$ and t is comprised of a growth component (the first term in brackets), a redistribution component (the second term), and a third component that corresponds to the change in poverty that is explained by the inflation difference between the poverty line and CPI, in a growth and distributional neutral case (Günther and Grimm 2007). The final term is the residual. $P(\mu_t, L_t, z_{t+1})$ is poverty at time t where the poverty line z has been inflated by the inflation rate at the poverty line relative to CPI between t and $t + 1$.

Deflating the poverty line in this manner means departing from the earlier percentile-specific inflation rate. Instead we use an inflation rate that is derived from the price changes of the basket of goods underlying the poverty line. We select a window of 5 per cent of the population above and 5 per cent below the poverty line as the group whose basket of goods informs the price index that we use to deflate z . We present results for the whole country in panels 1 and 2, and results for urban and rural areas in panels 3 and 4, and 5 and 6, respectively.

Table 3 compares the triple poverty decomposition to the Datt and Ravallion decomposition for 2005 to 2008, 2008 to 2010, and 2005 to 2010, and does so for the whole country and then for urban and rural areas separately. The first decomposition is done for the case where expenditure and the poverty line are deflated using CPI, and the second is for when expenditure is deflated using CPI and the poverty line is deflated using the poverty line price index (PLPI). The upper poverty line of ZAR6,084 in real (CPI-deflated) 2008 Rands is used in the first case. When expenditure and the poverty line are deflated using headline CPI, we see that the national poverty headcount reduced by 3.37 percentage points between 2005 and 2010. The drop in poverty was driven entirely by changes between 2008 and 2010 which more than offset the slight rise in poverty between 2005 and 2008. In the 2005–08 and 2008–10 periods the growth component was larger than the redistribution component and, in fact, the two worked in opposite directions. Over the entire 2005–10 period, however, both the growth and redistribution components served to reduce poverty.

The fall in the urban poverty rate between 2005 and 2010 when conventional CPI deflators are used is much more pronounced than the concurrent fall in rural poverty rates—1.96 per cent and 0.03 per cent, respectively. This difference is heightened when the poverty line inflation measure is used, with urban poverty falling by over 2.5 per cent over the period. Interestingly, the redistribution component in the decomposition is poverty-reducing in urban areas, but is poverty-increasing in rural areas. However, it must be noted that changes in rural areas are far more muted, and most of the change at the national level is being driven by urban area differences over time. The same dynamic is true for the Günther and Grimm (2007) decomposition, where expenditures are deflated using CPI and the poverty line is deflated using the PLPI discussed previously.

Table 3: Decomposition of national poverty headcount measures, $\Delta P_{t+1,t}$

Measure	2005 to 2008	2008 to 2010	2005 to 2010
National (CPI, CPI)			
$\Delta P_{t+1,t}$	1.12	-4.48	-3.37
Growth (CPI)	7.08	-7.40	-1.09
Redistribution	-5.27	2.53	-2.50
Poverty line (CPI)	-	-	-
Residual	-0.69	0.38	0.22
National (CPI, PLPI)			
$\Delta P_{t+1,t}$	0.46	-4.32	-3.86
Growth (CPI)	6.70	-7.08	-1.11
Redistribution	-5.82	2.42	-3.00
Poverty line (PLPI)	4.50	3.85	4.50
Residual	-4.92	-3.50	-4.25p
Urban (CPI, CPI)			
$\Delta P_{t+1,t}$	1.26	-3.22	-1.96
Growth (CPI)	8.46	-6.03	0.91
Redistribution	-5.62	2.73	-2.82
Poverty line (CPI)	-	-	-
Residual	-1.58	0.08	-0.05
Urban (CPI, PLPI)			
$\Delta P_{t+1,t}$	0.91	-3.55	-2.64
Growth (CPI)	8.01	-6.35	1.06
Redistribution	-6.14	2.52	-3.40
Poverty line (PLPI)	3.97	3.61	3.97
Residual	-4.93	-3.33	-4.26
Rural (CPI, CPI)			
$\Delta P_{t+1,t}$	0.04	-0.07	-0.03
Growth (CPI)	0.07	-0.13	-0.06
Redistribution	-0.03	0.04	0.03
Poverty line (CPI)	-	-	-
Residual	0.00	0.01	0.00
Rural (CPI, PLPI)			
$\Delta P_{t+1,t}$	0.03	-0.06	-0.03
Growth (CPI)	0.06	-0.12	-0.06
Redistribution	-0.03	0.04	0.02
Poverty line (PLPI)	0.05	0.04	0.05
Residual	-0.05	-0.02	-0.04

Note: Headcount poverty measures are calculated on the basis of per capita household expenditure (i.e. these are individual-level measures).

Source: Own calculations, IES 2005/06, LCS 2008/09, IES 2010/11 and published price indices.

Deflating expenditure by CPI and the poverty line by the PLPI (as shown in panels 2, 4, and 6 in Table 3) introduces a third component to the decomposition of poverty change. In all three time periods, the poverty line component served to increase the headcount poverty rate. In fact, its presence dominates the growth and redistribution components of poverty changes in the 2005–10 period. The fact that the poverty line component is positive shows that prices of goods consumed by the poor rose faster than those consumed by the non-poor and that those prices of goods consumed by the poor rose faster than the regular CPI suggests. However, introducing a poverty line component to the analysis substantially increases the absolute and relative size of the

residual. In the 2005 to 2010 period, for example, the poverty line component of the decomposition suggests that this differential inflation increased the poverty headcount rate by 4.5 percentage points. In order to accommodate for this, however, the residual needs to account for a drop of 4.25 percentage points in order to get us back to the original 3.86 percentage point drop in poverty. Despite the fact that the unexplained part of the decomposition increases when we account for differential inflation around the poverty line, the fact that the poverty line component indicates anti-poor price changes is consistent across all three time periods, and for national, urban, and rural measures respectively.

4.2 Sensitivity of inequality estimates to differential inflation

In order to assess the potential impact of prices on measures of inequality, we follow Goni et al. (2006) in decomposing the change in inequality indices of nominal consumption. Following Ruiz-Castillo et al. (2002) and Goni et al. (2006), we assume an inequality index, $\xi(x_t)$, in period t to be an increasing function in the level of inequality. The vector x_t measures nominal expenditures, i.e. $x_t = (x_t^1, \dots, x_t^H)' = (p_t^1 c_t^1, \dots, p_t^H c_t^H)'$, where p_t represents prices from period t and c_t represents household consumption, for all households (denoted by the superscripts $1, \dots, H$). If $x_{t,s} = (p_t^1 c_s^1, \dots, p_t^H c_s^H)'$ is the vector of household consumptions in period s evaluated at the prices of period t , then:

$$\begin{aligned} \Delta\xi &= \xi(x_t) - \xi(x_{t-1}) \\ &= \xi(x_{t,t}) - \xi(x_{t-1,t-1}) \\ &= \xi(x_{t,t}) - \xi(x_{t,t-1}) + \xi(x_{t,t-1}) - \xi(x_{t-1,t-1}) \end{aligned} \quad (1)$$

$$= \Delta\xi\text{Q} - \Delta\xi\text{P} \quad (2)$$

The first pair of terms in Equation (1) refer to the difference in the inequality measure when the baskets from the two different periods (t and $t-1$) are priced in terms of the prices of a single period (period t)—the only difference between the two sets of baskets being the quantities consumed. The second pair of terms refers to the change in the inequality measure when the base period baskets (i.e. period $t-1$) are priced using the sets of prices from each period. In this case, the only difference between the two sets of baskets is the prices at which they have been valued. This means that changes in nominal inequality may be thought of as consisting of a component that reflects the effects of changes in quantities consumed ($\Delta\xi\text{Q}$) and a component that reflects the effects of changing prices ($\Delta\xi\text{P}$). Goni et al. (2006: 5) describe $\Delta\xi\text{Q}$ as ‘changing real inequality’ and $\Delta\xi\text{P}$ as ‘inflation inequality’. The implication is that nominal inequality can change even if real inequality does not, due to changing prices.

If prices rise more rapidly among the poor between period $t-1$ and period t , for a fixed consumption basket the spending of the poor rises relative to that of non-poor households. Since we are dealing with a fixed consumption basket, we are talking about x_{t-1} (the fixed basket in its original prices) and $x_{t,t-1}$ (the fixed basket in ‘new’ prices). This has the effect that the distribution of $\xi(x_{t,t-1})$ is narrowed, reducing inequality. Therefore $\Delta\xi\text{P} < 0$. This implies that $\Delta\xi < \Delta\xi\text{Q}$: ‘*ceteris paribus*, for given real inequality, anti-poor price changes *reduce* nominal inequality, giving the (false) appearance of an improving distribution’ (Goni et al. 2006: 5, emphasis in original). In this context, simply re-pricing the original basket using the second period’s prices will cause the value of the inequality measure to fall. Conversely, pro-poor price changes imply a positive value for $\Delta\xi\text{P}$ and result in higher nominal inequality, even though real inequality is unchanged.

Using detailed product category price indices—the most detailed indices regularly published by Statistics South Africa—it is possible to perform the decomposition of changes in nominal inequality. Simply put, expenditure baskets at the level of the individual household are re-priced using the product category price indices (i.e. the price data used do not vary across households, but the quantities do). Table 4 presents the decompositions for the 2005–10 period as a whole, as well as for the 2005–08 and 2008–10 sub-periods. This is done for three measures of inequality: the Gini coefficient, the Theil index, and the mean log deviation, the latter two being generalized entropy indices. Decompositions are also presented separately for the entire national sample, the urban sample, and the rural sample. Estimates of inequality are of nominal inequality, initial inequality referring to the first year and final inequality to the final year of the period. The percentage change in the estimates of inequality over the period is then decomposed into an inflation inequality component ($P\Delta$) and a real inequality component ($Q\Delta$). Since the chosen base period may impact on the results—the base period refers to the consumption basket used—the decomposition is performed using first the initial period and then the final period as the base period.

Considering the national estimates of inequality, the data show that inequality declined in nominal terms between 2005 and 2010, the Gini coefficient falling from 0.668 to 0.636. However, in real terms, the decline has been smaller: using 2005 as the base period, it is estimated that the Gini coefficient would have only fallen to 0.650 in real terms over this period.¹² Assuming no change in expenditure patterns between 2005 and 2010, inequality would still have fallen (the Gini would have fallen to 0.654) simply due to changing prices over the period.

While the results indicate that nominal inequality in our expenditure aggregate declined only slightly between 2005 and 2010, the inclusion of the data point in 2008 reveals opposing trends in the two sub-periods: between 2005 and 2008, nominal inequality is estimated to have declined, while the latter sub-period saw nominal inequality increase. These patterns are consistent irrespective of the specific inequality measure or base period chosen.

The data reveal that inflation inequality generally has a noticeable impact on observed changes in nominal inequality. Across all three measures of inequality, for all three periods and for both expenditure baskets, the effect of real inequality changes is greater than that of differential inflation. For the 2005–10 period, inflation inequality is estimated to account for between 35 per cent and 56 per cent of the observed changes in nominal inequality, depending on the base and the inequality measure. Thus, for example, price changes are responsible for 2.1 percentage points or 1.7 percentage points of the almost 4.8 per cent decline in the level of the Gini coefficient between 2005 and 2010, depending on the base period. In terms of the Gini coefficient, differential inflation rates across the distribution account for roughly one-third to one-half of the change during this period. For the 2005–08 period, prices play a slightly smaller role—between 29 per cent and 38 per cent of the change in the inequality measure—and they are even less important in the 2008–10 sub-period.

Changes in real inequality in the three periods have been compounded by the impact of inflation differentials. In none of the cases presented here did the two effects have opposing signs. Both effects worked to lower inequality in the 2005–10 period as well as the 2005–08 sub-period, while both effects worked to raise inequality in the post-recession 2008–10 sub-period. The implication is that, while nominal inequality has changed only slowly over the period, real inequality has changed even less.

¹² This is calculated as: $0.668*(1-0.0267)$.

Table 4: Distributional effects of inflation inequality, 2005–10

Measure	Initial inequality	Final inequality	%Δ	Base in initial period (percentage points)		Base in final period (percentage points)	
				PΔ	QΔ	PΔ	QΔ
National—2005 vs. 2010							
Gini coefficient	0.668	0.636	-4.77	-2.10	-2.67	-1.68	-3.09
Theil index	0.957	0.829	-13.37	-5.33	-8.05	-5.08	-8.29
Mean log deviation	0.838	0.756	-9.80	-5.46	-4.35	-4.09	-5.71
National—2005 vs. 2008							
Gini coefficient	0.668	0.622	-6.81	-2.20	-4.61	-2.43	-4.38
Theil index	0.957	0.781	-18.43	-5.28	-13.15	-5.36	-13.08
Mean log deviation	0.838	0.710	-15.28	-5.74	-9.53	-5.84	-9.44
National—2008 vs. 2010							
Gini coefficient	0.622	0.636	2.19	0.47	1.72	0.45	1.74
Theil index	0.781	0.829	6.20	0.68	5.52	0.37	5.84
Mean log deviation	0.710	0.756	6.46	1.30	5.16	1.28	5.18
Urban—2005 vs. 2010							
Gini coefficient	0.645	0.610	-5.52	-2.05	-3.47	-1.61	-3.91
Theil index	0.840	0.727	-13.40	-5.27	-8.13	-5.24	-8.16
Mean log deviation	0.789	0.704	-10.74	-5.23	-5.51	-3.84	-6.90
Urban—2005 vs. 2008							
Gini coefficient	0.645	0.599	-7.25	-2.01	-5.24	-2.13	-5.12
Theil index	0.840	0.685	-18.38	-4.89	-13.48	-4.82	-13.56
Mean log deviation	0.789	0.666	-15.51	-5.23	-10.28	-5.04	-10.47
Urban—2008 vs. 2010							
Gini coefficient	0.599	0.610	1.87	0.26	1.61	0.32	1.54
Theil index	0.685	0.727	6.10	0.20	5.89	-0.07	6.17
Mean log deviation	0.666	0.704	5.65	0.83	4.82	1.01	4.64

Rural—2005 vs. 2010							
Gini coefficient	0.536	0.540	0.80	-3.07	3.87	-2.39	3.19
Theil index	0.696	0.691	-0.65	-6.33	5.67	-6.60	5.95
Mean log deviation	0.495	0.507	2.47	-6.36	8.83	-5.25	7.72
Rural—2005 vs. 2008							
Gini coefficient	0.536	0.492	-8.16	-3.45	-4.72	-3.94	-4.22
Theil index	0.696	0.559	-19.66	-7.68	-11.97	-8.84	-10.82
Mean log deviation	0.495	0.414	-16.32	-7.14	-9.18	-7.74	-8.58
Rural—2008 vs. 2010							
Gini coefficient	0.492	0.540	9.76	0.73	9.03	0.75	9.01
Theil index	0.559	0.691	23.65	1.69	21.95	1.61	22.04
Mean log deviation	0.414	0.507	22.46	1.53	20.93	1.73	20.73

Notes: (a) Estimates of nominal inequality use prices from March 2006 for the 2005/06 IES expenditures, from March 2009 for the 2008/09 LCS expenditures and from March 2011 for the 2010/11 IES expenditures. These months are the same as those used by Statistics South Africa as the base month for IES and LCS data. (b) Inequality measures are calculated on the basis of per capita household expenditure (i.e. these are individual-level measures).

Source: Own calculations.

For the 2005–10 period as a whole, price changes have been anti-poor— $\Delta\xi P$ is negative—and, as a result, the data suggest that differential inflation has worked to exaggerate the decline in real inequality. The same is true for the period between 2005 and 2008. However, for the 2008–10 sub-period, price changes have been pro-poor in that inflation rates for better-off households were higher. Price changes, therefore, have exaggerated the increase in real inequality over the sub-period. The finding that price movements have been anti-poor over the 2005–10 period is consistent with the finding of anti-poor price movements in terms of the triple decomposition of the national poverty headcount measure in Section 4.1.

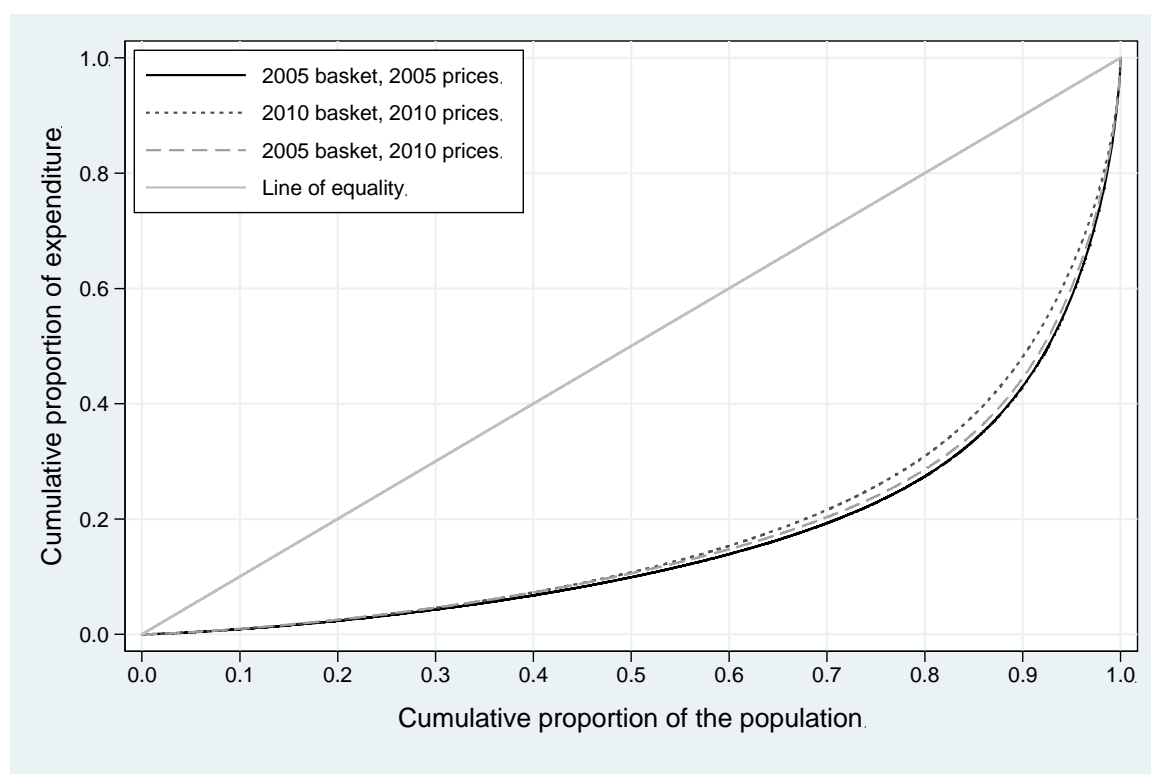
Differential price changes, therefore, have created a ‘wedge’ between real inequality ($\Delta\xi Q$) and nominal inequality ($\Delta\xi$) between 2005 and 2010. For the period under review, the effect of prices has been to exaggerate the changes observed in terms of real inequality as both the real inequality and the inflation inequality effects were in the same direction.

The urban and rural disaggregations are broadly consistent with the above in that inflation inequality and real inequality have tended to impact on nominal inequality in the same direction. Among urban households, nominal inequality is estimated to have fallen between 2005 and 2010, as well as between 2005 and 2008. The 2008–10 sub-period, though, saw nominal inequality among urban households rise. As was the case nationally, the inflation inequality and real inequality effects are identically signed (except for the Theil index with the base in the final period), and the real inequality effect is consistently larger than the inflation inequality effect. While the nominal inequality trends among rural households are slightly different from the urban and national trends for the full period—only the Theil index suggests an overall (and very small) decline in nominal inequality—the inflation inequality and real inequality effects are, again, identically signed and the latter is, in all instances but one, stronger.

The above findings are confirmed visually through Lorenz curves. Figure 9 presents Lorenz curves for 2005 and 2010, with the 2005 basket priced in 2005 as well as 2010 prices. In effect, this figure corresponds to the Gini coefficient calculations for 2005 to 2010, with the base in the initial period, in Table 4. The improvement in inequality over the period is evident in the slight inward shift of the Lorenz curve (towards the line of equality) between 2005 and 2010 (each priced in own prices).

When the 2005 basket is priced in 2005 prices, it is slightly changed: it is marginally closer to the line of equality at the lower end of the distribution and is slightly further away from the line of equality for the richest quarter of households. The gap between the own-priced Lorenz curves for 2005 and 2010 reflects the total change in nominal inequality. The gap between the two Lorenz curves based on the 2005 basket—where only the prices differ—corresponds to the effect of differential inflation ($\Delta\xi P$). The gap between the two Lorenz curves based on 2010 prices—where only the baskets differ—corresponds to the effect of real inequality changes ($\Delta\xi Q$).

Figure 9: Impact of prices on inequality as demonstrated by Lorenz curves



Source: Own calculations, IES 2005/06, IES 2010/11, and published price indices.

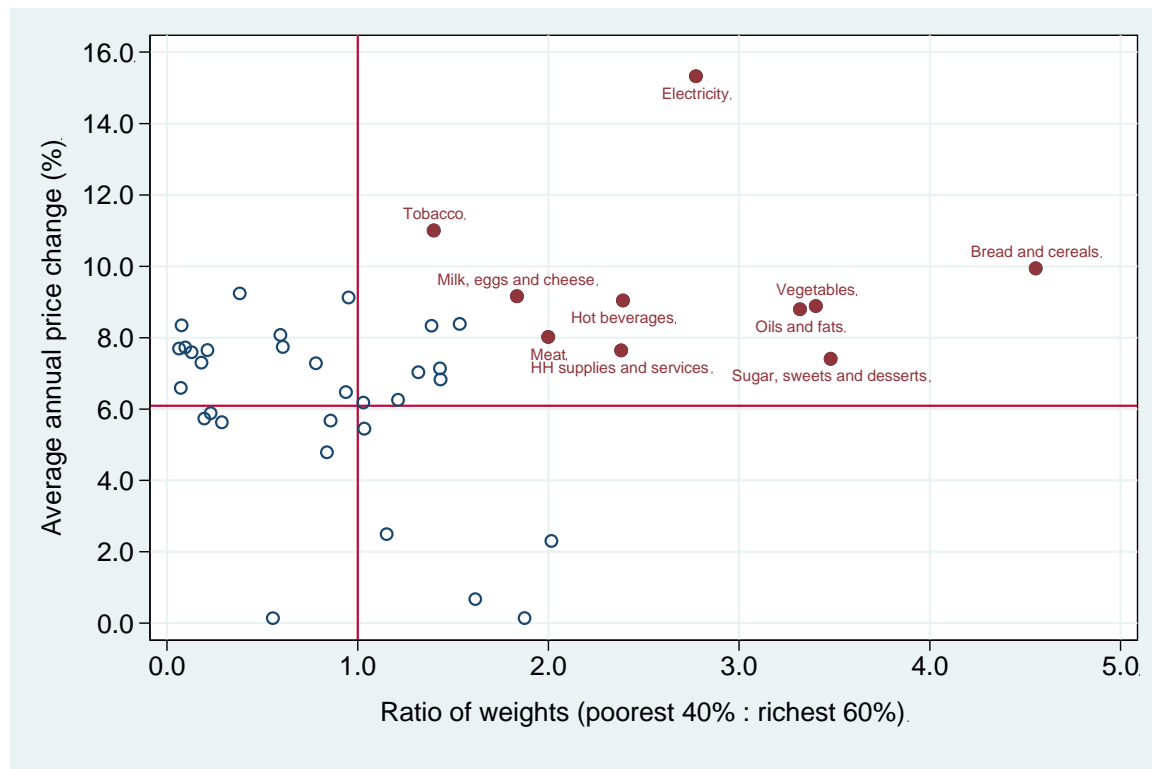
While the inflation inequality and real inequality effects have been in the same direction in the period under review, it is possible that these effects can counter each other: Goni et al. (2006: 11), for example, find that in six out of nine spells for four Latin American countries, the contributions of price changes and of real inequality changes had opposite signs. Observed changes in nominal inequality for the 2005–10 period and the 2005–08 sub-period were biased upwards, while the opposite is true of the 2008–10 sub-period. More broadly speaking, this decomposition suggests that real inequality may have been characterized by greater inertia over the period than is commonly believed.

4.3 Implications for poverty and inequality analyses covering the 2000s

The poverty and inequality decompositions presented above confirm that differential inflation rates often matter for the measurement of poverty and inequality trends over time. Both sets of decompositions also characterize the 2005–10 period as one during which price changes were anti-poor, with inflation rates for poorer households typically exceeding those of better-off households. What, though, are the expenditure categories that have promoted a gap between the inflation rates of poor and non-poor households?

In order for poor households to experience higher average rates of inflation over a given period, poor households must be ‘over-exposed’ to relatively high inflation items and ‘under-exposed’ to relatively low inflation items, with over- or under-exposure defined in terms of these items’ weights among poor relative to non-poor households. Figure 10 illustrates this by plotting the relative weights of each expenditure category in the CPI—calculated as the ratio between the weight for the poorest 40 per cent of households and the weight for the richest 60 per cent of households—against each category’s average annual price change. The horizontal line indicates the average rate of inflation for the period and the vertical line shows the categories in which poor households are under-exposed (to the left of the line) or over-exposed (to the right of the line).

Figure 10: Poor households’ exposure to high inflation expenditure categories, 2005–10



Notes: Four expenditure categories with negative overall price changes were omitted from the scatter plot. These are: postal services and telecommunication services (-11.4 per cent per annum; 0.7 relative weight); furnishings, floor coverings and textiles (-2.1 per cent per annum; 1.1 relative weight); footwear (-0.5 per cent per annum; 2.0 relative weight); and purchase of vehicles (-0.5 per cent per annum; 0.01 relative weight).

Source: Own calculations, IES 2005/06, IES 2010/11, and published price indices.

Expenditure categories with both high relative weights and above-inflation price increases over the period contribute to widening the gap in the price indices of poor and non-poor households. Ten of these have been highlighted. Of the ten expenditure categories, six are food categories and a seventh is a beverage category. The remaining three categories are electricity (a price regulated by government), tobacco (a price that is strongly affected by government, through taxation), and household supplies and services. At two extremes are electricity and bread and cereals. Bread and cereals have a very high relative weight—poor households spend 3.5 times more than non-poor households on this expenditure category relative to their total expenditures—so that almost any rate of price increase above inflation would make this category a substantial contributor to the gap between poor and non-poor price indices. Electricity, on the other hand, has a moderately high relative weight—the weight for poor households is 2.8 times that for non-poor households—but its rate of price increase has been particularly strong. In fact, electricity is by some margin the

expenditure category with the highest rate of price increase, having increased by 15.3 per cent per annum over the five-year period.

While the figure highlights expenditure categories characterized by rapid price increases and relatively high expenditure weights for poor households, it does not show that the higher average rate of inflation experienced by poor households is also caused by poor households' under-exposure to low inflation items. The key items in this regard are purchase of vehicles; domestic worker wages; tertiary education fees; insurance; postal services and telecommunication services; and recreational and cultural services. These findings echo, to some degree, earlier findings by Oosthuizen (2007), who calculates the relative discrepancy (the gap between two groups' price indices). Using more detailed price data for the 1997–2006 period and expenditure data for urban areas only, purchases of vehicles, insurance of buildings, and computers and telecommunication equipment are found to widen the gap between decile one and all urban households due to poor households' under-exposure to low inflation items (Oosthuizen 2007: 54). Paraffin, other tobacco products, and matches and candles were found to widen the gap through poor households' over-exposure to these high inflation items.

Given the above, what are the implications for poverty and inequality comparisons during the 2000s in South Africa? It is impossible to give a blanket answer to this question, since the answer is dependent on the prevailing pattern of inflation during the comparison period and whether this pattern was anti-poor or pro-poor. For a given period, this is relatively simple to determine: if the inflation rate for poor households is higher than the overall inflation rate, inflation can be said to be anti-poor and vice versa. Table 5 presents a matrix of possible inflation periods during the 2000s, based on comparisons between pairs of datasets. Based on the datasets' respective base periods in terms of prices, the pattern of inflation in each period can be determined. We have chosen to compare quintile one households (i.e. the poorest 20 per cent of households) with the national average. Patterns of inflation are described as pro- or anti-poor, or neutral. Inflation patterns are described as neutral when the difference between the two national indices and the quintile index is less than one point.

Table 5 confirms that for most two-way comparisons between the five datasets or time points, inflation has been anti-poor. This means that conventional estimates of changes in poverty that deflate expenditures using the headline inflation rate would suffer from an upward bias—improvements would be overstated, deteriorations would be understated. Similarly, not deflating expenditures (or using headline inflation) would overstate improvements in real inequality (or understate the extent of worsening real inequality). This effect may be quite strong when making comparisons between the IES 2000 and any of the later datasets. However, the effect would be much weaker when comparing any dataset from the LCS 2008/09 onwards with another later dataset. The effects here are typically weakly anti- or pro-poor, or neutral.

The effects of differential inflation on estimates of poverty and inequality are dependent on the prevailing pattern or dynamic of inflation. For the 2000s, inflation has typically been anti-poor, although the latter part of the period has been characterized by more variable inflation dynamics and a dynamic that has not been particularly strongly against poor or non-poor households. For other periods—or even sub-periods within the 2000s—this dynamic may, however, be quite different. For example, the inflation process that prevailed from mid-2003 to early-2006 was pro-poor, as were the processes during much of 1999 and 2001 (Oosthuizen 2007: 27).

Table 5: Patterns of Inflation, 2000–13

	IES 2000	IES 2005/06	LCS 2008/09	IES 2010/11	Census 2011
IES 2005/06	Anti-poor				
LCS 2008/09	Anti-poor +	Anti-poor			
IES 2010/11	Anti-poor +	Anti-poor	Pro-poor -		
Census 2011	Anti-poor +	Anti-poor	Neutral	Anti-poor -	
Oct. 2013	Anti-poor +	Anti-poor	Anti-poor -	Anti-poor	Neutral

Notes: (a) Base periods for prices are as follows: IES 2000—2000 (since total country price indices are not available prior to 2002); IES 2005/06—March 2006; LCS 2008/09—March 2009; IES 2010/11—March 2011; and Census 2011—October 2011. (b) 'Neutral' means that the gap between the All Items price index and the All Items index for the poorest 20 per cent of households is less than one point. 'Anti-poor +' means that the gap between the All Items price index and the All Items index for the poorest 20 per cent of households is greater than 20 points. A minus sign ('-') indicates that inflation is weakly pro- or anti-poor (i.e. the difference in indices is more than one but less than three index points).

Source: Own calculations.

5 Conclusion

This paper had two specific objectives. The first was to tell the story of the evolution of poverty and inequality in post-apartheid South Africa in a way that covers both money-metric and non-money-metric dimensions of well-being and in a way that teases out the drivers of these changes. The second goal of the paper was to assess the effect of prices on purchasing power across the distribution and, in particular, with regard to the poor. This is typically given only passing attention in the South African literature on poverty and inequality; with incomes or expenditures being deflated by a scalar derived from some version of the CPI in order to make comparisons over time. With respect to the analysis of trends in poverty and inequality, a key gap is the effect of differential price movements across the distribution. This paper considered the impact of prices on estimates of poverty and inequality in detail.

The post-apartheid narrative has to start with the inherited legacy of very high inequality and high poverty. Most obviously, the markers were the strong racial and rural disadvantages associated with apartheid. With the benefit in hindsight of our current knowledge about poverty traps, inequality persistence, and socioeconomic marginalization, it is the correlation of these racial and spatial markers with poorer human capital accumulation and poorer household and community assets that is perhaps the most daunting of all of the constraints that the post-apartheid government had to face. In this paper we used income data from 1993 to show this inherited legacy of high inequality and poverty. Many have done similar exercises. We reference this useful and extensive literature and draw on it to provide the detail on the unequal human capital, asset, and labour market situation at the start of the post-apartheid period. At the broadest level, the specific intent of post-apartheid policy-making has been to confront and overturn this inherited situation.

Jumping ahead to the contemporary situation, we used comparable, national 2010 income data to show a somewhat improved money-metric poverty situation and an inequality situation that is, at best, as unequal as the 1994 situation. This is sobering to say the least. That said, there are signs of progress and we spelt them out. A comparison of multidimensional poverty indices shows that there have been improvements in human capital. Access to education and average years of schooling have expanded and, on the health side, there have been improvements in child mortality and nutrition. In addition, there have been notable improvements in access to assets. Work on multidimensional poverty and the derivation of asset indices collectively show notable improvements in access to water and to electricity even for the poor. The asset index work extends this story to show improvements in access to sanitation and housing too.

These are notable achievements, very much in line with what any poverty reduction strategy would have had the post-apartheid society do. However, these achievements are not mirrored in equivalent money-metric improvements and this raises a fundamental question in understanding South Africa's post-apartheid performance. Why has South Africa not generated social returns from its investments in human capital and assets? We have some but not all of the pieces of this puzzle in place. In the paper we drew on a decomposition literature to show that South Africa's failure to generate more jobs has been central to the inability to see improved human capital realized in more earners and in higher earnings for more productive workers. A dynamic labour market has to be the central mechanism through which a society transforms itself; through which assets embodied in people become livelihoods and income. The South African labour market has been very static and has not done this.

We reference a literature that situates some of this failure within the schooling system itself. This literature argues that the quality of schooling has declined. This would imply that increases in measured years of schooling have not given young South Africans increased human capital or increased potential productivity. The apparent schooling investment is a cruel mirage. This view needs to be balanced against the fact that the post-apartheid economy has operated in the global economic environment and a skills twist in the demand for labour. South Africa, along with all developed economies and many middle-income developing economies, has seen an increasing demand for skilled and semi-skilled labour and very flat demand for unskilled labour. This is mirrored in changes to the returns to education. The returns to any schooling less than complete secondary have fallen over the post-apartheid period. Complete secondary and any tertiary continue to generate high returns, with tertiary returns rising sharply. What makes this skills twist so pernicious in the South African context is that the improvements in years of schooling have seen many more young South Africans getting 10 rather than 7 years of schooling. This improvement lies within the range of flat and falling returns. We have yet to see large increases in complete secondary (12 years) or tertiary education. In sum, the market has strongly dampened the returns to the improved educational access that has been achieved.

Another view on the labour market failure is the lack of an employment response to economic growth. In the context of South Africa's rising youth unemployment rate this can be thought of as a failure in the school to work transition. Partly this failure is about the levels of growth. Our growth rates have hovered just below 3 per cent for most of the post-apartheid period. Nearly all planning models of the South African economy have been clear that we require growth rates in excess of 5 per cent to kick-start job creation. In the mid-2000s our growth rates inched upwards towards these levels only for the financial crisis to cut them back to close to zero in 2008. In the paper we showed that growth has been pro-poor, and that the key mechanism here was a substantial expansion of the system of social grants to the needy by the post-apartheid government. While growth may not have generated employment, solid macro management ensured that increased tax revenues were used to finance significant state expenditures on social grants—as well as education and health—while not generating fiscal deficits. This is a notable achievement of the post-apartheid policy. However, as with education and health, without a dynamic labour market, these grants remain remedial. They are not generating second-round effects or pathways out of poverty through financing labour market entry or through financing the creation of small enterprises.

The above narrative could draw on a large body of literature. The same cannot be said for an assessment of the role of relative prices and inflation in these post-apartheid poverty and inequality dynamics. The second major objective of the paper was to address this gap. This was always going to present challenges for us. While South Africa has good national household survey data, it does not have consumption data containing both prices and quantities consumed. Nonetheless, there are a number of expenditure data series that potentially could be combined with price data to tell

the story. In the paper we review, in some detail, the expenditure and price data that would form the basis for our analysis of prices and inflation. The price data turned out to be more promising than expected. However, our probing of the expenditure data revealed some serious issues with regard to their lack of consistency to support comparisons over time. We deemed the data to be comparable over time only for the period 2005–10 as covered by two IESs and the 2008 LCS.

The paper explored the role of prices in driving expenditure-based poverty and inequality over the 2005–10 period using price/poverty decompositions and price/inequality decompositions. In line with our earlier analysis, we showed that both growth and redistribution were pro-poor. However, percentile-specific price indices dampen improvements in poverty. In addition, while measured inequality declined somewhat over this period, this decline is exaggerated by the fact that inflation was anti-poor. In other words, giving specific attention to what the poor and those at the bottom of the income distribution consume, and pricing this bundle as accurately as possible, we showed that these groups have to spend more than an average CPI adjustment would reveal on this consumption bundle. At the end of the day it is the consumption bundle that is the real measure of well-being and expenditure is merely a proxy measure. Indeed, the implication of our decomposition work is that some of the increase in the expenditures of the poor do not signal an increase in consumption and therefore in real well-being but rather an increase in the cost of the same consumption bundle.

Adding prices into the post-apartheid narrative does not make things look any better. Rather, it cautions that the support that we have seen for those at the bottom of the distribution may not have been as substantial as we have thought it to be. Mostly, the detailed analysis signals the exposure that those at the bottom of the expenditure distribution have had and continue to have to food price movements. It would have been very surprising to find otherwise. More novel is the finding that those at the bottom have become exposed to electricity prices, the price of services in general and transport prices. Our review of non-money-metric well-being has shown evidence of the successful roll-out of such services in the post-apartheid period. This success can be undermined by upward adjustments to the pricing of such services.

A The comparability of the PSLSD and NIDS expenditure data

The purpose of this section of the paper is to assess the comparability of the consumption expenditure data in the 1993 PSLSD and the first wave of NIDS. We begin by outlining how the two surveys conceptualize the expenditure module. We then move on to practical considerations of the quality of the data by investigating each component making up expenditure. This is done with the broad aim of creating a dataset that will allow for consistent comparisons of poverty and inequality over the period under study. With this in mind, recommendations about how to make the datasets consistent are made at various points in the document.

A.1 Expenditure in the 1993 PSLSD

The first expenditure module in the questionnaire asked about spending on energy, water, and rates in the last month. Following this, in the dedicated section on food expenditure, respondents were asked about total household expenditure on 31 different food items. An introductory question—‘Was x bought or consumed by this household in the past month?’ was asked. A positive answer was followed by a question about the regularity with which the item is usually purchased (weekly or monthly). Rand values of actual expenditure, gifts, payments, and consumption of own production of each item were aggregated into monthly amounts for each component of food expenditure. It is important to note that there are no ‘one-shot’ questions in the 1993 PSLSD which ask broader questions about total food/non-food expenditure in the last month. The one-shot questions in the questionnaire ask instead about expenditure on consolidated sub-sections, including groceries, restaurants, holidays, vehicles, furniture, clothing, domestic workers, insurance, and savings.

The non-food expenditure section is broken down into regular and non-regular expenditure. The former comprises expenditure in the last month while the latter asks about household expenditure in the last year. The items in each section are mutually exclusive and are outlined in the table below.

Education spending has a stand-alone section in which respondents are asked about expenditure in the past year on education and all the costs associated with education (transport, uniforms, books etc.).

There is one last expenditure section which summarizes food and non-food expenditure by asking about aggregated spending in various categories in the past month. The categories are listed in Table A1.

In the section on land use and subsistence agriculture, respondents were asked whether they rented land for crops and/or animals. The amount given reflected payment over a 12-month period. This amount was not included in our aggregate measure of household expenditure.

On the tricky subject of imputed rental income from owner-occupied housing, respondents were asked if the household has to pay rent. If yes, then that was recorded. If no, then the respondent was asked, ‘Suppose you did have to pay rent to live here, how much do you think you would have to pay in a month?’ This allows us to get a sense of the flow of benefits accruing to those who live in homes that they own, as well as those who do not own or rent but live in a house for free. Missing values for this variable were imputed using a rule-based approach, where 5 per cent of the value of the property was divided by 12 to get an approximate measure of the monthly value associated with living in a dwelling that you own. This approach conflicts with the imputation process followed in NIDS.

A.2 NIDS wave 1

Questions about imputed rent from owner-occupied housing and potential rent from those who don't own *and* don't pay rent are consistent with the 1993 PSLSD. Comparability issues arise in the way that missing values are dealt with, but this will be addressed in a later section.

In the food expenditure module, the first question asks respondents to provide a one-shot estimate of total food expenditure in the last 30 days. This is used as a fallback data point if the data quality of the food line items is poor. Respondents were asked about household expenditure on 32 items over the past 30 days. As in the 1993 PSLSD, respondents were asked to provide actual Rand amounts for expenditure, gifts, payments, and the value of each item consumed from own production, where appropriate. It is worth noting that the time frame for respondent recall in NIDS is always monthly (the last 30 days), whereas in the PSLSD it could be weekly, monthly, or annual.

The non-food expenditure section asks about expenditure on 53 items. These are broken into various sub-sections, including: personal items, transport costs, energy, water and municipal rates, insurance, household items, clothing and shoes, health, education, and miscellaneous items. All questions relate to expenditure in the past 30 days. In contrast to food expenditure, there is no one-shot question for non-food expenditure to fall back on. Expenditure on 'other' energy sources such as wood, paraffin, coal, candles, gas, batteries, and diesel are consolidated into a single category. This differs from the 1993 data, where each item was asked about separately. Expenditure on insurance is broken down into its various components, including life insurance, funeral policies, educational policies, and short-term insurance. Expenditure on 'other' school expenses is consolidated into a single variable, in contrast to the 1993 data.

The quality of the household expenditure data in wave 1 is such that researchers can perform analysis at a broad level (total expenditure, food expenditure) or at a much finer level if necessary.

A.3 Non-inclusion of NIDS wave 2

As this was the second wave of a longitudinal survey, the questionnaire remained very similar to its counterpart in wave 1. Imputed rent and food expenditure matched wave 1, while the only difference in non-food expenditure is that a question about expenditure on lobola was added.

While the line items are conceptually consistent between waves 1 and 2, the structure of the questions differ considerably. A serious missing data problem arose in non-food expenditure for wave 2. In wave 1, of the 53 non-food expenditure variables, none had more than 40 per cent missing. However, in wave 2, 44 out of 54 non-food expenditure variables have over 40 per cent missingness.

It seems that the way the non-food questions were asked is at the base of this missing data problem. In wave 1 (and, indeed, in the food expenditure section of wave 2), the respondent answering the household questionnaire was asked (a) did this household spend money on x in the last 30 days and (b) if yes, how much was spent? In wave 2, the question was simply 'how much was spent on x in the last 30 days?' Fieldworkers were instructed to record a zero if the respondent answered that nothing was spent on item x. We therefore have three kinds of responses to each question (1) a positive value indicating that the household definitely spent money on that item, (2) a zero value indicating that the household definitely did not spend money on that item, (3) a negative value with an unclear interpretation.

Ideally the negative value would be interpreted as ‘the household spent money on x but the respondent is unable/unwilling to provide an amount’. These missing values would then be imputed. However, because we have so many negative values (compared to positive values *and* compared to negative values in wave 1), it is clear that not all the households with negative values actually spent money on item x.

The problem is that there is no clean way of distinguishing between households that answered don’t know/refused because they don’t provide an amount, and those that answered don’t know/refused because they actually don’t know whether anyone in the household consumed that particular item. The way the question was asked, forced these two categories to be lumped together.

Missing values were imputed in a slightly different way for households which had 40 or more of the 54 non-food items missing. The process is described in Brown et al. (2012) and in the accompanying Stata do files that are available for download at the National Income Dynamics website. For households with missing values for 40 or more of the 54 non-food items, an aggregate non-food expenditure measure was imputed, after obtaining an aggregate measure for all other households. The procedure applies to approximately 500 households in the wave 2 sample.

The implication of this missing data problem in wave 2 is that researchers have to be very careful when analysing non-food expenditure item by item. The recommendation documented by the data provider is that non-food expenditure should not be analysed at a finer level than the aggregated measure. The food expenditure data are good enough to allow for a finer analysis of the line items.

The final point of difference between the NIDS waves 1 and 2 is the most critical in our decision not to include the latter in our analysis. The second wave was split up into two phases (see Brown et al. 2012, for more information). The wave 2 phase 1 questionnaire is largely consistent with wave 1, as outlined above. However, the phase 2 household questionnaire is far shorter and only includes a single question relating to expenditure—a one-shot question on total expenditure. This makes it impossible to do anything other than the broadest possible analysis of household expenditure. Due to the fact that phase 2 covered a non-trivial proportion of respondents, we decided to exclude this most recent dataset from our analysis in this paper.

A.4 Expenditure variables

Table A1 provides the variables included in the expenditure modules of the PSLSD and NIDS datasets. Variables relating to monthly expenditure are shown together with variables for which only annual expenditure figures are available.

Table A1: Expenditure variables in the PSLSD and NIDS wave 1

Consumption item	PSLSD 1993	NIDS W1 2008
Energy, water, and rates		
Wood	Monthly	
Paraffin	Monthly	
Coal	Monthly	
Electricity	Monthly	Monthly
Candles	Monthly	
Gas	Monthly	
Batteries	Monthly	
Diesel	Monthly	
Other energy	Monthly	Monthly
Water	Monthly	Monthly
Rates	Monthly	Monthly
Levies		Monthly
Food		
Maize	Monthly	Monthly
Maize flour	Monthly	Monthly
Rice	Monthly	Monthly
Bread	Monthly	Monthly
Wheat flour	Monthly	
Cereal	Monthly	Monthly
Legumes	Monthly	Monthly
Potatoes	Monthly	Monthly
Tomatoes	Monthly	
Tubers	Monthly	
Oil	Monthly	Monthly
Butter	Monthly	Monthly
Cheese	Monthly	Monthly
Jam	Monthly	Monthly
Milk	Monthly	Monthly
Baby food	Monthly	Monthly
Sugar	Monthly	Monthly
Red meat	Monthly	Monthly
Canned red meat	Monthly	Monthly
Chicken	Monthly	Monthly
Eggs	Monthly	Monthly
Fresh fish	Monthly	Monthly
Tinned fish	Monthly	Monthly
Pumpkin	Monthly	
Other vegetables	Monthly	Monthly
Bananas	Monthly	
Apples	Monthly	
Citrus	Monthly	

Soft drinks	Monthly	Monthly
Biscuits		Monthly
Pasta		Monthly
Samp		Monthly
Peanut butter		Monthly
Tinned fruit and veg		Monthly
Salt and spices		Monthly
Coffee and tea		Monthly
Soya products		Monthly
Food hampers		Monthly
Ready-made meals		Monthly
Fruits and nuts		Monthly
Meals from outside the home	Monthly	Monthly
Other food	Monthly	Monthly
Regular non-food		
Personal		
Cigarettes	Monthly	Monthly
Alcohol	Monthly	Monthly
Entertainment	Monthly	Monthly
Personal care	Monthly	Monthly
Newspapers	Monthly	Monthly
Cell phones		Monthly
Lotto and gambling		Monthly
Ceremonies		Monthly
Internet		Monthly
Sport		Monthly
Telephone	Monthly	Monthly
Transport		
Petrol and oil	Monthly	Monthly
Public transport	Monthly	Monthly
Vehicle payments (excl. insurance)		Monthly
Miscellaneous		
Washing powder	Monthly	Monthly
Childcare	Monthly	Monthly
Religious fees	Monthly	Monthly
Donations	Monthly	
Domestic workers	Monthly	Monthly
Swimming pool maintenance		Monthly
Pets		Monthly
Toys		Monthly
Gifts		Monthly
Income tax payments		Monthly
Insurance		
Life insurance		Monthly
Funeral policies		Monthly
Educational policies		Monthly
Short-term insurance		Monthly
Household items		

Kitchen equipment	Annual	Monthly
Home maintenance	Annual	Monthly
Bedding	Annual	Monthly
Material for curtains		Monthly
Furniture	Annual	Monthly
Clothing		
Shoes	Annual	Monthly
Clothes	Annual	Monthly
Material	Annual	Monthly
Health		
Medical aid		Monthly
Doctors	Annual	Monthly
Hospital fees	Annual	Monthly
Medical supplies	Annual	Monthly
Traditional healers	Annual	Monthly
Homeopath, physio, dietician		Monthly
Personal items		
Holidays	Annual	Monthly
Jewellery	Annual	Monthly
Education		
School fees	Annual	Monthly
Uniforms	Annual	Monthly
Transport to school	Annual	
Meals at school	Annual	
Stationery	Annual	Monthly
School books	Annual	Monthly
Boarding fees	Annual	
Other contributions	Annual	
Extra tutoring	Annual	
Extramural activities	Annual	
Other	Annual	Monthly
Land rental		
Rented land	Annual	
One-shot questions		
Food		Monthly
Groceries	Monthly	
Restaurants	Monthly	
Holidays	Annual	
Vehicles	Monthly	
Furniture	Monthly	
Clothing	Monthly	
Domestic workers	Monthly	
Insurance	Monthly	
Savings	Monthly	

Source: Own calculations.

A.5 Comparing the two datasets

The two datasets are similar enough to facilitate a comparison without too much modification. The first area that requires some hard thinking is imputed rent from owner-occupied housing. The

imputations in the 1993 PSLSD use a rule-based approach to assign 5 per cent of the value of the property as an annual potential rental amount. This is then divided by 12 to for a monthly figure. This is in contrast to the NIDS wave 1 dataset, where missing values were imputed using a regression-based approach. Abstracting away from difference in dealing with missing data, the quality of the data that are available is questionable to begin with, with many households quoting unrealistically low amounts. For example, over 20 per cent of households in the PSLSD are said to be valued at ZAR1,000 or less. The recommendation is to remove imputed rent from consumption expenditure, but to keep actual rent in the dataset. This means that we will overstate the welfare of renters relative to owners. In the PSLSD roughly 22 per cent of households are rented and falls to 14.5 per cent in NIDS wave 1.

The second concern relates to the different time frames associated with expenditure for different variables. In the 1993 data, there are some expenditure items for which we have annual data only. These include household items, clothing, health, and education spending. This is in contrast to both waves of NIDS data where these items are all reported on (at least) a monthly basis. The recommendation here is to divide the annual 1993 figures by 12, where appropriate.

The final point to note is that expenditure figures should be deflated to a common base. For the moment, the recommendation is to deflate the expenditure data to a real 2008 equivalent, as is done in the comparison dataset.

A.6 Conclusion

Conceptually, the NIDS expenditure modules are better than those in the PSLSD. All components of expenditure relate to spending in the last month, while some also include annual expenditure. The PSLSD only asks about annual expenditure for some key spending variables. However, this difference is not insurmountable, as has been outlined above.

B The comparability of the IESs

B.1 Introduction

The key official source of data on the incomes and expenditure patterns of South African households in the post-apartheid era is the IES. This survey has been conducted at five-yearly intervals since 1995 by Statistics South Africa and its primary purpose is to be used to compile the weights for the CPI. However, since this is the only nationally representative household survey conducted by Statistics South Africa with other than a cursory exploration of incomes or expenditures, the IESs have been widely used to measure and track changes in poverty and inequality.

B.2 Overview of the surveys

Four IESs have been conducted during the post-apartheid era in South Africa, in 1995, 2000, 2005/06 and 2010/11. In addition, the LCS 2008/09 includes a module very similar to the IES and is therefore included here.

Broadly speaking, the surveys in 1995 and 2000 were very similar to each other, while the 2005/06 survey saw a number of methodological changes introduced. The 2008/09 LCS and 2010/11 IES saw further refinements of the methodology, but are very similar to the 2005/06 survey. Apart from minor changes to the questionnaire in 2000, the only significant difference between the 1995 and 2000 surveys was in the design of the sample and the sampling methodology. Yu (2008: 4-5)

details the differences in sampling methodology between the three surveys. One of the more important differences relates to the sample frame. For the IES 2000, the sample frame was based on the 1996 Census, covering the entire geographical area of the country. In contrast, the sample frame in 1995 was based on the 1991 Census, which did not cover the former ‘independent’ homelands—Bophuthatswana, the Ciskei, the Transkei and Venda (the so-called TBVC states)—whose populations were estimated. Yu (2008: 4) also notes that the IES 1995 limited participation in the survey to just ten household members, while a maximum of five household members (the household head, his/her spouse, and any three other members) were included in the income section of the questionnaire, limitations that were not applied in later surveys.

In both the 1995 and 2000 IESs, Statistics South Africa administered a single questionnaire, visiting each household only once. Both surveys used the recall method, requiring respondents to remember their expenditures over the previous month or year, depending on the type of item (the reference period for more frequently purchased items was typically a month, and the previous 12 months for less frequently purchased items). Statistics South Africa used the payment approach—taking into account only payments made by the household in respect of a given item during a given period, whether or not they were delivered during the period—in both surveys to collect data on expenditure on goods and services, while own production was valued using the consumption approach, which takes into account the total value of goods or services consumed or used during a given period. The Standard Trade Classification (STC) was used to classify items.

The 2005/06 IES involved various methodological changes. First, the survey was conducted over a period of 12 months from September 2005 onwards, rather than a single month as had been the case previously. Each month, a sample of households was surveyed, with each household participating in the survey for one month, while the sample was chosen in such a way that it was spread evenly across the 12 months and was nationally representative in each quarter (Statistics South Africa 2008b: 24, 31). Second, Statistics South Africa introduced a weekly diary to collect information on households’ daily acquisitions, with households required to complete separate diaries for each of four weeks. Where households completed two or three diaries, these were used to impute data for the remaining weeks, but households with fewer than two diaries were excluded from the final dataset (i.e. treated as non-response) (Statistics South Africa 2008b: 27). Third, the classification system used in the 2005/06 IES was the COICOP, rather than the STC used in earlier surveys. Finally, while the 2005/06 IES also used the payment and consumption approaches to collect data on services and own production, it followed the acquisition approach for goods. This approach takes into account the ‘total value of goods and services acquired (not necessarily consumed but for household consumption purposes) during a given period, whether or not they are paid for during the period of collection’ (Statistics South Africa 2008b: 31).

The 2008/09 LCS was far broader in scope than the IESs, collecting a wide variety of information relating to living conditions and poverty. Income and expenditure data were collected in one of the modules of the survey. In most respects, the collection of income and expenditure data in this survey was very similar to that of the IES 2005/06, although the sample was somewhat larger (just over 25,000 households as opposed to just over 21,000 households). Data were collected using both recall and diaries, and data were classified according to the COICOP system. The LCS did, though, collect expenditures on goods using the acquisition as well as the payment approach.¹³ The IES 2010/11 differed only in that the number of weekly diaries and the number of visits per household were reduced to two diaries and four visits, from four and six respectively in 2008/09.

¹³ The LCS statistical release indicates that both the acquisition and payment approaches were used (Statistics South Africa 2011: 2), although the IES 2010/11 statistical release indicates only the acquisition approach (Statistics South Africa 2012a: 1).

Table B1: General Information on IES-type surveys since 1995

	IES 1995	IES 2000	IES 2005/06	LCS 2008/09	IES 2010/11
Survey period	Oct. 1995	Oct. 2000	Sept. 2005 - Aug. 2006	Sept. 2008 - Aug. 2009	Sept. 2010 - Aug. 2011
Links to other surveys	October Household Survey 1995	Labour Force Survey 2000(2)	n.a.	A module within LCS 2008/09	n.a.
Sample frame	Census 1991	Census 1996	Census 2001	Census 2001	Census 2001
Sample	29,582 households	26,263 households	21,144 households	25,075 households	25,328 households
Questionnaires	One	One	One main; four weekly diaries	One main; four weekly diaries	One main; two weekly diaries
Methodology	Recall	Recall	Recall and diary	Recall and diary	Recall and Diary
Visits per household	One	One	Six	Six	Four
Classification system	STC	STC	COICOP	COICOP	COICOP
Expenditure data collection approach					
Goods	Payment	Payment	Acquisition	Acquisition and payment	Acquisition
Services	Payment	Payment	Payment	Payment	Payment
Own production	Consumption	Consumption	Consumption	Consumption	Consumption

Source: Statistics South Africa (2008b, 2011, 2012a, 2012b), and Yu (2008: 5).

The IESs are primarily dedicated to collecting information on households' expenditures and, as such, the questionnaires are extensive and detailed. For the most part, the expenditure modules are quite similar. Table B2 provides details on reference periods for different types of expenditure data across the five surveys. These have, for the most part, stabilized since the 2005/06 IES.

Table B2: Expenditure reference periods

Category	1995	2000	2005/06	2008/09	2010/11
Housing		Monthly; some items annual			
Domestic workers		Monthly			
Food	Monthly			Weekly diaries	
Alcoholic beverages	Monthly			Weekly diaries	
Non-alcoholic beverages	Monthly			Weekly diaries	
Tobacco products	Monthly			Weekly diaries	
Personal care	Monthly			Weekly diaries	
Other household consumables	Monthly			Weekly diaries	
Household services	Monthly			Weekly diaries	
Household fuel	Annual	Monthly		Weekly diaries	
Clothing and footwear	Annual		Quarterly and annual	Bi-monthly and annual	Quarterly and annual
Furniture and equipment			Annual		
Health services			Annual		
Transport	Annual Some items monthly		Annual		
Communication	Monthly		Annual		

Computer and telecom equipment	n.a.	Annual
Education		Annual
Reading matter and stationery	Annualized from weekly or monthly data	Annual
Recreation, entertainment, and sport		Annual
Miscellaneous expenditure	Annual	Some annual, some monthly
Own production		Annual

Notes: 'Monthly' refers to the past month, 'quarterly' refers to the three months prior to the survey, and 'annual' refers to the 12 months prior to the survey. Household fuel excludes electricity, which is included within the housing category with a month reference period. From 2005/06 onwards, households were required to record the full price of all items purchased (or estimated value for gifts etc.) during the week for each of the weekly diaries. Categories where the reference period is 'Weekly diaries' means that the weekly diaries are the only source of information on these expenditures.

Source: Survey questionnaires.

B.3 Comparability of the surveys

Given that there is no other nationally representative survey that provides such detailed information on both income and expenditure, the IESs have become key data sources in the analysis of poverty and inequality in South Africa.

IES1995

Since the release of the IES 1995—one of the earliest nationally representative household surveys conducted by Statistics South Africa and the closest to the advent of democracy in 1994—this survey has been used extensively in the analysis of poverty and inequality. As later IESs became available, the 1995 survey was extensively used as the base period for analysis of trends in poverty and inequality. Importantly, later surveys were often evaluated in terms of the 1995 data, with little consideration given to the possibility that the 1995 data may have been flawed.¹⁴

More recently, however, critiques of the 1995 data have begun to emerge, largely as a result of concerns relating to the 1995 October Household Survey (OHS), which was conducted simultaneously with the IES. As a result, the suitability of the both 1995 surveys for use as a base year for comparisons has been questioned.

One of the main concerns about the two datasets relates to the sample. In their analysis of poverty and inequality during the first five years of democracy, Hoogeveen and Özler (2006: 90) point to sampling problems in the 1995 OHS/IES. Specifically, the '1991 Census, which was the sampling frame for the 1995 OHS and IES ... was carried out under the apartheid regime and had marked coverage problems' (Hoogeveen and Özler 2006: 90). This census excluded the former so-called

¹⁴ For example, one of the important criticisms of the 2000 IES was that it showed a substantial decline in per capita incomes and expenditures relative to 1995 levels (see section B.3.2).

‘independent’ homelands—the Transkei, Ciskei, Bophuthatswana, and Venda—and, although it was the first time that an attempt was made to actually enumerate the majority of the African population, it relied heavily on self-enumeration, compromising data quality among the less literate African population in particular (Zulu and Sibanda 2005: 222). Further, the 1991 Census made use of a combination of sample surveys and aerial photography to estimate the population in ‘inaccessible African areas’ (Zulu and Sibanda 2005: 222).

Branson and Wittenberg (2007: 316), looking at employment status between 1994 and 2004 using each of the OHS and September Labour Force Survey (LFS) datasets, note that while ‘the qualitative picture is consistent across all surveys, the year 1995 looks anomalous’. The 1995 data revealed substantially greater employment between the ages of 25 and 55 years than in any of the other datasets used, with employment among African males being particularly high. This echoes earlier findings by Wittenberg (2004) relating to significantly more agricultural workers recorded in the OHS than in other surveys in adjacent years. The pair of datasets, therefore, exhibit some anomalies that make comparisons difficult.

Table B3: Estimates of income and expenditure in 1995 and 2000

	Income		Expenditure	
	Household	Per capita	Household	Per capita
1995 (1995 prices)	ZAR37,000	ZAR8,786	37,000	ZAR8,892
2000 (2000 prices)	ZAR45,000	ZAR11,755	ZAR40,000	ZAR10,463
1995 (2000 prices)	ZAR51,000	ZAR12,135	ZAR51,000	ZAR12,282
2000 vs. 1995, per cent difference				
Nominal	+21.6	+33.8	+8.1	+17.7
Real	-11.7	-3.1	-21.6	-14.8

Source: Statistics South Africa (2008b: 27-8) and own calculations.

IES 2000

The results of the IES 2000 were rather controversial when originally released by Statistics South Africa. The key issue was that the survey found that incomes and expenditures had declined considerably relative to levels reported in the IES 1995. Estimates of mean income and expenditure, for households and per capita, for the two years as estimated by Statistics South Africa are presented in Table B3.

While the estimates in nominal terms showed gains over the period of between 8 per cent and 34 per cent, these were more than completely accounted for by inflation. Real comparisons show that expenditure shows a particularly strong decline: mean household expenditure fell 21.6 per cent, while per capita expenditure fell by 14.8 per cent. In a discussion of this finding, Van der Berg et al. (2007: 8) note that the size of this decline ‘implies a greater fall in output than ... occurred during the Great Depression’, and argue that it is inconsistent with trends in various other economic indicators over the period. Thus, they point to, among other trends, increases over the period in the sales of petroleum products, in electricity produced and consumed, in goods transported, as well as in tax revenues (driven by strong growth in VAT, income tax, and company tax revenues).

Disaggregation of expenditure by main STC category presented in Table B4 shows that nine of the 20 categories saw real declines in expenditure between 1995 and 2000. These declines ranged from -4.1 per cent (transport) to -44.0 per cent (furniture and equipment) and -72.3 per cent

(household services), with expenditure on food falling by 5.1 per cent in real terms. At the same time, large increases in spending were observed for computers and telecommunication equipment (+104.5 per cent), domestic workers (+61.4 per cent), household fuel (+49.9 per cent) and education (+49.2 per cent). The largest contributors to the decline in total annual household expenditure were miscellaneous expenditure (equivalent to 92.5 per cent of the total decline), furniture and equipment (13.7 per cent), clothing and footwear (10.6 per cent), and food (7.4 per cent).

Some of the changes in real expenditure can be explained relatively easily in terms of our understanding of social and economic dynamics of the time. For example, the rapid growth of expenditure on computer and telecommunication equipment between 1995 and 2000 is expected, given rising consumer demand for home computers and growing mobile phone penetration within the South African market. Rising incomes would also be correlated with increased expenditure on luxury goods such as computer and telecommunication equipment, reading matter and stationery, and even domestic workers. However, it seems implausible that the early post-1994 period should be characterized by a gradual decline in expenditure on food.

Table B4: Total annual household expenditure by STC category, 1995 and 2000 (2000 prices)

Category	1995		2000		Change	
	ZAR millions	Share	ZAR millions	Share	Per cent	Share
Housing	76,084	14.6	78,656	17.1	3.4	-4.2
Domestic workers	7,251	1.4	11,703	2.6	61.4	-7.3
Food	88,212	17.0	83,748	18.3	-5.1	7.4
Beverages	8,433	1.6	9,781	2.1	16.0	-2.2
Cigarettes, smokers' requisites	4,343	0.8	4,530	1.0	4.3	-0.3
Personal care	11,354	2.2	14,242	3.1	25.4	-4.8
Other HH consumer goods	6,534	1.3	4,821	1.1	-26.2	2.8
HH services	1,612	0.3	446	0.1	-72.3	1.9
HH fuel	2,726	0.5	4,087	0.9	49.9	-2.2
Clothing and footwear	23,440	4.5	16,981	3.7	-27.6	10.6
Furniture and equipment	18,923	3.6	10,602	2.3	-44.0	13.7
Health services	18,678	3.6	16,937	3.7	-9.3	2.9
Transport	48,988	9.4	46,986	10.2	-4.1	3.3
Computer, telecom. equipment	1,502	0.3	3,071	0.7	104.5	-2.6
Communication for HH purposes	10,907	2.1	9,613	2.1	-11.9	2.1
Education	8,822	1.7	13,160	2.9	49.2	-7.1
Reading matter, stationery	2,298	0.4	3,109	0.7	35.3	-1.3
Recreation, entertainment, sports	6,457	1.2	7,147	1.6	10.7	-1.1
Miscellaneous expenditure	166,270	32.0	110,123	24.0	-33.8	92.5
Expenditure on own harvest/livestock	6,714	1.3	9,123	2.0	35.9	-4.0
Total annual HH expenditure	519,548	100.0	458,866	100.0	-11.7	100.0

Source: Yu (2008: 16) and own calculations.

While part of the real decline in total expenditure observed between 1995 and 2000 can be ascribed to problems with data quality in the latter year—Simkins (2004: 3), for example, notes that ‘a considerable number of observations in the 2000 IES are seriously inaccurate and/or incomplete’—there are also problems in terms of the representivity of the 2000 dataset, which may

have impacted on the estimated level of total expenditure. Specifically, the 2000 IES is under-representative of the White population, when compared to the 2001 Census.

Despite their similarities—conceptually and in terms of the questionnaire structure—the comparability of the 1995 and 2000 IESs is dubious. This may be true officially, as Van der Berg et al. (2007: 12) claim that ‘Statistics South Africa recently admitted that data from the 1995 and 2000 takes cannot reliably be used to derive trends in income’. However, they provide no reference for this assertion, while we were unable to locate other evidence of such a confession.

IES 2005/06

Although there is a decline in both income and expenditure between 1995 and 2000, the IES 2005/06 shows a rapid increase for both variables during the preceding five years. Total annual household expenditure is estimated to have risen by 63.7 per cent between 2000 and 2005/06, while household income increased by 43.1 per cent (Yu 2008: 16). This seems to confirm the suspicion that the IES 2000 was significantly under-capturing income and expenditure.

Table B5: Total annual household expenditure by STC category, 2000 and 2005/06

Category	2000		2005/06		Change	
	ZAR million	Share	ZAR million	Share	Per cent	Share
Housing	78,656	15.1	118,512	25.8	50.7	-65.7
Domestic workers	11,703	2.3	10,615	2.3	-9.3	1.8
Food	83,748	16.1	71,997	15.7	-14.0	19.4
Beverages	9,781	1.9	7,616	1.7	-22.1	3.6
Cigarettes, smokers' requisites	4,530	0.9	3,680	0.8	-18.8	1.4
Personal care	14,242	2.7	6,603	1.4	-53.6	12.6
Other HH consumer goods	4,821	0.9	4,229	0.9	-12.3	1.0
HH services	446	0.1	323	0.1	-27.6	0.2
HH fuel	4,087	0.8	3,386	0.7	-17.2	1.2
Clothing and footwear	16,981	3.3	26,304	5.7	54.9	-15.4
Furniture and equipment	10,602	2.0	21,234	4.6	100.3	-17.5
Health services	16,937	3.3	29,978	6.5	77.0	-21.5
Transport	46,986	9.0	110,498	24.1	135.2	-104.7
Computer, telecom. equipment	3,071	0.6	4,655	1.0	51.6	-2.6
Communication for HH purposes	9,613	1.9	16,414	3.6	70.7	-11.2
Education	13,160	2.5	18,558	4.0	41.0	-8.9
Reading matter, stationery	3,109	0.6	2,678	0.6	-13.9	0.7
Recreation, entertainment, sports	7,147	1.4	15,258	3.3	113.5	-13.4
Miscellaneous expenditure	110,123	21.2	274,949	59.9	149.7	-271.6
Expenditure on own harvest/livestock	9,123	1.8	3,667	0.8	-59.8	9.0
Total annual HH expenditure	458,866	88.3	751,154	163.7	63.7	-481.7

Source: Yu (2008: 16) and own calculations.

While the IES 2005/06 shows an increase in total expenditure relative to 2000, this is driven by a few specific categories (finance and insurance—roughly one-third of the total increase—transport, housing). Importantly, though, expenditure on food falls significantly, from ZAR85.3 billion in 2000 to ZAR73.9 billion in 2005/06, a decline of ZAR11.4 billion or 13.4 per cent (Van der Berg 2007: 9). Consequently, Statistics South Africa (2008c: 1) notes that the food share within total expenditure fell between 2000 and 2005/06, not only in aggregate, but also across income groups,

race groups and provinces. This decline is attributed to the implementation of the diary (the diary method tends to underestimate expenditure, while recall tends to overestimate expenditure), while the falling food share in expenditure was justified in terms of the Engel curve. Nevertheless, the food share revealed in the 2005/06 data is described as ‘low for a country at South Africa’s level of development’ (Statistics South Africa 2008c: 17).

For the CPI, Statistics South Africa adjusted food and non-alcoholic beverages (as well as for personal care items) upwards by 42.0 per cent. Alcoholic beverages and tobacco expenditures were adjusted upwards by 440.6 per cent and, although no information on these adjustments for the 1997, 2002, or 2012 CPI weights was found, there seems to be no reason to expect that the extent of this adjustment would have varied significantly across surveys (Statistics South Africa 2008a: 6-8).¹⁵

Transport and housing show very strong increases from 2000 to 2005/06—revised CPI weights for these items were somewhat controversial in 2008, although not necessarily for reasons relating to the survey’s reliability but rather its timing. However, the transport category was also subject to a change in the measurement methodology, from payment to acquisition, which may further have compounded the change.

An important methodological change with implications for the comparability of the datasets occurred in the way the cost of owner-occupied housing was measured. In 1995 and 2000, Statistics South Africa used interest on mortgage bonds as the measure for the cost of owner-occupied housing. The quality of these particular variables—interest component of mortgage bond repayment, capital component of mortgage bond repayment, and total monthly mortgage bond repayment—is very poor and it is clear that Statistics South Africa would have had to have relied on external data to construct the associated weights for the CPI. In 2005/06, however, the decision was taken to use imputed rent. Respondents who were owner-occupiers were asked to estimate the value of their dwellings and the annual value for imputed rent was calculated as 7 per cent of that amount. While respondents were asked to value their dwellings in 1995, this question was not asked in 2000 and so it is not possible to construct an imputed rent variable at all in 2000. Further, it is not clear whether 7 per cent is a time-invariant proportion or whether some other percentage would need to be used in other years.

LCS 2008/09 and IES 2010/11

These surveys have been released relatively recently and published evaluations of their comparability have not been found. From a methodological standpoint, these surveys are broadly consistent. Like the 2005/06 IES, both of these surveys use weekly diaries, although the number of diaries is reduced in the 2010/11 IES, and data are classified using the COICOP system.

As already noted, the LCS 2008/09 has an ‘IES module’ as opposed to being a dedicated income and expenditure survey. Given the scope of the LCS—it has seven modules and 27 sub-sections—the fact that the income and expenditure modules are likely to have been covered relatively late in the survey process (assuming module numbers correspond to interview numbers, they would have been covered in the fourth and fifth out of six weeks of a given household’s involvement) and the concurrent collection of data through the weekly diaries, it is possible that data quality may have been impacted to some extent. The national response rate of 88.0 per cent for the LCS 2008/09 is slightly lower than the 91.6 per cent of the IES 2010/11.

¹⁵ Although, it should be noted, these types of adjustments may technically compromise the suitability of the CPIs chosen for deflation of expenditure aggregates derived from the IESs.

B.4 Conclusion

To what extent, then, are the IES datasets—and the LCS income and expenditure module – comparable? It seems that, at least from a conceptual point of view, the IES 1995 and 2000 are technically comparable. The questionnaires are very similarly structured: only one new expenditure category was introduced in 2000 and only one saw a change made to its reference period. The same can be said of the latter three datasets—the IES 2005/06, the LCS 2008/09, and the IES 2010/11. However, the latter datasets differ significantly from the earlier two surveys. Eight expenditure categories, including food, rely solely on the weekly diaries for data collection. While most other categories have the same reference periods as in 1995 and (particularly) 2000, clothing and footwear has an additional reference period (information is required for the past 3 months, as well as for the past 12 months), and certain components of the STC category, *miscellaneous expenditure*, are monthly rather than annual.

However, as documented above, the IES 2000 appears to have substantially under-recorded expenditure relative to both the 1995 and 2005/06 rounds, making dubious any comparison of poverty or inequality with the IES 2000. Although 1995–2005 comparisons appear consistent with our understanding of developments within the South African economy over the period, comparisons between these two datasets are complicated by at least three issues. First, the IES 2005/06 and 2010/11 record very low values for food and non-alcoholic beverages, as well as for personal care items, forcing Statistics South Africa to make significant adjustments to the data when calculating expenditure weights for the CPI. Conversely, the 2005/06 expenditure share for transport was almost three times that observed in 1995 or 2000. Second, the very poor data on interest on mortgage bonds in 1995 and 2000 makes constructing an accurate aggregate for housing very difficult, if not impossible, while the shift to imputed rent in 2005/06 further complicates comparisons. Although the adjustment factor for the 2008 CPI weights is not known, imputed rent was revised downwards by almost half for the 2012 CPI weights. Imputed rent is derived from the estimated value of the dwelling—calculated as 7 per cent of the value of the dwelling. Third, the sampling problems uncovered in the 1995 IES and accompanying OHS call into question the appropriateness of using these datasets as baselines in comparative analyses.

Most welfare analyses that use aggregate expenditure from these datasets tend to gloss over the comparability issues. They will typically note that there are issues of comparability, but tend to proceed with comparisons in any event. However, given that this research places significant emphasis on the individual components within total expenditure, it is more exposed to some of the problems discussed above, necessitating a more conservative approach to assessing comparability.

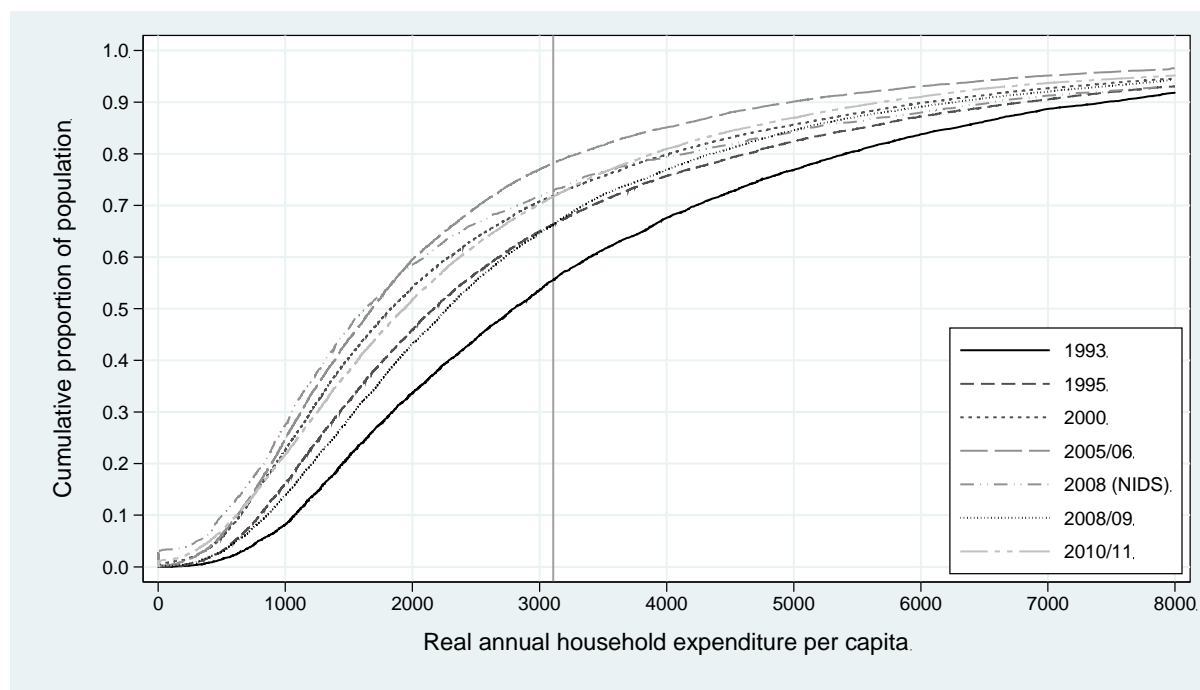
C Poverty and inequality trends based on expenditure data

What do the expenditure data reveal about poverty and inequality? We begin our comparisons by using all seven datasets to investigate the distribution of total household consumption expenditure per capita between 1993 and 2008. Thereafter we break down expenditure into food and non-food and perform a similar analysis. All variables are deflated to their real 2008 Rand values using headline CPI and are presented as annual household expenditure per capita.

Three poverty lines are used in this paper, all of which are taken from Statistics South Africa's report on the development of poverty lines for statistical reporting (Statistics South Africa 2008d). The food poverty line is based on a daily per capita energy requirement and stands at ZAR259 per capita per month in 2008 prices. This equates to the figure of ZAR3,108 used in our study. The lower poverty line is made up of the ZAR259 food expenditure component plus a non-food component of ZAR248 for a total of ZAR507 per capita per month. The non-food component is derived from the average non-food expenditure of households that spend ZAR259 per month on food. The non-food component of the lower poverty line is calculated as the average non-food expenditure of households where total expenditure is equal to the food poverty line. This lower line stands at ZAR360 per capita per month.

Figure C1 presents cumulative density functions for real annual household expenditure per capita for each of the datasets. The vertical lines represent the lower and upper poverty line of ZAR4,320 and ZAR6,084 respectively. For any possible poverty line between the origin and the upper poverty line, consumption expenditure poverty is lowest in 2010/11 and highest in 2008 (NIDS). Poverty rates in 1993 and 1995 track each other closely over the distribution of our welfare measure up to ZAR6,084 whereupon the 1995 CDF crosses its 2005 counterpart. The poverty rate in 2008 is a little over 60 per cent at the upper line. This is in line with research using household income per capita as the measure of welfare with a similar poverty line. For example, Leibbrandt et al. (2010) find consumption expenditure poverty of 54 per cent using a slightly higher poverty line of ZAR6,180 per month. The difference between the two is largely driven by the fact that the authors include rental expenditure whereas this study does not. A point of concern to be highlighted is the fact that poverty rates jump around significantly from year to year. Given what we know from both the income poverty and non-money-metric poverty literature, the trend since 1993 has seen poverty decrease from year to year. We would expect this robust finding to be reflected in our consumption expenditure figures, but this is not the case. Taken literally, the story the CDFs tell is that poverty rates over the range of expenditure to the upper poverty line were generally similar in 1993 and 1995, before diverging for values higher than ZAR6,000. Poverty at the upper line is measured at 57 per cent and 54 per cent for 1993 and 1995 respectively. Poverty then jumped a great deal between 1995 and 2000 (60 per cent) before falling by the same amount as the previous jump from 2000 to 2005 (54 per cent). The most puzzling feature of Figure C1 is the fact that it reflects a very large rise in poverty between 2005 and 2008 (63 per cent)—something that is not backed up by any of the income-based or non-money-metric research. Expenditure data from the LCS reveal a very similar distribution to the 2005/06 IES, although poverty falls significantly between 2008/09 and 2010/11.

Figure C1: Cumulative density functions for real annual household expenditure per capita



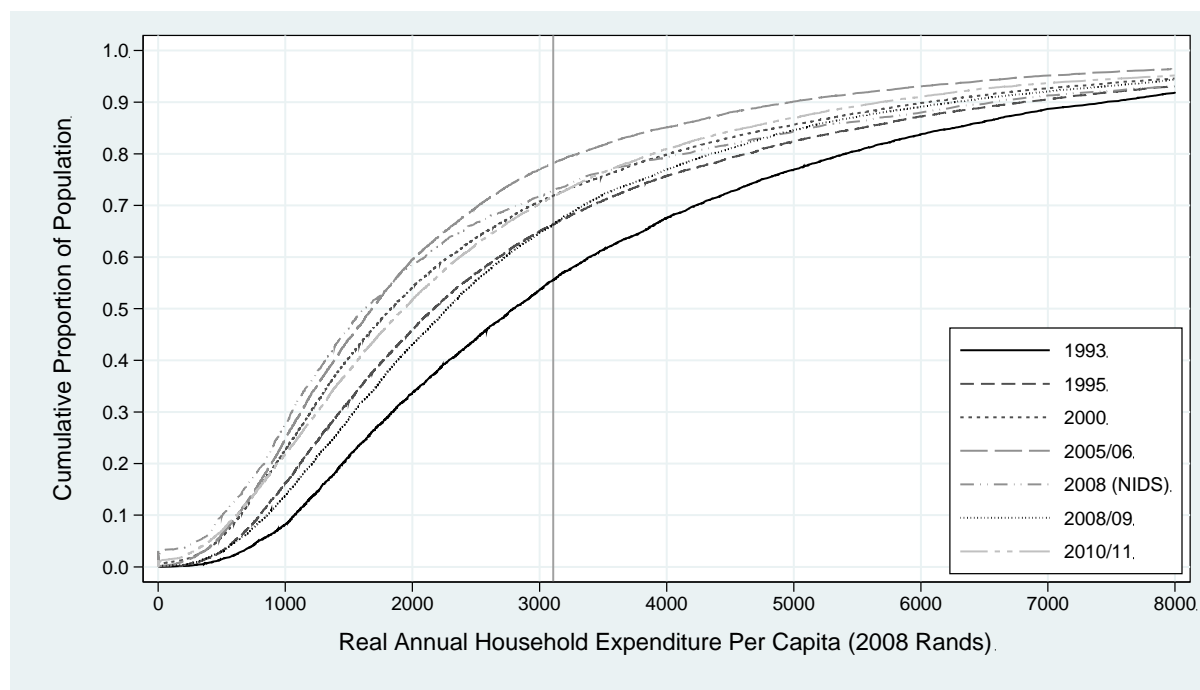
Source: Own calculations, PSLSD 1993, IES 1995, IES 2000, IES 2005/06, NIDS 2008, LCS 2008/09, IES 2010/11.

The ordering of poverty rates is sensitive to the choice of poverty line. That is to say, no poverty dominance is displayed in the figure above. The 1993 and 1995 CDFs cross just below the lower poverty line, while the 1995 and 2005 curves cross at the point of the upper poverty line. The 2008 CDF lies above the other curves until ZAR8,000, after which it crosses the 2000 and then the 1993 lines. Nevertheless, for all poverty lines up to the upper poverty line, the 2008 CDF lies above the 2000 CDF, which lies above all other CDFs. Similarly, the 2010/11 CDF lies below all other CDFs, indicating lower poverty rates irrespective of the chosen poverty line.

A discussion of the poverty gap measure is contained in section 4.1, which deals with the sensitivity of poverty and inequality estimates to the choice of deflator. It suffices to say here though that the poverty gap at the upper line is highest in 2008 (0.39) and lowest in 2010 (0.26).

The CDFs of real annual household food expenditure per capita tell a very different story to that of the figure above. The food poverty line is set at ZAR259 per capita per month in 2008 Rands, which equates to ZAR3,108 per capita per year. This amount is represented by the vertical line in Figure C2. According to this breakdown, food consumption poverty was lowest in 1993 and highest in 2005. This is driven by the extremely large discrepancy in the relative share of food expenditure in each dataset—39.2 per cent and 15.8 per cent in 1993 and 2005 respectively. The ordering of the relative contribution of food expenditure to total expenditure is in fact reflected in the ordering of poverty at the line of ZAR3,108 below. As noted, the share of food expenditure peaked in 1993, followed by 1995, 2000, 2010, 2008/09, 2008 (NIDS), and 2005. While it is almost surely the case that food expenditure is overly weighted relative to non-food expenditure in 1993, it appears that the share of food in overall expenditure declined in the post-apartheid period.

Figure C2: Cumulative density functions for real annual household food expenditure per capita



Source: Own calculations, PSLSD 1993, IES 1995, IES 2000, IES 2005/06, NIDS 2008, LCS 2008/09, IES 2010/11.

The 1993 CDF is first-order dominated by all the other curves in the figure above, and is the only curve to be dominated over the entire range from ZAR0 to ZAR8,000. The 2005 and 2008 CDFs cross at about ZAR1,500 and, from this point onwards, the 2005 curve lies above all the others. The distance between the 1995 and 2000 CDFs is relatively constant from low values up to the food poverty line.

At the food poverty line, the share of the population spending below ZAR3,108 per capita per year rises from 55 per cent in 1993 to 66 per cent in 1995. It then rises once again in 2000 (71 per cent) before peaking in 2005 (78 per cent). There is then a steep drop off to 2008, where the proportion under the poverty line stands at just over 71 per cent. The poverty gap is lowest in 1993 and highest in 2005 at 0.23 and 0.42 respectively. It is interesting to note that the poverty gap ratios in 2005 and 2008 are very close to one another, in contrast to their respective headcount ratios. This indicates that although a higher percentage of the population found itself below the poverty line in 2005 than in 2008, the average poor person was further away from the poverty line in the latter than in the former.

Table C1: Food poverty and inequality estimates, 1993–2010

	Headcount	Poverty gap	Poverty gap squared	Total expenditure Gini	Food expenditure Gini
1993	0.55	0.23	0.13	0.54	0.41
1995	0.66	0.32	0.19	0.61	0.45
2000	0.71	0.37	0.23	0.66	0.46
2005/06	0.78	0.42	0.27	0.66	0.45
2008 (NIDS)	0.71	0.41	0.27	0.71	0.52
2008/09	0.68	0.31	0.18	0.61	0.42
2010/11	0.73	0.38	0.24	0.63	0.47

Source: Own calculations, PSLSD 1993, IES 1995, IES 2000, IES 2005/06, NIDS 2008, LCS 2008/09, IES 2010/11.

Note: The poverty line used is Statistics South Africa's food poverty line of ZAR259 per capita per month in 2008 prices.

The highly unequal nature of South African society has been well documented through the use of income measures. Expenditure-based measures of inequality have been less consistent over time, but are very high according to any criteria. One of the broadly accepted facts of inequality findings in South Africa in the last 20 years has been that inequality increased rapidly from 1993 to 2000, before plateauing somewhat thereafter. Using the first wave of NIDS and the 2000 IES to make this comparison suggests that inequality rose from 0.68 in 2000 to 0.70 in 2008 (Leibbrandt et al. 2010). The expenditure data used in this study also reflect a rise in inequality over the period, although at a steep gradient. Total expenditure inequality stood at 0.54 in 1993 and rose by 7 percentage points to 0.61 in 1995. Given the implausibility of a 7 percentage point change in inequality over a two-year period, it is very likely the case that the 1993 inequality measure is understated. Inequality was stable at 0.66 in 2000 and 2005, before rising to 0.71 in 2008. This figure is consistent with the 2008 income Gini coefficient, as discussed previously, but remains higher than the Gini coefficients directly before and after that period.

Turning our attention to the Gini coefficient calculated for food expenditure only, the same patterns are replicated, albeit at lower levels throughout. Given that people in the lower part of the expenditure distribution spend a greater share of overall expenditure on food, it is to be expected that the food expenditure Gini coefficient is lower than its total expenditure counterpart. The food Gini stands at 0.41 in 1993 and remains at around 0.45 in 1995, 2000, and 2005. It then increases substantially to 0.52 in 2008 (NIDS), but falls again in the latter two surveys.

The data presented here reveal some of the problems faced in analysing poverty and inequality using post-apartheid expenditure data. While individual surveys are internally consistent—telling broadly similar stories that are consistent with the consensus view of poverty and inequality—there are significant problems in terms of external consistency. Thus, for example, we find significant variation without a stable trend in the cumulative density functions at per capita expenditures around our chosen poverty lines. Even looking at only food expenditure and food poverty—which one would expect to be more consistent—there are some puzzling changes.

In terms of our three chosen datasets, the cumulative density functions reveal very close similarities between 2005/06 and 2008/09, with a relatively large rightward shift to 2010/11. This indicates higher real incomes and lower poverty rates in 2010/11, which is somewhat unexpected given the intervening economic recession. However, the food expenditure CDFs reveal the significantly lower recorded expenditure for food in 2005/06 relative to both 2008/09 and 2010/11, the latter being located between the two other CDFs.

D South African price data

D.1 The South African CPI

The CPI published by Statistics South Africa on a monthly basis is the official measure of consumer inflation in the country. The current headline measure of inflation is the All Items CPI for all urban areas and it is this measure that is targeted by the South African Reserve Bank in its monetary policy-making.

The CPI serves two key purposes within the system of economic statistics in South Africa: it is a macroeconomic indicator of the overall price level in the economy, as well as a microeconomic cost of living measure. Given this dual purpose, there may be instances where methodological choices are made that improve the CPI in terms of one purpose, but not both (for example, whether imputed rent or the net acquisition approach should be used for pricing housing).

Apart from its usefulness to monetary policy makers, there is a variety of applications for which the CPI is used. The CPI is extensively used in wage setting in South Africa, through individual and collective bargaining as well as sectoral determinations, while also informing adjustments to the nominal values of social grants. From an analytical perspective, the CPI is used to deflate incomes and expenditures in different time periods to allow comparison. However, since it is constructed on the basis of a very specific pattern of expenditure, headline CPI may not be an appropriate measure of price change for all households. As a result, conclusions regarding the evolution of poverty and inequality over time may differ if more appropriate price indices are used.

D.2 Construction of the CPI

Expenditure weights

Price indices require data on the prices of the items in the index, as well as data that will inform the relative weights of the individual items within the overall index. For consumer price indices, item weights are constructed on the basis of detailed expenditure surveys. In South Africa, Statistics South Africa conducts the IES on a five-yearly basis to collect detailed expenditure data. The IESs have been conducted four times since the end of apartheid—in 1995 (in conjunction with the OHS of that year); in 2000 (in conjunction with the LFS of September 2000); in 2005/06; and, most recently, in 2010/11—and their express purpose is for the construction of CPI weights.

While the IES data form the basis for the construction of the CPI, it is not the only source of information. Instead, Statistics South Africa, following international practice, uses various other sources of data to adjust IES-derived weights to correct for under- or over-reporting by households in the IES. Unfortunately, the exact nature of these adjustments has not always been made clear to outsiders. However, the reweighting and rebasing exercises of 2008 and 2012 have seen greater transparency on the part of Statistics South Africa in terms of detailing the nature of these adjustments.

Table D1: Adjustment of IES aggregates for the CPI weights

Category	Original value (ZAR billion)	Adjusted value (ZAR billion)	Adjustment factor
<i>1997 CPI weights (IES 1995)</i>			
	No published information available		
<i>2002 CPI weights (IES 2000)</i>			
	No published information available		
<i>2008 CPI weights (IES 2005/06)</i>			
Food and non-alcoholic beverages	100.971	131.773	1.305
- <i>Food and non-alcoholic beverages</i>	<i>100.971</i>	<i>143.401</i>	<i>1.420</i>
Personal care	8.666	12.306	1.420
Restaurants	9.633	15.007	1.558
- <i>Restaurants and hotels</i>	<i>15.354</i>	<i>16.894</i>	<i>1.100</i>
Alcoholic beverages and tobacco	8.065	43.597	5.406
<i>2012 CPI Weights (IES 2010/11)</i>			
Food and non-alcoholic beverages	159.973	216.747	1.355
Alcoholic beverages	(unreported)	48.676	-
Tobacco	(unreported)	18.013	-
Owner-occupied housing	256.708	139.051	0.542
New motor vehicles	(unreported)	63.711	-
Used motor vehicles	(unreported)	10.381	-
Gambling	1.496	16.356	10.933
Restaurants and hotels	30.331	41.773	1.377
Personal care	14.659	21.419	1.461
Insurance	(unreported)	114.665	-

Source: Statistics South Africa (2008a: 6–8, 2012d: 8–13).

Note: Categories in italics among the 2008 CPI weights are those where information was published in the documentation for the 2012 CPI weights. In the case of food and non-alcoholic beverages, the information originally published was inconsistent with the explanations provided and therefore the more recently published information is deemed correct.

For the 2008 weights, Statistics South Africa (2008a: 5) notes that adjustments to the IES-derived weights were made for frequently purchased items, specifically food and non-alcoholic beverages, personal care, restaurants, and alcoholic beverages and tobacco. These adjustments were made on the basis of data from the ‘Private Consumption Expenditure Accounts of the GDP, sectoral surveys conducted by Stats SA of the retail, motor trade and food and beverages industries and data from various industry sources’ (Statistics South Africa 2008a: 6) and are significant. Even more information on the adjustments for the weights to be applied from January 2013 onwards based on the IES 2010/11 has been made public (Statistics South Africa 2012d). Unfortunately, no such information has been located for earlier weights. Details of the reported adjustments are presented in Table D1, with percentage adjustments ranging from +10 per cent to +440 per cent for the 2008 CPI weights, and from -46 per cent to +993 per cent for the 2012 CPI weights.

Weights for the South African CPI are constructed as conventional plutocratic expenditure weights. Weights are calculated as:

$$w_i = \frac{\sum_{h=1}^H e_i^h}{\sum_{i=1}^n \sum_{h=1}^H e_i^h} \quad (3)$$

where m_i is the weight of the elementary aggregate i for $i = 1, \dots, n$ items, and e_i^h represents the expenditure on elementary aggregate i by household b for $b = 1, \dots, H$ where H is the total number of households. Thus, for example, the weight for white bread is calculated as the sum of expenditure on white bread across all households, expressed as a proportion of the sum of expenditure on all items across all households (i.e. as a proportion of total expenditure across all households).

Price data

Detailed price data are the second type of data required in the construction of a price index. Prior to 2008, Statistics South Africa ran a monthly Survey of Retail Prices to collect the required price data. Prices were collected for ‘the selected consumer goods and services in the “basket” sold by ... retail trade and service outlets to consumers in the 14 metropolitan and 39 other urban areas in the nine provinces of South Africa’ (Statistics South Africa 2002: 1). The raw price data collected in this survey are extremely detailed and there are typically multiple price series for a single indicator product.¹⁶

Currently, the methodology for collecting price data is somewhat different, with Statistics South Africa relying on field and head office data collection. In field data collection, Statistics South Africa’s price collectors visit sampled outlets to record actual prices on the shop floor, with sampled products typically being commodities. In head office data collection, staff in Statistics South Africa’s head office carry out postal, fax, email, and telephonic surveys to collect mainly prices of services (Statistics South Africa 2009b: 18). Not all price data are collected monthly, however. In some cases, prices are not set on an ongoing basis, changing only quarterly or annually for example, and Statistics South Africa will collect price information on these items at an appropriate interval. During the 2008 reweighting and rebasing of the CPI, Statistics South Africa published details on the frequency of price collection, noting for example that they survey the prices for taxi fares quarterly in March, June, September, and December; for building insurance biannually in January and July; those of school fees annually in March; and for electricity annually in July and August (Statistics South Africa 2009a: 1–2).

Within indicator products, price series for sampled products are combined into single price index using a Jevons index, which is an unweighted geometric mean of the price relatives of sampled products. Mathematically:

¹⁶ In terms of the COICOP, the classification currently used by Statistics South Africa in the compilation of the CPI, the following naming convention is used (Statistics South Africa, 2009b: 5).

COICOP level	Name	Example
2-digit	Category	Food and non-alcoholic beverages
3-digit	Class	Food
4-digit	Group	Bread and cereals
5-digit	Product	Bread
8-digit	Indicator product	Loaf of white bread
12-digit	Sampled product	Albany 700g loaf of white bread

For the sake of simplicity, this hierarchy is used throughout this paper, even when referring to other classification systems.

$$I_j^{0:t} = \prod \left(\frac{p_i^{t_1}}{p_i^{0t}} \right)^{\frac{1}{n}} = \frac{\prod (p_i^t)^{\frac{1}{n}}}{\prod (p_i^0)^{\frac{1}{n}}} \quad (4)$$

where $I_j^{0:t}$ is the index from period 0 to period t , p_i is the price of the sampled product I , and n is the number of sampled products within the indicator product.

The indicator product price indices are then weighted according to expenditure weights to derive indices for the product level and higher aggregations, using a Young index:

$$I^{0:t} = \sum w_i^b I_i^{0:t} \text{ and } \sum w_i^b = 1 \quad (5)$$

using the same notation as above and where b is the weight reference period, which precedes period 0.

The most notable limitation of CPIs calculated in this way is the use of fixed expenditure weights, which prevent the price index from reflecting changing expenditure patterns over time. Specifically, these types of price indices are unable to take into account the switching of expenditure to lower-priced goods in the face of high inflation.

One of the key concerns regarding the price data in relation to poverty and inequality analyses is that there are, as yet, no rural price indices for South Africa. This is despite the fact that CPIs for rural areas and the whole country, rather than just urban areas, are published by Statistics South Africa on a monthly basis. The published rural price index is not a true rural price index, but is instead constructed using rural expenditure weights and urban prices.¹⁷ This use of urban prices in the construction of a rural or national CPI is not ideal in the absence of evidence that confirms that urban and rural prices move in tandem. If urban and rural prices move in tandem, the use of urban price relatives will not compromise the accuracy of the rural or national CPI. However, should this not be the case—that is, where there is a variable wedge between urban and rural prices—these price indices will be unable to accurately reflect changing price levels.

Key methodological changes during the period

The reweighting of the CPI presents an important opportunity to statistical agencies for introducing methodological changes. As noted above, the South Africa CPI is about to be reweighted for the fourth time since 1994 and, although documentation relating to these changes is not always available (as was the case with documentation relating to adjustments made to the original IES data), it is safe to assume that at least some methodological changes were made during each of the four reweighting exercises.

Perhaps the most important reweighting in terms of methodological changes was that of 2008, as a wide variety of changes were introduced in an effort to bring the South African CPI closer in line with international best practice. The most notable of these changes was the shift to the COICOP, the international standard for the classification of household expenditure. As the name suggests, the guiding principle of this classification system is that expenditures of similar purpose should be classified together. Prior to 2008, classification was according to the International Trade Classification (ITC), a trade-based system used by Customs.

¹⁷ The total country CPI is similarly constructed using urban prices and national expenditure weights.

The key implication of this classification change is that comparisons of sub-indices are made more difficult, if not impossible. Statistics South Africa (2009b: 7–8) notes that this change in classification may merge ITC categories to create new categories, shift products between categories, or create entirely new categories that were not reflected within the ITC. Some of the most notable changes include:

- Household insurance, motor vehicle insurance and medical insurance were shifted from the ITC's *Housing, Transport, and Health* categories respectively, to *Miscellaneous goods and services* within COICOP;
- Medical aid contributions were shifted from the ITC's *Medical care and health expenses* to *Miscellaneous goods and services* in COICOP; and
- Expenditures in restaurants, included under *Food* within the ITC, were shifted to *Restaurants and hotels* under COICOP (Statistics South Africa 2009b: 8).¹⁸

Two other important methodological changes affecting the construction of a post-apartheid time-series of price indices were also implemented during the 2008 reweighting. These were a change in the method of construction of the basket of goods and services, and a change in the geographical areas for which price indices are calculated and published.

In 2008, provincial baskets were allowed to differ from each other. For inclusion, non-food items (at the 5-digit level) needed to account for at least 10 per cent of expenditure within the 3-digit class in a given province, while food items needed to account for at least 0.5 per cent of expenditure and be purchased by at least 5 per cent of households (Statistics South Africa 2009b: 15). In other words, in order for bread to be included in the basket, it needed to be purchased by at least 5 per cent of households and account for at least 0.5 per cent of expenditure on food. Any item in a provincial basket was taken up in the national basket. Although details for 1997 and 2002 baskets are unclear, national and provincial baskets were identical in terms of their constituent items. This change in the construction of the basket resulted in a substantial reduction in the number of indicator products for which prices need to be collected, allowing Statistics South Africa to increase the number of individual prices collected within each indicator product.

The publication of sub-national price indices is complicated by changing local and provincial boundaries, as well as changes in coverage. In 1994, the CPI covered so-called 'historical metropolitan areas'. This was replaced by 'metropolitan' and 'other urban areas' in 1997, which in turn was replaced by 'primary' and 'secondary urban areas' in 2008. Primary urban areas are defined by municipal boundaries as applicable in the 2001 Census, while secondary urban areas are defined by 'continuous built-up area known by that name rather than municipal boundaries, which in many cases include substantial rural areas' (Statistics South Africa 2009b: 16). Indices for primary urban areas may be published individually or as a combined primary urban areas index within each province, while indices for secondary urban areas are always combined within a given province. Changes in political boundaries within South Africa saw the introduction of nine new sets of provincial price indices in 2002, corresponding to the nine provinces introduced in 1994. These changes mean that sub-national price indices covering the full post-apartheid period are not available and where they are available from 2002 onwards there may be breaks in 2008.

¹⁸ In order to address the break in the series of sub-indices, Statistics South Africa released a set of sub-indices constructed from historical data from 2002 to 2008 that had been reclassified according to COICOP (i.e. extending the COICOP indices backwards in time). Unfortunately, this cannot fully account for the methodological and coverage differences between the pre-2008 CPI and the post-2008 CPI and is therefore an approximation of the COICOP CPI using the ITC-based data. Further, because the base year of these series is 2008, additivity is not maintained and the individual sub-indices do not aggregate to the official published CPI.

Importantly, prior to 2008, only five CPIs are published for sub-national geographies: all items, all items excluding housing, food only, all items excluding food, and pensioners.

A final methodological change worth mentioning here is the change in the way that Statistics South Africa estimates the cost of owner-occupied housing. This change is discussed in detail in Appendix B, but it is worth providing some detail here too. In 1995 and 2000, the cost of owner-occupied housing was measured as the interest component of mortgage bond repayments. In the 2005/06 IES, as part of Statistics South Africa’s effort to bring the CPI more in line with international best practice, imputed rent was introduced as 7 per cent of the value of the dwelling (as an annual value), replacing interest on mortgage bonds.

D.3 The CPI in the context of the analysis of poverty and inequality

The effect of inequality on the CPI

The CPI has two main uses within the context of the analysis of poverty: it is used either to update the real value of poverty lines, or to deflate expenditures of households from two different time periods so that they may be compared. However, given that expenditure patterns differ across the income/expenditure distribution and for different types of households, the question arises as to the appropriate price index to use for the abovementioned purposes.

One of the important constraints when using the CPI in the analysis of poverty (and, indeed, inequality) is the impact that inequality has on the structure of the CPI. As a plutocratically weighted price index, the expenditure weights are found to be biased towards higher expenditure groups. In other words, the structure of the official CPI weights resemble more closely the expenditure patterns of wealthier, rather than poorer, households.

The bias towards higher expenditure households is introduced through the method of calculation of the weights. Prais (1959: 126) notes that the plutocratic weight w_i^p attached to a specific expenditure item i can be expressed as an unequally weighted average of the household level expenditure shares, with the weights being each household’s total expenditure across all items. Thus, as the expenditure shares of higher expenditure households receive greater weight within the calculation, a bias towards these households is introduced.

Exactly where in the distribution the ‘representative household’ is located is related to the extent of expenditure inequality: higher levels of inequality are associated with a location further up the distribution. Thus, for example, the representative household in Spain in the 1990s has been found to have been located in the 61st percentile of the income distribution (Izquierdo et al. 2003: 149), in the 71st percentile in the United Kingdom in the 1970s (Muellbauer 1974, as referred to in Izquierdo et al. 2003: 149), and in the 75th percentile in the United States in 1990 (Deaton, 1998: 43). In four Latin American countries—Brazil, Colombia, Mexico, and Peru—the representative household is found to be located between the 80th and 90th percentiles using data from different periods between the late 1980s to the early 2000s (Goni et al. 2006: 7). In South Africa, with its extreme inequality, the representative household was located in the 95th percentile in 2000 (Oosthuizen 2007: 20).

There are two main options available to avoid this bias. The first option is to calculate the weights of the CPI in such a way that each household is given equal weighting within the calculation. The resulting weights, known as democratic weights, are calculated as:

$$w_i^D = \frac{1}{H} \sum_{h=1}^H \left(\frac{e_i^h}{\sum_i^n e_i^h} \right) \quad (6)$$

using the same notation as above. Here, weights are calculated at the individual household level first and these are then averaged over all households. Within democratic weight structures, lower expenditure households receive a higher weighting than is the case within conventional plutocratic weight structures. As a result, the representative household is located closer to the middle of the distribution. For example, Oosthuizen (2007: 20) finds that the percentile with the highest correlation with the democratic weight structure is the 46th percentile.

The second approach aims to reduce expenditure inequality and heterogeneity in expenditure patterns by calculating price indices for sub-populations (group-specific price indices). In so doing, the ability of the CPI to reflect the inflation experiences of households is improved. Various criteria may be used to group households. Most commonly, households are grouped according to income or expenditure, thereby separating better- and worse-off households whose expenditure patterns may often differ markedly. Importantly, grouping households according to this criterion explicitly reduces intra-group inequality, thereby reducing the extent of plutocratic bias. Alternatively, groups may be defined based on demographic or labour market characteristics of household members or household structure. Statistics South Africa publishes a limited number of such indices, including indices by expenditure quintile and an index for pensioners. These are, however, not available provincially (and no detail on the construction of the pensioner CPI is provided in documentation published by Statistics South Africa).

Conclusion

In addition to headline CPI, Statistics South Africa publishes a wide range of price indices. These include the following:

- Indices by expenditure quintile: These indices are constructed on the basis of the expenditure patterns of household expenditure quintiles and were introduced in January 1997 (for historical metropolitan areas, and for metropolitan and other urban areas) and revised in January 2008 to cover all urban areas. According to official documentation for the 1997, 2002, and 2008 weights, quintile cut-offs are constructed by calculating quintiles of the *total* number of South African households and using the expenditure of the top-ranked household in each quintile. In other words, quintiles are constructed using all households (including rural households), but weights are constructed using only those households in the relevant geographical unit that fall within each quintile.
- Indices for pensioners: These indices are available for historical metropolitan areas, metropolitan and other urban areas, rural areas, total country, and all urban areas (depending on time period), although no detail on how ‘pensioners’ is defined is publicly available.
- Numerous indices at the category, class and group level: These are available for historical metropolitan areas, metropolitan and other urban areas, rural areas, total country, and all urban areas (depending on time period), but from 2008 are also available by province (but classified according to COICOP).¹⁹
- Various analytical indices: These include indices for commodities, services, core inflation, and administered prices, as well as CPIs excluding certain categories, classes, groups, or products.
- Statistics South Africa has also recently begun publishing Paasche and Fisher indices (as opposed to the official Laspeyres indices), with coverage beginning from January 2008.

¹⁹ Although, as already discussed, actual rural price data is not collected by Statistics South Africa.

The changes in classification system on the one hand and geographical coverage on the other over the post-apartheid period mean that options for incorporating differential price effects into the analysis of poverty and inequality over time are constrained and require some compromise.

In all instances, the implicit assumption is that the urban-based prices used in the construction of the CPI are reflective of prices in rural areas.

Perhaps the simplest option would be to use the expenditure quintile CPIs, which already account for variations in expenditure patterns according to expenditure level. These indices are available, at varying geographical levels, from January 1997 onwards.²⁰ One option to bridge the 1993-96 period would be to use the All Items CPI as a proxy. Using quintile-specific price indices, however, means that significant detail and category-level variation is lost.

Alternatively, a decision regarding geographical coverage should be taken and the price indices at the level of expenditure category can be used. Here, there are essentially two options. First, the expenditure category indices for historical metropolitan areas can be used for the entire period. The advantage of doing this is that the same series is used for the entire period, although the disadvantage is that this has the narrowest geographical coverage of the national level indices. Second, the expenditure category indices at the broadest available geographical level in a given month can be used. If there is little difference in the indices across geographical area, then the first of these two options may be preferred for its simplicity and consistency.

²⁰ Documentation for the weights introduced in 1997 makes reference to three expenditure groups in use prior to that time, although the indices for these groups are not published.

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