THE CONSTRUCTION OF A PRICE INDEX FOR SOUTH AFRICAN MEDICAL SCHEME CONTRIBUTIONS

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ABSTRACT
Concerns about the affordability of medical scheme cover play a central role in the motivation for the introduction of National Health Insurance in South Africa. An accurate measure of the change in the price of medical scheme cover over time is necessary to inform health and social security policy, and would provide consumers, employers and the regulator with a useful benchmark. A Medical Scheme Contribution Index is constructed using the Paasche formula and a sample of open medical schemes for the period 2006 to 2010. The results of the index indicate a 17.48% increase in real contributions over the period.

KEYWORDS
South Africa, medical schemes, price index

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1. INTRODUCTION

In the 2008/9 fiscal year, health sector expenditure in South Africa made up 8.9% of GDP (Day & Gray, 2010). Most (58.4%) of this expenditure occurred in the private sector (Day & Gray, 2010), where medical schemes act as the primary financing intermediaries by collecting contributions, pooling these contributions and purchasing medical goods and services. As at 31 December 2009 there were approximately 8.0 million beneficiaries covered by medical schemes, representing 16.25% of the population (Council for Medical Schemes, 2010; Statistics South Africa, 2009b, 2010).

Medical schemes are tax-exempt, not-for-profit entities owned by their members. Members of medical schemes pay monthly contributions to the scheme, on their own behalf as well as on behalf of their dependants. Medical schemes are regulated by the Council for Medical Schemes (CMS) under the Medical Schemes Act 131 of 1998 and are subject to ‘community rating’ (where contributions are allowed to vary only by family size, family structure, in terms of adult and child dependants, and income and not by risk factors such as age and health status), resulting in relatively simple contribution tables.

The gross contributions received by medical schemes (i.e. both risk and savings contributions and inclusive of loadings for non-healthcare costs such as administration), totalled R84.9 billion in 2009 (Council for Medical Schemes, 2010). Medical scheme contributions form part of the consumer price index published by Statistics South Africa as part of the subcategory “Miscellaneous Goods and Services/Insurance/Insurance connected with health”. This subcategory has a weight of 3.68% in the Headline CPI and is calculated based on the unweighted average contributions of a sample of five medical schemes in South Africa (Kelly, 2009).

The affordability of medical scheme cover has been the focus of long-standing debate. Medical scheme coverage is unaffordable for the vast majority of South Africa (Eighty20, 2009) and the rising cost of cover has been put forward in numerous forums as part of the motivation for the introduction of National Health Insurance (McIntyre, 2010).

There is, however, no widely accepted methodology for tracking medical scheme contribution increases. This research considers the issues affecting the construction of a price index and proposes a method for constructing an index to monitor the changes in the gross price of medical scheme cover. Application of the method is demonstrated through the construction of a contribution index for a sample of medical schemes based on historical data (for the time period 2006 to 2010).

Consumers and employers have a direct interest in the changes in the price of medical scheme coverage, and a published price index would be a useful comparative tool. Employers may subsidise the medical scheme contributions of employees and would have an interest in the trends in remuneration costs, particularly their post-retirement liability. The CMS currently approves annual medical scheme contribution increases and would benefit from an accurate and representative benchmark. A major function of the CMS is to protect the interests of members of medical schemes (CMS,
The CMS could use this index as a high-level tool to monitor the affordability of coverage in South Africa, as could labour unions in the wage negotiation process. As medical scheme contributions are partially tax-deductible, National Treasury and the South African Revenue Service are also likely to be interested in the price of medical scheme cover over time.

South Africa is in the process of moving towards a system of National Health Insurance (NHI) and the future of medical schemes in this new paradigm is unclear (Republic of South Africa, 2011). The proposed index methodology would need to be revised to reflect the contributions to the funding entity or entities that may replace the current medical scheme structures. However, the current proposals envisage a 14-year implementation period for NHI implying the continued existence of medical schemes for some time to come.

We begin, in Section 2, by outlining the relevant index methodology literature and the current methodology used by Statistics South Africa. In Section 3 we outline the data sources we used. In Section 4 we describe the methodological choices that we made in defining the price of medical scheme cover, constructing the basket and choosing an index formula. In Section 5 we present our results, compare the results to other relevant price indices and illustrate the sensitivity of the results to the assumptions made. In the final section we discuss the implications of the research and highlight areas for further work.

2. BACKGROUND

Index numbers are single numbers used to summarise key features of a set of variables. A price index is an index number that reflects the relative price levels over time, and can be used to separate a change in total expenditure into price changes and quantity changes (ILO et al., 2004).

The key methodological issues to be considered in the construction of a price index include the determination of the basket of goods, the measurement of prices, the aggregation of these prices, the time span the index should cover and the intervals at which it should be calculated. It is desirable that a price index be accurate, simple and intelligible; the accuracy of an index depends on the choice of formula, the sample size, the sampling methodology and the quality of the original data (Fisher, 1927).

There are practical constraints on index construction, primarily relating to data availability, collection and processing. Constructing a medical scheme contribution index is complicated by the large number of medical scheme options available and changes in the market: there are new options being introduced on an ongoing basis as well as changes being made to existing options (Boskin et al., 1998). This complexity is offset by infrequent price changes. Although medical scheme membership is on a month-to-month basis price changes require regulatory approval and thus typically only occur once a year.

Index numbers are assigned a value of one or 100 at a base date and all price changes are expressed relative to this reference period (denoted period 0). A price
index can be calculated as the percentage change in the value of an aggregate, holding the quantities constant (ILO et al., 2004).

Alternatively, a price index can also be calculated by calculating price changes for each item in the basket of goods and averaging them; the items are then weighted according to the proportion of total expenditure they represent (ILO et al., 2004). The price movements are referred to as price relatives: the ratio of the price of a single item at a second point in time to the price of the same item at an earlier point in time (ILO et al., 2004). The two approaches are mathematically identical if the same assumptions are made. The price relative approach is particularly useful where various sub-indices are required or where the effect of a change in one constituent needs to be analysed (Crowe, 1965). Further discussion is confined to this approach.

Either way, a price index is simply a weighted average. The choices of possible formulae thus depend on the method of averaging (for example, geometric averaging) and the possible choices of weights. Due to the forces of supply and demand (amongst other factors) the pattern of relative quantities of goods and services consumed changes over time. There is thus more than one possibility for the choice of weights for a price index, ranging from the pattern of consumption pre-dating the period of comparison to the pattern of consumption at the end of the period of comparison.

The Lowe formula, denoted here a \( P_{Lo} \), is a standard fixed basket formula where the weights are drawn from period \( b \). There are two special forms of the Lowe formula that are discussed extensively in the literature: the Laspeyres formula, denoted here as \( P_L \) (Laspeyres, 1871, as cited in ILO et al., 2004), where the period from which weights are drawn (\( b \)) is the same as the reference period (0) and the Paasche formula, denoted here as \( P_P \) (Paasche, 1874, as cited in ILO et al., 2004) where \( b=t \) and \( t \) is the current time period. The price relative formulae are seen below. The generic Lowe formula in price relative form can be seen in Equation 1; the Laspeyres formula in Equation 2; and the Paasche formula in Equation 3.

\[
P_{Lo} = \sum_{i=1}^{a} \left( \frac{p_{li}^t}{p_{li}^0} \right) \cdot s_{li}^{0b} \tag{1}
\]

\[
P_L = \sum_{i=1}^{a} \left( \frac{p_{li}^t}{p_{li}^0} \right) \cdot s_{li}^{00} \tag{2}
\]

\[
P_P = \left\{ \sum_{i=1}^{a} \left( \frac{p_{li}^t}{p_{li}^0} \right)^{-1} \cdot s_{li}^{00} \right\}^{-1} \tag{3}
\]

where

- \( t \) is the current time period
- \( p_{li}^x \) is the price of item \( i \) in time period \( x \) and
- \( q_{li}^x \) is the quantity of item \( i \) in time period \( x \).
And where the expenditure share takes the following form:

\[ s_i^{obs} = \frac{p_i^ob q_i^b}{\sum_{i=1}^{n} p_i^ob q_i^b} \]

The Laspeyres index assumes a “rigid quantitative pattern of consumption” (Marris, 1958, p.244) in that it does not allow for shifts in supply and demand in response to price increases. The Laspeyres index tends to overstate the overall increase in prices because consumers tend to substitute items that have had lower price increases for those that have had higher price increases. This substitution bias is often referred to as the Laspeyres bias. The extent of the bias will depend on the price elasticity of demand and the extent to which substitutes are available. In this situation the Paasche index will understate the overall increase in price as the weights will reflect the shift towards the items that experienced the lowest price increases. It exaggerates the effect of savings that can be generated through substitution.

The relationship between Paasche and Laspeyres depends on the relationship between price and quantity movements, which are affected by the demand effects described above as well as supply-side effects. Large differences between the Laspeyres and Paasche price index numbers will arise if the weights in the two time periods are significantly different and if there is a relationship between changes in price and changes in the quantities purchased (Marris, 1958). In such a situation there exists a further class of index formulae termed superlative formulae. A commonly used example is the Fisher formula which is the geometric average of the corresponding Laspeyres and Paasche values (Fisher, 1927).

The common use of the Laspeyres formula is largely driven by a lack of availability of current expenditure data. In addition, the idea of a constant set of weights preserves continuity (Newhouse, 2001). However, as consumer preferences and conditions change over time the items selected for the basket become less representative and the relative importance of items also changes (Newhouse, 2001). This necessitates updating the basket from time to time to avoid the index becoming irrelevant.

The large number of goods and services available, together with limitations on data availability, often make it necessary for a price index to be based on a representative sample of goods. The sampling methodology and sample size greatly affect the accuracy of the index and the choices made will influence whether the items in the basket are representative, relevant and reflect the primary purpose of the index (Crowe, 1965).

Due to the time-consuming and data-intensive nature of calculating a price index, purposive sampling is sometimes used. Purposive sampling is more cost-effective, particularly where “clusters” of data can be collected. For example, instead of sampling medical scheme options to estimate expenditure weights, data could be collected from a single medical scheme administrator that administers multiple medical schemes. Purposive sampling is problematic in that it introduces subjective factors which means that sampling error cannot be calculated (ILO et al., 2004).
The sampling methodology will affect the weighting structure of the index, in that weight data will only be available for sampled items. Fisher (1927) refers to the concept of double-weighting (calculating weights for individual items and for categories of items) as a means of ensuring accuracy. If only the individual items are weighted, some categories may be given more weight relative to other categories if expenditure on the sampled items is a higher proportion of expenditure for those categories. Statistics South Africa (Haglund, 2000) and the American Bureau of Labour Statistics (Boskin et al., 1998) make use of a hierarchical or pyramidal structure in the construction of their Consumer Price Index where weighting occurs on multiple levels.

At the lowest level of an index, elementary price indices are estimated, and are most often calculated without the use of explicit expenditure weights due to limitations on data availability (ILO et al., 2004). The lack of weighting means that simple averages are used. As with the higher level formulae, elementary price indices can be in aggregate form or price relative form. The three options are the Carli index (the simple arithmetic mean of price relatives), the Dutot index (the ratio of un-weighted arithmetic mean prices) and the Jevons index (the un-weighted geometric mean of price relatives) (ILO et al., 2004).

Elementary indices can be calculated either as direct or chain-linked indices (direct indices compare the current price with the price in the base period, whilst the chain indices compare the current price with that in the preceding period). It is computationally easier to deal with missing prices, replacement items and quality changes if chain-linked indices are used (ILO et al., 2004).

For goods and services where there exist differences between list prices and transaction prices a methodological decision needs to be made as to which to use. However, medical scheme prices are directly observable. The competitive nature of the market leads to prices being published in advanced and prices are typically published online as well as in scheme brochures. There is also no difference between list prices and transaction prices.

Ideally when an item included in a price index ceases to exist, a replacement product, responsible for a large proportion of the original item’s sales, should be sampled and introduced to the index (ILO et al., 2004). In the medical scheme industry the problem of item discontinuation is managed relatively easily since members of the original option are usually automatically defaulted onto a new or existing option (Joseph, 2006). The quality discrepancies between terminated items and replacement items is managed either subjectively by direct quality adjustments or avoided via the assumption of quality equivalence (Cutler et al., 1998).

The introduction of new medical scheme options is relatively infrequent. In other sectors of the market new goods often show atypical price development (Marris, 1958) and thus require sensitive treatment. There is no a priori reason to expect this in the medical scheme environment.

As an alternative approach to those described above, hedonic price analysis can also be implemented at the level of a medical scheme option. Here the dependent
variable would be the price of cover and the explanatory variables would be the attributes of the benefit option. This approach would require that factors such as the profile of people on the option be controlled for, and it requires an understanding of how consumers select benefit plans, including issues of moral hazard, anti-selection and employer decision-making. This approach assumes that consumers make efficient choices. However, inefficiencies may arise in the medical scheme market because consumers are not fully aware of the good they are purchasing (Berndt et al., 2000).

Statistics South Africa follows the methodological guidelines in the International Labour Organisation (ILO) manual when compiling the South African CPI. The current South African CPI weights are largely based on the 2005/6 Income and Expenditure survey (IES) which was released in March 2008. The survey ran from September 2005 to August 2006, allowing for a 12-month period in which seasonal expenditure patterns were identified. Statistics South Africa uses a sampling methodology for items to include in the basket based on a combination of expenditure and frequency, the intention being to exclude very high-cost, low-frequency items (luxury goods) and also to exclude very high-frequency, low-cost items (Statistics South Africa, 2009c).

Weights represent the proportions of total consumption expenditure of households, and are updated every five years (Statistics South Africa, 2009c). Prices are updated on a monthly, quarterly or annual basis with a Jevons index being used for the elementary aggregates and a Young index being used for higher-level aggregation (Statistics South Africa, 2009c). The index is published monthly.

3. DATA
Schemes publish their contributions on an annual basis. The majority of options use contribution tables that differentiate contributions between the principal member, adult dependants and child dependants (so-called PAC tables). There are still some schemes that utilise contribution tables based on family size (family size tables).

Medical scheme contribution tables are available both from the registered scheme rules and from scheme marketing material (either available in hard copy or electronically from the internet). Where the two data sources contradict one another preference is given to the registered scheme rules. In some instances, scheme administrators had to be contacted directly to obtain the necessary marketing material. Data were collected for a five year period from 2006 to 2010.

The CMS publishes annual lagged beneficiary data for each option including the total number of beneficiaries and principal members as at 31 December of each year. The CMS also collects more detailed beneficiary data by beneficiary type and income band. However, these data are not published.

The construction of an accurate Medical Scheme Contribution Index (MSCI) is impeded by the practical difficulties associated with accessing detailed data on the numbers of principal members, adult dependants and child dependants in each medical scheme option. Although these data are collected and stored by individual
medical schemes (via their administrators), they are not made publicly available. We were fortunate to obtain these data for 2009 from the regulator.

We were not able to obtain detailed data relating to the income distribution of medical scheme members per option. In the absence of such data there is no accurate way to allow for variation in income distributions between options and schemes. Instead, data were drawn from the 2009 General Household Survey (GHS) to estimate an industry-wide income distribution. The GHS is an annual survey conducted by Statistics South Africa designed to measure the living conditions of South Africans.

The definition of income used in the GHS is total salary inclusive of bonuses and overtime, and before tax and any deductions (Statistics South Africa, 2009a). The CMS definition of income is broadly consistent (Khanyile, 2010). From the GHS data it is possible to identify respondents that belong to a medical scheme. It is, however, not possible to identify which respondents are principal members and not dependants. The assumption was made that only the respondents identified as being the “head of household” were principal members. Based on earlier GHS data it was found that on average the head of household is the highest income earner in a household (Moodley, 2008). The possibility exists that the principal member is not the head of household, and is not the highest income earner in the household. We may thus expect this assumption to result in a potential overstating of the incomes of medical scheme members.

Quarterly Earnings Statistics published by Statistics South Africa were used to adjust the 2009 income distribution estimated from the GHS data for the other years included in the index.

4. METHODOLOGY

A price index of medical scheme contributions would reflect the rate of change in the price of medical scheme cover as acquired by the individual consumer. The total price of cover may not be paid by the consumer alone, but may be subsidised by their employer, government or another third party. This definition of the index is not entirely consistent with definition of a consumer price index which measures changes in consumer purchasing power and is thus based only on consumer out-of-pocket expenditure. By definition it excludes all payments by government as well as employer subsidisation of health care (Berndt et al., 2000; Newhouse, 2001). The approach taken here is supported by Cutler et al. (1998), who argue that the consumer ultimately bears the full cost of health care via out-of-pocket payments, higher individual premiums, lower wages or increased taxes, and in this way changes in the price of health insurance (or medical schemes in the South African context) impact on consumer purchasing power.

There are three types of medical schemes in South Africa: schemes which allow public membership (open schemes), schemes which limit membership to pre-defined groups of people (restricted membership schemes) and bargaining council schemes. The Medical Scheme Contribution Index (MSCI) constructed is based on
the contributions of open schemes as it is only the options offered by these entities that consumers can choose between.

Medical scheme contributions are made up of risk contributions and savings account contributions. The risk contributions purchase the member (and his or her beneficiaries) insurance cover as part of a risk pool. They include loadings for non-medical expenditure (e.g. administration and broker commission). Savings contributions accrue in their entirety to a personal savings account for each member (i.e. there is no risk pooling). Any unused amount in a medical savings account at the end of a year can be rolled over to the following year, unlike risk benefits which are forfeited if not used.

The 2005 directive prohibiting variable day-to-day benefits also stopped schemes from offering variable medical savings accounts (Council for Medical Schemes, 2006a), thereby reducing the flexibility and consumer appeal of medical savings accounts. The MSCI is based on gross medical scheme contributions, inclusive of both risk and savings account contributions, as savings account contributions are no longer discretionary.

The index reference period used to construct the index was 2006. The introduction of the 2005 directive made comparisons between 2005 and 2006 gross contributions difficult as the 2005 contributions had a discretionary component which varied between members. The index was calculated annually because medical scheme prices typically increase only on 1 January of each year.

Due to the practical considerations associated with collecting historical medical scheme price information it was necessary to work with a sample and not the entire industry. The basket of goods and services for the MSCI would comprise a number of medical scheme options, because medical scheme contributions vary at an option level. Ideally, sampling should thus occur at a medical scheme option level. There are, however, a number of reasons to sample schemes and include in the basket all the options offered by each scheme in the sample. If data are to be obtained from schemes directly it makes sense to sample at the scheme level in order to facilitate data collection, as doing so reduces costs and increases the speed of data collection. Sampling at the scheme level also allows for easier substitution of discontinued options, and the introduction of new options into the basket. The disadvantage of sampling at scheme level is that for the same number of options there will be fewer schemes included in the index.

Schemes were sampled on a proportional basis, based on the number of beneficiaries covered as at 31 December 2006. Proportional sampling allows the sample size to be reduced substantially whilst still covering a large proportion of total beneficiaries. The size of the sample was influenced by the time and resources available for data collection. The list of schemes identified was cross-checked against beneficiary numbers as at 31 December 2009 and schemes that were no longer in existence were excluded from the sample (Munimed & Global Health). Resolution Health was also excluded as we had difficulty obtaining historical contribution data. The resultant sample was made up of 15 medical schemes.
Table 1 Coverage of sample

<table>
<thead>
<tr>
<th></th>
<th>31 December 2006</th>
<th>31 December 2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportion of registered open medical schemes</td>
<td>37%</td>
<td>45%</td>
</tr>
<tr>
<td>Proportion of beneficiaries in open medical schemes</td>
<td>88%</td>
<td>92%</td>
</tr>
<tr>
<td>Number of options represented in index</td>
<td>93</td>
<td>85</td>
</tr>
<tr>
<td>Number of options with income bands</td>
<td>27</td>
<td>27</td>
</tr>
</tbody>
</table>

From time to time the schemes included in the basket will need to be updated in order to allow for new schemes, new options, schemes that have been liquidated and shifts in market share over time. It is recommended that this be done on a five-year cycle, although in times of industry change and consolidation it may be necessary to do so more often. This would entail updating the base year and chain linking the indices.

A Paasche formula was used to construct the MSCI. This allows for the index to be calculated on a one-year lagged basis (due to the lag in beneficiary data availability). The Paasche index is preferable to the Laspeyres index because it takes account of the large potential shifts in the number of beneficiaries that can occur from year to year. The formula takes the following form:

\[
P_{qm} = \left \{ \sum_j \sum_i \left( \frac{p_{ij}^t}{p_{ij}^0} \right)^{-1} \cdot s_{ij}^a \right \}^{-1}
\]

where

\[
p_{ij}^t = m \cdot p_{ijk_m}^t + a \cdot p_{ijk_a}^t + c \cdot p_{ijk_c}^t
\]

\[
s_{ij}^a = \frac{p_{ij}^t \times n_{ij}^t}{\sum_y p_{ij}^y \times n_{ij}^y}
\]

- \( t \) is the year for which the index value is being calculated
- \( q \) is medical scheme with options \( j \) and income bands \( i \)
- \( k \) is beneficiary type (with values \( k_m, k_a, k_c \))
- \( m \) is the proportion of beneficiaries that are principal members
- \( a \) is the proportion of beneficiaries that are adult dependants
- \( c \) is the proportion of beneficiaries that are child dependants
- \( n \) is the number of beneficiaries
- \( p \) is the gross medical scheme contribution per beneficiary

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\( a \) is the proportion of beneficiaries that are adult dependants
\( c \) is the proportion of beneficiaries that are child dependants
\( n \) is the number of beneficiaries
\( p \) is the gross medical scheme contribution per beneficiary
The problem of option discontinuation is dealt with relatively easily since members of the original option are usually automatically defaulted onto a new or existing option (Joseph, 2006). In cases where an option was discontinued in one year and then reintroduced in the following year and cases where contribution data were missing the contributions for the missing year were imputed. The imputed price was calculated as the midpoint between the prices in adjacent periods.

In cases where members were not defaulted onto an obvious alternative option, the discontinued option was excluded from the sample. This was possible because of the retrospective calculation of the index. If the index is to be calculated on an ongoing basis discontinued options will all need to be dealt with explicitly.

Schemes that make use of income bands typically adjust the level of income bands from year to year in order to maintain the real value of the bands. The number of income bands may also be adjusted over time. Both these types of adjustments are individually determined by schemes and thus may vary considerably. The use of the Paasche formulation allows for the matching of price and quantity data per income band in calculating expenditure shares. Both values relate to time period \( t \) and thus no adjustments need to be made to ensure correspondence between the values.

With the exception of 2010, the number of beneficiaries in each year was calculated as the average of the number of beneficiaries as at 31 December of the previous year and the number of beneficiaries as at 31 December in that year. This assumes that changes in beneficiaries are uniform over the year, and allows for changes in beneficiaries that occur at the beginning of the year as well as changes occurring over the course of the year. The beneficiary data for 31 December 2010 was not available at the time of writing. The 2010 weights were thus based on beneficiary numbers as at 31 December 2009.

The price relative for each option is based on the average contribution per beneficiary on that option. We thus needed to estimate the number of beneficiaries in each combination of beneficiary type and income band in each year. As we were only able to obtain the detailed beneficiary-type (principal, adult, child) split per option for 2009 we assumed that this split remained constant over the period. The dependant ratio for each option was also assumed to be constant across income bands. The proportion of principal members in each income band was estimated from the income distribution derived from the 2009 GHS data, inflated and deflated appropriately.

There were two scheme mergers that occurred on 1 January 2010 (Medicover merged with Liberty, and Bestmed merged with Telemed). From scheme marketing material for 2010 we were able to ascertain the new option structure available to members post-merger. We however needed to make assumptions regarding the movement of members from the old option structure to the new option structure. These assumptions were based on communications with the new merged entities (personal communication, telephone, March 2010). A further scheme merger took place on 1 October 2010 between Oxygen and Medshield. This merger did not affect the MSCI calculated for this paper but will affect subsequent calculations.
5. RESULTS
The Medical Scheme Contribution Index is illustrated in Figure 1. Medical scheme contributions rose by an average 10.84% per annum over the period. The highest annual increase in nominal terms was from 2008 to 2009. However, in real terms the highest annual increase was from 2009 to 2010 when real contributions increased by 6.94%. Real contributions increased by 17.48% over the period.

Statistics South Africa does not publish a sub-index that reflects only medical scheme contributions. The sub-index for “Miscellaneous Goods and Services”, of which medical scheme contributions are a part, is shown in Figure 1 and is consistently lower than the MSCI.

The CMS receives rule amendment submissions from all registered schemes annually. The CMS require that any proposed increase that exceeds CPI plus three per cent be accompanied by a brief motivation (Council for Medical Schemes, 2009). This benchmark forms an upper limit below which the CMS aims to maintain annual contribution increases. It can be seen in Figure 1 that the MSCI exceeds this benchmark.

The MSCI figures were compared with average gross contribution increases for open schemes published by the CMS in their annual reports (Table 2). The CMS do not make use of an index methodology and increases are based on average contributions

![Figure 1](image.png)

**Figure 1** Comparison of MSCI with CPI, CPI+3% and CPI sub-category Miscellaneous Goods and Services
collected by schemes in each year. The figures were not consistently higher or lower, but did differ in all but one year.

**Table 2** Comparison of annual increase in MSCI with figures published by the CMS

<table>
<thead>
<tr>
<th>Year</th>
<th>CMS</th>
<th>MSCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006-2007</td>
<td>8.1%</td>
<td>9.7%</td>
</tr>
<tr>
<td>2007-2008</td>
<td>9.9%</td>
<td>9.9%</td>
</tr>
<tr>
<td>2008-2009</td>
<td>13.3%</td>
<td>12.3%</td>
</tr>
<tr>
<td>2009-2010</td>
<td>14.3%</td>
<td>11.4%</td>
</tr>
</tbody>
</table>


The assumptions underlying the MSCI were sensitivity tested. We tested the sensitivity to the split of principal members, adult dependants and child dependants by using an average for the industry (as opposed to the option-specific data obtained from the CMS). We also tested the sensitivity to the assumed income distribution by replacing the income distribution derived from the GHS with an assumption that members were uniformly distributed across income bands. The results were found to be very stable.

**Table 3** Results of sensitivity testing

<table>
<thead>
<tr>
<th>Year</th>
<th>Industry Index</th>
<th>Using average PAC split</th>
<th>Using uniform income distribution</th>
<th>Using average PAC split and uniform income distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>1.0000</td>
<td>1.0000</td>
<td>1.0000</td>
<td>1.0000</td>
</tr>
<tr>
<td>2007</td>
<td>1.0973</td>
<td>1.0919</td>
<td>1.0966</td>
<td>1.0913</td>
</tr>
<tr>
<td>2008</td>
<td>1.2059</td>
<td>1.2050</td>
<td>1.2056</td>
<td>1.2049</td>
</tr>
<tr>
<td>2009</td>
<td>1.3546</td>
<td>1.3583</td>
<td>1.3543</td>
<td>1.3581</td>
</tr>
<tr>
<td>2010</td>
<td>1.5095</td>
<td>1.5069</td>
<td>1.5092</td>
<td>1.5067</td>
</tr>
</tbody>
</table>

5. DISCUSSION

The methodology described here does not explicitly account for changes in the extent of the coverage provided and thus provides no insight into the value for money provided by medical schemes. The results produce indicate that the real cost of cover has increased over time. Whilst this may be due to an increase in the benefits provided, the impact on affordability of cover remains a concern.

The accuracy of the index values calculated can be improved by increasing the sample size and by obtaining more accurate beneficiary data directly from schemes. In the absence of accurate member income data from schemes, the estimates of the income distribution of principal members could be improved by utilising GHS data.
from other survey years. However, the index does not appear to be highly sensitive to this assumption. The index constructed here is based on open medical schemes. However, it may be desirable from a regulatory perspective to calculate separate indices for restricted membership schemes and bargaining councils as well as an index that is representative of the entire medical scheme industry.

Differences arise between the changes in the price of medical scheme cover, as experienced by the consumer, and the changes in the prices of goods and services experienced by medical schemes. This is because medical scheme contributions are affected by factors other than the price of the goods and services they purchase, which include changes in the benefits offered, changes in the consumption of medical goods and services, changes in quality of care, changes in beneficiary demographics, and changes in solvency margins (Berndt et al., 2000; Da Silva, 2007). Further work is required to analyse the factors behind increasing contributions. Actuaries are well placed to do this sort of work and should ensure appropriate use of index construction methodologies when doing so.

Figures on rising real medical scheme contributions are typically drawn from the annual reports published by the CMS and mask movement between schemes and between options and consequently the results obtained here differ from the figures published by the CMS. An accurate index is an important tool for isolating changes in the price of cover. The CMS is best placed to collect the necessary data and to publish an accurate medical scheme contribution index. This would improve their ability to oversee the annual benefit and price changes submitted by schemes, to engage with underlying price drivers and to inform changes in the health policy environment.
REFERENCES


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