An analysis of the accuracy of South Africa's inflation figures since 1922

Jannie Rossouw

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Abstract

This paper assesses the accuracy of South African inflation data since 1922, the earliest date from which comparable price level and inflation data is available for South Africa. Historic prices recorded for 1922, 1974 and 2006 are adjusted in accordance with the rate of increase in the consumer price index (i.e. the inflation rate) and relevant sub-indices of the consumer price index in one instance since those dates and compared to current prices of these items. In this way it is assessed whether actual prices increased slower or faster than the rate of inflation. The findings are that prices increased broadly in accordance with the inflation rate since 1922, but that distortions occurred since 2006. The conclusion is that the rate of inflation underreports price increases since 2006. As the prices available for comparative purposes (in the main food and clothing prices) carry a comparatively higher weight in the expenditure basket of the low income group, the implication is that the poor suffers as a consequence of sustained and underreported inflation. The analysis in this paper provides justification for a lack of inflation credibility and perceptions that historic price increases exceed price increases reported by the rate of inflation. This finding implies that an independent reassessment is required to ascertain the accuracy of inflation figures in reporting price increases over time.

1 Introduction

This paper assesses the accuracy of South African inflation data since 1922. Rudimentary price data for South Africa exists from 1895, but more comparable country-wide data is only available from 1922. Data pertaining to certain foodstuff, paraffin and coal are available from that date, published in the *Official Yearbook of the Union of South Africa and of Basutoland, Bechuanaland Protectorate and Swaziland – No 5, 1922* (Union of South Africa, 1923:327). This price data is used in the analysis in this paper in respect of 1922. In addition, comprehensive price data on the prices of selected consumer goods are available

*Head: School of Economic and Business Sciences, University of the Witwatersrand

for 1974 and 2006. The 2006 data was collected at that time for comparison to the 1922 and 1974 data. The 1974 data was collected by the Institute for Planning Research (IPR) at the (then) University of Port Elizabeth.

This paper projects expected current prices, based on historic prices and adjusted in accordance with inflation for 1922, 1974 and 2006. For purposes of projecting expected current prices based on inflation in the ensuring period for comparison with actual prices, the rate of change in the consumer price index (CPI and change in CPI is the rate of inflation) is used, which is available from 1922. In addition, the rates of change in sub-indices of the CPI is used in respect of the 2006 price data for comparative purposes.

Statistics SA has an extensive definition of the CPI: "The CPI is a current social and economic indicator that is constructed to measure changes over time in the general level of prices of consumer goods and services that households acquire, use, or pay for. The index aims to measure the change in consumer prices over time. This is done by measuring the cost of purchasing a fixed basket of consumer goods and services of constant quality and similar characteristics, with the products in the basket being selected to be representative of households' expenditure during a year or other specified period. Such an index is called a fixed-basket price index. The index also aims to measure the effects of price changes on the cost of achieving a constant standard of living (i.e. level of utility or welfare). This concept is called a cost-of-living index (COLI)" (Statistics SA, 2013b:1)

"The CPI" and "the rate of inflation" (the latter calculated as changes in the CPI) are published in South Africa on the basis of a weighted average overall CPI. It is "weighted" in as much as it reflects the spending pattern of an "average" South African household, thus making provision for poor and rich; young and old; all provinces of the country and the like. Other "inflation rates" are also published, e.g. for provinces, pensioners, etc.

Statistics SA states that "(t)he South African CPI has two equally important objectives:

1. to measure inflation in the economy so that macroeconomic policy is based on comprehensive and up-to-date price information and to provide a deflator of consumer expenditure in the expenditure national accounts; and

2. to measure changes in the cost of living of South African households to ensure equity in the measures taken to adjust wages, grants, service agreements and contracts" (Statistics SA, 2013b:1).

This paper addresses both matters elucidated by Statistics SA (2013b:1) in as much as it assesses the accuracy with which (on average) the rate of inflation reflects selected price increases and, therefore, cost-of-living increases over time. South Africa suffered considerable inflation since 1922. With CPI in 1922 at 100, the index is equal to 15319 by 2015, equating a rate of increase of 5,6 per cent per annum on average. A basket of goods and services that sold for the equivalent of R1,00 in 1922, will therefore cost about R153,19 today.

In this paper historic prices recorded for 1922, 1974 and 2006 are adjusted in accordance with the overall inflation rate over the ensuing period and these calculated prices are compared to current actual prices. Prices are adjusted in two ways: The rate of change in the overall CPI is used for price adjustments from 1922, 1974 and 2006, while changes in sub-indices of the CPI are also used for certain items in respect of the 2006 price data (such sub-indices of the CPI do not exist all the way back to 1922). This analysis shows whether actual prices increased at a rate slower or faster than the rate of inflation over the period of comparison. With CPI equal to 100 in 1922, the relevant CPI values for the years of comparison are:

- 1974 = 350
- 2006 = 8 705
- 2015[1] = 15 319

Fedderke and Simkins (2012) confirm periods of high inflation in South Africa, stating that "(t)here have been deviations in the form of high inflation between the late 1970s and the early 1990s and the large budget deficits of the last apartheid years. But it has been recognised each time also by post-apartheid governments that these deviations are undesirable and policies have been introduced to rectify them" (2012:203). This observation is confirmed by the fact that inflation in South Africa was much higher since 1974 than before 1974, as is shown by the CPI data above. However, the approach in this paper and the approach used by Fedderke and Simkins (2012) differ in as much as the latter used the implicated gross domestic product (GDP) deflator to make real adjustments, while this paper uses the inflation rate (= changes in the CPI) for purposes real adjustment.

Fourie and van Zanden (2013) also used GDP, real GDP and GDP deflator figures to calculate real income levels in the Cape Colony from 1701 to 1800. Their research methodology is therefore not comparable with the approach followed in this paper.

Likewise, De la Escosura (2012) used real GDP figures to calculate output per head in African countries before independence. The approach followed in this paper also differs from the methodology followed by De la Escosura (2012).

The rate of increase in the food and non-alcoholic beverages and clothing and footwear sub-indices are also used where relevant in a second analysis of the 2006 price data to ascertain possible differences in findings, in addition to adjustments based on the overall CPI data. The current weight of food and non-alcoholic beverages in the overall CPI is 15,41, while clothing and food wear has a weight of 4,07. The consumer price index for food and non-alcoholic beverages (CPIFNB) increased from 100 in 2006 to 199,5 in 2015, while the consumer price index for clothing and footwear (CPICF) increased from 100 in 2006 to 132,4 in 2015.

[1] May 2015.

This analysis of changes in the CPI since 1922 shows that price increases were at moderate rate from 1922 to 1974, where after prices accelerated considerably. From 1922 to 1974 the average annual rate of increases in prices was 2,4 per cent per annum. From 1974 to 2015 the average annual rate of increases in prices was 9,7 per cent per annum. This informs the choice of prices in 1974, while 1974[2] also marks the first year of a 20-year period until 1993 during which South Africa experienced sustained double digit inflation.

Vink et al. (2004) states that "(t)he CPI was first used in 1707 when William Fleetwood compiled a simple index to estimate the average change in the prices paid by Oxford University students over the previous two and half centuries. In 1823, Joseph Lowe published a study on agriculture, trade and finance in which he developed the concept of a price index as the change in the monetary value of a select set, or basket, of goods and services, an approach that it still widely used today". The use of the CPI as an indication of price levels and of changes in the CPI as a measure of general price increases therefore has a long history.

Very little has been published on the testing of the accuracy of South African inflation figures over time by means of comparing adjusted historic prices and actual prices on the basis of the inflation rate, other than Rossouw and Padayachee (2007), Rossouw (2008) and Rossouw and Padayachee (2008).

This earlier research (Rossouw and Padayachee 2007, Rossouw 2008 and Rossouw and Padayachee 2008) using the inflation rate to adjust historic prices to expected current levels for comparative purposes found that actual price increases generally corresponded with expected price increases calculated on the basis of the inflation rate, although a number of outliers were identified. In this regard Rossouw (2008:224 and 225) stated that over the relevant periods of comparison " ... no systematic over-reporting or under-reporting of changes in prices in terms of the CPI was discernable ... (and) ... no basis for a low credibility of inflation figures as an accurate indication of price increases in the South African economy could be found ... (but) ... in respect of the prices of food and food-related items, some items increased to price levels much higher than their projected price levels, based on historic prices adjusted for CPI".

In 2004 Vink et al. (2004) reported their assessment of South Africa's consumer price index for food. They concluded that the calculation of the CPI in South Africa " ... compiles with international best practice and is comparable with the methodology used by most other countries ... (but) ... the Laspeyres formula ... (used to calculate the CPI) tends to overstate price increases". This finding contradicts the observation of Rossouw (2008:224 and 225).

This paper supplements literature and research on inflation perceptions and the lack of credibility of inflation figures among South Africa consumers (see for instance Dias et al., 2007 or Enderlein and Verdun, 2013 for literature on similar international research), as well as literature on historic price movements over time. This paper assesses whether South African consumers are correct in their perception that the rate of inflation underreports the actual rate of price

[2]Inflation actually moved above 10 per cent in the latter part of 1973, but the overall rate of inflation for that year was 9,4 per cent, while it was 11,6 per cent in 1974. It stayed at double digits until 1992 and only dropped to single digits in 1993.

increases (see for instance Rossouw et al., 2011 or Rossouw et al., 2013 on this topic), or whether inflation figures are indeed credible. This paper therefore makes a contribution to the debate on inflation perceptions and credibility and accuracy, which are of paramount importance for the successful implementation of an inflation targeting monetary policy framework such as is used at the moment in South Africa (see for instance Mishkin, 2011). In its analysis, this paper focuses only on the price increases of consumer goods. This is a shortcoming in respect of any comparison with overall inflation in as much as services comprise more than 50 per cent of South Africa's overall CPI. However, an *ex post* overall comparison of the prices of services cannot be performed as historic price information for services is not readily available.

This paper differs in its approach from the methodology often used to assess the buying power of money in terms of goods over time. While this paper compares the actual prices of individual items over time and compare such prices with "expected prices", calculated in accordance with the rate of inflation, assessments of buying power follow the approach of calculating the real purchasing power of a given amount of money (e.g. R100) over time (see for instance Brand-Jonker, 2015) or an overall food basket (News24, 2013). Such comparisons generally also do not include clothing, as is the case in this study.

The approach in this paper is aligned to the research of ETM Analytics (2014) in as much as it shows that actual price increases of items weighing more heavily on the poor (particularly food) accelerate at a pace faster than the official rate of inflation. However, the methodology followed in this paper differs from the methodology used by ETM Analytics. Whereas this paper reports a comparison of the prices of same items over time, ETM Analytics (2014) calculated the alternative price index (API), which takes into account, inter alia, the impact of asset prices, raw material costs and the exchange rate on the cost of travelling to other countries, in addition to items included in the CPI calculated by Stats SA. The API is therefore viewed by ETM Analytics as a broader and more resperentative indicator of inflation in South Africa. Based on this analysis, ETM Analytics (2014) argues that the GDP deflator has been underestimated, implying that real economic growth has been overestimated. Based on the methodology used by ETM Analytics, the average annual rate of inflation for the period 2000 to 2013 was 8,3 per cent per annum, compared to the official rate of inflation of 5,9 per cent per annum over this period.

The rest of this paper is organised as follows: Section 2 highlights difficulties in comparing the prices of consumer goods over time. Section 3 describes the identification of and methodology used to compare the inflation-adjusted historic and current prices of consumer goods. Section 4 reports the findings of the comparison. The conclusions follow in Section 5.

2 Difficulties in historic price comparisons

Identifying and selecting goods (other than food) for use in the comparison in this paper pose certain challenges. This section describes these challenges.

2.1 Quality adjustments

Consumer goods have undergone numerous quality improvements over the period of comparison. In the calculation of the price level and the rate of inflation, periodic adjustments are made to account for such improvements. Statistics SA defines "(q)uality adjustments are the process of estimating what the market price of a replacement product would be if it had the characteristics of the product it replaces and with whose price its price is to be compared. The process requires estimating the market value of any differences in the price-determining characteristics of the two products and adjusting by addition, subtraction or multiplication by a coefficient – the observed price of the replacement product ... " (Statistics SA, 2013b:36).

The most comprehensive research undertaken into this matter was the work of the *Advisory Commission to Study The Consumer Price Index*, appointed by the Senate Finance Committee in the United States of America in 1996, commonly known as the Boskin Report (United States of America, 1996). The aim with the Boskin Report was to assess independently possible over- or under-measure of general price increases by means of changes in the consumer price index. The Committee concluded, *inter alia*, that " ... improvements in the quality of products, such as greater energy efficiency or less need for repair, are ... (sometimes) ... measured inaccurately or not at all" (United States of America, 1996).

In response to the publication of the Boskin Report, the OECD hosted in June 2005 a seminar to consider the measurement of inflation. A number of OECD countries reported at this seminar their initiatives to improve the accuracy of inflation measurement (see for instance Linz and Behrmann, 2005; Ribe, 2005; Shimizu, 2005; or Woolford, 2005). The treatment of housing cost, and particularly owner-occupied housing, received considerable attention at this seminar (see for instance Cournède, 2005: 2; Diewert, 2005: 5, Shimizu, 2005: 1; or Weideman, 2006: 6), but this is a matter outside the scope of this paper.

However, the topic of comparing actual price increases with projected prices adjusted in terms of the rate of inflation or with changes in the CPI over the period of comparison received little attention at the conference and receives no attention in the literature.

A matter of importance for this paper highlighted at the seminar is that changes of the prices of goods often receive more attention than changes in the prices of services, as is the case in this paper. In the composition of the CPI, the weight of services, relative to goods, has increased over the years. This is also the case in South Africa.

Figure 1 shows that goods prices inflation for South Africa was generally below the overall rate of inflation, while services inflation was above the overall rate of inflation. This paper finds that goods inflation was above, rather than below, the overall rate of inflation since 2006.

In the case of South Africa, Statistics SA states that "(t)he CPI measures price change by comparing the cost of a fixed basket of commodities. This basket is based on expenditures in a particular reference period. The basket contains

only commodities of unchanging or equivalent quantity and quality, the index reflects pure price movements" (Statistics SA, 2013b:27). Statistics SA adds that "(p)rior to 2013, there were no quality adjustments in the South African CPI. The use of quality adjustments is part of standard international practice. The South African CPI has introduced quality adjustments for different products in staggered phases. The products where quality adjustments are made are motor vehicles, cellphones, decoders, DVD players and TVs" (2013b:27).

In this paper the consumer goods identified are assumed to be homogeneous over the period of comparison, implying that quality improvements are simply reported as price increases, as was the case in South Africa until 2013. Price increases are therefore over reported, rather than underreported, owing to quantity improvements. However, this does not erode the validity of this research, as Statistics SA used the same approach until 2013. Moreover, to date Statistics SA makes no quality adjustments in respect of the goods compared in this paper.

2.2 Relative scarcity

Prices reflect relative scarcity, implying that changes in relative scarcity result in price changes. Such changes are not regarded as inflation. Inflation differs considerably from changes in relative scarcity. The *Encyclopaedia Britannica* describes inflation as "... an inordinate rise in the general level of prices" (1988: 310). Laidler and Parkin (1975: 741) inflation as "a process of continuously rising prices, or equivalently, of a continuously falling value of money" (1987: 832), while relative price changes reflect changes in relative scarcity, e.g. more expensive food owing to a poor harvest.

However, in this paper all price increases recorded are viewed as indicative of inflation, as no *ex post* allowance can be made for changes in relative scarcity.

2.3 Decimalisation

South Africa adopted a decimal currency system on 14 February 1961, which replaced the previous system comprising pounds, shillings and pennies (£/s/d) (see for instance SA Reserve Bank, 1971). In the previous system 20 shillings (s) comprised £1 and 12 pennies, abbreviated as d from the abbreviation for *denarius*, a Roman coin similar to a penny, comprised 1 shilling. For the comparison in this paper the conversion rate at the time of decimalisation in 1961 is used for the conversion of pre-1961 prices, namely: £1 = R2; 10 shillings = R1; 12 pennies = 10 cents; $2\frac{1}{2}$ pennies = 2 cents; and 1 penny = 1 cent (see for instance Engelbrecht, 1987).

2.4 *Metrification*

South Africa adopted the metric system on 1 April 1971. The following conversion rates are used in this paper (see for instance Simetric, [S.a.]) to convert imperial measurements to metric measurements to ensure comparability:

1 inch = 2,54 centimetres;
1 pound = 454 grams;
1 ounce = 28 grams;
26 fluid ounces = 750 millilitres;
1 pint = 0,57 litres; and
1 gallon = 4,55 litres.

2.5 Relaxation of controls and quantity adjustments

South Africa previously made extensive use of control measures such as import control, price control, wage control, job reservation and standardisation of certain goods in terms of weight and measurement (see for instance Wessels, 1996). Control measures have been relaxed since the democratic election in 1994, with price controls over petrol, illuminating paraffin and medicine as the most important remaining forms of control. As a result of the relaxation of the control measures, standardisation of consumer goods has disappeared. Standardisation would have resulted in easier historic comparison, but the necessary adjustments could be made to ensure comparability.

Statistics SA describes "(a) quantity adjustment is a form of quality adjustment where the pure change in the quantity of a product results in the adjustment of a price" (Statistics SA, 2013b:37). Statistics SA describes such adjustments as " ... one of the most straightforward explicit adjustments to undertake. It is applicable when the size of the replacement item differs from that of the previously priced item. This is accomplished by scaling the price of the old or new product by the ratio of quantities" (Statistics SA, 2013b:37). A similar approach is used in this paper.

2.6 Rationing

South Africa used quantitative rationing, rather than price, to limit demand, particularly during World War II (see for instance Chetty, [S.a.]: 17; Chetty, 2001: 20; or Wessels, 1996). For instance, after the first oil shock in 1973, South Africa also used for a number of years fuel rationing by means of restricting of selling hours. Owing to quantity rationing market prices at those times did not reflect supply, demand or market equilibrium, as prices were set by the authorities. Possible price distortions owing to rationing are not taken into account in this paper as *ex post* adjustments for such possible distortions cannot be made.

3 Identification, selection and methodology of comparing prices of consumer goods

The prices of various consumer goods at different dates since 1922 have been identified for comparative purposes, based on the availability of historic data. The data sources are:

- the *Official Yearbook of the Union of South Africa and of Basutoland, Bechuanaland Protectorate and Swaziland – No 5, 1922* (Union of South Africa, 1923), which reported actual prices and weights (or quantities) of food and other household items for 1922;
- the IPR, an Institute at the University of Port Elizabeth which subsequently merged with other institutions of higher learning to form the Nelson Mandela Metropolitan University, for price data in respect of 1974; and
- Rossouw (2008) for price data in respect of 2006.

Historic prices, price increases calculated in accordance with the rate of inflation and current prices are reported in the Tables in the appendix. The selection of shops for price data collection is important owing to price differences between shops. It was decided to use the same shops as were used by Rossouw (2008) in the collection of price data in 2006, thereby removing possible distortions owing to the use of different outlets.

The analysis in the annexure shows that certain actual prices exceed projected prices adjusted from historic levels by the rate of inflation, thus rendering support to a lack of credibility of historic inflation figures as an accurate indication of price increases. On the contrary, however, some current prices are lower than projected prices, thus refuting a notion of underreporting historic price increases by means of the rate of inflation, although these examples are a minority. Of particular importance is the evidence of a systematic trend of actual prices exceeding adjusted and projected prices since 2006.

4 Findings

The analysis in this paper covers the comparison of historic prices over different periods, namely 1922 to 2015; 1974 to 2015 and 2004 to 2015. The trends and findings discernable form each of the periods are discussed below.

4.1 *1922 to 2015*

Over this period the prices of 21 items are compared, based on data obtained from the *Official Yearbook of the Union of South Africa and of Basutoland, Bechuanaland Protectorate and Swaziland – No 5, 1922* (Union of South Africa, 1923) and prices collected from the same stores as used by Rossouw (2008). The finding is that the actual prices of these items were lower than their projected prices in nine instances and higher in 12 instances (please see Table 1).

The analysis shows an interesting and, in some instances, a somewhat surprising mix of lower and higher prices, summarised as follows:

- it is somewhat surprising that the price of bread increased at a rate lower than the rate of inflation, while the price of flour increased much more rapidly than the rate of inflation;

- the tea price increased much more rapidly than the coffee price;
- the prices of meat products (bacon, mutton and red meat) increased at a much more rapid rate than the rate of inflation; and
- the rate of increase in energy prices (coal and paraffin) exceeded the rate of inflation since 1922.

The overall conclusion in respect of this period of comparison is that no clear trend of inflation either over reporting or underreporting actual price increases. The rate of inflation seems to be a fairly accurate indicator of average price increases (and particularly food prices) since 1922.

As an aside, it is interesting to note that the pensionable emoluments of the Governor of the SA Reserve Bank was £5 000 (R10 000) in 1922 (Rossouw, 2011). This has increased to some R3 million in 2015 (SA Reserve Bank, 2015:99). This increase is well above the rate of inflation over this period. An increase in the pensionable emoluments of the Governor commensurate with the rate of inflation over the period 1922 to 2015 would have resulted in pensionable emoluments of some R1,53 million in 2015. This difference elucidates difficulties in extensive-period price comparisons, as other changes such as affordability also play a role. For instance, the basket of goods used for comparative purposes since 1922 was more affordable for the Governor in 2015 than in 1922. This matter is not covered in this paper

4.2 *1974 to 2015*

The data for 1974 was collected by the IPR for the calculation of minimum living wage. This data was collected annually from 1974, but stopped some time after South Africa's democratic elections in 1994, apparently because funding for such research was no longer available. The prices of food, clothing and household consumables were collected and are used in the analysis in this paper.

As is evident from Table 2 in the annexure, the prices of 11 food items and of 21 items of clothing can be compared over the period 1974 to 2015. The prices of 6 items in the category summarised as household consumables[3] can be compared. In this instance the finding is that that the actual prices of 22 items were lower than their projected prices and higher in 16 instances.

However, on closer inspection this comparison shows that food prices (with the exception of cooking oil and dry legumes) increased at a rate higher than the rate of inflation. To the contrary, the prices of clothing increased at a rate lower than the rate of inflation. With the exception of soap products (soap powder and sunlight soap), the prices of household consumables increased faster than the rate of inflation. This analysis shows that food prices and prices of household consumables increased generally faster than the rate of inflation, while clothing prices increased at a slower rate. This difference informed the approach followed

[3]Items grouped as "household consumables" are items included in the CPI under "cleaning and maintenance products" (with an overall CPI weight of 0,54 per cent) and materials for the maintenance and repair of the dwelling, with a weight of 1,03 per cent.

in respected of the use of more indices to adjust prices for inflation, explained in the next section.

4.3 *2006 to 2015*

The data for 2006, obtained from Rossouw (2008) and current store prices are compared in Tables 3 and 4 in the annexure. It is evident from Table 3, where all prices are adjusted with the rate of change in the overall CPI, that the prices of most food items, clothing and household consumables accelerated at a faster pace than the overall rate of inflation calculated as the rate of change in the CPI. The only exceptions are male pajamas and shirt, female cotton dress, head scarf and jersey, and soap powder and sunlight soap (i.e. 7 items), out of a total of 38 items. This analysis provides justification for consumers to doubt the credibility of past inflation figures (particularly over the period 2006 to 2015) and supports a perception that inflation figures are an inaccurate (and too low) indication of actual increases in the general price level.

Another approach is followed in Table 4. In this instance the price of food is not adjusted with the rate of change in the overall CPI, but with the rate of inflation calculated by Statistics SA for food and non-alcoholic beverages (CPIFNB). The prices of clothing are adjusted with the rate of inflation in clothing prices (CPICFW) calculated by Statistics SA, while the prices of household consumables are adjusted with the overall rate of inflation. The aim of this difference in approach is to ascertain whether sub-indices of the CPI improves the predictability of current prices, compared to adjusted historic prices, thus an attempt to get better results in respect of actual prices correlating with projected prices calculated on the basis of these rates of inflation.

The results are again disconcerting in as much as the prices of only 7 items increased at a rate lower than the calculated rate of increase: cooking oil, jam, skimmed milk, female cotton dress and jersey, soap powder and sunlight soap, when this revised approach is used.

Food prices accelerated at a rate faster than the rate of inflation, as reflected by the sub-index for food and non-alcoholic beverages, a component of the weighted "overall" CPI (see also Reuters, 2015 on this matter), but the analysis shows that the actual rate of increase in food prices exceeded the sub-index calculated for food and non-alcoholic beverages. With food prices outpacing the overall rate of increase in inflation in South Africa, the expectation is that the index calculated for increases specifically in the prices of food and non-alcoholic beverages should reflect such higher increases. This was not the case over the period of comparison.

Clothing prices also exceeded "expected prices" calculated in terms of the rate of inflation since 2006. In this instance the sub-index for clothing and footwear price increases, rather than the overall rate of inflation, was used to calculate expected prices for comparative purposes. However, in this instance the rate of change in the sub-index for price increases in clothing and footwear increased at a rate lower than the overall rate of inflation, while actual price increases exceeded the overall rate of inflation.

In the case of the price comparison since 2006 a systematic trend of actual prices exceeding projected prices is discernable, which is disconcerting. A comparison of price increases since 2006 gives an indication of systemic underreporting of actual price increases and therefore the rate of inflation. Underreporting of the rate of inflation has serious implication in a country such as South Africa where the central bank targets inflation, as it implies that interest rates are too low when inflation is underreported.

An even more disconcerting conclusion emerges when the inflation rates of various income groups in South Africa are analysed in view of the finding elucidated above. While the CPIFNB and CPICFW account for 15,41 per cent and 4,07 per cent, respectively, of South Africa's overall CPI, these percentages, respectively, are 37,52 and 6,14 for the lowest (poorest) income quintile[4] (Statistics SA, 2013a:2).

The type of products used in the comparison (particularly food and household consumables) has hardly shown quality improvements, e.g. in terms of packaging, over the period of comparison. These are basic food and cleaning items sold mainly in standardised packaging, e.g. tins, bags, bottles or plastic wrapping or containers. Likewise, the clothing used in the comparison did not change quality, as like-for-like items were compared. Quality improvements are therefore not an explanation for the underreporting of the rate of inflation.

Calculated on an unweighted basis, the total cost of the items analysed in 2006 amounted to R922,14. In 2015 the total cost of these items increased to R1 900,33. While the average official rate of inflation over this period was 6,3 per cent per annuam, the actual average annual rate of increase of these items was 8,4 per cent. This actual average annual rate of increase corresponds with the finding of ETM Analytics (2014) reported above.

The implication is quite simple: products with a total weight of 43,66 per cent in the overall CPI of people in the lowest income group generally increased at a rate faster than the rate of inflation since 2006 in the sample used in this paper. Based on the information in this paper, poor consumers became poorer since 2006 and the rate on inflation underreported price increases of important components of their expenditure.

5 Conclusions

Despite difficulties in comparing historic prices adjusted in terms of changes in the CPI with current prices, the necessary adjustments could be made to ensure comparability. No systematic inaccurate reporting of changes in the CPI (= inflation rate) over the period since 1922 is discernable. To the contrary, over shorter periods there is some evidence of the inflation rate underreporting actual price increases, particularly in respect of food and non-alcoholic beverages and clothing and footwear. This has serious implications for poor people in South Africa, as they spend more than 40 per cent of their income on these items. It

[4]Disposable annual income below R21 399 in December 2013 (Statistics SA, 2013a:1).

seems that their actual rate of inflation is higher than the official rate of inflation reported by the South African authorities.

Statistics SA (2013b:1) highlights the objectives for the calculation of the South African CPI as the *measurement of inflation*; the provision of a basis to ensure that macroeconomic policy is based on comprehensive and *up-to-date price information*, the provision of *a deflator of consumer expenditure*s; the measurement of *changes in the cost of living*; and a *basis for the adjustment of wages, grants, service agreements and contracts* (Statistics SA, 2013b:1). Based on the assessment in this paper, these objectives were not achieved since 2006.

The analysis in this paper provides justification for a lack of inflation credibility and perceptions that historic price increases exceed price increases reported by the rate of inflation. This finding implies that an independent reassessment is required to ascertain the accuracy of inflation figures in reporting price increases over time. South Africa needs a Boskin Report.

Stats SA should also publish the weighted average price per item used for purposes of calculating the weighted average overall CPI. The will provide the general public with an interest in the matter with an opportunity to compare the prices used of the measurement with actual prices. This can help Stats SA to ensure public confidence in the CPI and, concomitantly, the rate of inflation.

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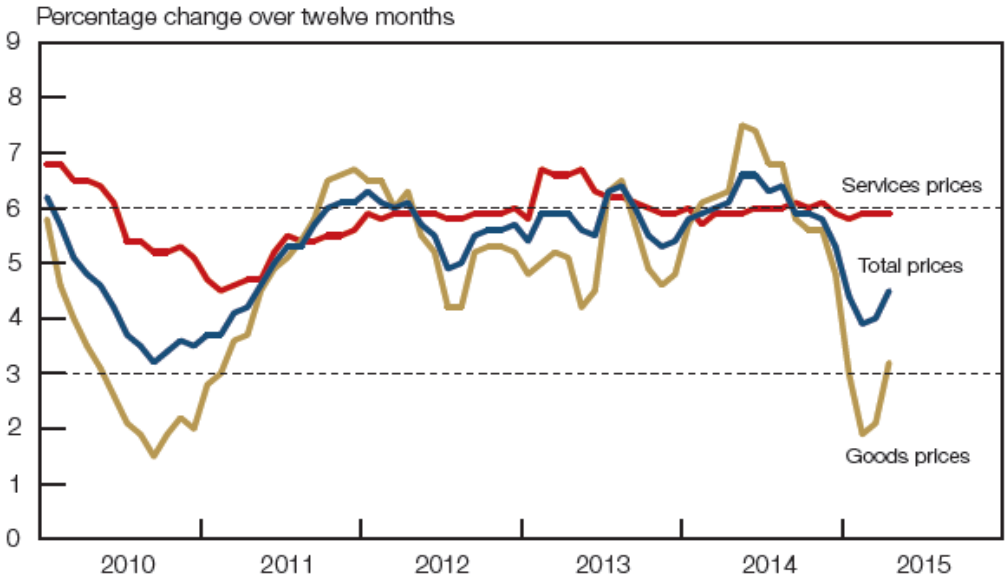
Figure 1: Rate of change in South African prices: Goods and services



Source: SA Reserve Bank

APPENDICES

Table 1: Prices in 1922, adjusted in accordance with change in overall CPI, 1922 to 2015, and for metrification

Item	Imperial measurement	Metric equivalent(grammes/litre)	Historic price in 1921	Rand equivalent, cents	CPI in 1922 = 100	Projected price, CPI = 15319, (R)	Adjusted volume/weight (grams/litre)	Adjusted projected price, 2015 i.t.o. adjusted volume/weight (R)	Actual price, 2015	% Difference
Bread	1 lb	454	5,03d	4	100	6.13	800	10.80	10.27	-4.9
White flour	25 lb	113500	9 s 9,3d	98	100	150.13	2500	3.31	12.79	286.8
Oatmeal	1 lb	454	7,4d	6	100	9.19	2000	40.49	34.99	-13.6
Rice	1 lb	454	5,2d	4	100	6.13	1000	13.50	9.99	-26.0
Tea	1 lb	454	2 s 5,6d	24	100	36.77	500	40.49	59.79	47.7
Coffee (ground)	1 lb	454	1 s 9,2d	18	100	27.57	500	30.37	29.98	-1.3
Condensed milk	14 oz	397	1 s 5,3d	14	100	21.45	397	21.45	17.99	-16.1
Sugar	1 lb	454	6,32d	5	100	7.66	1000	16.87	9.99	-40.8
Golden syrup	1 lb	454	10,6d	9	100	13.79	454	13.79	17.99	30.5
Jam	1 lb	454	10,2d	9	100	13.79	450	13.67	8.99	-34.2
Candles	1 lb	454	1 s 1,4d	11	100	16.85	450	16.70	16.79	0.5
Potatoes	12 lb	5450	1 s 11,6d	19	100	29.11	7000	37.38	29.99	-19.8
Paraffin	1 gal	4,55	3 s 2d	32	100	49.02	1	10.77	13.15	22.1
Coal	100 lb	45500	1 s 11,4d	19	100	29.11	70000	44.78	52.7	17.7
Butter	1 lb	454	2 s 4,9d	24	100	36.77	500	40.49	43.99	8.6
Cheese	1 lb	454	1 s 8,6d	17	100	26.04	500	28.68	41.99	46.4
Bacon	1 lb	454	2 s 5,5d	15	100	22.98	500	25.31	75.99	200.3
Eggs	1 doz	N/A	2 s 9,6d	18	100	27.57	1doz	27.57	19.98	-27.5
Fresh milk	1 pt	0,57	4,6d	4	100	6.13	1	10.75	15.69	46.0
Beef	1 lb	454	9,3d	8	100	12.26	1000	26.99	66.99	148.2
Mutton	1 lb	454	10,9d	9	100	13.79	1000	30.37	98.99	226.0

Sources: Union of South Africa, (1923), PEP, Shoprite, Statistics SA, own calculations

Table 2: 1974-Prices adjusted with the overall CPI and compared to 2015-prices

Item	Unit	Price in 1974 (R)	Estimated price (CPI increase from 350 to 15319)	Actual price (R)	% Difference
Food					
Brown bread	800g	0.09	3.94	10.27	160.7
Cheese	1kg	0.98	42.89	83.99	95.8
Coffee/tea	1kg (50/50)	0.98	42.89	86.77	102.3
Cooking oil	750 ml	0.46	20.13	12.79	-36.5
Dry legumes	500g	0.31	13.57	9.99	-26.4
Eggs	1doz	0.4	17.51	19.98	14.1
Maize meal	12.5kg	1.34	58.65	74.99	27.9
Margarine	250g	0.15	6.57	11.99	82.6
Salt	1kg	0.13	5.69	7.58	33.2
Skimmed milk	500g	0.61	26.70	42.99	61.0
Sugar	2.5kg	0.41	17.95	24.99	39.3
Male clothing					
Pullover	1	4.69	205.27	99.99	-51.3
Pajamas	Long pair	4.99	218.41	99.98	-54.2
Shirts	long sleeve	3.5	153.19	69.99	-54.3
Shoes	1 pair	4.5	196.96	129.99	-34.0
Socks	1 pair	0.65	28.45	8.99	-68.4
Trousers	1 pair	8.99	393.48	109.99	-72.0
Underpants	1 pair	0.99	43.33	13.99	-67.7
Vest	1	0.99	43.33	39.99	-7.7
Female clothing					
Blouse	1	3.99	174.64	59.99	-65.6
Bra	1	1.19	52.08	36.99	-29.0
Cotton dress	1	5.66	247.73	59.99	-75.8
Head scarf	1	0.48	21.01	24.99	18.9
Jersey	1	5.99	262.17	79.99	-69.5
Night dress	Summer	3.59	157.13	59.99	-61.8
Overcoat	1	18	787.83	79.99	-89.8
Panties	1 pair	0.49	21.45	29.99	39.8
Petticoat	1	1.99	87.10	99.99	14.8
Shoes	1 pair	4.29	187.77	109.99	-41.4
Skirt	1	3.99	174.64	74.99	-57.1
Stockings	1 pair	0.33	14.44	12.99	-10.1
Vest	1	0.99	43.33	39.99	-7.7
Household consumables					
Bleach	750ml	0.16	7.00	9.99	42.7

Floor polish	400ml	0.19	8.32	17.49	110.3
Scouring powder	550g	0.15	6.57	20.89	218.2
Shoe polish	50ml	0.13	5.69	10.89	91.4
Soap powder	1kg	0.59	25.82	18.99	-26.5
Sunlight soap	500g	0.27	11.82	7.99	-32.4

Sources: Institute for Planning Research, [S.a.], PEP, Shoprite, own calculations

Table 3: 2006-Prices adjusted with the overall CPI and compared to 2015-prices

Item	Unit	Price in 2006 (R)	Estimated price (CPI increase from 8705 to 15319)	Actual price (R)	% Difference
Food					
Brown bread	800g	3.69	6.49	10.27	58.2
Cheese	1kg	31.99	56.30	83.99	49.2
Coffee/tea	1kg (50/50)	32.98	58.04	86.77	49.5
Cooking oil	750 ml	6.99	12.30	12.79	4.0
Dry legumes	500g	4.39	7.73	9.99	29.3
Eggs	1doz	8.04	14.15	19.98	41.2
Maize meal	12.5kg	31.99	56.30	74.99	33.2
Margarine	250g	2.89	5.09	11.99	135.8
Salt	1kg	2.99	5.26	7.58	44.1
Skimmed milk	500g	21.99	38.70	42.99	11.1
Sugar	2.5kg	11.29	19.87	24.99	25.8
Male clothing					
Pullover	1	49.99	87.97	99.99	13.7
Pyjamas	Long pair	69.95	123.10	99.98	-18.8
Shirts	long sleeve	39.99	70.37	69.99	-0.5
Shoes	1 pair	59.99	105.57	129.99	23.1
Socks	1 pair	4.99	8.78	8.99	2.4
Trousers	1 pair	59.99	105.57	109.99	4.2
Underpants	1 pair	6.49	11.42	13.99	22.5
Vest	1	17.99	31.66	39.99	26.3
Female clothing					
Blouse	1	22.99	40.46	59.99	48.3
Bra	1	9.99	17.58	36.99	110.4
Cotton dress	1	69.95	123.10	59.99	-51.3
Head scarf	1	16.99	29.90	24.99	-16.4
Jersey	1	79	139.02	79.99	-42.5
Night dress	Summer	29	51.03	59.99	17.5
Overcoat	1	39.95	70.30	79.99	13.8
Panties	1 pair	4.99	8.78	29.99	241.5
Petticoat	1	16.99	29.90	99.99	234.4
Shoes	1 pair	29.99	52.78	109.99	108.4
Skirt	1	29.99	52.78	74.99	42.1
Stockings	1 pair	4.99	8.78	12.99	47.9
Vest	1	12.99	22.86	39.99	74.9
Household consumables					

Bleach	750ml	5.29	9.31	9.99	7.3
Floor polish	400ml	9.59	16.88	17.49	3.6
Scouring powder	550g	7.69	13.53	20.89	54.4
Shoe polish	50ml	5.19	9.13	10.89	19.2
Soap powder	1kg	12.99	22.86	18.99	-16.9
Sunlight soap	500g	5.99	10.54	7.99	-24.2

Sources: Rossouw, 2008, PEP, Shoprite, own calculations

Table 4: 2006-Prices adjusted with the CPIFNB, CPICF and overall CPI (as relevant) and compared to 2015-prices

Item	Unit	Price in 2006 (R)	Estimated price	Actual price (R)	% Difference
Food			CPIFNAB		
Brown bread	800g	3.69	7.36	10.27	39.5
Cheese	1kg	31.99	63.82	83.99	31.6
Coffee/tea	1kg (50/50)	32.98	65.80	86.77	31.9
Cooking oil	750 ml	6.99	13.95	12.79	-8.3
Dry legumes	500g	4.39	8.76	9.99	14.1
Eggs	1doz	8.04	16.04	19.98	24.6
Maize meal	12.5kg	31.99	63.82	74.99	17.5
Margarine	250g	2.89	5.77	11.99	108.0
Salt	1kg	2.99	5.97	7.58	27.1
Jam	900g	9.99	19.93	17.99	-9.7
Red meat	1kg	28.99	57.84	66.99	15.8
Skimmed milk	500g	21.99	43.87	42.99	-2.0
Sugar	2.5kg	11.29	22.52	24.99	11.0
Male clothing			CPICF		
Pullover	1	49.99	66.19	99.99	51.1
Pyjamas	Long pair	69.95	92.61	99.98	8.0
Shirts	long sleeve	39.99	52.95	69.99	32.2
Shoes	1 pair	59.99	79.43	129.99	63.7
Socks	1 pair	4.99	6.61	8.99	36.1
Trousers	1 pair	59.99	79.43	109.99	38.5
Underpants	1 pair	6.49	8.59	13.99	62.8
Vest	1	17.99	23.82	39.99	67.9
Female clothing			CPIFCF		
Blouse	1	22.99	30.44	59.99	97.1
Bra	1	9.99	13.23	36.99	179.7
Cotton dress	1	69.95	92.61	59.99	-35.2
Head scarf	1	16.99	22.49	24.99	11.1
Jersey	1	79	104.60	79.99	-23.5
Night dress	Summer	29	38.40	59.99	56.2
Overcoat	1	39.95	52.89	79.99	51.2
Panties	1 pair	4.99	6.61	29.99	353.9
Petticoat	1	16.99	22.49	99.99	344.5
Shoes	1 pair	29.99	39.71	109.99	177.0
Skirt	1	29.99	39.71	74.99	88.9
Stockings	1 pair	4.99	6.61	12.99	96.6
Vest	1	12.99	17.20	39.99	132.5
Household consumables			Overall inflation		
Bleach	750ml	5.29	9.31	9.99	7.3

Floor polish	400ml	9.59	16.88	17.49	3.6
Scouring powder	550g	7.69	13.53	20.89	54.4
Shoe polish	50ml	5.19	9.13	10.89	19.2
Soap powder	1kg	12.99	22.86	18.99	-16.9
Sunlight soap	500g	5.99	10.54	7.99	-24.2

Sources: Rossouw, 2008, PEP, Shoprite, own calculations