CHAPTER 3

MEASUREMENT OF INFLATION

3.1 Introduction

When considerating inflation in any economy, it is important that consensus should be reached about the interpretation of price increases to be classified as such, rather than adjustments in relative prices, and the measurement of such increases in terms of a predetermined indicator, as is explained in the next section. This is placed in perspective by the statement that "[t]he issue of how best to measure inflation is very complex. Despite universal usage of the term inflation, there is no generally agreed definition that is sufficiently precise to develop an unequivocal measure" (Woolford, 2005: 2). As inflation has been associated from the earliest years with the introduction of money into an economy, it can take the form of:

- literally debasing the currency, i.e. reducing the metal content of gold or silver coins, but not reducing their face value accordingly;
- reducing the value of a currency in terms of another through an adjustment of the exchange rate; or
- increasing liquidity in the economy without a commensurate increase in the production of goods and services for consumption – the form of inflation analysed in this study.

Section 2 of this chapter considers the measurement of price changes and inflation. Sections 3 and 4 focus on international initiatives to improve the measurement of inflation, and Section 5 reviews similar initiatives in South Africa. The international and domestic experience with inflation and implications of the analysis in this chapter for developing countries, are considered in Section 6. The conclusions from this chapter follow in Section 7.

3.2 The measurement of inflation

Van der Walt states that "[i]nflation may be described as a sustained rise in the general price level. Inflation is, therefore, reflected in a general and widely diffused increase in the prices of goods and services in the economy" (1985: 23). Mishkin states that "[w]hen inflation is defined as a continuing and rapid rise in the price level, most economists … will agree … that money alone is to blame" (2004: 635). These definitions, as well as the viewpoint that inflation is a monetary phenomenon, apply in this study.

Authorities responsible for measuring price levels (and therefore price changes) in an economy periodically embark on initiatives to improve the accuracy of such measurement in terms of the CPI or similar indices. If the index used for measuring price levels, and therefore to derive inflation or changes in cost of living, does not measure price levels accurately over time, the result would be distortions in the measurement of inflation and real economic activity, resulting in inaccurate adjustments to compensate for cost-of-living changes.

Of the available formulae used to compute the CPI, the most commonly used are the Laspeyres index (a fixed-weighted index), and the Paasche index where base quantities are chosen from the measurement period, rather than the base period (United Nations, 2004). A review of available literature shows, however, that the Laspeyres index is used by more developed economies than the Paasche index, e.g. Australia, Germany, New Zealand, the UK and the United States (Reserve Bank of Australia, 1998: 1; Federal Statistical Office, [S.a.]; Statistics New Zealand, [S.a.]; Sharing Benefits, 2005; and ESA, [S.a.]).

Over time, additional indices have been developed to measure changes in the price level. However, despite its shortcomings the Laspeyres index still has wide application as an instrument for the measurement of inflation, as "[t]wo obvious virtues of the Laspeyres formula are its simplicity and its familiarity. It is easy to explain a measure to compare the price of a fixed market basket of goods over time, and anyone who has studied a bit of economics has learned

about a Laspeyres index, though perhaps without the title" (Wykoff, [S.a.]). Additional indices, other than the Laspeyres and Paasche indices (see for instance Silver and Heravi, 2003), include the following:

- Carli index, which is an evenly weighted average of the price ratios where the numerator price is the price of the commodity in the current month and the denominator price is the price of the same commodity in a base month (Diewert, 2003: 1 and 4);
- Dutot index, the ratio of unweighted arithmetic means of base-period price-weighted price changes (Diewert, 2003: 1);
- Edgeworth (or Marshall Edgeworth) index, " … defined as the weighted arithmetic average of the current to base period price relatives which uses the quantities of an intermediate basket as weights. The quantities of the intermediate basket are arithmetic averages of the quantities of the base and current periods" (OECD, 2003);
- Fisher index, a geometric mean of the Laspeyres and Paasche indices (Mohr et al., 1988: 48);
- Jevons index, which is calculated as the unweighted geometric mean of relative prices (Diewert, 2003: 1);
- Lowe index, which measures the proportionate change between periods 0 and *t* in the total value of a specific basket of goods and services, which does not have to consist of the actual quantities in any period (OECD, 2003);
- Rothwell index, a short-term price index including seasonal fluctuations in monthly price changes (Van Mulligen and Oei, 2004: 10);
- Törnqvist index (also known as the Törnqvist Theil index), a weighted geometric average of the price relatives using arithmetic averages of the value shares in the two periods as weights (OECD, 2003);
- Walsh index, "[a] price index defined as the weighted arithmetic average of the current to base period price relatives which uses the quantities of an intermediate basket as weights. The quantities of the intermediate basket are based on the geometric mean of the volumes of the base and current periods" (OECD, 2003); and

- Young index, which is calculated as " … an expenditure share weighted average of price ratios where the numerator price is the price of the commodity in the current month and the denominator price is the price of the same commodity in a base month" (Diewert, 2003: 4).

Despite its shortcomings, the majority of countries, including South Africa (Mohr et al., 1988: 114), use Laspeyres-type indices to calculate inflation. Owing to the shortcomings in the accurate measurement of price changes highlighted above, certain countries have taken steps aimed at improving the accuracy of measuring either inflation or changes in cost of living. The next section highlights the findings of the Boskin Report and its recommendations in the United States. It is the best-known international investigation into the accuracy of the measurement of cost-of-living changes.

3.3 Investigation into accurate measurement of changes in cost of living in the United States

Owing to concerns at the time about bias in the CPI used to measure increases in the average cost of living in the United States, the Senate Finance Committee in 1996 appointed the *Advisory Commission to Study The Consumer Price Index*. The Commission was also mandated to recommend amendments to ensure that changes in the CPI accurately reflect changes in cost of living. This Commission is generally known as the Boskin Commission and its report is referred to as the Boskin Report, as it was chaired by Boskin, at the time a Professor of Economics at Stanford University in California, although the Commission comprised five members in total (United States of America, 1996). The Boskin Report was released in December 1996 and recommended downward adjustments in the level of the CPI. The importance attached internationally to this report is evident from the fact that the OECD had hosted a seminar in 2005, dealing with the question *Inflation Measures: Too High - Too Low - Internationally Comparable?*, where changes in CPI measurement in certain OECD countries since the release of the Boskin Report received considerable attention. Such changes are discussed in Section 3.4 below.

As highlighted above, changes in the CPI do not perfectly measure increases in the cost of living in a particular area or country, giving rise to the question whether measured inflation overstates or understates actual price increases. The Boskin Report addressed this matter systematically in the United States. According to Parkin, "[t]he main sources of bias in the CPI … [of the United States] … are new goods bias, quality change bias, commodity substitution bias and outlet substitution bias … [with the result that] … the bias in the CPI distorts private contracts and increases government outlays" (2003: 469), as the CPI is used as price adjustment factor in many contracts, wage settlements and, in the United States, social security payouts. Adjustments have to be made to the CPI as new goods replace old products, e.g. CDs replaced LPs, or PCs replaced typewriters. Such adjustments often result in the new goods bias and the quality change (improvement) bias, as accurate adjustments are not always possible (Samuelson and Nordhaus, 2001: 451). As relative prices change, consumers substitute goods and services in their consumption patterns or change their spending habits to different outlets (see for instance Du Toit, 1988). However, the composition of the CPI cannot take account of such changes over the short run, which results in a bias in the composition of the CPI (Parkin, 2003: 469).

The Boskin Report concluded, *inter alia*, that "[t]here are several categories or types of potential bias in using changes in the CPI as a measure of the change in the cost of living. Substitution bias occurs because a fixed market basket fails to reflect the fact that consumers substitute relatively less for more expensive goods when relative prices change. Outlet substitution bias occurs when shifts to lower price outlets are not properly handled. Quality change bias occurs when improvements in the quality of products, such as greater energy efficiency or less need for repair, are measured inaccurately or not at all. New product bias occurs when new products are not introduced in the market basket, or included only with a long lag" (United States of America, 1996). A further conclusion of the Boskin Report is that the CPI is the best available measure to ascertain increases in inflation, but " … it is not a true cost of living index … [as] … has been recognised by the Bureau of Labor Statistics – the BLS – for many years. Despite many important BLS updates and improvements in the CPI, changes in the CPI will overstate changes in the true cost of living for the next few years. The Commission's best estimate of the size of the upward bias looking forward is 1,1 percentage points per year. The range of plausible values is

0,8 to 1,6 percentage points per year" (United States of America, 1996; see also Rietveld, 2006). Gwartney et al. state that " … measurements of inflation are generally thought to be upwardly biased by about 1 percent per year" (2000: 12).

Although the Boskin Report focuses attention on the CPI and sources of possible bias in the index, the BLS holds the view that improvements in the CPI as a measure of price levels are an ongoing process (Johnson et al., 2005: 12). Since the publication of the Boskin Report, changes have been made to improve the CPI (Samuelson and Nordhaus, 2001: 452), which include more frequent updates of the weights used in compiling the CPI and sample rotation between outlets. As a result " … the market basket used in calculating the CPI is more up-to-date and reflective of current consumer behavior than it ever has been. The BLS will continue to constantly evaluate and improve its methodologies to produce the most accurate index possible" (Johnson et al., 2005: 13). Since 2002 the expenditure weights used in the CPI of the United States have been updated every two years, while before then it had been done roughly every ten years. At the same time the implementation lag has been shortened. All these measures probably resulted " … in a smaller increase in the index; for 2004 the increase in the index was 0,06 per cent lower than it would have been had the old weights been in place" (Johnson et al., 2005: 12).

In addition to more regular updates of the weights and outlets used to compile the CPI, the introduction of new consumer goods introduced into the economy also receives special attention by the BLS, with the aim of introducing such goods into the CPI in a timely fashion, thereby ensuring that the CPI is a market basket accurately reflecting consumer purchases. This approach also ensures that the CPI captures " … some of the consumer surplus when new goods enter the economy and decline steadily in price, as sometimes happen with new technology goods; failure to capture this surplus has been seen as a possible source of bias" (Johnson et al., 2005: 12).

In 2000 the BLS created the Federal Economic Statistics Advisory Committee (FESAC), following a recommendation of the Boskin Report. The FESAC serves as a link between the BLS and the academic research community, allowing the exchange of ideas between the academic and research communities (Johnson et al., 2005: 13).

Two relevant conclusions can be drawn from the policy changes following the findings and recommendations of the Boskin Report. Price changes are sometimes overstated, rather than understated[34]; and regular revisions to the index used for measuring price changes, both in terms of spending weights reflecting the purchase patterns of consumer goods and for outlets, are required to ensure that the CPI continues to reflect average spending patterns of consumers. Following the publication of the Boskin Report, a number of OECD countries have improved the measurement of price changes, as is explained in the next section.

3.4 International attempts to improve accuracy in the measurement of inflation

Following the Boskin Report, the OECD arranged a seminar on 21 and 22 June 2005 to consider the measurement of inflation. The OECD, with its secretariat in Paris, France, is a " … forum where the governments of 30 market democracies work together to address the economic, social and governance challenges of globalisation as well as to exploit its opportunities. The Organisation provides a setting where governments can compare policy experiences, seek answers to common problems, identify good practice and co-ordinate domestic and international policies" (OECD, [S.a.]). Membership of the OECD is limited to countries committed to a market economy and democratic principles, and its members produce 60 per cent of the world's goods and services. South Africa is not a member country of the OECD. The Organisation was established in 1961, emanating from the Organisation for European Economic Co-operation (OEEC), founded in 1947 to co-ordinate the Marshall Plan for the reconstruction of Europe after World War II (OECD, [S.a.]).

At the seminar a number of OECD member countries reported their experiences with and efforts to improve the accuracy of measuring price increases in their respective economies. The

[34] A long period of deflation in Japan contributed to a low credibility of inflation figures. Prices in Japan increased during the ten-year period after 1985 by 14,4 per cent, or by about 1,4 per cent per year, whereafter the economy entered a prolonged period of deflation. The Japanese inflation figures were often criticised between 1985 and 1995, as "[s]ome economists and journalists … believed that the CPI overstated the price increase rate … " (Statistics Bureau, 1996: 3) to avoid admitting publicly that the economy was then already in deflation.

accuracy of inflation figures is naturally of importance for all countries, but even more so since the emergence of inflation targeting as an anchor for monetary policy, as "[u]nder a policy framework espousing the principles of consistency, transparency and communication, getting the numbers wrong can be extremely costly" (Rietveld, 2006: 41). Papers highlighting initiatives in a number of OECD countries to improve the measurement of price levels and price changes in terms of the CPI in areas other than owner-occupied housing, were presented at the OECD seminar (see for instance Linz and Behrmann, 2005; Ribe, 2005; Shimizu, 2005; or Woolford, 2005).

Six main problem areas in the application of the methodology to measure price increases by means of changes in the CPI were highlighted at the seminar (Diewert, 2005: 2 to 6):

- First, a standard CPI index is not a true Laspeyres index, in as much as the consumer expenditure basket pertains to a base year. Expenditure weights are therefore selected on an annual basis, whereas the prices are collected in the main at a monthly or quarterly frequency. A true Laspeyres index would be one where the base period expenditures coincide with the base period for the prices;
- secondly, at the first stages of aggregation of CPI statistics, the use of unweighted indices might result in a bias problem;
- thirdly, it is difficult to work out a coherent methodological treatment of quality change and new goods in the context of a fixed-base Laspeyres index;
- fourthly, the treatment of seasonal commodities is a major problem area. The use of an annual basket reports the longer run trend of inflation, but if the focus is on month-to-month price changes as is the case with central banks (particularly in an inflation-targeting environment), the use of annual weights can result in misleading signals owing to seasonal price adjustments;
- fifthly, prices of goods often receive more attention than prices of services in the composition of the CPI, while the relative importance of services in consumer expenditure has increased over the years; and
- last, more than one CPI may be required to meet the needs of different users. Some users require information on monthly price movements in a timely fashion, whereas other users

require accurate measurements of cost-of-living increases. Similarly, multiple indices could be useful in the context of the treatment of owner-occupied housing.

The treatment of housing cost, housing expenditure and owner-occupied housing in the CPI received considerable attention at the seminar, particularly because no standardised approach is applied by OECD countries (see for instance Cournède, 2005: 1; or Diewert, 2005: 5). The literature highlights four different (but accepted) ways for the treatment of owner-occupied housing (see for instance Cournède, 2005: 2; Diewert, 2005: 5, Shimizu, 2005: 1; or Weideman, 2006: 6).

One specific aspect to consider in the decision whether housing cost should be included in a price index is that "[a] house is a place to live in and at the same time an investment. To separate the measurement of the use from that of investment is a difficult problem in CPI calculation … " (Guðnason, 2005: 5). An additional complication is that "[t]he CPI measures price changes in household expenditures but does not take into account changes in households' income. Two kinds of income are connected to owner-occupied housing. One is the imputed rent that is assumed that the owner pays himself for using the housing durable and the other is the capital gain/loss in income from the price increase of the durable" (Guðnason, 2005: 10). To overcome these difficulties, a number of countries and jurisdictions simply exclude the cost of owner-occupied housing from the CPI.

Christensen et al. state that "[o]ne of the central preoccupations of statistical work at the OECD is to assess and advance international comparability of statistical series" (2005: 3). To this end, differences in the treatment of home ownership " … may be an unsatisfactory solution when there are large differences in the share of the population that own their dwellings … [as in] … two countries that are identical except for the share of home owners, the same changes in all prices would produce different changes in CPI" (Christensen et al., 2005: 5). Christensen et al. nevertheless conclude that " … there is no single best CPI – several conceptual approaches exist and their choice depends essentially on the use to which the CPI is put … [as] … a CPI that excludes OOH (owner-occupied housing) entirely could be interpreted as measuring the average

change in prices of monetary transactions of consumer goods and services in the HH (household) sector" (2005: 3 and 4).

At the same seminar, Schreyer submitted a report on the findings of an OECD " … questionnaire to countries to find out about priorities for future work on the CPI at the national and at the international level" (2005: 1). The main findings reported by selected OECD member countries in their responses to the questionnaire are highlighted in Appendix F.

Inflation rates of countries cannot be compared without the necessary circumspection. Country-specific issues, e.g. decisions about the inclusion or exclusion of owner-occupied housing cost in the index used to measure changes in price levels, or methods used to adjust for quality improvements, might distort comparisons. Cournède states for instance that " … only four of the 12 euro area countries include estimates of owner-occupied housing costs in the national consumer price indices and these four countries use three different methods. It proved therefore impossible to agree on and implement a measure for owner-occupied housing when the HICP was first introduced" (2005: 1; see also Konijn et al., 2002). The methodology used for the calculation of the CPI therefore differs between countries within the same economic union, and even between countries using one currency and monetary policy.

International initiatives to enhance the standardisation of the measurement of inflation culminated in the publication of *Consumer Price Indices: An ILO Manual*[35] (International Labour Organization, 2004). This manual contains " … detailed comprehensive information and explanations on compiling a consumer price index" (International Labour Organization, 2004: v). However, the recommendations of this manual are not uniformly applied by all countries.

[35] Although published by the International Labour Organization, other contributors to the manual are Eurostat, the IMF, the OECD, the United Nations Economic Commission for Europe and the World Bank.

3.5 Measurement of inflation in South Africa

In South Africa's case the rate of inflation is defined as changes in the CPI, which is measured by Statistics SA (see for instance Van der Walt, 1985). In countries such as South Africa which have adopted an inflation-targeting monetary policy, a clear distinction of responsibilities is required between an agency entrusted with the calculation of the rate of inflation and the central bank, entrusted with the responsibility of achieving the inflation target specified in terms of the inflation rate. Entrusting these responsibilities to one agency could cast serious doubt on the credibility of the inflation figures owing to a vested interest of such an agency to publish inflation figures aligned with the inflation target.

In addition to splitting responsibilities, an index suitable to use for the measurement of price changes reflecting inflation in South Africa should be selected. To this end Van der Walt (1985: 23) highlights production (or wholesale) price indicators (PPI), CPI and implicit national accounts deflators as indicators available for measuring inflation. The first two indices measure price levels of items included in the indices on a monthly basis. The deflator is derived by calculating ratios of current to constant prices of national accounting aggregates (Van der Walt, 1985: 23). The main disadvantages of using changes in the deflator for the measurement of inflation are that changes in the prices of certain commodities included in the deflator are not determined domestically, but fixed on international markets; the deflator reflects not only price changes, but also changes in the composition of output; it is available only periodically (typically on a quarterly basis) and with a time lag; and the deflator is subject to revision whenever national accounts data is revised (Van der Walt, 1985: 23). Owing to these shortcomings, changes in this deflator cannot be used to measure inflation.

The PPI measures the price level of commodities produced and sold at non-retail level in the manufacturing sector, foreign manufactured goods imported for domestic consumption and goods produced in other sectors of the economy. This index has limited application in as much as it does not include the prices of any services (Van der Walt, 1985: 23). Owing to its shortcomings, changes in this index cannot be used as a representative indicator of domestic price changes.

Changes in the CPI are accordingly the best instrument for measuring inflation. The CPI measures the prices of selected goods and services included in a "spending basket" of an average South African household. The main disadvantages of using changes in the CPI for purposes of measuring inflation, are that the index:

- does not cover all prices in the economy, as the prices of investment goods and certain goods and services produced by the government are excluded (Van der Walt, 1985: 24);
- can only take cognisance of the substitution of products for consumption purposes at the time of periodic revisions (Van der Walt, 1985: 24);
- frequently measures quality improvements simply as price increases (Van der Walt, 1985: 24);
- does not provide for purchasing patterns of any particular household, but for an "average household" that can hardly exist in practice (Central Statistical Service, 1987: 1);
- records the retail prices of the goods and services included in the index, implying that the index reflects the market price effect of changes in indirect taxes and subsidies (Du Toit, 1988; Van der Walt, 1985: 24); and
- differs in composition between countries, particularly in respect of the treatment of owner-occupied housing (see for instance Diewert, 2005: 5; or Cournède, 2005: 4).

The main advantages of using changes in the CPI as a measure of inflation is the reflection of actual prices, rather than derived prices. Despite the disadvantages mentioned above, this advantage, compared to the disadvantages of other possible instruments of measurement, implies that changes in the CPI is regarded as the most suitable instrument for the measurement of inflation in South Africa (Van der Walt, 1985: 24). In South Africa's case, a weighted overall CPI is calculated, and changes in this index are regarded as the overall rate of inflation. The current basket used for measuring average expenditure was reviewed in 2000 and implemented in 2001 (Statistics SA, 2001), and the main components are highlighted in Table 3.1.

Table 3.1 Composition of overall CPI in metropolitan and other urban areas: selected weights, 2000

Item	Weight
Goods:	59,42
Food (included in goods)	23,02
Housing (included in goods)	20,70
Transport (included in goods)	13,72
Services	40,58
Medical care (included in services)	6,90

Source: Statistics SA, 2003

Rates of inflation are also calculated for different socio-economic groups and different regions in the country. To the extent in which the expenditure patterns of specific consumers differ from the average expenditure pattern, their rates of inflation will also differ from the average inflation rate (Rossouw, 2005: 296). Table 3.2 highlights the most important differences in spending weights between the "average" household (or overall CPI) and that of the very low (annual gross household income below R8 070 in 2000) and very high (annual gross household income above R56 001 in 2000) income groups. Owing to these differences, the annual inflation rate for the low income group for the period June 2000 to March 2005 amounted to 6,25 per cent, while it was 4,81 per cent for the high income group (see also Bhorat and Oosthuizen, 2005: 6).

On a regional basis inflation is calculated for each of the nine provinces, and these rates of inflation can differ considerably, owing to differences in the spending patterns of consumers in the different provinces. For example, large regional differences in inflation were recorded between the Free State and the Northern Cape. The annual average rate of increase in the Free State over the period June 2000 to March 2005 was 4,53 per cent, compared to an annual average increase of 5,76 per cent in the Northern Cape and an annual rate of inflation of 5,14 per cent nationally (Rossouw, 2005: 297).

Table 3.2 Selected spending weights in metropolitan and other urban areas in South Africa, 2000

Item	Overall CPI	Very low income	Very high income
Goods	**59,42**	**83,88**	**53,97**
Food	23,02	51,24	16,69
Housing	20,70	10,04	23,51
Transport	13,72	4,03	16,25
Services	**40,58**	**16,12**	**46,08**
Medical care	6,90	0,67	8,58

Source: Statistics SA, [S.a].

As in other countries, South Africa also makes periodic adjustments to the calculation of its CPI. At the time of the completion of this study, the South African CPI was based on the spending weights (or basket) of South African consumers as measured in 2000. At the time of the announcement of these weights in 2002, Statistics SA stated that "[t]he expenditure patterns of households change with time as their needs and buying preferences change. To ensure that the CPI gives an accurate and reliable reflection of price changes of goods and services purchased by the average household, it is necessary to update the consumer basket (weighting structure) from time to time" (2002). This includes a review of the various goods and services purchased by an average household and the calculated weights (relative importance) of the various goods and services used for the calculation of the CPI (Statistics SA, 2002).

Over the past 20-odd years (i.e. since 1985) the composition of the South African CPI has been revised every five years, initially by the Central Statistical Service (CSS), which was subsequently replaced by Statistics SA. Earlier the composition was reviewed less frequently, as

the revised consumer basket for 1985, introduced with effect from November 1987, replaced a basket that was compiled for 1975 (Central Statistical Service, 1987: 5). In announcing the rebasing of the consumer basket for 1985 spending patterns, the important point was made that the " … basket of goods and services is, to some extent, fictitious since provision must be made for the purchasing abilities and preferences of all households – for example, in the housing component, elements appear for the rental of a flat, as well as for ownership costs such as interest and assessment rates" (Central Statistical Service, 1987: 1).

The consumer basket also reflects the prices of goods and services purchased by an average South African household, with the word *purchased* used deliberately in the definition " … to distinguish those transactions from certain types of expenditure which do not represent the direct purchase of goods and services. The most important of these is income tax which is excluded … since the amount of tax paid is not related to the quantity of government services used by a given family. Similar exclusions are life insurance premiums, pension fund contributions and the capital portion of mortgage bond repayments, all of which are forms of savings and investment" (Central Statistical Service, 1987: 2). At the same time the CPI was also amended to provide for publication according to income groups. The annual income " … of the lower income group was less than R8 000, that of the middle income group R8 001 to R19 999 and that of the higher income group R20 000 and more[36]" (Central Statistical Service, 1987: 6). In addition," … to make provision for possible geographic differences in spending preferences … a consumer price index is calculated for each of the twelve main urban areas in the country" (Central Statistical Service, 1987: 7).

When the rebasing was announced in November 1987, it was found that a recalculation of the CPI for October 1987 on the basis of both the 1975 and 1985 consumer baskets caused a decline of 3,83 per cent in the index (Central Statistical Service, 1987: 4), implying that price levels of goods and services purchased by an average household were marginally overstated until October 1987 owing to the use of 1975 spending weights, rather than the 1985 weights. To account for

[36] Adjusted with changes in the CPI, the annual income of this group would have been more than R96 154 in 2000, while the high income group in terms of the 2000 rebasing of the CPI is regarded as households with an annual income exceeding R55 160, as a different approach for dividing households into income groups was used.

this difference an adjustment factor was used for one year to ensure continuity in the index (Central Statistical Service, 1987: 4).

In accordance with the cycle of revising the spending patterns of households and rebasing the CPI every five years form 1985, the Central Statistical Service (CSS) announced in October 1991 a revised consumption basket for 1990. For purposes of compiling this basket, a survey was undertaken on behalf of the CSS " … by the Human Science Research Council. The survey was undertaken in … 12 urban areas … [where] … a sample of households was selected, for which expenditure patterns were determined" (Central Statistical Service, 1991: 2). Included for the first time in the consumer basket for purposes of calculating the CPI were spending in respect of TV decoders, CD players and toll road fees (Central Statistical Service, 1991: 2). The inclusion of these items confirms that periodic rebasing is required to ensure that ample cognisance is taken of consumers purchasing new products and services that were not available previously.

Similarly, the CSS announced on 27 February 1997 a new consumer basket based on the spending patterns of 1995 (Central Statistical Service, 1997). This reflected the results and findings of the " … quinquennial survey on the *Income and Expenditure of Households*. The results of this survey are also used to determine the relative importance (weight) of each item in the basket of goods and services purchased by an average household" (Central Statistical Service, 1997: 2). In the compilation of the spending patterns, "[t]he survey on the income and expenditure of households was undertaken by the CSS in October 1995 and covered 30 000 households throughout South Africa. Unlike the 1990 (and previous) surveys on the expenditure of households, which covered the 12 main metropolitan areas only, the 1995 survey covered all urban areas as well as non-urban (rural) areas" (Central Statistical Service, 1997: 2). As was the case five years earlier, certain purchases of households were included in the composition of the CPI for the first time. These inclusions included sectional title levies, spending on traditional healers (sangomas), cell-phone expenditure, Internet subscriptions, courier services, personal computers and software, and the payment of lobola and dowry (Central Statistical Service, 1997: 2).

During October 2002 Statistics SA announced the results of the next quinquennial survey to rebase the CPI to 2000 consumer spending patterns (Statistics SA, 2002: 2). The sample covered 30 000 households throughout South Africa in urban and non-urban areas and included respondents living in houses, townhouses, flats, hostels, informal type dwellings and traditional dwellings (Statistics SA, 2002: 2). For the first time expenditure on gambling and private security was included.

In terms of income, the survey for 2000 catered for five expenditure groups, and "[t]he boundaries of the expenditure group categories were obtained by calculating the quintiles (five equal groups) of the total number of households in South Africa and placing the break-point at the total expenditure of the top household (ranked according to expenditure) in each of the quintiles" (Statistics SA, 2002: 2). In terms of this distribution, the very low expenditure group with total annual household expenditure up to R8 070 in 2000, comprised 20 per cent of the population, but comprised only 1,39 per cent of the expenditure in terms of the rebased overall CPI of metropolitan and other urban areas in 2000. Conversely, the 20 per cent of households in the very high expenditure group with annual expenditure over R55 160 in 2000, comprised 68,41 per cent of the expenditure (Statistics SA, 2002: 3 and 4).

The most significant changes recorded in the relative importance of different goods and services as a result of the rebasing on 2000 spending patterns (highlighted in Table 3.3), are spending on food that increased from 19,48 per cent in 1995 to 23,02 per cent in 2000 and housing, with a decrease from 22,45 per cent to 20,70 per cent, as well as a decline in the percentage of income spent on clothing. Moreover, by 2002 when the rebasing was announced, the comparative CPIX-figures (CPIX denotes changes in CPI in metropolitan and other urban areas excluding changes in mortgage interest costs) for 1995 and 2000 were also published. Subsequent to the announcement in 2002 of the spending weights following the rebasing in 2000, it was announced on 30 May 2003 that a systematic error was made in the revised data in respect of the residential rent component in the CPI (Statistics SA, [S.a.]). As a result of this error, the value and the rate of growth of the residential rent component in the CPI were overestimated.

Table 3.3 Main components of CPI and CPIX in metropolitan and other urban areas, 1995 and 2000

Item	CPI 1995	CPI 2000	CPIX 1995	CPIX 2000
Commodities	57,34	59,42	65,71	66,24
Services	42,66	40,58	34,29	33,76
Food	19,48	23,02	21,92	25,66
Non-alcoholic beverages	0,82	1,13	0,92	1,26
Alcoholic beverages	1,17	1,52	1,32	1,70
Cigarettes, cigars and tobacco	1,04	1,21	1,17	1,35
Clothing and footwear	5,07	3,64	5,70	4,06
Housing	22,45	20,70	12,74	11,57
Fuel and power	3,54	3,84	3,98	4,28
Furniture and equipment	1,77	2,82	4,88	3,15
Household operation	4,87	4,68	5,48	5,22
Medical care and health expenses	5,81	6,90	6,54	7,70
Transport	13,65	13,72	15,36	15,30
Communication	3,21	2,86	3,61	3,19
Recreation and entertainment	2,18	3,04	2,45	3,39
Reading matter	0,69	0,36	0,78	0,40
Education	1,82	3,38	2,05	3,77
Personal care	3,08	3,92	3,47	4,37
Other goods and services	6,78	3,26	7,63	3,63

Source: Statistics SA, 2002

The impact of these inaccurate estimates on the annual inflation rate, measured as changes in the CPI for the historical metropolitan areas, was an overmeasurement increasing gradually from 0,2 of a percentage point in February 2002 to 2,3 percentage points in March 2003. The average impact of these data errors amounted to 0,9 percentage points for the period January 2002 to December 2002. In the short run Statistics SA, the agency responsible for the compilation of the

CPI, rectified the problem by using data from external sources to update residential rental information on a quarterly basis. The permanent solution introduced by Statistics SA was the implementation of special surveys to determine the rent of houses, flats and townhouses (Statistics SA, [S.a.]).

A rather similar incident occurred in 1991, when a mistake was made in the calculation of South Africa's PPI figures (Republic of South Africa, 1991; SA Reserve Bank, 1991: 10) after the rebasing for 1990. In this instance the mistake was detected after the release on 12 August 1991 of the PPI figures for May 1991. The necessary historic adjustments were made to the PPI figures and revised data were released on 28 August 1991 (Republic of South Africa, 1991). These incidents show that inflation data should not only be readjusted to reflect revised spending patterns over time, but should also be subjected to scrutiny to reveal timely any possible data errors. It is also reassuring to note that the adjustments were publicly announced and therefore subjected to public scrutiny, rather than to try and hide it from the public eye.

This brief review of adjustments to the measurement of price levels in South Africa over the past 22 years shows that periodic rebasing is indeed necessary to adjust the CPI for changes in spending habits and patterns, and for the inclusion of new products. Moreover, it also shows that the South African CPI includes goods and services purchased by an average consumer, but is not in the true sense of the word an accurate reflection in changes in cost of living: it is rather an indication of price levels facing an average household. Changes in the CPI therefore reflects average price changes facing an average household.

The Bureau of Market Research (BMR) at the University of South Africa until 2004 assessed periodically the spending habits (in cash and in kind) of different South African population groups[37] (Bureau of Market Research, 2000). The BMR completed such a study in 2000 and stated that "[t]he study calculates household expenditure on roughly 500 expenditure items (goods and services) in South Africa by language group and province for 2000" (Bureau of Market Research, 2000: 1). The study identified four language groups (Afrikaans, English,

[37] The survey results of the BMR are discussed in Chapter 6.

Nguni and Sotho) and one of its findings is that "[c]onsiderable differences occur in the expenditure patterns of the language groups" (Bureau of Market Research, 2000: 2).

Although the BMR study is not directly comparable with the South African CPI despite the fact that the research was done in the same year as the most-recent rebasing of the CPI, it should be noted that both the study and the CPI rebasing showed considerable differences in spending patterns between groups. Whereas the BMR found this for language groups, the rebasing of the CPI has shown the same tendency for different income groups. Appendix G compares the findings of the BMR in terms of actual spending and the CPI weights calculated by Statistics SA.

The comparison of the adjusted spending pattern used by the BMR and the weights used in the CPI, shows a large degree of convergence in respect of expenditure on food, transport and communication, accounting for 39,6 per cent of the weights used in the CPI. The biggest discrepancy in terms of percentage points is in respect to spending on housing and household operations, where definition problems (e.g. classification of electricity under housing, rather than as fuel and power) and reclassifications required for comparative purposes, might be the reasons for the discrepancies. Moreover, the analysis of the BMR represents to a larger extent than the CPI a cost-of-living index, as it includes non-purchased items such as income tax, savings, spending in kind and support of family members. It would not be possible to compile a CPI which takes cognisance of these items.

The items where a divergence of larger than 20 per cent is recorded, are:

- clothing, foodwear and accessories, where the adjusted BMR spending is nearly 30 per cent higher;
- medical care, where the adjusted BMR spending is nearly 22 per cent lower;
- education, where the adjusted BMR spending is more than 30 per cent lower;
- entertainment, sport and recreation, where the adjusted BMR spending is some 70 per cent lower;
- furniture and household equipment, where the adjusted BMR spending is nearly 60 per cent higher;

- alcoholic beverages, where the adjusted BMR spending is some 90 per cent higher;
- cigarettes, cigars and tabacco, where where the adjusted BMR spending is some 95 per cent higher; and
- reading matter, where the adjusted BMR spending is about 50 per cent higher.

These trends serve to confirm that the weights used in the compilation of the CPI should indeed be revised regularly to account for possible changes in spending preferences. In this example, spending patterns differed even in respect of the same year, i.e. 2000. Such an adjustment is indeed done in South Africa every five years; a practice that should be continued in the interest of reporting accurately the price level and the rate of inflation.

This analysis of the major components of the South African CPI leads to two conclusions. First, the consumption basket is fictitious in as much as it provides for purchasing preferences of an "average household". Such a household can hardly exist, as it would, for instance, utilise at the same time both owner-occupied and rental accommodation. Secondly, regular updates of spending baskets used in the composition of the CPI are a prerequisite for accurately measuring price levels and, therefore, price changes and inflation. This ensures that cognisance is taken in a timely fashion of changes in spending preferences and patterns, and the introduction of new consumer goods and services.

3.6 International experiences with inflation and implications for developing countries

The analysis in this chapter shows that no "single-best" approach for measuring inflation exists. Countries by and large use the techniques and data at their disposal to measure price changes in their economies. Inflation has been identified as a problem many years ago and has not been confined to any country or any group of countries, e.g. developed or developing countries. Developed and developing countries experienced a surge in inflation in the 1970s, after periods of moderate inflation following World War II. In years preceding World War II, inflation was viewed as a temporary problem, with prices moving back to pre-inflation levels during periods of deflation (Haslag, 1997: 19).

Table 3.4 Average inflation rates in developed and selected emerging economies, 1949 – 1953 to 1980 – 1982

	1949 – 1953	1954 – 1959	1960 – 1965	1966 – 1969	1970 – 1973	1974 – 1979	1980 – 1982
Industrialised economies	5,3	2,3	3,4	3,9	6,3	9,2	9,8
Developing countries	6,1	4,8	3,9	5,5	8,7	19,4	24,0
Underdeveloped countries	14,1	11,8	9,3	9,6	11,6	33,4	33,2
South Africa	5,4	2,4	2,1	3,0	6,3	11,8	14,6

Sources: De Wet, 1987; author's addition of South Africa

The reasons for sustained inflation after World War II were (i) a shortage of labour resulting in wage increases, and (ii) the continued application of demand management policies advocated by Keynes to end the high level of unemployment of the Great Depression during a period of full employment (De Wet, 1987: 3). Table 3.4 highlights inflation rates in different groups of countries and in South Africa for the period 1949 – 1953 to 1980 – 1982. The country classification used by De Wet (1987) is not compatible with the classification used in Table 3.5, highlighting inflation for the period 1961 – 1970 to 1991 – 2000.

The rate of increase in inflation abated in developed economies in the 1980s, but accelerated both in South Africa and in other emerging economies, as highlighted in Table 3.5. The two tables show that inflation in South Africa followed broadly the same trend as in industrialised economies (as identified by De Wet, 1987) or developed economies (as identified by Mokoena et al., 2004) until the end of the 1970s, but did not decline to the same degree as in those countries during the 1980s.

Table 3.5 Average inflation rates in developed and selected emerging economies, 1961 – 1970 to 1991 – 2000

	1961 – 1970	1971 – 1980	1981 – 1990	1991 – 2000
Developed economies	4,0	10,8	8,1	3,0
Selected emerging economies*	18,3	29,8	139,7	58,9
South Africa	2,8	10,6	15,4	9,0

* Argentina, Brazil, Bulgaria, Chile, Colombia, Czech Republic, Egypt, Hungary, India, Indonesia, Israel, Korea, Malaysia, Mexico, Pakistan, Peru, Phillippines, Poland, Russia, South Africa, Thailand, Turkey and Venezuela

Sources: Adapted from Mokoena et al., 2004; author's addition of South Africa

The surge in international inflation in the 1970s was caused to a large extent by the first oil price shock and inappropriate policies to deal with that shock, causing widespread increases in general price levels, while the Vietnam War also caused price pressures in the United States. In addition, the Bretton Woods system of fixed but adjustable exchange rates, in existence since World War II, collapsed in 1971 (Mishkin, 2004: 473; see also McAleese, 2004: 593). The Bretton Woods system was based on the convertibility of US dollars held by foreign governments and central banks into gold at a fixed rate of US$35/ounce, implying that the dollar became the international reserve currency. The system survived for some 25 years despite a number of shortcomings, the most important of which were that (Mishkin, 2004: 473):

- countries experiencing difficulties in maintaining the value of their currencies against the US dollar owing to continued trade deficits were permitted to devalue their currencies, but those countries running consistent trade surpluses had no obligation to revalue their currencies; and
- the United States, as reserve currency country, could not devalue the US dollar even if it had continued trade deficits with the rest of the world.

During the 1960s the United States made attempts to reduce domestic unemployment by pursuing an inflationary monetary policy, resulting in trade deficits and an overvalued US dollar. As the surplus countries refused to revalue their currencies, the Bretton Woods system collapsed in 1971 and after unsuccessful attempts to reinstitute it, floating exchange rates were introduced in 1973 (Mishkin, 2004: 473; McAleese, 2004: 593).

An expansionary monetary policy, the collapse of the Bretton Woods system and the oil price shock of 1973 all contributed to the development of world-wide inflation in the 1970s. Gwartney et al. refer to inflation as " … the economic plague of the 1970s" (2000: 7). However, since 1979, particularly " … when Paul A. Volcker took the helm at the Federal Reserve, the mission of the central bank has been clear: to beat inflation down by repeated clubbings with the monetary policy truncheon" (Popper, 2002: 67). The appointment of Volcker followed on a period that Mishkin describes as follows: " … from 1965 through the 1970s, policymakers had little credibility as inflation-fighters – a well deserved reputation, as they pursued an accommodating policy to achieve high employment … To wring inflation out of the system, the Federal Reserve under Chairman Paul Volcker put the economy through two back-to-back recessions …" (2004: 655). Only after the second recession Volcker established credibility for the anti-inflation policies of the Board of Governors of the Federal Reserve System (Fed), a condition that still prevails.

Developed economies subsequently adopted a similar monetary policy approach and contained inflation successfully in the 1980s. Developing and emerging-market economies, including South Africa, did not adopt the same policy at the time. This exacerbated South Africa's inflation problem, as explained in Chapter 5, until containing inflation again emerged as a monetary policy objective by 1989 (Stals, 1989: 10). Certain developing countries still experience problems in containing inflation. A case in point is Zimbabwe, where annual inflation accelerated to 585 per cent in 2005 (Banco de Moçambique, 2005; see also Coorey et al., 2007).

Since 1990 South Africa has succeeded in containing inflation by using orthodox, rather than structural, economic policies. At the time of the completion of this study, South Africa has successfully kept its CPIX rate of inflation within its target range of 3 to 6 per cent for a period of 43 months since September 2003[38]. The question in respect of this policy success is naturally whether it was achieved at the expense of other policy goals such as reduced unemployment, as highlighted in Chapter 2. Developing countries are faced by the same challenge: containing inflation without negative consequences for economic growth, reductions in unemployment or the alleviation of poverty. Finding answers to this dilemma is, however, beyond the scope of this study.

International investors and credit-risk rating agencies (see for instance Mishkin, 2004 on such agencies) take cognisance of inflation figures in assessing country credit risk. Developing economies accordingly stand to gain from initiatives to standardise the measurement and international comparison of inflation. Developing economies should make every attempt within their limited economic means and resources to ensure the periodic rebasing of their inflation data. Lack of rebasing can lead to a situation where inflation is reported inaccurately by a large margin, which may solicit inappropriate advice on the conduct and implementation of macroeconomic policies. The publication of wrong inflation data, e.g. owing to a lack of timely rebasing, could also result in the implementation of inappropriate monetary policy by developing countries. This can be detrimental to international investment.

3.8 Conclusions

This chapter highlights differences in the understanding of the true or full meaning of the word inflation and different approaches to its measurement. Inflation is associated with the introduction of money into an economy in as much as it can take the form of debasing the currency by reducing the content of precious metal coins, devaluing the exchange rate or increasing liquidity in the economy without a commensurate increase in the production of goods and services for consumption.

[38] CPIX was 6,3 per cent in April 2007.

Despite the possible shortcomings in measuring inflation in terms of changes in the CPI highlighted in this chapter, this study broadly follows the approach suggested by Mishkin (2004) and by Van der Walt (1985) when considering inflation and the credibility of published inflation figures in South Africa: a rise in the general price level as measured in terms of changes in the CPI, although it should be borne in mind that it is not a true cost-of-living index.

The general conclusions to be drawn from this chapter are that:

- average price changes are often overstated, rather than understated;
- the use of different price indices (e.g. Laspeyres or Paasche) will result in differences in the measurement of price changes;
- regular revisions of the composition (weights) of the index used for measuring price levels are required to ensure that it continues to reflect average spending patterns of consumers;
- calculated rates of inflation should not be compared between countries without the necessary circumspection, as country-specific issues such as the treatment of owner-occupied housing costs in the index used to measure changes in price levels might distort comparisons;
- the consumption basket is fictitious in as much as it provides for purchasing preferences of an average household, which can hardly exist; and
- any statistical errors in the calculation of inflation should be subject to public scrutiny when rectified.

The composition of the index used to measure price levels, and therefore also price changes and inflation, should be updated periodically in an attempt to ensure accurate measurement of domestic price levels. The manual published by the International Labour Organization serves as international best practice for this purpose. However, country-specific issues, particularly in respect of owner-occupied housing, lead to differences in the composition of indices used to measure price increases. Countries should consider increased harmonisation of their indices used for measuring inflation with the published international guidelines. Harmonisation will enhance comparability of inflation figures between countries, which might eventually enhance world-wide credibility of inflation figures. In addition, it will contribute to economic development in as

much as international consistency in inflation measurement will help with the leveling of the playing field between developed and developing economies in the quest of the latter for international investment.

A number of factors contributed to a moderate acceleration of inflation internationally and in South Africa since World War II, and particularly during the 1960s and 1970s. This acceleration differed from previous experiences with inflation where price stability had again been achieved within a reasonable period of time, as rising prices became a permanent feature, rather than a temporary aberration. In the 1980s developed economies achieved success in containing inflation, but South Africa and other developing countries did not achieve the same success. South Africa achieved success in containing inflation only during the 1990s, after the introduction of a renewed focus on containing inflation in 1989, while some developing countries still suffer relatively high rates of inflation (see for instance Coorey et al., 2007; or Mokoena et al., 2004).

Developing countries should use resources to ensure that their rates of inflation remain an accurate indicator of price increases. Inaccurate measurement of inflation may result in the adoption of inappropriate macroeconomic and monetary policies. Developing countries accordingly stand to gain from initiatives to standardise the measurement and international comparison of inflation.