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Changes in South African well-being between 2008/9 and 2014/15: The evidence from expenditure and asset data

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Changes in South African well-being between 2008/9 and 2014/15: The evidence from expenditure and asset data[1]

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Abstract

South Africa's Living Conditions Surveys (LCSs) are crucial instruments in monitoring the well-being of South Africa's population. Using expenditure as the yardstick for assessing well-being, the LCSs show a marked drop in poverty between 2008/09 and 2014/09. This would be a welcome trend. Unfortunately, the data collection method changed between these surveys so that there is at least some doubt as to whether the trend is real or due to measurement changes. Given that the expenditure modules are quite onerous for respondents this is an important question.

In this paper we assess the reliability of the measured improvement of welfare by analysing also the information in the asset modules of these surveys. In comparison to the expenditure diaries the asset modules are much easier to complete and should therefore be much less prone to measurement error. We combine the information in the asset variables by constructing various asset indices and show that if these are used across the surveys they confirm that indeed average well-being has improved between 2008/09 and 2014/15.

Keywords: poverty measurement, asset indices

[1] This article is based on Motshidisi Nthatisi's research report submitted for the Postgraduate Diploma in Survey Data Analysis for Development (Nthatisi 2017).

Introduction

South African social scientists have tried to understand and measure well-being and poverty since the beginning of the twentieth century. The first Carnegie Commission into Poverty, which did its work around the time of the Great Depression, considered the situation of "poor Whites." The Second Carnegie Enquiry into Poverty and Development, held in the last decade of the Apartheid State, had a much broader focus. It compiled a shocking picture of the state of poverty of the majority (Wilson and Ramphele 1989). With the advent of democracy, the need to monitor and measure poverty became a priority of the government. A number of surveys, in particular the Living Conditions Surveys, were specifically commissioned to accomplish this objective and several major reports concerned with the measurement of poverty were released by Statistics South Africa (StatsSA) dealing *inter alia* with poverty mapping, setting of poverty lines and poverty trends (StatsSA 2000, 2008, 2017, 2018).

The "Poverty Trends" report (StatsSA 2017a) covered the evolution of poverty since 2005. It suggested that poverty over the entire period had come down, with a particularly sharp reduction between 2009 and 2011 according to all poverty lines (see Figure 1). The headcount poverty rate (using the Upper Bound Poverty Line, UBPL) decreased from 62.1% to 53.2% during that period (StatsSA 2017a, Table 2.1, p.14). This would undoubtedly be good news. Nevertheless, there are grounds for being cautious. The "Poverty Trends" report itself noted that

> "Household expenditure surveys … are amongst the most demanding surveys run by statistical agencies both for those implementing the surveys and the households that are sampled to participate. These surveys often suffer from higher-than-average number of refusals relative to other surveys in the survey programme." (StatsSA 2017a, p.3)

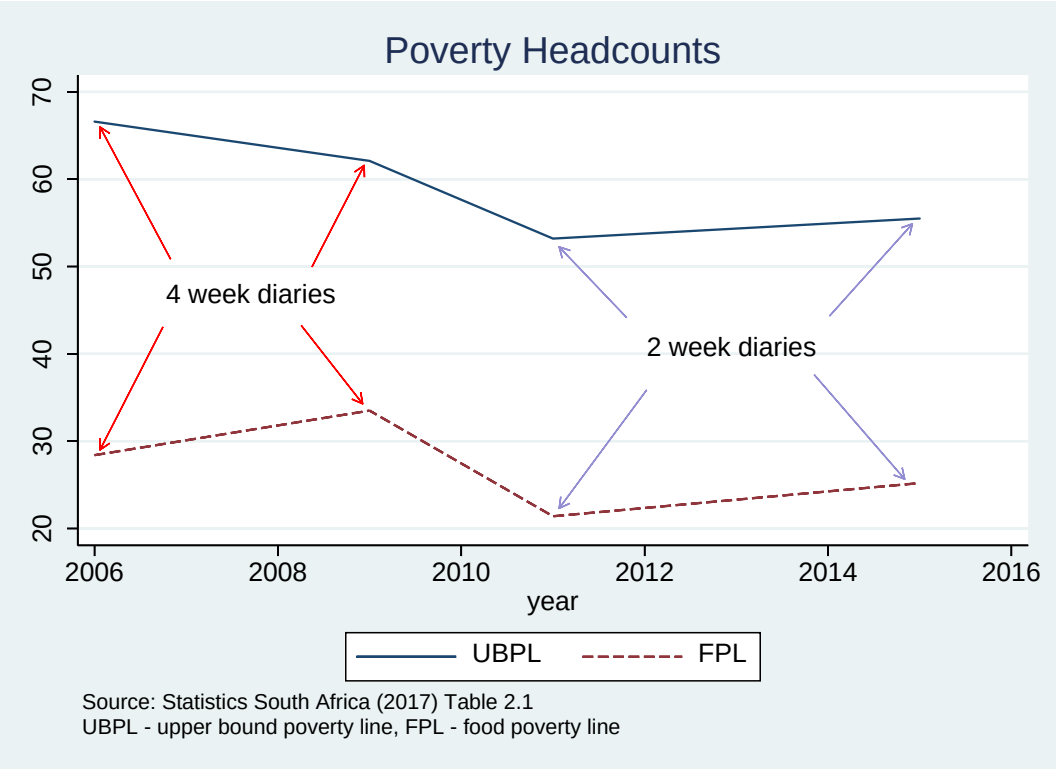

Figure 1

In an effort to reduce interviewee fatigue the diary collection method was altered between the Living Conditions Survey (LCS) of 2008/9 and the Income and Expenditure Survey (IES) of 2010/11 (as indicated in Figure 1). Instead of being asked to keep diaries for four weeks, households only had to keep them for two.

> "After extensive testing, the reduced diary-keeping showed an increase in the number of items reported in the weekly diary and had a noticeable impact on reducing respondent fatigue (meaning households were less likely to drop out during data collection)." (StatsSA 2017a, p.6)

This raises the question whether the drop in poverty after 2008/9 may not be at least in part due to more complete coverage of expenditures in the 2010/11 IES and 2014/15 LCS.

One way of assessing the impact of the reporting change is to use a different measure of well-being that is not affected by interviewee fatigue to the same extent as the diary. The Living Conditions Surveys also contain asset schedules which can be collected relatively quickly. It seems reasonable to assume that households that only partially complete the diaries will still provide accurate information on the assets. In this paper we will investigate whether the increase in monetary well-being, as reflected in the dropping poverty rates, is paralleled by an increase in asset holdings also.

Besides acting as a check on the monetary measures of well-being, assets can be seen as interesting in their own right. Indeed, there is a strand of the literature that argues that asset based measures may capture long-run well-being better than income or expenditure does (Filmer and Scott 2012, Sahn and Stifel 2003). We will provide a brief literature review in the next section, focusing on both the construction of asset indices as well as the measurement of expenditure. After that we will discuss our data, the methods that we propose to use and present our results.

Literature Review

The measurement of expenditure

The complexities involved in measuring expenditure have been discussed in the literature *inter alia* by Deaton (1997), Deaton and Grosh (2000) and Browning, Crossley and Winter (2014). As these authors note (e.g. Deaton and Grosh 2000, p.92; Browning *et al* 2014*,* p.479), the problem confronting survey designers is that they are often interested not only in getting accurate estimates of mean or total consumption, but also of its distribution. To get an accurate picture of mean consumption one could (in theory) ask respondents only about consumption during the last day or week — households that did not purchase during that period would be counterbalanced by those making purchases to cover several days or weeks. The problem is that to classify a household as poor one requires accurate information about consumption over an extended period. There is therefore no choice but to try to capture consumption for a period long enough to assess who is poor and who is not.

In order to measure consumption over an extended period, one has the choice of getting respondents to recall their purchases, or to record them as they occur, in a diary. Recall methods are subject to forgetting, which becomes worse the longer the time period covered by the question. A different problem is the possibility of "telescoping", i.e. the inclusion of rarely purchased items into the recall period, because the respondents incorrectly remember when the purchase was made. Diary methods were thought to be superior in this regard, because consumption items would be recorded properly at the time that the purchase was made.

Nevertheless, there is considerable cause for scepticism also in relation to data collected by the diary method. Deaton and Grosh note that

> "the rate of reporting declines with time, so that, in two-week diaries, more consumption is recorded in the first week than in the second. … In Armenia the diary was kept for four weeks, and the downward trend continued over this longer span. The second week's expenditures on food were 26 percent lower than those of the first, the third week's were 35 percent lower than those of the first, and the fourth week's were 40 percent lower than those of the first" (2000, p.120)

Browning *et al* (2014, p.479) note that there is considerable noncompliance with diaries, with entries frequently recorded only at the time that the diary is collected, in effect changing the diary method to one of recall. Compliance also decreases with the duration of recording (2014, p.480).

Beegle, de Weerdt, Friedman and Gibson (2012) report on a randomised experiment using different methods for collecting consumption data in Tanzania. Their "gold standard" is a diary method using personal diaries for every adult in the household, with intensive fieldworker call-backs. With the exception of a comprehensive recall instrument with a shorter (seven day) time horizon, most other data collection methods showed significantly lower food and total expenditure measures. This was true also of diary methods using a single household diary. Beegle *et al* also provide evidence that misreporting was a function of household size, i.e. more expenditures were missed (relative to the personal diaries) when there were more adults in the household. The implication for poverty measurement was startling: the benchmark case yielded a headcount of 47.5% (with a $1.25 per day poverty line), while collecting consumption through a single household diary would have given a poverty rates in the region of 55% to 59%, and instruments relying on recall gave estimates with a range of 55% to 66.8%. In short, how consumption is measured can have a dramatic impact on the resulting poverty rates. And diary instruments are not immune to this problem.

In this context it is useful to be a bit wary about over-interpreting the reduction in the poverty rate after 2008/9 given that the duration of the diary record-keeping was reduced from four weeks to two. We turn now to a discussion of the use of assets in the measurement of welfare.

The use of asset indices

Filmer and Pritchett (2001) argued that a usable index of wealth could be obtained from the first principal component of the correlation matrix of asset variables. It made sense to think that whatever was common to these variables was "wealth" — but beyond this, such an asset index yielded meaningful differentials when applied to outcomes such as educational enrolment (Filmer and Pritchett 1999,2001).

The Filmer and Pritchett argument made a big impact, because it allowed social scientists to make better use of the information contained in the Demographic and Health Surveys (DHSs), which lacked income or expenditure information. Asset indices based on principal components provided a way of differentiating the rich from the poor. Indeed, so useful did these indices prove, that "wealth indices" calculated by principal components are now released as part of the production process of the DHSs (Rutstein and Johnson 2004).

A related approach was used by Sahn and Stifel (2000,2003), also on DHS data. They constructed an asset index from the asset variables using factor analysis. Yet another approach is to use multiple correspondence analysis, given that most of the variables included in the asset indices are categorical (Booysen, van der Berg, Burger, von Maltitz and du Rand 2008). In practice principal

components, factor analysis and multiple correspondence analysis yield asset indices that are highly correlated (Wittenberg and Leibbrandt 2017).

Filmer and Scott (2012) analysed the performance of various asset indices in relation to per capita expenditures in 11 countries. They considered the following asset indices:

- Predicted per capita expenditures
  This involved regressing per capita expenditures by OLS on the asset variables. The fitted values from this regression provide the linear asset index that will mimic per capita expenditure most closely.
- Principal Components asset indices
  They created two versions of asset indices by principal components, one using consumer durables as well as various infrastructure variables (as in the typical "wealth" index released by the DHS) and one using only consumer durables.
- Count of assets
  This is a simple count of binary asset variables, i.e. variables which measure whether a household owns a particular asset or not. Obviously the infrastructure variables were not included in this index.
- Weighted share of assets
  This is a modification of the count of assets, where the *i*-th asset variable, a_i, is multiplied by $(1 - w_i)$ where w_i is the fraction of the population that owns a_i. This can be thought of as a "count of rare assets", i.e. assets that are owned by very will count almost a full unit, whereas assets that are owned by almost everyone will count almost nothing.
- IRT index
  This is an asset index constructed by item response theory.
- Per capita value of household assets
  The values of the assets recorded by the household are added and divided by household size.

Filmer and Scott first assess to what extent the population rankings (from poorest to richest) given by per capita expenditures and the asset indices are stable, and to what extent households that are classified in the bottom quintile by one technique are similarly placed by others. They show that the rankings are reasonably correlated, but not highly so. As a result there can be considerable differences in the "targeting" of poverty using one approach or another.

They also explore how well the contrasts between rich and poor, based on different asset indices or per capita expenditure, predict differences in social outcomes, such as enrolment rates, primary school completion, the use of medical care, fertility, child mortality, and labour market participation (p.371). They show that the gaps in outcomes that are observed are typically robust to the measure of economic status that is used. Indeed, often the asset indices seem to show larger gaps than per capita expenditures do. Wittenberg (2011,2013) similarly showed that asset indices provided similar results when predicting obesity than using income did.

Wittenberg and Leibbrandt (2017) caution that asset indices constructed by principal component methods (and factor analysis or multiple correspondence analysis) frequently score rural assets negatively. The "common factor" extracted by the method is often a combination of "wealth" and access to electricity. They suggest that some care should be taken in screening the variables used and excluding assets that are negatively correlated with the others (e.g. livestock ownership). They

also suggest that an uncentred principal components (UCPC) index has some desirable theoretical properties, including the fact that it can be used to estimate a Gini coefficient of inequality in asset holdings. Nevertheless the scores of the UCPC index again need to be carefully monitored, because some rare assets can end up with extreme coefficients. These should preferably be excluded from the index.

Assets in South Africa

Besides acting as proxies for expenditure in datasets where it is unavailable, assets are of interest in their own right and can be seen as another dimension of well-being. Bhorat and van der Westhuizen (2013) show that there was a major improvement in access to infrastructure between 1993 and 2008 alongside an increase in the holdings of consumer durables. Wittenberg and Leibbrandt (2017) confirm the latter finding and show that as a result the Gini coefficient for inequality in asset holdings came down sharply between 1993 and 2008.

Data

The study uses the microdata from the LCS 2008/09 and LCS 2014/15 (StatsSA 2012,2017b). The LCS is a nationally representative survey with a sample of approximately 30 000 households, collected from around 3 000 primary sampling units. The purpose of the survey is to collect information on income and expenditure, subjective assessment of poverty, health status, access to services and household asset ownership. The information is collected through several different instruments: a household survey with several modules and expenditure diaries. Data collection is over an entire year. In 2008/09 households were asked to keep weekly diaries for four weeks. As a result, there are in effect 12 monthly sub-samples of the 2008/09 survey. As noted in the introduction this method was modified by the time of the 2010/11 Income and Expenditure Survey, with households keeping diaries for only two weeks. Consequently there are 26 different sub-samples in the LCS 2014/15 (although these cannot be accurately identified in the sample).

Objectives and research questions

Our primary aim is to verify whether there was, in fact, a noticeable improvement in monetary well-being between 2008/09 and 2014/15, or whether the measured increase is an artefact of more complete data collection in the latter survey. Our hypothesis is that an improvement in economic welfare between these periods would be reflected in an improvement in asset ownership. We do not expect better completion rates of the diary to affect the accuracy of the asset schedule.

The only spill-over effect from diary to asset schedule that might be relevant, is if the demands of keeping a diary prompted households to drop out of the survey altogether. This is likely to be a problem predominantly among richer households, who have many more transactions to record and who are more reluctant to participate in surveys in general. In fact, the overall response rates in the LCS 2014/15 were **lower** than those in the LCS 2008/09. Aggregate response rates were 88% in 2008/09 and 84.9% in 2014/15 (StatsSA 2017c, Table 3), with marked declines in the richer provinces, viz. Gauteng (from 79.7% to 65.3%) and Western Cape (from 85.2% to 79.1%). So higher total drop-out among the rich is unlikely to explain the worse distribution in the LCS 2008/09.

A second aim of the research is to focus on asset ownership in its own right, in particular to establish whether the increase in asset ownership between 1993 and 2008 noted by Bhorat and van der Westhuizen (2013) and Wittenberg and Leibbrandt (2017) continued during the period 2008 to 2015.

Methods

Cumulative Distribution Functions and Stochastic Dominance

We update the 2008/09 expenditures to April 2015 using the headline CPI. In order to assess the relative well-being in the two surveys we rely primarily on estimating cumulative distribution functions (CDFs) for both real per capita expenditures and asset index scores. In particular, we want to assess first order stochastic dominance (Deaton, 1997 pp.162-169), i.e. whether

$$F_1(x) \geq F_2(x)$$

where $F_1(x)$ is the CDF of our welfare measure in 2008/09 and $F_2(x)$ is the corresponding one for 2014/15; or at least whether this relationship holds within a particular interval [a,b] where a is a plausible lower bound on the poverty rate and b a plausible upper bound. If stochastic dominance holds, then regardless of the poverty line used well-being is better in 2014/15 than in 2008/09. This is particularly useful for asset indices where there are no obvious poverty lines to use as reference. Besides visual inspection of the CDFs we use the DASP package (Aarar and Duclos 2013) to estimate the points where the respective CDFs intersect.

Calculation of Asset Indices

We calculate a range of asset indices, using the pooled LCS 2008/09 and LCS 2014/15 as our universe. In order to do so we select asset variables that are present in both asset schedules. We only use consumer durables for this exercise. In some cases we needed to amalgamate categories. For instance in the LCS 2008/09 households were asked whether they owned a "computer". In 2014/15 they were given the separate options, owning a computer, a laptop or a tablet. We chose to assume that households owned a computer if they owned any one of those three. The indices that we choose are based on the list used by Filmer and Scott (2012), discussed earlier.

1. Predicted log per capita expenditure

This is our preferred measure, since it provides the best linear approximation to (log) per capita expenditure. Assume that measured log per capita expenditure $\log y^*$ is given by

$$\log y^* = \log y - \eta$$

where $\log y$ is the true value and η is the extent to which true expenditure has been under-measured due to respondent fatigue with the diary. The OLS regression of measured log per capita expenditure on the asset variables is given by

$$\log y^* = \beta_0 + \beta_1 a_1 + \cdots + \beta_k a_k + \varepsilon$$

where a_j is the *j*-th asset variable. We can substitute the expression for $\log y^*$ to get

$$\log y = \beta_0 + \beta_1 a_1 + \cdots + \beta_k a_k + \varepsilon + \eta$$

What happens when we estimate this depends on whether any of the asset variables are correlated with the mismeasurement η. That could happen if, for instance, mismeasurement is a bigger problem among rich households. Observe, however, that the fitted values

$$index = \hat{\beta}_0 + \hat{\beta}_1 a_1 + \cdots + \hat{\beta}_k a_k$$

for the two time periods get the same coefficients $\hat{\beta}_j$ so regardless whether we estimate the correct population projection parameters or not, the distribution of the index in the two periods depends only on the distribution of the asset variables in the two periods. The asset index will give a reliable picture of the underlying trends except if there is a measurement problem in the asset variables a_j and that measurement error is correlated with η.

2. Count of assets index

This is, as the name suggests, the sum of the binary asset variables a_j.

3. Weighted share of assets

As discussed in our review of Filmer and Scott (2012), this is a count of assets with the binary asset variables a_j weighted with $(1 - w_j)$ where w_j is the fraction of the population that owns a_j. We noted that this can be thought of as a count of rare assets.

4. Principal components index

This is the first principal component of the set of asset variables. In line with the argument of Wittenberg and Leibbrandt (2017) we screened the implied coefficients and removed any assets that received negative scores and then recalculated the index on the shortened list of assets.

5. Uncentred principal components

This is an index calculated according to the methods outlined in Wittenberg and Leibbrandt (2017). As suggested in that paper we screened the implied coefficients for extreme values and removed those assets that produced outliers and reestimated the index on the reduced list.

Statistics on assets

Besides analysing the CDFs of the asset indices we will also calculate the proportion of the bottom 20%, 40% and 60% of the pooled asset index that is observed in each survey. This is akin to picking a relative poverty line over the pooled data and then using that as a standard to measure poverty rates in each survey.

In the case of the uncentred principal components index we also calculate the Gini coefficient for each period to assess how the distribution of assets changed over time.

Results

The distribution of per capita expenditure

Figure 2 shows the Cumulative Distribution Functions of log real annual per capita expenditure. We have superimposed the positions of the Upper Bound and Food Poverty Lines (dashed). It is evident that within this range (and indeed for a much greater range of values) poverty is undoubtedly lower in the LCS 2014/15 than in the LCS 2008/09, in line with the findings of the “Poverty Trends” report (StatsSA 2017a).

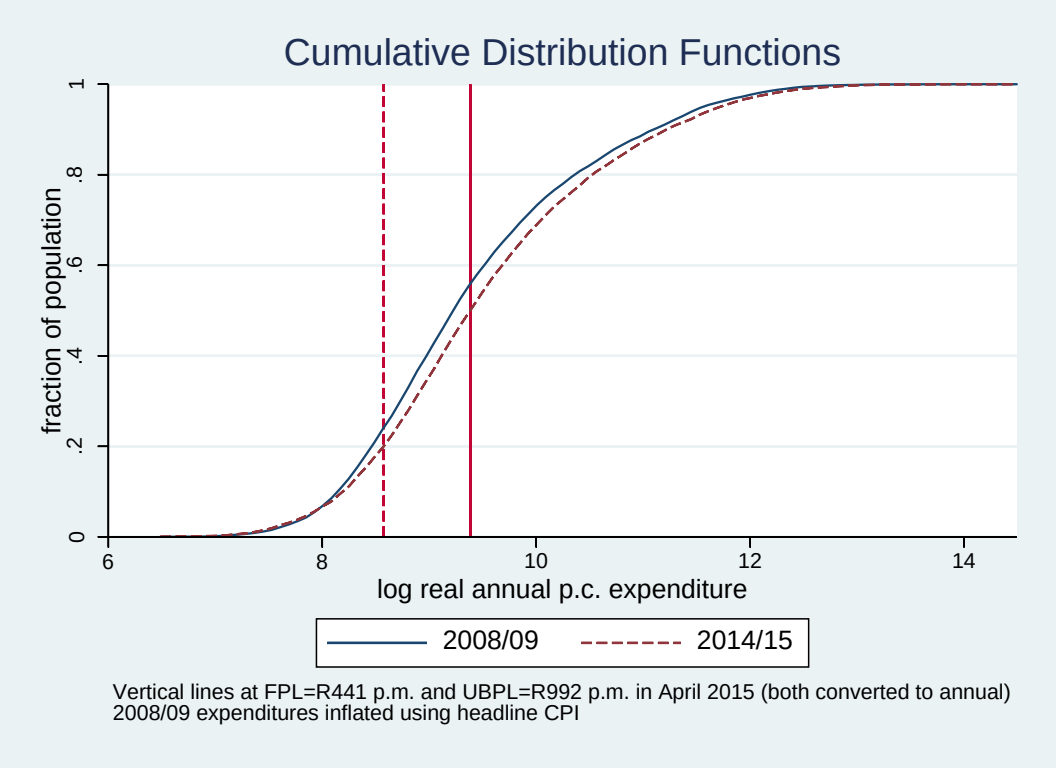

Figure 2

According to the DASP calculations the CDFs cross at R 2915 (i.e. R 242.92 per month), which corresponds to a log value of 7.98. Below this level the CDF of 2014/15 actually lies above that of 2008/09. The next crossing point is at R 623 478 or a log value of 13.34. As is evident from Figure 2, the vast majority in both years earns below that. In short, for the bulk of the distribution it is clear that economic conditions in 2014/15 were better than in 2008/09.

The change in asset holdings between 2008/09 and 2014/15

Before calculating any asset indices we report the proportion of households in each survey that owned the asset in question (see Table 1). We only report on the assets that were in both schedules.

Table 1 Proportion of households owning asset in LCS 2008/09 and 2014/15

Asset	Mean	Robust Std. Err.	[95% Confidence Interval]	
Radio				
2008/09	0.529	0.006	0.518	0.541
2014/15	0.437	0.006	0.425	0.449
Stereo/Hi-fi				
2008/09	0.224	0.005	0.213	0.235
2014/15	0.208	0.005	0.198	0.217
DSTV				
2008/09	0.137	0.005	0.127	0.147
2014/15	0.328	0.006	0.316	0.341
Television				
2008/09	0.691	0.006	0.679	0.702
2014/15	0.786	0.003	0.781	0.791

DVD player				
2008/09	0.495	0.006	0.483	0.508
2014/15	0.436	0.006	0.425	0.448
Refrigerator/freezer				
2008/09	0.657	0.007	0.644	0.670
2014/15	0.747	0.006	0.736	0.759
Stove (electricity, paraffin, gas)				
2008/09	0.797	0.005	0.788	0.807
2014/15	0.847	0.005	0.838	0.856
Microwave oven				
2008/09	0.378	0.007	0.364	0.393
2014/15	0.487	0.007	0.473	0.501
Washing machine				
2008/09	0.281	0.007	0.266	0.295
2014/15	0.334	0.007	0.320	0.349
Kitchen furniture				
2008/09	0.524	0.007	0.511	0.537
2014/15	0.525	0.007	0.511	0.540
Dining room furniture				
2008/09	0.427	0.007	0.414	0.440
2014/15	0.340	0.007	0.327	0.353
Bedroom furniture				
2008/09	0.564	0.007	0.551	0.577
2014/15	0.545	0.008	0.530	0.559
Computer (+laptop/tablet)				
2008/09	0.156	0.006	0.144	0.160
2014/15	0.234	0.006	0.221	0.246
Camera				
2008/09	0.135	0.005	0.124	0.145
2014/15	0.102	0.004	0.094	0.110
Cellular telephone				
2008/09	0.833	0.004	0.826	0.840
2014/15	0.921	0.003	0.916	0.926
Landline telephone				
2008/09	0.151	0.006	0.140	0.162
2014/15	0.096	0.004	0.087	0.104
Internet service				
2008/09	0.065	0.004	0.058	0.072
2014/15	0.109	0.005	0.099	0.118
Motor vehicle				
2008/09	0.255	0.007	0.240	0.268
2014/15	0.272	0.007	0.258	0.285
Motor cycle/scooter				
2008/09	0.014	0.001	0.012	0.016

2014/15	0.015	0.001	0.012	0.017
Bicycle				
2008/09	0.112	0.004	0.105	0.111
2014/15	0.073	0.003	0.067	0.079
Canoe/boat				
2008/09	0.008	0.001	0.006	0.010
2014/15	0.004	0.0006	0.003	0.005
Power-driven tool				
2008/09	0.115	0.005	0.105	0.124
2014/15	0.074	0.004	0.067	0.081
Plough				
2008/09	0.031	0.002	0.027	0.036
2014/15	0.019	0.002	0.016	0.023
Tractor				
2008/09	0.007	0.0007	0.006	0.008
2014/15	0.005	0.0006	0.003	0.006
Grinding mill				
2008/09	0.014	0.001	0.011	0.016
2014/15	0.004	0.0005	0.003	0.005
Wheel barrow				
2008/09	0.231	0.005	0.221	0.242
2014/15	0.213	0.005	0.203	0.223
Bed				
2008/09	0.867	0.004	0.859	0.875
2014/15	0.913	0.004	0.905	0.921
Livestock				
2008/09	0.027	0.002	0.024	0.031
2014/15	0.034	0.002	0.030	0.038
Poultry				
2008/09	0.113	0.004	0.105	0.121
2014/15	0.038	0.002	0.033	0.042

Point estimates have been calculated using Stats SA weights

Standard errors have been corrected for clustering

The picture presented by Table 1 is mixed. The general picture is certainly towards an increase in asset holdings over time — television, DSTV, stove, microwave, washing machine and computer ownership are all up. Some of the categories in which there are declines, e.g. landlines and cameras, are explicable given the much greater penetration of smartphones. Nevertheless, there are other categories such as dining room furniture and some high-end goods (e.g. canoe/boat) where the relative drops between 2008/09 and 2014/15 cannot be so easily explained. The apparent collapse of poultry holdings would probably merit a fuller investigation in its own right.

Creation of the asset indices

Table 2, column 1, in the Appendix provides the regression results used to construct predicted log per capita expenditures. Our regression explains about half of the variation in log per capita expenditures. In this case (unlike with the PCA index) we are happy to keep the negative scores. The

aim of this exercise is to get the best linear approximation to log per capita expenditure. The negative coefficients are induced by the dependent variable, i.e. an external benchmark, and are not due to a negative internal correlation between “rural” and “urban” assets. In this case the index should not be thought of as a measure of who has more assets, but what the portfolio of asset holdings suggest about the likely per capita expenditure of that household.

Column 2 provides the coefficients on an asset index constructed by Principal Components using all of the asset variables available. Note that this is not the same as the “scoring” coefficients returned by the PCA routine, since the normalisation of the variables (in particular division by the standard deviation) also needs to be taken into account. Because the plough, livestock and poultry assets all returned negative coefficients they were removed from the asset list. The index that we used has the weights given in column 3 of Table 2.

The coefficients on the uncentred principal components index using all asset variables is given in column 4. The “canoe” variable had the astonishing coefficient of 230. We removed all assets with extreme coefficients (in this case bigger than 9) and reestimated the index with the remaining ones. Those coefficients are shown in column 5. The largest coefficient is now for internet access (with a coefficient of 8.5), which seems a fair indicator of affluence.

Table 3, also in the Appendix, provides the means of the pooled asset indices by survey. These indicate that in all instances the average asset holdings had increased somewhat between 2008/09 and 2014/15, although in most cases not by much.

Shifts in the distribution 2008/09 to 2014/15

Figure 3 shows the CDFs of predicted log expenditure for the two surveys. It should be noted that by construction the dispersion of this variable will be lower than for the original, since it does not account for the variance around the conditional means. This can be seen by noting the different ranges of the x axis variables in Figures 2 and 3. Nevertheless, the pattern is very clear — there are markedly fewer households with asset holdings predictive of poverty in 2014/15 than there were in 2008/09. DASP estimates that the first crossing-point between the CDFs is at an index value (predicted log expenditure) of 10.763.

The gap between the two distributions is sizable. In Table 4 we show the proportion of each distribution that falls below three relative “poverty lines”, fixed at the 20^{th}, 40^{th} and 60^{th} percentile of the pooled distribution. In the case of the predicted log expenditures the gap between the 2008/09 and 2014/15 proportions is around 10 percentage points at all these benchmark scores.

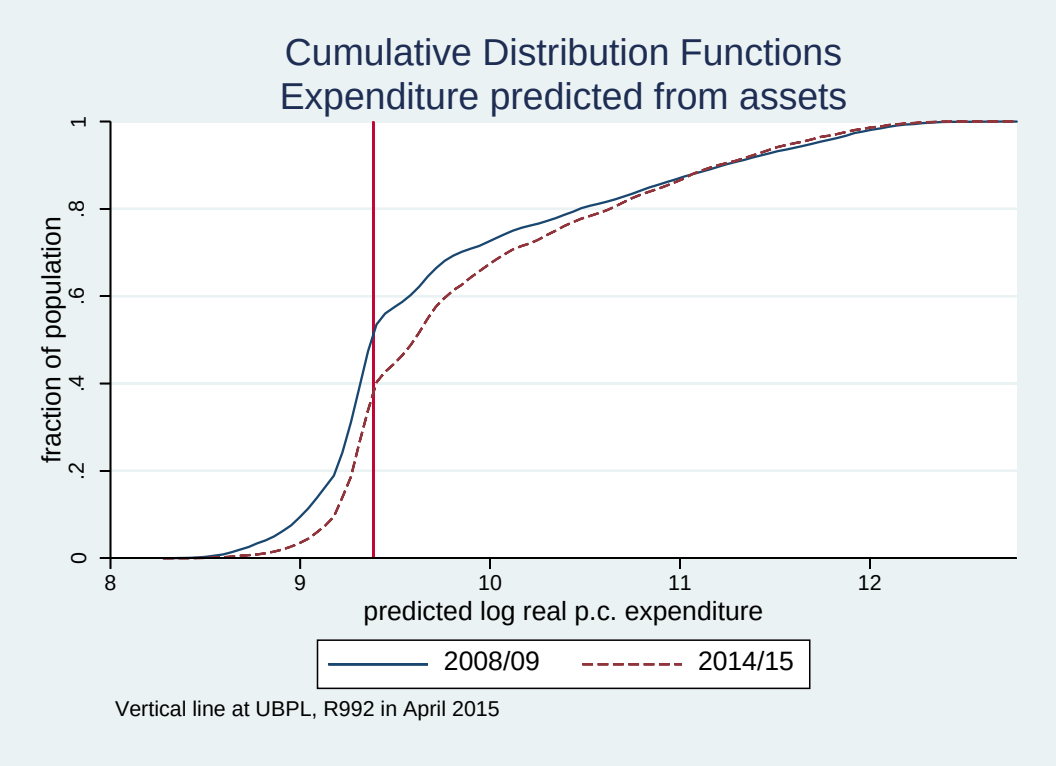

Figure 3

The other asset indices do not yield such big gaps between the distributions. The CDFs are shown in Figure 4. Nevertheless, in all cases there is evidence that the 2014/15 distribution stochastically dominates the 2008/09 one in the range relevant for poverty analysis. In the case of the count index, for example, DASP suggests that the first crossing-point is reached at a count of 14 assets, i.e. in the top quintile. Table 4 suggests that the vertical gap between the two distributions is of the order of five percentage points in the bottom 40%, narrowing at the 60th percentile to three.

The gaps are much smaller still in the case of the weighted share index. However even in this case the 2014/15 distribution dominates until the index value of 5.348 is reached (according to DASP). The gaps are of the order of two percentage points, at all the "poverty lines" that we consider.

The principal components index again shows clear dominance. The first crossing-point is at the index value of 2.105 which is at the 80th percentile of both distributions. The vertical line in the figure is at zero, the mean of the pooled distribution. The vertical gaps shown in Table 4 are around six percentage points.

The final graph shown in Figure 4 is the CDF of the uncentred principal components index. This index has a much more right-skewed distribution than the others. Again there is clear evidence of stochastic dominance in the relevant range. The CDFs cross at 11.04 which is at the 87th percentile of both distributions. The gaps at the lowest relative poverty line are around three percentage points, rising to six and five percentage points at the 40th and 60th percentiles of the pooled distribution.

For the UCPC index we also calculated the Gini coefficient. The Gini in 2008/09 was 0.62, dropping to 0.59, showing that the distribution of assets had become a little more equal. This will happen if general asset holdings increase.

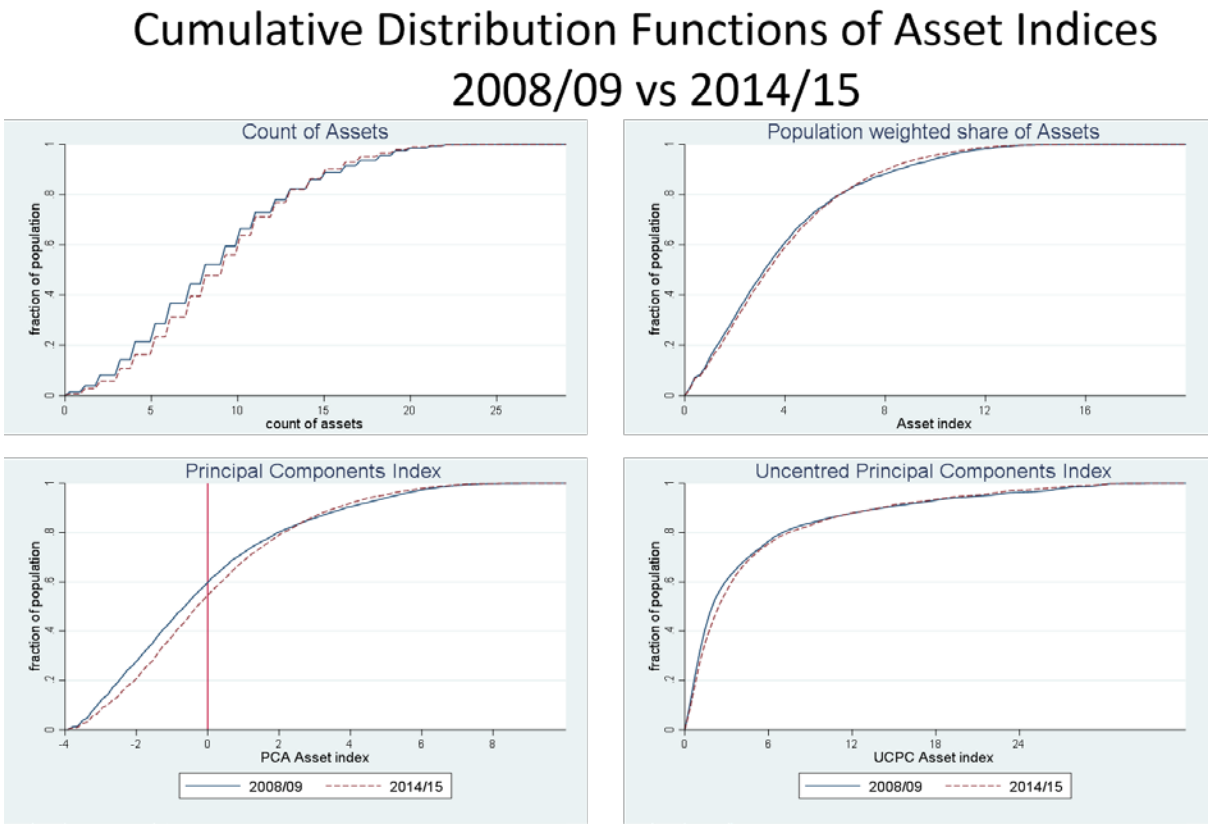

Figure 4

Discussion

We had two research questions for this study. We wanted to establish whether the marked reduction in poverty between 2008/09 and 2014/15 was real, or an artefact of a different method of data collection. We also wanted to know whether the improvement in asset holdings noted for the post-Apartheid period until 2008 continued afterwards. Our results provide unambiguous answers to both questions.

The predicted log expenditures suggest that the size of the decrease in poverty between 2008/09 and 2014/15 is more than plausible. Indeed, the asset index would have predicted an even larger reduction. The other asset indices, while not as good proxies for expenditure, also concur that economic conditions had improved over this period.

As far as the asset holdings are concerned, consideration of individual assets provided a complex pattern, with some assets becoming more prevalent and others less so. Consequently, we need a summary measure of aggregate holdings, i.e. an asset index. Predicted log expenditures are problematic in this regard, because of the negative scores on some of the assets. The remaining indices however, are also unequivocal showing that aggregate holdings in the bottom 80% of households had increased. The size of the increase varies with the index, i.e. how the different assets are weighted.

The smallest increase is shown by the weighted share asset index, i.e. the count of rare assets. In this case the reduction in “asset poverty” is of the order of two percentage points. The small size of the gap is not so surprising given that some of the rarest assets (e.g. canoe or tractor) show reductions

in holdings between the surveys, whereas relatively more common ones (such as television) show strong increases. The other three indices show vertical gaps between the respective CDFs of the order of five percentage points in the relevant ranges which suggest a more marked increase in asset holdings among the majority.

Interestingly all of the asset indices also indicate that at the top of the distribution there is a reversal, with more asset holdings in 2008/09 than in 2014/15. This is provocative. Is it plausible that the bottom 80% of the population improved their asset holdings, but the top 10% got worse off? This doesn't square with the fact that earnings at the top of the distribution rose faster than those further down (Wittenberg 2017). A more plausible explanation is that the higher non-response rate in 2014/15 noted earlier reduced the coverage of the affluent. This would suggest that measurement problems may affect the 2008/09 and 2014/15 comparisons but in the opposite way to that hypothesised at the outset —the gaps between the distributions might have been larger but for the higher non-response rate.

Conclusion

Our analysis shows that despite worries about the impact of changes in the measurement instrument, the reduction in poverty between 2008/09 and 2014/15 is undoubtedly real. Over this period, asset holdings among the majority increased noticeably. We did, however, discover a different measurement issue. It appears that coverage of the rich in 2014/15 was less complete than in 2008/09. This is most likely due to the higher non-response rates in that survey.

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Appendix

Table 2 Coefficients on the Regression based, the PCA and the UCPC asset indices

VARIABLES	(1) Regression	(2) PCA 1	(3) PCA 2	(4) UCPC 1	(5) UCPC 2
radio	0.0360***	0.175	0.177	0.0203	0.199
	(0.0102)				
stereo_hifi	0.0947***	0.441	0.441	0.0821	0.745
	(0.0134)				
satellite	0.222***	0.571	0.571	0.103	0.964
	(0.0150)				
television	-0.00196	0.506	0.506	0.0121	0.130
	(0.0147)				
dvd	0.0332***	0.405	0.405	0.0275	0.265
	(0.0117)				
fridge_freezer	0.0176	0.538	0.539	0.0131	0.140
	(0.0144)				
stove	-0.0181	0.316	0.316	0.00915	0.101
	(0.0148)				
microwave	0.311***	0.576	0.575	0.0364	0.363
	(0.0141)				
washing_machine	0.0808***	0.634	0.634	0.0713	0.638
	(0.0155)				
kitchenfurn	-0.131***	0.385	0.387	0.0163	0.172
	(0.0122)				
diningfurn	0.0523***	0.502	0.505	0.0369	0.342
	(0.0124)				
bedroomfurn	0.0345***	0.467	0.469	0.0176	0.181
	(0.0126)				
computer	0.386***	0.645	0.645	0.213	1.839
	(0.0192)				
camera	0.291***	0.731	0.733	0.583	4.122
	(0.0215)				
cellphone	0.0928***	0.344	0.345	0.00887	0.0970
	(0.0156)				
landline	0.335***	0.689	0.690	0.378	2.907
	(0.0196)				
internet	0.306***	0.744	0.745	1.042	8.519
	(0.0253)				
vehicle	0.723***	0.642	0.643	0.116	0.999
	(0.0173)				
motorcycle	0.194***	0.779	0.782	12.48	
	(0.0491)				
bicycle	-0.101***	0.517	0.519	0.441	2.714
	(0.0187)				
canoe_boat	0.261***	0.979	0.983	230.4	
	(0.0610)				
powerdriventool	0.171***	0.736	0.738	0.762	4.524
	(0.0218)				
plough	-0.161***	-0.0183		0.658	3.186
	(0.0272)				
tractor	0.347***	0.549	0.572	16.46	
	(0.0606)				

grindingmill	-0.0200	0.475	0.489	9.627	
	(0.0558)				
wheelbarrow	-0.245***	0.260	0.266	0.0604	0.422
	(0.0116)				
bed	-0.0489***	0.294	0.296	0.00811	0.0884
	(0.0173)				
livestock	-0.120***	-0.128		0.222	1.789
	(0.0227)				
poultry	-0.335***	-0.207		0.0476	0.458
	(0.0159)				
Constant	9.266***	-3.905	-3.931		
	(0.0224)				
Observations	48,199	48,199	48,201	48,199	48,212
R-squared	0.507				

All procedures used StatsSA household weights. Standard errors (in parentheses) have been corrected for clustering.
*** p<0.01, ** p<0.05, * p<0.1

Table 3 Means of Pooled Asset Indices by survey

	Mean	Linearized Std. Err.	[95% Conf.	Interval]
Predicted log p.c. expenditure				
2008/09	9.76	0.016	9.73	9.80
2014/15	9.89	0.014	9.86	9.92
Count index				
2008/09	8.84	0.084	8.68	9.01
2014/15	9.15	0.077	9.00	9.30
Weighted share index				
2008/09	3.91	0.053	3.80	4.01
2014/15	3.93	0.048	3.83	4.02
Principal components				
2008/09	-0.13	0.047	-0.22	-0.04
2014/15	0.10	0.042	0.02	0.18
Uncentred principal components				
2008/09	4.83	0.121	4.59	5.06
2014/15	4.92	0.106	4.71	5.13

Means calculated using StatsSA household weights.
Standard errors corrected for clustering

Table 4 Proportion of households in each survey falling into the bottom 20%, 40% and 60% of the pooled distribution

	Bottom 20%		Bottom 40%		Bottom 60%	
	2008	2014	2008	2014	2008	2014
Predicted						
Proportion	0.265	0.152	0.477	0.343	0.654	0.561
s.e.	0.0055	0.0040	0.0074	0.0062	0.0079	0.0073
Count						
Proportion	0.287	0.233	0.445	0.395	0.665	0.638
s.e.	0.0060	0.0060	0.0069	0.0070	0.0072	0.0071
Weighted share						

Proportion	0.212	0.191	0.412	0.391	0.610	0.592
s.e.	0.0054	0.0054	0.0068	0.0069	0.0073	0.0072
PCA						
Proportion	0.237	0.173	0.437	0.372	0.629	0.578
s.e.	0.0057	0.0052	0.0071	0.0069	0.0075	0.0073
UCPC						
Proportion	0.221	0.186	0.435	0.374	0.629	0.578
s.e.	0.0053	0.0052	0.0068	0.0066	0.0075	0.0073

Notes:

1. Bottom 20%, 40% and 60% are defined on the pooled distribution
2. The count index has a much more discrete distribution. In that case the bottom 20% actually contains 25.5% of all cases (count≤5). The bottom 40% contains 41.6% (count≤7) and the bottom 60% contains 64.9% (count≤10)
3. All point estimates use StatsSA weights
4. Standard errors are corrected for clustering

SALDRU

Southern Africa Labour and Development Research Unit

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

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

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