Maintaining a balance: The impacts of ageing on the age cross-subsidy in medical scheme contributions

By L Wayburne and E Bradley

Presented at the Actuarial Society of South Africa's 2013 Convention
31 October–1 November 2013, Sandton Convention Centre

ABSTRACT

In an environment of open enrolment without mandatory cover and community rating without risk equalisation, medical schemes are exposed to the risk of a change in membership profile. An older membership tends to exhibit higher claim costs (all else equal), thus these schemes are likely to require higher contributions to cover claims. In an analysis of a sample of industry data, the paper quantifies the age cross-subsidy in contributions. The cross-over age between claims and contributions was found to be around 60 years, differing by scheme and option type. The average cost increase due to one year of ageing was found to approximately 1.9% and lowest on traditional plans. The cost impact has historically been offset in large parts by benefit option buy-ups. However, going forward, cost pressures may limit this. The paper also shows the long-term cost of medical scheme benefits based on changes in the underlying membership profile, revealing the importance of attracting and retaining younger members. These results differ by individual scheme where exposure to an older age profile impacts the sustainability of the scheme and is a catalyst for the current consolidation of the medical scheme risk pool.

KEYWORDS

Medical schemes; community rated contributions; age cross-subsidy; ageing; linear model

CONTACT DETAILS

Lara Wayburne, NMG Consultants and Actuaries, NMG House, 411 Main Avenue, Randburg.
Tel: +27(0)11 509 3217, Email: lwayburne@nmg.co.za

1. INTRODUCTION

During the period of deregulation before the implementation of the Medical Schemes Act (Act 131 of 1998) in 2000, medical schemes were able to restrict the number of older and sicker members entering the risk pool through contribution loadings, underwriting restrictions or exclusions and benefit design. This was done on the basis of statistical evidence that, on average, older members are higher claimers than younger members. This is in part because chronic illnesses are more prevalent at older ages and these generally require ongoing treatment and care, often with expensive medicines and procedures.

Since 2000, the medical schemes industry has operated on the basis of social solidarity principles of open enrolment, community rating of contributions and the compulsory provision of the prescribed minimum benefits. This structure enabled any individual to apply for medical scheme cover and be given access to cover at the same contribution for a specific set of benefits relative to other members. These pillars of the structure of the industry were implemented alongside specifically defined underwriting norms of general or condition-specific waiting periods and late joiner penalties. This has paved the way for a medical scheme environment in which the underlying age and health profile of the membership are key determinants of the overall contribution levels charged for the benefits available.

Community rated contributions are by definition an equal payment towards the overall claims and expense experience of a group of lives who are members of a benefit option. Section 24(e) of the Act states that "… medical scheme does not or will not unfairly discriminate directly or indirectly against any person on one or more arbitrary grounds including race, age, gender, marital status, ethnic or social origin, sexual orientation, pregnancy, disability and the state of health." The only allowance for age is through differentiation of contributions by principal member, adult dependent and child dependent. Contributions may also differ by income (introducing income subsidisation) but no other membership demographic or risk factors may be used to differentiate contributions. According to Section 33(2) of the Medical Schemes Act[1] each benefit option should be priced on a self-sufficient basis therefore requiring age and income cross-subsidies per benefit option to be sufficient to cover the costs of claims.

The consequence of a community rated contribution structure is that within a given risk pool, if there are no new entrants or exits (including births and deaths), the group ages by one year on average each year. On the basis that claim costs increase with age, all else equal, the cost of claims would be expected to increase in a corresponding manner. Therefore, in order for a scheme to maintain its contribution levels (for simplicity ignoring the impacts of inflation and other input pricing dynamics), it

1 Section 33(2) of the Medical Schemes Act outlines that "approval of benefit options will be subject to provision of prescribed benefits, self-supporting in terms of membership and financial performance, financially sound, the option should not jeopardise the financial soundness of any existing options within the medical scheme."

needs to balance the age profile of its membership. This includes balancing the entry of new members and exits of existing members such that the age profile does not get older. Where a medical scheme experiencing ageing of its membership (either through stagnation, young membership losses or attracting older beneficiaries), the scheme is at risk of higher claim costs which could impact its sustainability.

Previously recommended health reform mechanisms that were intended to be implemented following the introduction of the Medical Schemes Act in 2000 included mandatory medical scheme cover for the employed population[2] and the implementation of a risk equalisation fund. In the absence of these reform mechanisms, individual medical schemes, and by extension the industry overall, are directly exposed to the risk and cost impact of a shift in the underlying age profile of a scheme. Open medical schemes are directly exposed to a change in risk profile through older members joining the scheme and/or younger members exiting the scheme, which, under an open enrolment framework, is possible. A restricted scheme, on the other hand, draws its membership from the employer(s) that sponsor the scheme and therefore are exposed to a change in the age profile of the underlying employee base.

Where the shadow version of the risk equalisation fund[3] was structured to equalise the impact of varying risk profiles (based on age, chronic conditions) for a common set of benefits, the absence of this fund implies that schemes are exposed to competing on the basis of risk profile (amongst other factors) in order to keep their contributions at a reasonable level.

The medical scheme risk pool has recently shown little overall net positive growth over the past five years other than the growth of the Government Employees Medical Scheme ('GEMS'). The extent to which individual schemes have been able to achieve growth is mixed. The population of medical scheme beneficiaries grew by 3.8% annually from 2006 to 2011 including GEMS and shrunk by 0.3% annually excluding GEMS. With a number of restricted schemes having amalgamated into open schemes together with many employers opening up freedom of choice or a pre-determined selection of schemes for their employees, many of these members have moved into the open scheme risk pool. In tandem, restricted schemes are able to attract new members

2 The incorporation of mandatory cover would force younger, healthy members of the population to join a medical scheme, improving the medical scheme's risk pool. This would assist in offsetting the increase in the membership's annual average age increase. Dr Ayanda Ntsaluba, the previous Director General of Health, spoke about the health department's commitment to implementing mandatory contributions by those with the ability to pay during the Consultative Forum on Risk Equalisation on 10 July 2013. The intention was for mandatory cover to be introduced once the REF came into operation.

3 A Risk Equalisation Fund (REF), a key institutional element of Social Health Insurance, was required to ensure that everyone pays the same industry community rate for the common package of benefits, not the rate determined by the age and health profile of the medical scheme they have chosen to join. Extensive consultation between the Department of Health and the industry occurred from July 2003 onwards and the REF moved into a shadow period of operation from January 2005. In September 2011 the Registrar of Medical Schemes announced that the plans to implement REF were on hold and Circular 6 of 2012 indicated that the plan to implement REF was withdrawn but that CMS would continue to collect REF data from medical schemes, albeit at a reduced frequency.

depending on employer practices and to the extent that membership is compulsory or a preferred scheme amongst employees where choice is afforded. This puts pressure on the maintenance of the medical scheme risk pool age profile for both open and restricted schemes.

Circular 4 of 2013 published by the Council for Medical Schemes indicated that the average utilisation increase assumed by medical schemes for the pricing of 2013 claims was 2.8% (25th percentile: 1.5% and 75th percentile: 4.6%). This indicates that utilisation increases are significant drivers behind cost increases in the industry, and medical schemes' views of these utilisation increases vary significantly. Utilisation increases due to ageing are likely to be a significant component, the impact of which is often hard to establish. The impact of ageing may be masked by the impact of other cost-driving factors.

Within the above context, the researchers through their employer have gathered data from a number of medical schemes to investigate the extent of age cross-subsidies within existing contribution structures to quantifying the impact of ageing. We have investigated the shape of the claims curve against the contribution curve to estimate the cross-over age and the extent to which younger members are cross-subsidising older members. Our methodology includes the fitting of a linear model to allow for factors other than age impacting on claim costs so that we can analyse the influence of age on claims by standardising for the other factors. We then quantify the impact of an additional year of ageing on claims and contributions. The results highlight the possible exposure of schemes to the cost of ageing and the significance thereof.

The Actuarial Society of South Africa's Advisory Practice Note (APN) 303 advises considerations of changes in utilisation as a result of factors including, but not limited to, changes in disease profile and changes in demographic profile, such as average age. Therefore we believe that this research will assist schemes in quantifying this impact. In addition, we believe that medical schemes in South Africa would benefit from this research by being able to pre-empt the cost of ageing and manage it accordingly. It also highlights the importance of attracting and retaining young members into the medical scheme risk pool so that the industry can at least maintain the current age profile as the existing membership ages which will continue the cross-subsidisation of older and/or sicker members by younger and/or healthier members.

The structure of this paper is as follows. Section 2 commences with an analysis of the changes in the overall age profile across the medical schemes industry based on data published in the CMS annual reports. The paper then presents the data used for this analysis from the participating medical schemes and an overview of the methodology in Section 3. The linear modelling methodology and results are set out in Section 4, followed by the results of the ageing analysis presented in Section 5 which demonstrate the significance of age on claim costs and how this varies by type of option. Thereafter in Section 6, we show the long-term industry implications. This is followed by conclusions and recommendations in Section 7.

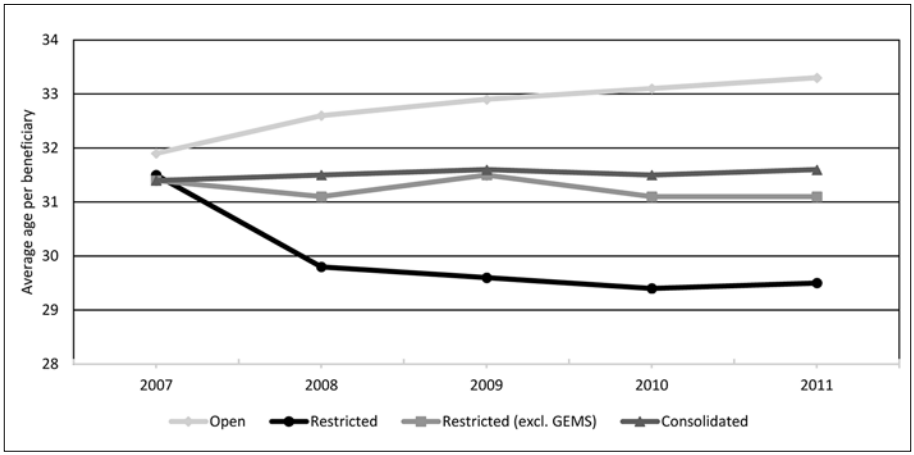
2. AGE TRENDS IN THE OVERALL MEDICAL SCHEME RISK POOL

Age information within the industry is mostly published at an average age level. Data from the Council for Medical Schemes Annual Reports shows that the consolidated market is showing little change in the age profile of beneficiaries. However, within the open and restricted markets, the age patterns are significantly different. The open scheme average age is increasing while the restricted scheme average age is decreasing. The latter is mostly attributable to the growth of GEMS which has attracted relatively younger members to the scheme. These members have come from both the open medical scheme environment and the uncovered population, with the impact being that the loss of these members could have been a factor increasing the average age in open schemes. Therefore, if GEMS is excluded, the average age of restricted scheme beneficiaries has been relatively flat. This implies that, overall excluding GEMS, the industry average age has increased marginally over the past 5 years.

Table 1 Average age per beneficiary (Council for Medical Schemes Annual Reports)

Average age per beneficiary	2007	2008	2009	2010	2011
Open schemes	31.9	32.6	32.9	33.1	33.3
Restricted schemes	31.5	29.8	29.6	29.4	29.5
Restricted schemes (excluding GEMS)	31.4	31.1	31.5	31.1	31.1
Consolidated	**31.4**	**31.5**	**31.6**	**31.5**	**31.6**

The average age per individual medical scheme can vary significantly. As an indication, in 2011 within the open scheme market the lowest average age was 27 and the highest was 44. The changes in average ages are summarised in the graph below:



Graph 1 Average age per beneficiary (Council for Medical Schemes Annual Reports, 2007–2011)

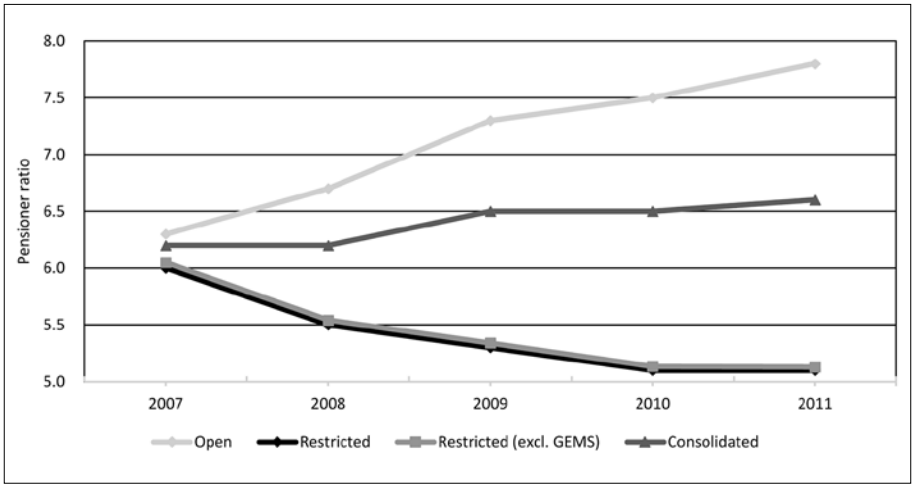
The extent to which the post-retirement subsidy of medical scheme contributions has affected the movement of members between open and restricted schemes is also of interest. With many employers reducing or eliminating subsidies, the active (pre-pensioner) population are more likely to seek cover in open medical schemes with the subsidised pensioner population remaining within the sponsored scheme, often a restricted scheme. The opposite could occur with pensioners not being covered and therefore seeking cover elsewhere. Based on the former, this could mean that restricted schemes are exposed to a higher average age (and pensioner ratio) compared to the latter scenario.

Similarly, the pensioner ratio for open schemes has increased while that of restricted schemes has decreased. This ratio has increased marginally for the consolidated medical scheme risk pool reflecting that the ageing in the population is not uniform across ages and that there is possibly more ageing at the older ages. This also suggests that the movement of members from restricted schemes to open schemes has been through the movement of older members on average.

Graph 2 reflects the marginal impact of GEMS on the industry pensioner ratio. This suggests that GEMS has a similar pensioner population proportion to other restricted schemes and members below the age of 65 years have younger average ages than those of other schemes.

Graphs 1 and 2 also illustrate that in the absence of younger members being attracted into the medical scheme risk pool, the membership is at risk of ageing, which is an extension of the current trajectory of changes to the average age and pensioner ratio indicators.

Schemes that have been able to grow their membership risk pool over the past five years have shown an increase in the average age of their beneficiaries from 31.35



Graph 2 Pensioner ratio (Council for Medical Schemes Annual Reports, 2007–2011)

to 33.59 years while shrinking schemes have shown an increased age from 31.25 to 34.12 years. This could indicate the movement of members from shrinking schemes to growing schemes. The movement in average age for these schemes and given that they are decreasing in size presents additional risk.

The following section presents the approach and methodology to analyse the age cross-subsidy in medical scheme contributions and quantify the impact of ageing.

3. OVERVIEW OF APPROACH AND METHODOLOGY

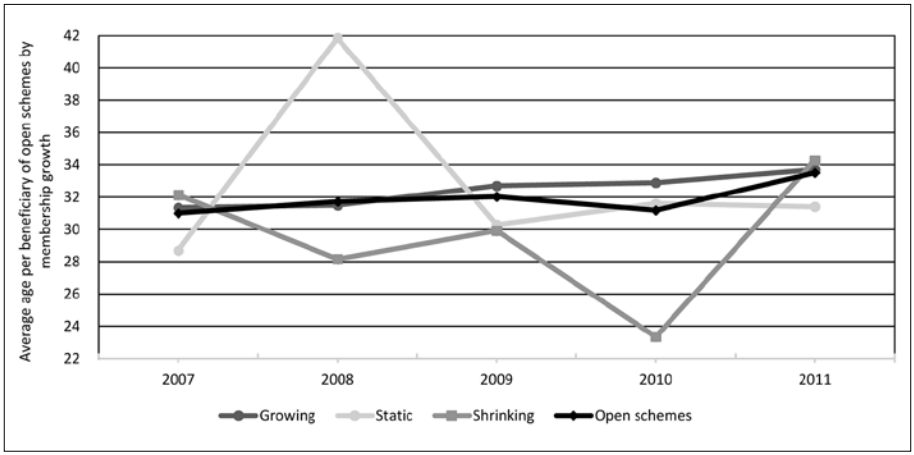
Data used for Analysis

Medical scheme claims, contributions and membership data were obtained for the years 2010 to 2012 from eight South African medical schemes. This included four open medical schemes and four restricted medical schemes. Only 2012 data was available for one of the schemes. The majority of the analysis has been done using 2012 information which therefore includes all participating scheme data. The analyses are exposure adjusted, therefore, a change in the sample size by year would not be expected to impact results. Where this has impacted any comparisons to 2010 or 2011 information this has been detailed.

The plans within the schemes were categorised as either new generation, traditional or hospital plans according to the following criteria:

— **New generation** Outpatient benefits are paid from a savings account
— **Traditional** Outpatient benefits are paid from a risk benefit
— **Hospital plan** No outpatient benefits are available.

Medical scheme members will choose plans according to their desired health care requirements. This is expected to be impacted by the demographic profile of members



Graph 3 Average age per beneficiary of open schemes based on membership growth experience (Council for Medical Schemes Annual Reports, 2007–2011)

(e.g. age). The demographic difference between plan types was therefore considered through categorising by plan types.

Threshold benefits did not form part of the categorisation of plan type. For example, where outpatient benefits were paid from a savings account, with threshold benefits payable from risk after exhausting the savings account, this was classified as a new generation plan.

Within the eight schemes, there were 36 plans analysed. These plans were comprised as shown in the table below.

Table 2 Number and type of benefit options analysed

Scheme type	Plan type			
	New generation	Traditional	Hospital	Total
Open	6	12	5	23
Restricted	3	8	2	13
Total	9	20	7	36

Membership Summaries

The table below provides a summary of the 2012 membership information for the plans analysed.

Table 3 Summary of 2012 membership information by plan type

Scheme type		Plan type			
		New generation	Traditional	Hospital	Total
Open	Number of beneficiaries	43,658	202,242	55,245	301,145
	Average age (years)	44.02	34.53	36.60	36.25
	Average family size	2.10	2.21	2.14	2.18
	Chronic prevalence	28.5%	20.6%	10.3%	19.8%
Restricted	Number of beneficiaries	49,040	157,809	36,281	243,129
	Average age (years)	42.87	44.99	34.47	42.95
	Average family size	2.00	2.00	2.52	2.06
	Chronic prevalence	51.4%	34.2%	16.6%	33.9%

A total of 544,274 beneficiaries were analysed in 2012. This represents approximately 6.5% of the total medical scheme membership pool.

The average age of open scheme beneficiaries was lower than restricted scheme beneficiaries by over six years. This was primarily due to an older group of restricted scheme beneficiaries on traditional plans. The traditional plan beneficiaries were younger than those on new generation and hospital plans within the open schemes.

The group considered is slightly older than the average beneficiary profile in

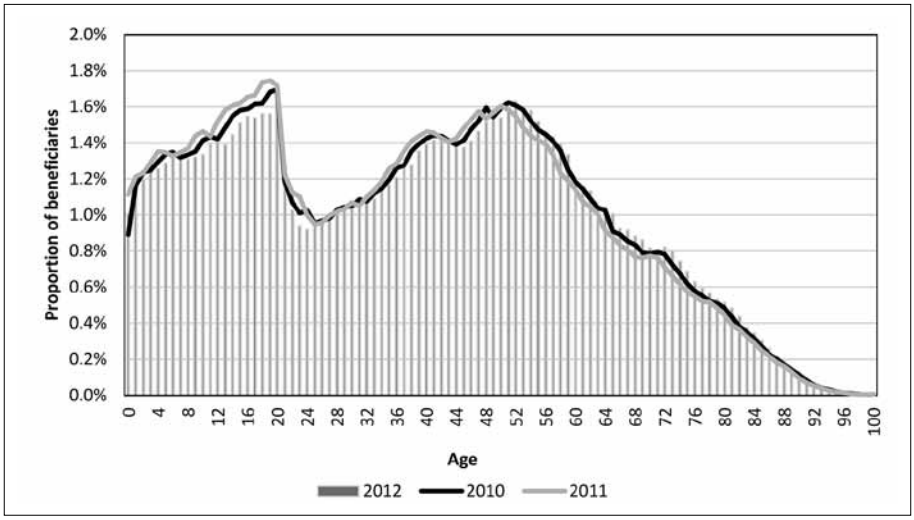
the medical scheme industry. The open scheme average age of 36.25 years compares to an average open scheme age of 33.3 years as at 31 December 2011 as reported by the Council for Medical Schemes. The restricted scheme average age of 42.95 years compares to an average restricted scheme age of 31.1 years excluding GEMS as at 31 December 2011.

The chronic prevalence for restricted schemes is seen to be consistently higher than open schemes. This is expected to be in part due to the higher average age of the restricted scheme beneficiaries. However, this is also the case where age is in line or lower. This may be due to restricted schemes providing more comprehensive benefits for chronic conditions including conditions that are not covered under the compulsory Chronic Disease List (CDL). This may also be due to more proactive managed care programmes and a bigger drive to register beneficiaries on chronic managed care programmes due to a more paternalistic attitude by restricted schemes.

Graph 4 shows the change in membership profile considered from 2010 to 2012, excluding the scheme for which only 2012 data was available. The membership profile by age has remained relatively stable. The shift in profile from 2010 to 2012 can be seen to be related to ageing of the population.

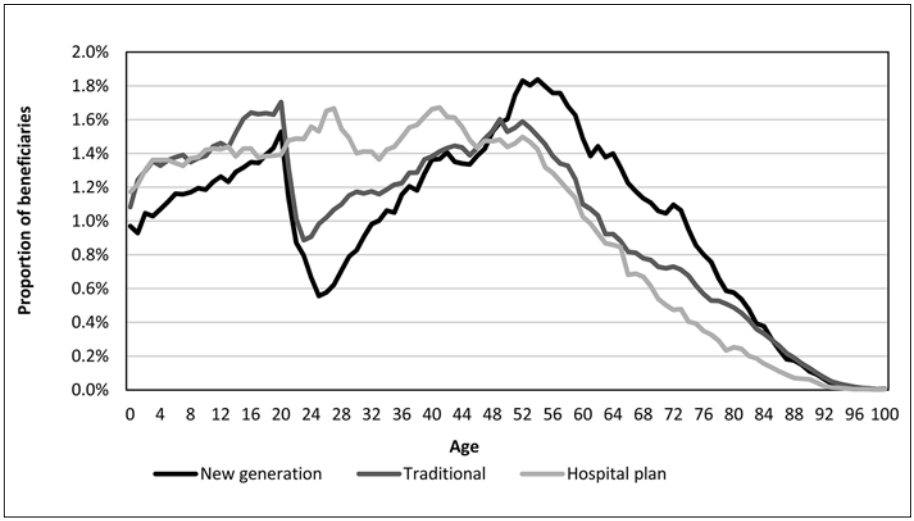
Graph 5 shows the membership profile by age of the beneficiaries considered for 2012, split by plan type.

The hospital option age graph does not exhibit the 'twin peaks' shapes of the new generation and traditional plans. The average age of hospital plan beneficiaries was lower than beneficiaries on the other plan types due to a larger proportion of young members between the ages of 21 and 40. There were a greater proportion above the age of 50 on new generation plans.

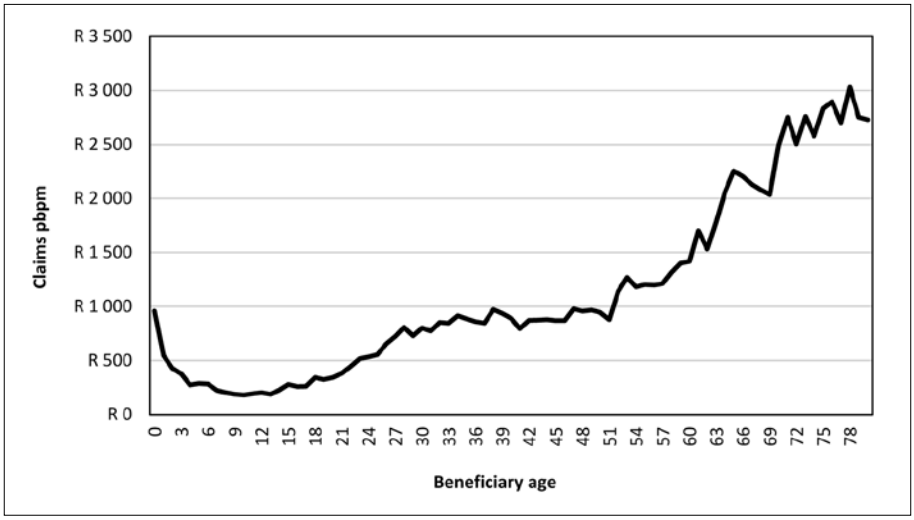


Graph 4 Age profile per year

The shape of the average membership curves by age has remained relatively unchanged since 2010 on the traditional and new generation plans, with the plan types ageing by approximately 1 year and 1.5 years respectively over the two year period. The hospital plan average age has decreased by approximately half a year due to a large group of younger beneficiaries not considered in 2010 and 2011.



Graph 5 Age profile per benefit option type (2012)



Graph 6 Claim cost by beneficiary age

Given the community rated structure of medical scheme contributions, schemes are exposed to a worsening risk profile. Age is seen to be a significant driver behind increased claims costs. In addition, chronicity is expected to drive additional costs due to chronic medication costs and additional costs related to a poorer health profile. Age and chronicity, together with increased chronic prevalence by age, play a significant role in increased costs.

Graph 6 shows the average costs per beneficiary per month ('pbpm') by age on a large open medical scheme for 2012.

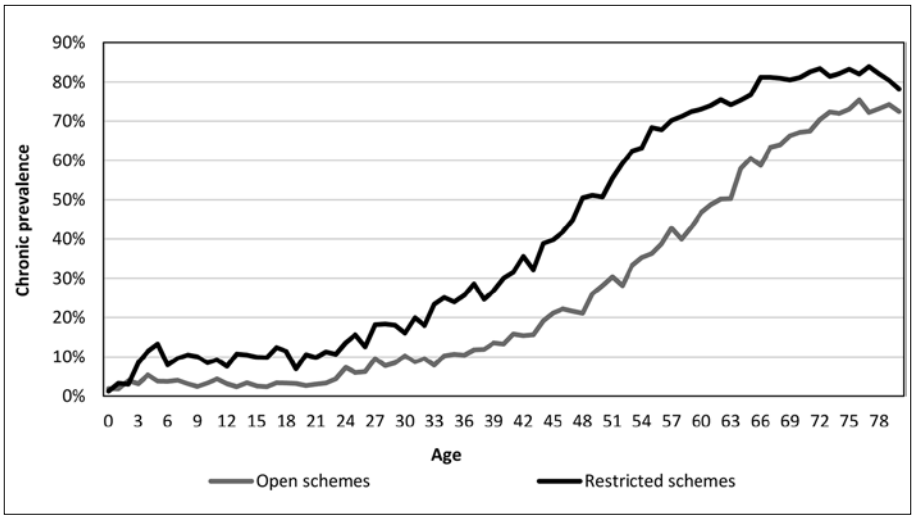
The significant degree to which age is seen to drive increased costs is justification for schemes to carefully monitor the age of their membership pool. The results in this report seek to provide a better understanding of the impact of the demographic profile of members (particularly age) on claims costs and the implications for medical schemes.

Chronic Prevalence versus Age

As outlined above, chronic prevalence is expected to be related to age and to increase with age. As a result, claims increases per year of ageing are expected to be related both to an ageing effect and an increased probability of suffering from a chronic condition.

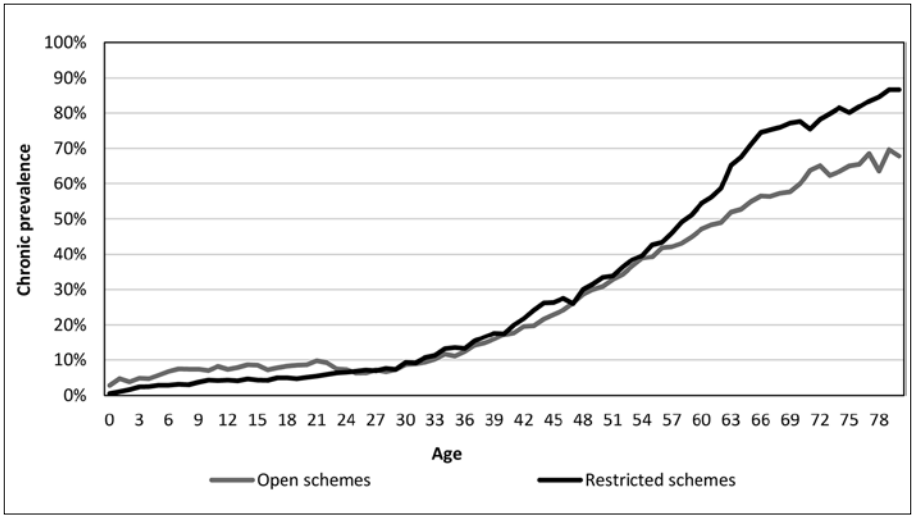
The relationship between age and chronic prevalence has been analysed for the membership pool considered. The graphs below show the average chronic prevalence by age for 2012 depending on scheme type and plan type.

The chronic prevalence is clearly seen to increase consistently by age. As detailed above, the chronic prevalence for restricted schemes was seen to be higher than open schemes, even when the impact of age is removed.

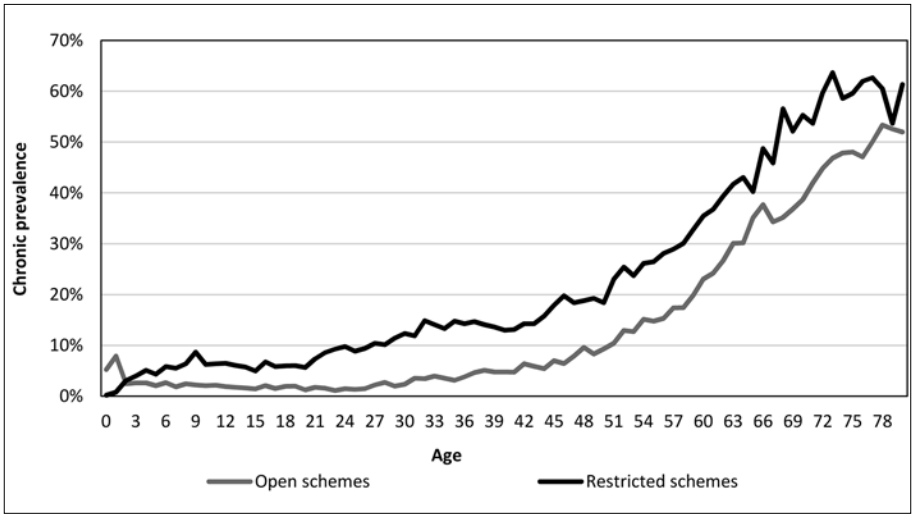


Graph 7 Chronic prevalence by age – new generation plans

The chronic prevalence of restricted scheme beneficiaries on traditional plans is lower than on new generation plans, and is similar to the open scheme chronic prevalence. The chronic prevalence on hospital plans is lower on average than on the other plan types by age. The prevalence peaks at 50% to 60% as opposed to 70% to 90%. Table 4 details the average chronic prevalence in 2012 by scheme type and plan type.



Graph 8 Chronic prevalence by age – traditional plans



Graph 9 Chronic prevalence by age – hospital plans

TABLE 4 Average chronic prevalence by scheme and plan type

Scheme type	New generation	Traditional	Hospital	Total
Restricted	51.4%	34.2%	16.6%	33.9%
Open	28.5%	20.6%	10.3%	19.8%
Total	**38.7%**	**26.5%**	**12.9%**	**25.8%**

The combined impact on costs of age and chronicity warrants considerations. This is analysed in more detail in Section 5 under the heading 'Impact of Chronicity in Conjunction with Age'.

4. LINEAR MODELLING

Methodology

Linear regression was used to obtain a linear formula for claims per beneficiary per month. This was performed per plan per year. Claims were grouped per period based on claims service dates rather than claims payment dates. There was no allowance made for incurred but not reported ('IBNR') claims as claims payment data was available to June 2013 and any IBNR claims for 2012 were deemed to be expected to be immaterial.

The following predictive variables were considered for the purposes of the linear claims formulae:

— Beneficiary age
— Chronic status ("Y" if the beneficiary was authorised to receive medication for a chronic condition)
— Tenure on scheme (less than one year, one to three years, greater than three years)
— Gender
— Beneficiary type (principal member, adult dependant, child dependant)
— Newborn indicator ("Yes" if the beneficiary age was zero)
— Province of residence
— Persal indicator ("Y" if the beneficiary was a state employee)
— Income band (in line with the income bands used for contribution differentiation).

The predictive variables were not all available in all cases. Beneficiary age, tenure, gender, beneficiary type and a newborn indicator were considered in all cases.

The cube of age was ultimately used rather than the integer age due to the improvement in the goodness of fit of the final models and the expectation that the rate of increase in claims costs by age was also expected to increase.

Each line of data used for performing a linear regression related to a month for which a beneficiary was active on the scheme plan. The line of data consisted of the beneficiary's claims for that month as well as all information available related to the predictive variables effective as at that month.

No adjustments were made related to varying claims seasonality during a year, as it was not considered necessary based on the assumption that demographic profiles were not expected to differ significantly during the course of a year.

The statistical software R was used to perform the linear regressions and the process followed for selecting the linear model was a backwards stepwise approach, as detailed below:

— A linear model was fitted including all predictive variables
— Where not all predictive variables were found to be significant predictors of claims according to the *t*-values, the variable with the lowest *t*-value was removed
— The model was then refit
— This process was repeated until all variables were found to be significant predictors of claims costs based on a *p*-value lower than 0.1 from a *t*-test
— The *F*-statistic was consulted to ensure that the linear model could be accepted as a predictor of claims costs.
— The *F*-statistics for all final linear models implied a *p*-value below 0.1% in all cases.

Where discrete predictive variables included more than two variations, these were grouped in some cases where not all variations were found to be significant predictors of claims. This was done until one or more grouped variations were found to be significant predictors or, if not, the variable was removed.

Significant predictors of claims were not further removed from the linear models through the use of goodness of fit comparisons such as the use of the Akaike Information Criterion, Bayesian Information Criterion or Adjusted R-squared statistic. This was due to the fact that the inclusion of more predictive variables was seen to be more valuable than the goodness of fit of the final linear model due to the ability to glean additional information regarding the potential impact of predictive variables on claims costs.

Graph 10 shows the actual average risk claims costs per beneficiary per month by age for 2012, relative to the expected costs based on the linear models produced. The graph shows that despite producing a slightly different shape in the average claims curve by age, the modelled claims costs are a good fit for the actual experience.

Results

Table 5 details the proportion of cases in which a predictive variable was included in the final linear model relative to the number of cases in which it was available.

Where discrete predictive variables include more than two variations, the variable was included in the proportions above if any of the variations was found to be a significant predictor of claims costs.

Province of residence and income band were both found to have a significant impact on claims costs in 100% of the cases in which they were considered. However, they were considered infrequently and within these discrete variables not all of the variations were found to be significant.

Aside from these two variables, beneficiary age and chronic status appeared most frequently as significant predictors of claims in the linear models fitted. This reinforces

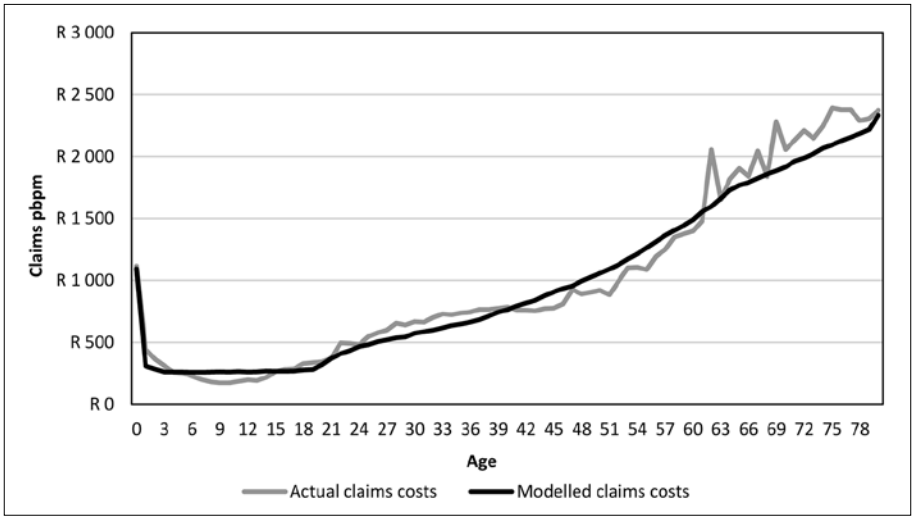
the expectation that these two factors are significant drivers behind claims costs, as discussed in the introductory section. This justifies further analysis of the impact of age and chronic prevalence on costs and the impact of cross-subsidies by age.

Table 5 Predictive variables used in linear modelling

Predictive variable	Number of times considered	Proportion of cases found to be significant
Beneficiary age	98	96.9%
Chronic status	71	93.0%
Tenure	98	36.7%
Gender	98	49.0%
Beneficiary type	98	73.5%
Newborn indicator	98	56.1%
Province of residence	6	100.0%
Persal indicator	39	46.2%
Income band	3	100.0%

A fixed intercept amount formed part of the final linear models produced in line with the methodology outlined above. This intercept value represented a base claim amount for all beneficiaries on a plan irrespective of their demographic profile.

The average relative Rand impact of each variable was estimated as the calculated Rand amount contributing to the estimated per beneficiary Rand cost, from the linear formulae, relative to the intercept value from the linear formulae. This was done for all cases in which the predictive variable was considered.



Graph 10 Actual claim costs against modelled claim costs by age

Graph 11 details the results of these calculations for all plan types from 2010 to 2012. For new generation and hospital plans, age was seen to have the largest impact on the Rand value of claims, followed by chronicity. For traditional plans, chronicity was found to have the largest impact on the Rand value of claims.

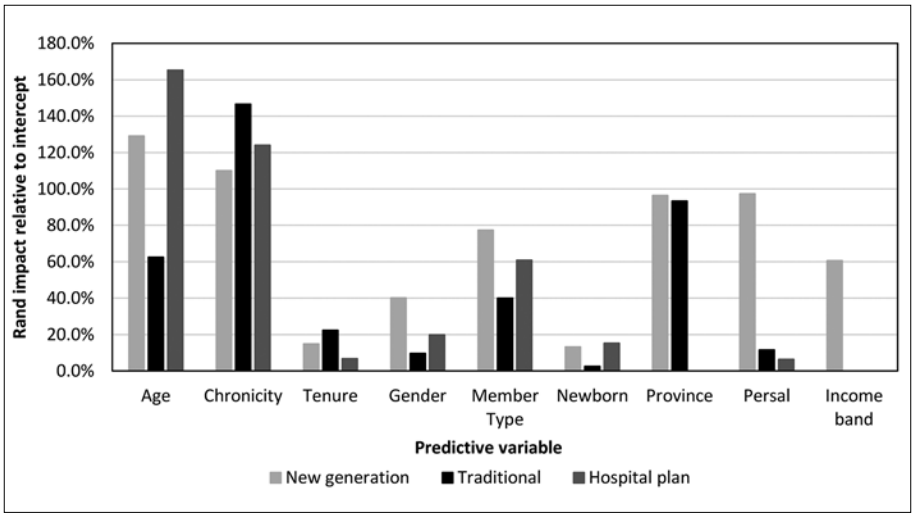
Impact of Chronicity on Claims Costs

Graph 12 details the additional claims per beneficiary per month for chronic beneficiaries according to the linear models fitted, split by plan type. Chronic beneficiaries were those identified as so within the medical scheme data. This relates primarily to beneficiaries registered for chronic medication. Rand amounts for 2010 and 2011 were inflated to 2012 terms for comparability using an inflation assumption of 7.5% a year for the graph below and the remaining analysis in this section. 7.5% represented a reasonable overall inflation assumption based on actual tariff increases and general utilisation increases (without the impact of ageing) on the group of medical schemes considered.

The average additional claim amount per beneficiary per month due to chronicity was observed to be R978. This includes all claims costs, and not chronic medication costs exclusively. The average Rand impact was similar for new generation and traditional plans. However the average impact for hospital plan options was lower due to the unavailability of certain outpatient benefits associated with chronic health care.

Impact of Tenure on Claims Costs

Table 6 details the average additional claims for those with a tenure less than one year and one to three years relative to beneficiaries on a scheme more than three years.



Graph 11 Rand impact relative to intercept for each predictive variable

TABLE 6 Impact of tenure on claim costs

Tenure	Scheme type	New generation	Traditional	Hospital	Total
Less than one year	Restricted	R381.17	R61.93	R513.97	R405.80
	Open	R391.71	R189.17	R361.87	R355.95
	Total	**R387.70**	**R157.36**	**R431.00**	**R375.34**
One to three years	Restricted	R90.60	R61.93	R225.92	R136.88
	Open	R189.04	R209.34	R224.08	R201.36
	Total	**R151.54**	**R172.49**	**R224.92**	**R176.29**

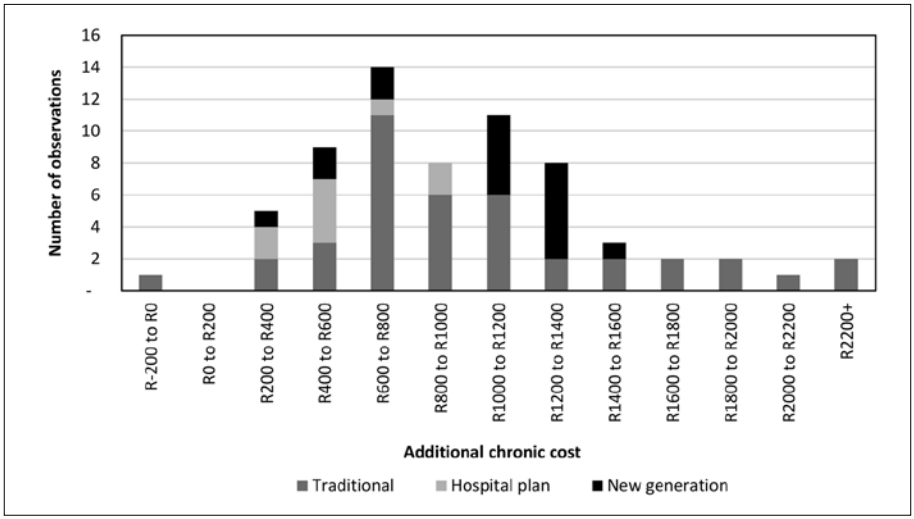
The average additional claims cost for beneficiaries on a scheme for less than a year and between one and three years was R375 and R176 respectively. This is potential evidence for an anti-selective effect as claims are highest at the outset and decrease gradually.

Impact of Gender on Claims Costs

Where gender was seen to be a significant predictor of claims costs, there was no consistent trend regarding whether males or females claimed more. Both males and females were found to claim more in 50% of cases on average, removing the effect of other variables such as age.

Impact of Beneficiary Type on Claims Costs

Where adult dependants were found to claim significantly differently from principal members, the observations were different for open and restricted schemes. Adult dependants were found to claim more than principal members 100% of the time on



GRAPH 12 Additional chronic cost by plan type

restricted schemes. Conversely, principal members were found to claim more than adult dependants 94% of the time on open schemes.

This observation may be related to anti-selection. Adult dependants would be more likely to anti-select on restricted schemes where membership for principal members is compulsory. Alternatively, principal members may be considered more likely to anti-select in the open scheme market where scheme choice is available.

Impact of Province of Residence on Claims Costs

The most notable finding was that those residing in Limpopo were found to claim less than beneficiaries residing elsewhere. This may be related to a relative lack of access to healthcare facilities and practitioners in Limpopo.

Impact of State Employment on Claims Costs

Where state employment was found to be a significant claims predictor, state employees were found to claim R150 to R300 less than other beneficiaries. This could be as a result of a combination of less access to healthcare providers and less awareness of benefits available.

5. THE COST OF AGEING

Cross-over Ages

The linear formulae were used to estimate expected claims per month for the entire membership pool considered from 2010 to 2012. In addition, the relevant monthly risk contribution was allocated to the membership pool based on year, beneficiary type, income band and plan. Late joiner penalties were not considered for those joining medical schemes after the age of 35.

Average claims per month were plotted per age for each plan from 2010 to 2012 and compared to the average contribution by age. A cross-over age was determined as the youngest age above 25 at which claims were found to exceed contributions to ensure that the impact of changes from child dependent status were not considered. This cross-over age represents the age at which beneficiaries start to cost a scheme more than they receive, without considering non-health care costs.

Those below the cross-over age will be required to cross-subsidise those above the cross-over age. Therefore, from a medical scheme perspective, at a particular point in time those below the cross-over age are attractive beneficiaries. Graph 13 shows the cross-over ages observed on all medical scheme plans considered for each year from 2010 to 2012.

The majority of the cross-over ages were found to be between the ages of 54 to 64. The mean age was 61.1, the median age was 60.0 and the standard deviation was 6.4 years.

In order to establish whether scheme size plays a role in the degree of cross-subsidisation, schemes were categorised into size categories according to the following criteria:

— **Small** fewer than 6,000 principal members
— **Medium** between 6,000 and 15,000 principal members
— **Large** greater than 15,000 principal members.

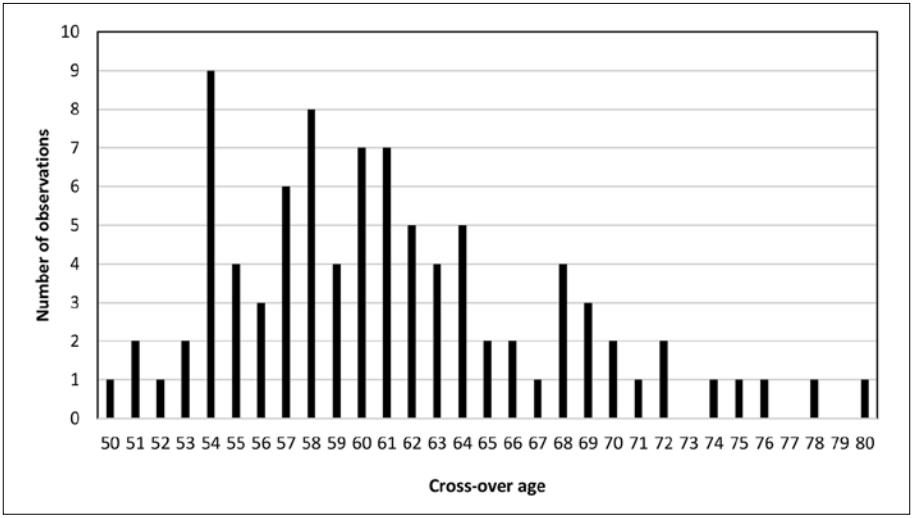
Table 7 shows the number of scheme plans by scheme size and plan type for 2012. Table 8 shows the cross-over ages by scheme size and plan type for 2012.

TABLE 7 Number of plans by scheme size and plan type for 2012

Plan type	Scheme size		
	Small	Medium	Large
New generation	1	3	5
Traditional	5	3	12
Hospital	2	–	5
Total	**8**	**6**	**22**

TABLE 8 Cross-over ages by scheme size and plan type for 2012

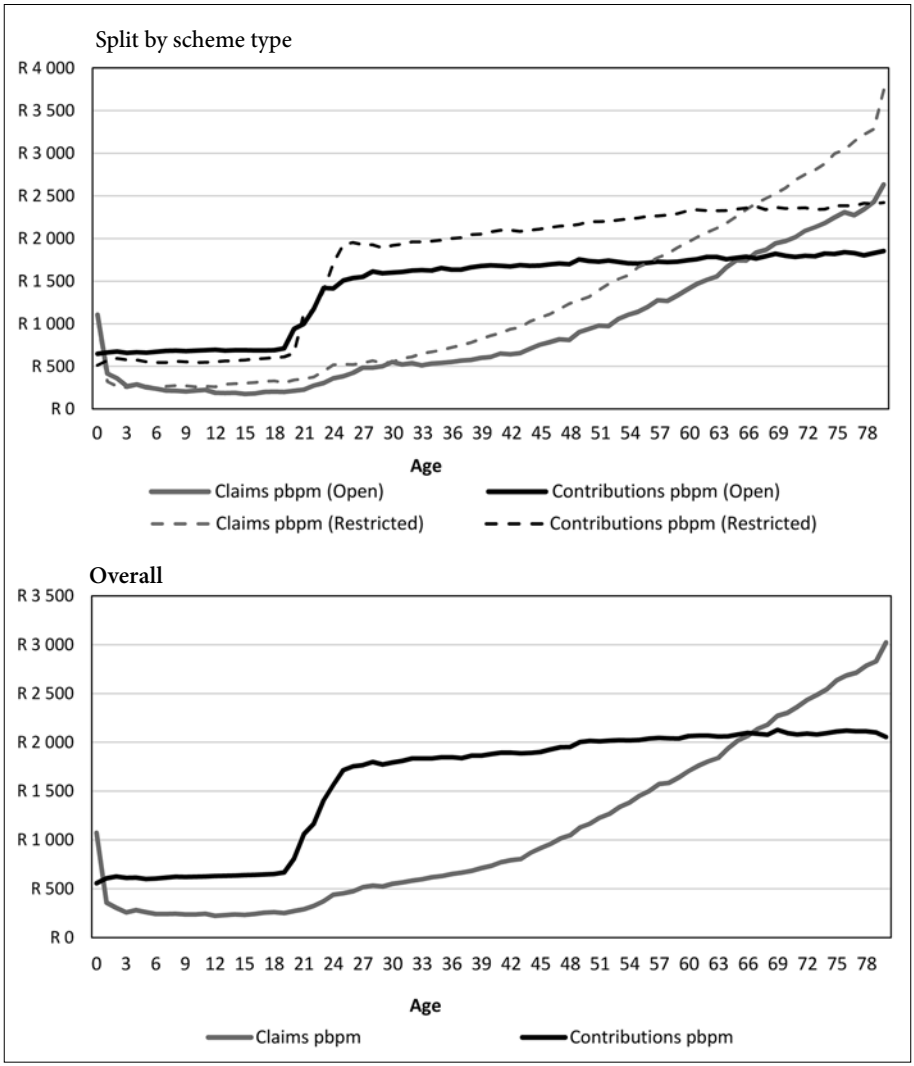
Plan type	Scheme size		
	Small	Medium	Large
New generation	58	70	65
Traditional	58	57	59
Hospital	62	Not available	59
Total	**58**	**68**	**60**



GRAPH 13 Claim and contribution cross-over ages

No consistent trends are evident from the table above. Despite the lack of data within the medium and small schemes relative to large schemes, this leads to the conclusion that scheme size did not appear to play a significant role in affecting the age at which cross-subsidisation begins. As a result, the impact of scheme size is not considered further.

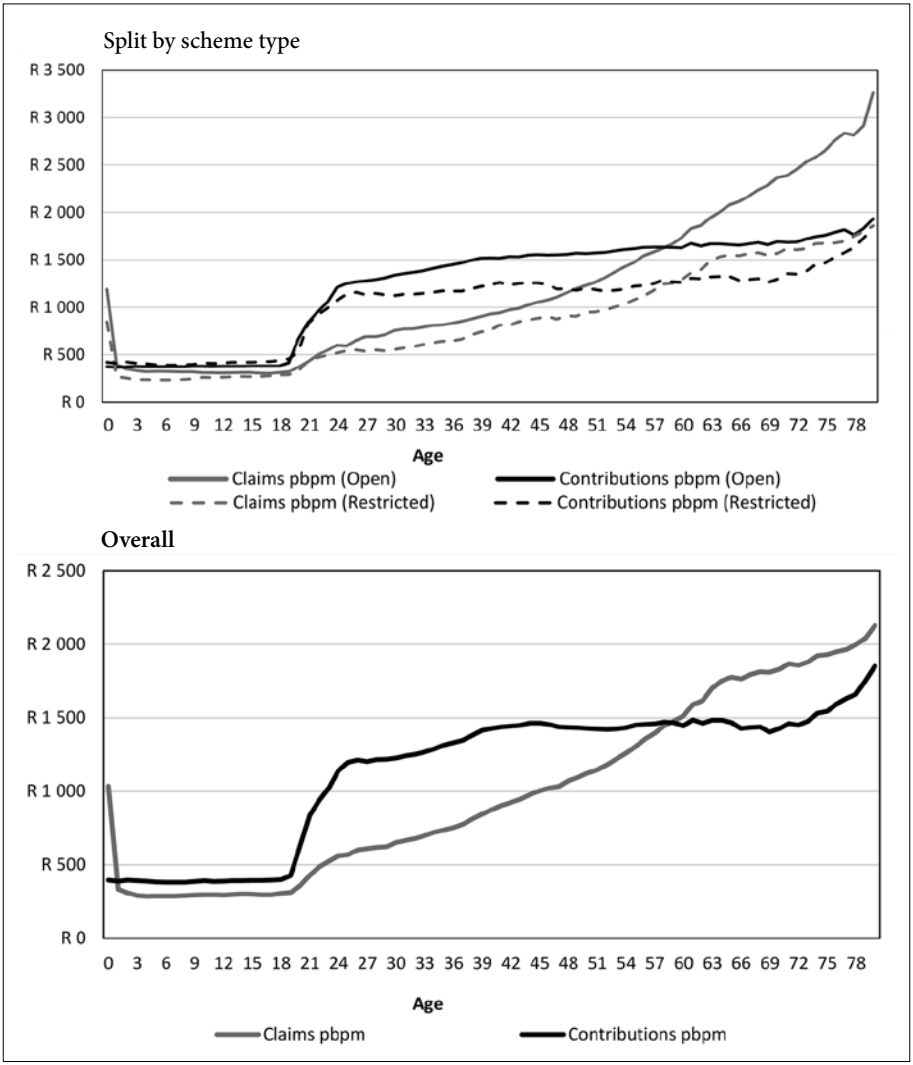
By averaging over the beneficiaries in the relevant membership pools, the average cross-over ages were determined by year, scheme type and plan type.



Graph 14 Average risk claims and contributions pbpm – New generation plans

It must be noted that the claims costs and contributions by age represent a point-in-tine comparison at each age. The point-in-time comparison implicitly allows for changes in profile and option changes by age based on the mix of the individuals included in each age.

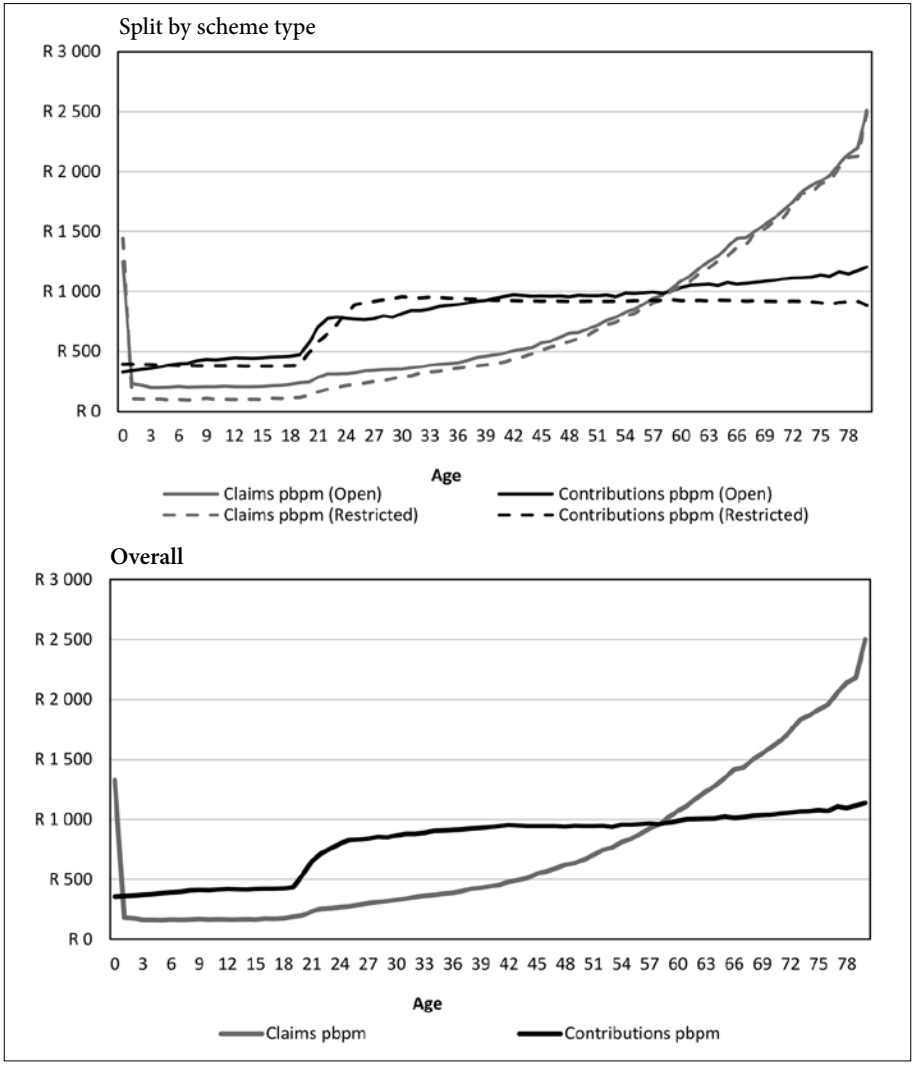
Graphs 14, 15 and 16 show the average risk claims and contributions per beneficiary per month for 2012 split by scheme type and plan type.



Graph 15 Average risk claims and contributions pbpm – Traditional plans

The average cross-over age for both open and restricted schemes was 67. Child contributions were significantly more relative to claims costs for open schemes. Above the age of 25, both claims costs and contributions were higher for restricted schemes on average.

The open scheme cross-over age was 59 compared to the restricted scheme cross-over age of 60. In this instance, child contributions were significantly more relative to claims costs for restricted schemes, compared to new generation plans



Graph 16 Average risk claims and contributions pbpm – Hospital plans

where the converse was true. Furthermore, above the age of 25, both claims costs and contributions were lower for restricted schemes on average.

The open scheme cross-over age for hospital plans was 59 compared to the restricted scheme cross-over age of 58.

The cross-over ages were mostly consistent when comparing open and restricted schemes. The cross-over age was approximately 59 years for both traditional and hospital plans. The cross-over age was significantly higher for new generation plans, where it was seen to be 67 years. This may be related to the higher average age of the membership on the new generation plans considered, assuming the contribution is set at a higher level to compensate for the greater number of older beneficiaries.

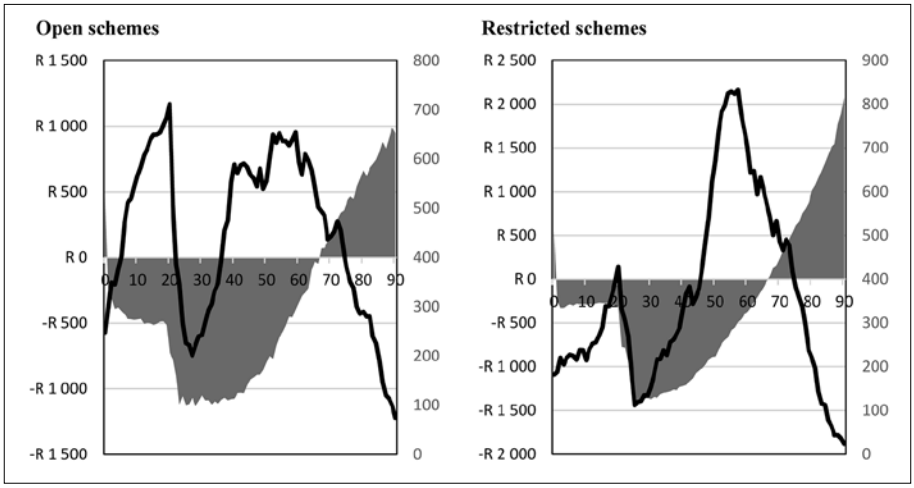
The cross-over ages have remained largely consistent since 2010 with the exception of traditional plans. These cross-over ages have increased by four years and eight years for open schemes and restricted schemes respectively. This is due to large contribution increases and a steeper contribution curve by age related to a larger degree of benefit option buy-up as members age.

The contribution curve is seen to increase by age due to a more expensive plan mix as age increases.

The above graphs also show that the contributions per beneficiary per month increase with age despite the community rated structure. This is mostly as a result of plan mix changes. Late joiner penalties loaded to the contributions are not shown.

Graphs 17, 18 and 19 show the net difference between the average risk claims and contributions per beneficiary per month for 2012 split by scheme type and plan type shaded, along with the number of beneficiaries per age shown by the black lines.

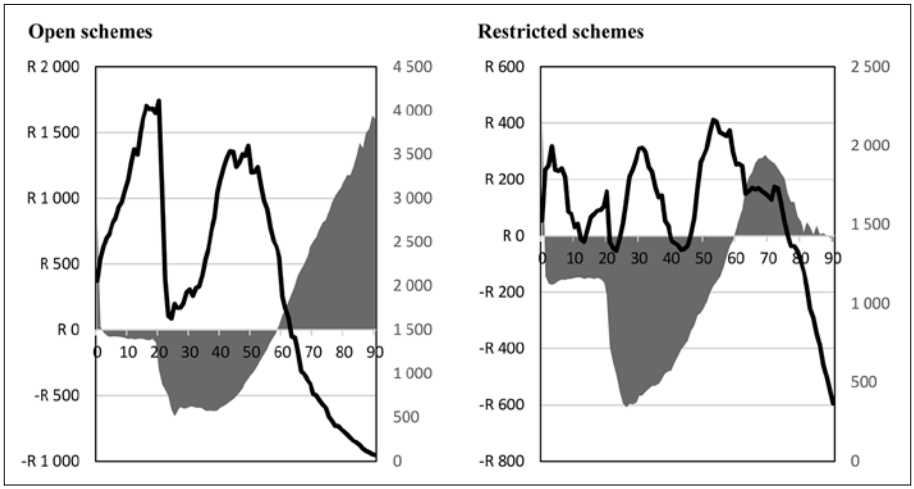
The beneficiaries contributing the highest net income were those between 23 and



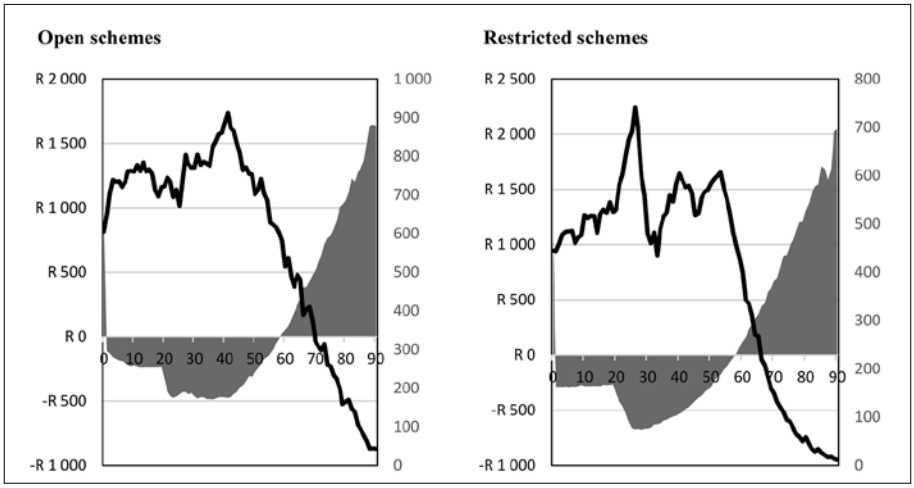
Graph 17 Net difference between average risk claims and contributions pbpm –new generation plans

40 on open schemes. On restricted schemes the beneficiaries contributing the highest net income were those aged exactly 25, with the net income consistently reducing at older ages. On both open and restricted schemes the net cost continued to increase at older ages above 70.

As with new generation plans, the net income was similar for beneficiaries aged 24 to 40 and was lowest at these points. On restricted schemes the net income was highest



Graph 18 Net difference between average risk claims and contributions pbpm – traditional plans



Graph 19 Net difference between average risk claims and contributions pbpm – new generation plans

at age 26 and decreased steadily from 27 to 70. Interestingly, the net cost decreased above age 70 due to a more significant increase per year of age in contributions relative to claims. The average net cost for those aged 80 and above, was minimal.

On all plan types the maximum net income within open schemes was found for beneficiaries between the ages of 25 and 40 approximately, and was similar at these ages. Whereas within restricted schemes, the maximum net income was found at approximately age 25 and decreased steadily for each year above 25.

This is due to a combination of a more significant increase in claims per year of ageing above age 25 on restricted schemes as well as a steeper increase in average contributions per year of ageing on open schemes. This may be as a result of an increased tendency to buy-up in the open scheme industry, possibly due to a wider range of plan selection available.

Late Joiner Penalties

Late joiner penalties and waiting periods are the two underwriting mechanisms that medical schemes have in order to protect against anti-selection within an environment governed by open enrolment and community rating. The purpose of late joiner penalties is to encourage medical scheme beneficiaries to seek cover at a younger age in order to allow for the cross-subsidy from the younger beneficiaries to the older sicklier beneficiaries.

Through considering the sample medical scheme population detailed above, we have attempted to determine the extent to which medical schemes are protected from lost cross-subsidies as a result of anti-selecting beneficiaries joining at older ages through late joiner penalties.

Table 9 details the late joiner penalties payable monthly that are applicable for beneficiaries joining the medical scheme population after the age of 35 as set out in the Medical Schemes Act. The penalty period is defined as the number of years after 35 at which a beneficiary joins a medical scheme less any previous credible cover on a medical scheme.

Table 9 Late joiner penalties

Penalty period after age 35	Late joiner penalty
0–4 years	5% of risk contributions
5–14 years	25% of risk contributions
15–24 years	50% of risk contributions
25+ years	75% of risk contributions

The net income or cost was calculated per age based on the average modelled claims cost per age for all medical schemes considered in 2012 relative to the average risk contribution for this group. The cost of beneficiaries joining medical schemes after the age of 35 was calculated as the sum of net income or cost for all ages between 35 and the

age of joining a medical scheme. This cost was compared to the total expected future risk contributions per age in order to determine a cost relative to risk contributions of joining the population late. This was then compared to the late joiner penalties in order to determine whether they were sufficient.

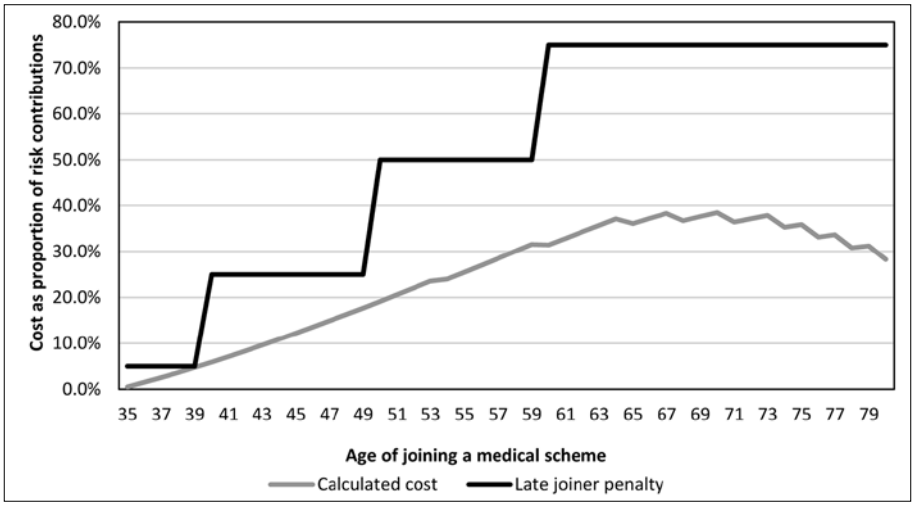
In order to determine the future expected contributions, PA(90)-1 mortality was applied. Inflation was not considered on claims and contributions (implicitly allowing for the inflation on these items to remain in line). The graph below details the cost of beneficiaries joining late per age relative to the late joiner penalties that apply.

Graph 20 implies that late joiner penalties are sufficient to cover the cost of lost cross-subsidies as a result of joining the medical scheme population after the age of 35. The cost of lost cross-subsidies reduces after the age of 67 as older beneficiaries start to become a net cost to schemes and schemes realise the value of a shorter expected future period of losses related to the beneficiary over their expected future lifetime.

Late joiner penalties are defined as relating to beneficiaries joining after the age of 35. However, beneficiaries between the age of 21 and 35 are also expected to provide net income to medical schemes.

Graph 21 shows the equivalent cost compared to late joiner penalties if the cost of beneficiaries joining medical schemes late is calculated as the sum of net income or cost for all ages between 21 and the age of joining a medical scheme.

If cross-subsidisation is considered from the age of 21, late joiner penalties are seen to be mostly in line with the expected loss in cross-subsidisation for late joiners after the age of 40. However, schemes remain exposed to the loss in cross-subsidies for members joining between the ages of 21 and 40.



Graph 20 Cost of beneficiaries joining late per age relative to late joiner penalties

Cost per Year of Ageing

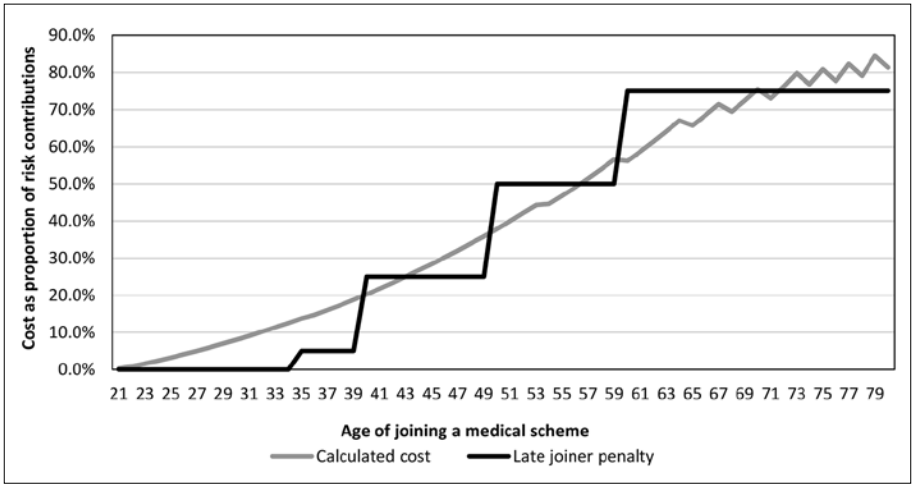
The cost per year of ageing is a key consideration, particularly for medical schemes, in estimating the future prospects of claims costs. The increase in benefit utilisation as a result of expected ageing of the membership profile normally forms part of the expected claims inflation for budgeting purposes. Given the importance of this assumption, the average cost per year of ageing has been examined.

An additional claims cost per year of ageing was calculated at each age through comparing the average claims cost per beneficiary for the next age relative to the average claims cost for the age under consideration. The average claims cost per beneficiary per age used was as shown in the claims curves in Section 5 under the heading 'Cross-over ages'.

It is important to bear in mind that this does not necessarily represent a projected trajectory of an individual's claims costs into the future but rather represents a point-in-time comparison of claims at each age. The point-in-time comparison implicitly allows for changes in profile and option changes by age based on the mix of the individuals included in each age.

Graphs 22 and 23 show the claims and contribution increases per year of ageing by age for 2012, split by scheme type. The most significant claims and contribution increases per year of ageing occur between the ages of 20 and 25 as children first become principal members and adult dependants. Claims cost increases exceeded contribution increases for the most part between the ages of 35 and 75.

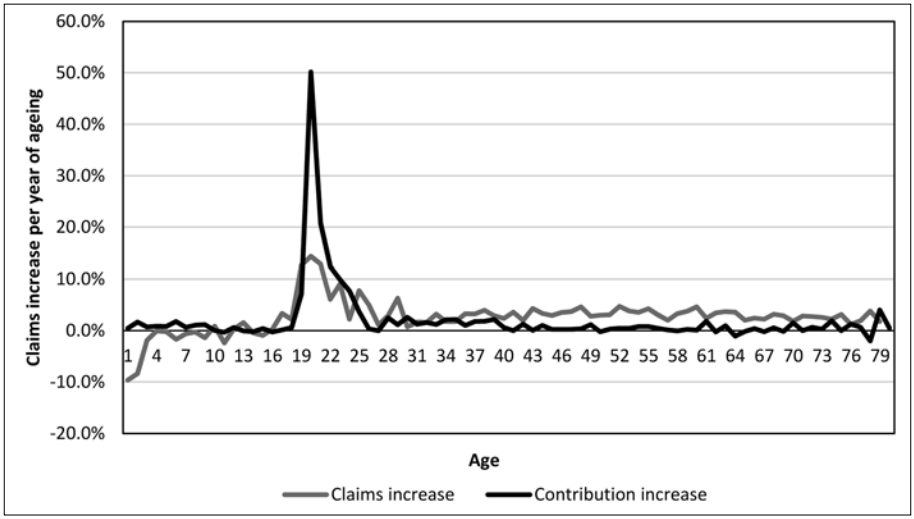
The experience regarding cost per year of ageing by age was similar on open and restricted schemes. The most significant claims and contribution increases per year of ageing also occurred between the ages of 20 and 25. Claims cost increases exceeded contribution increases for the most part between the ages of 30 and 70.



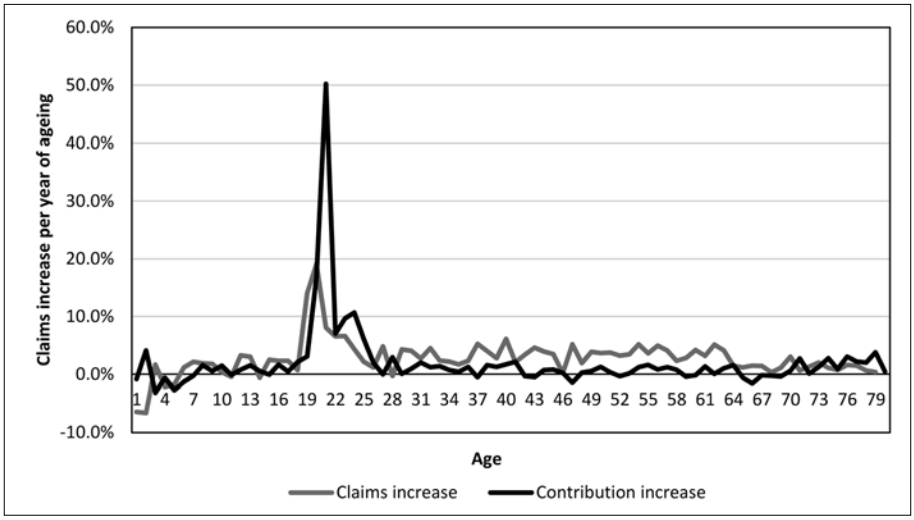
Graph 21 Late joiner penalties against cost of claims from age 21

Graphs 24, 25 and 26 show the claims and contribution increases per year of ageing by age for 2012, split by plan type.

Claims and contribution increases were in line for the most part below the age of 30 and for ages 30 and beyond contribution increases were minimal with claims increases averaging 3.4% per year of ageing and decreasing gradually at the older ages.



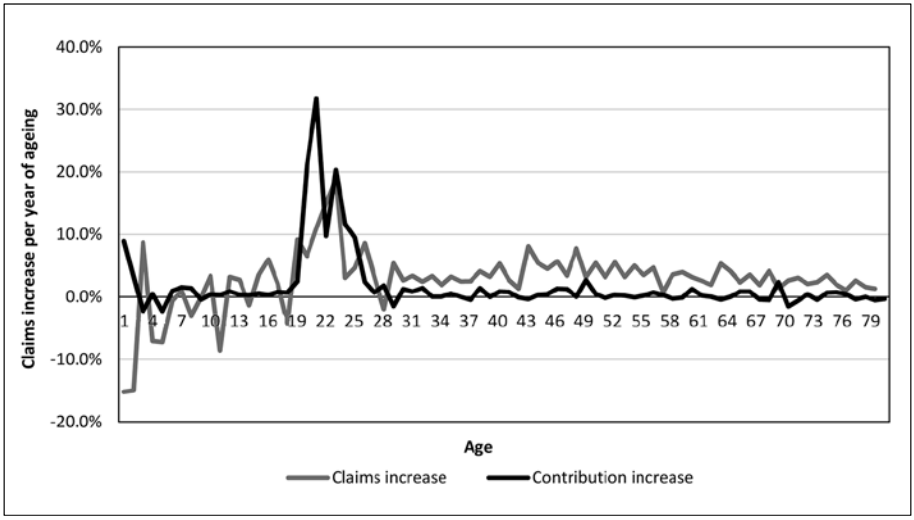
Graph 22 Claim and contribution increases per year of ageing by age – open schemes



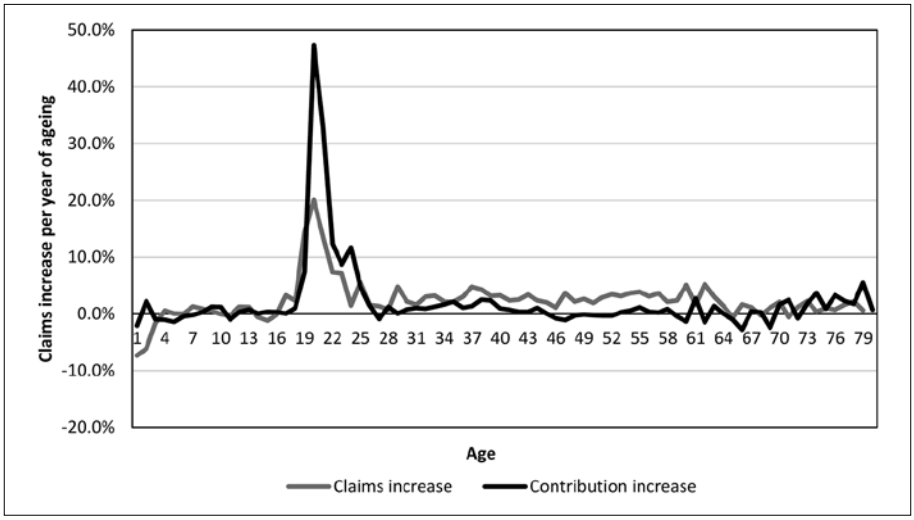
Graph 23 Claim and contribution increases per year of ageing by age – restricted schemes

Claims and contribution increases were in line for the most part below the age of 30 and above the age of 65. For ages between 30 and 65, claims increases exceeded contribution increases and were on average 3.0% per year of ageing.

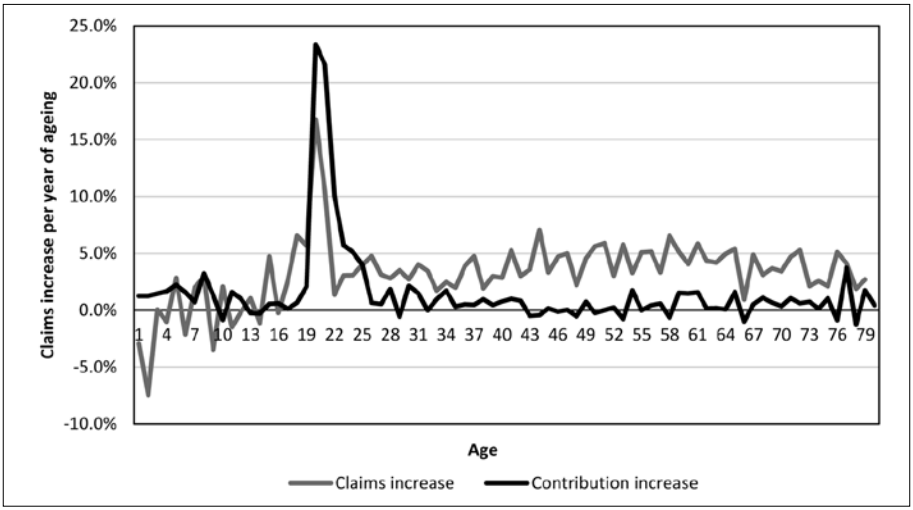
On hospital plans, claims increases were significantly above contribution



GRAPH 24 Claim and contribution increases per year of ageing by age – new generation plans



GRAPH 25 Claim and contribution increases per year of ageing by age – traditional plans



Graph 26 Claim and contribution increases per year of ageing by age – hospital plans

increases from the age of 25 onwards. Claims increase by 3.9% on average per year of ageing above the age of 25. The increases per year were weighted by the membership within each age in order to calculate the overall average ageing impact. The net ageing impact was calculated by applying the same methodology to contribution increases and subtracting the overall contribution increase per year of age.

Table 10 shows the consolidated average increases in claims and contributions for all ages.

Table 10 Average increases in claims and contributions for all ages per year by plan type

Plan type	Increases per year of ageing (overall)	
	Claims	Net of contributions
New generation	2.1%	0.5%
Traditional	1.7%	(0.5%)
Hospital	2.2%	0.6%
Overall	**1.9%**	**(0.2%)**

The overall average increase in claims per year of ageing was calculated to be 1.9%. The overall increase in cost net of contributions per year of ageing was found to be slightly negative. However, this is largely due to the sharp increase in contributions for young adults. This does however indicate that if the entire membership pool were to be considered in isolation without new entrants, costs would be expected to decrease in the next year, allowing for the impact of option changes such as buy-ups.

The effect of ageing on claims costs was most significant in hospital plans and least significant in traditional plans. This can be attributed to the cost of hospital claims being more strongly linked to increased age than outpatient claims.

Given the significant variation in claims increases due to ageing by age group, Table 11 shows the consolidated average increases on claims and contributions split by three distinct age groups.

TABLE 11 Claim increases per year of ageing by age

Plan type	Increases per year of ageing (0–18)		Increases per year of ageing (19–24)		Increases per year of ageing (25+)	
	Claims	Net of contributions	Claims	Net of contributions	Claims	Net of contributions
New generation	(4.3%)	(5.2%)	10.2%	(8.9%)	3.4%	1.8%
Traditional	(2.9%)	(3.5%)	12.1%	(11.1%)	2.5%	1.1%
Hospital	(3.6%)	(4.6%)	6.6%	(4.7%)	3.9%	1.7%
Overall	**(3.3%)**	**(4.0%)**	**10.2%**	**(9.1%)**	**2.9%**	**1.1%**

When those aged 25 or above are considered, the overall average increase in claims per year of ageing was 2.9%. The net increase in cost was 1.1%.

Claims were seen to decrease on average per year of ageing for those aged 0 to 18, due in large part to higher claims for new-borns. The most significant claims increases were between the ages of 19 to 24. However this age group also experiences the highest decrease in net costs due to contributions increasing at a higher rate than claims costs.

Net cost increases were the lowest for traditional plans above the age of 18, but traditional plans experience the lowest net decrease in costs below age 19.

An alternatively methodology was applied in order to calculate average claims cost increases per year of ageing. The expected claims based on the linear models for the current members were compared to the expected claims if age was increased by one. This does not allow for the impact of a change in chronic status, plan or beneficiary type by age. Table 12 details the average increases on claims for all ages and adults above the age of 25.

TABLE 12 Claim increases per year of ageing by plan type

Plan type	Increases per year of ageing (overall)	Increases per year of ageing (adults)
New generation	0.43%	1.45%
Traditional	0.03%	1.14%
Hospital	1.05%	3.61%
Overall	**0.24%**	**1.47%**

The low increase in claims cost due to ageing in children results in overall average increases that are relatively low when excluding the impacts of other factors such as increased chronicity. The overall average increase in claims per year of ageing was calculated to be 0.2 %, compared to 1.9% when the effect of varying other variables such as chronicity and plan choice by age was considered.

The next section considers the extent to which chronicity and age act together to drive claims cost increases.

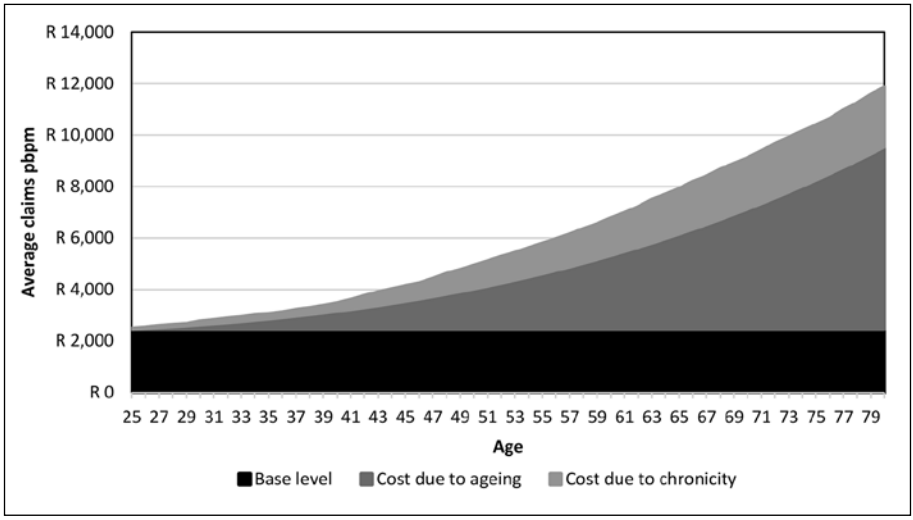
Impact of Chronicity in Conjunction with Age

A scenario was considered in order to assess the impact in Rand terms on claims of ageing and chronicity and how this varies by age as chronic prevalence increases. The 25-year-old beneficiaries of the 2012 membership were considered for this purpose. The claims of these beneficiaries were projected to the age of 80.

The claims were projected annually initially by allowing all member information to remain constant with the exception of the age which was increased in increments of one. The change in claims from an increased age was then projected by applying the increased age to the linear models. This allowed for the increase in claims due to age exclusively to be projected.

Similarly, chronic prevalence was then allowed to increase with age based on the chronic prevalence rates estimated above by scheme and plan types. Through applying the chronic status using the linear models, the impact of increased chronic prevalence on claims was projected.

This projection ignored the effects of inflation, mortality or discounting into the future.



Graph 27 Impact of ageing and chronicity on future claims

Graph 27 shows the projected trajectory of future claims for these 25 year old beneficiaries split by the impact of increased age and increased chronic prevalence.

Claims costs were seen to increase to a greater degree due to age exclusively rather than due to increased chronic prevalence. By the age of 80, increased costs due to ageing represented 286% of the initial claims cost, whereas increased costs due to chronic prevalence represented 92% of the initial claims cost. This represented 2.5% and 1.2% annual increases respectively.

6. LONGER TERM INDUSTRY IMPLICATIONS

Methodology

Given the significant impact the membership profile is seen to have on the claims cost experienced by medical schemes (particularly age and the additional effect this has on chronicity) medical schemes are at risk of a fundamental change in profile driving up costs. Medical schemes are currently struggling with maintaining competitive and affordable contributions in light of health care cost inflation which is significantly higher than Consumer Price Inflation. Should utilisation increase due to membership profile changes that are not able to be managed, it may affect the viability of schemes.

The effect known as the "actuarial death spiral" could further exacerbate this. The beneficiaries that contribute more than they claim ('good risks') are more likely to opt out of medical scheme membership due to an increase in contribution levels through utilisation increases. This would further drive up contribution rates as the level of cross-subsidy catering for the poorer risks decreases. An example of this would be a decreased level of new young beneficiaries joining the membership pool.

This section assesses the level of young beneficiaries that need to join the medical scheme risk pool in order to continue to cross-subsidise the older, sicker and costlier beneficiaries. This is done through taking the 2012 membership pool considered in the analyses above as a sample of the medical scheme membership pool.

In order to project the impact on contributions and claims given changes in the risk pool, the following assumptions were made:

— The 2012 membership considered for the results in Sections 2 and 3 was used as a base membership on which to perform the projections
— Inflation and discounting were not considered as the purpose was to analyse the impact of a change in the membership profile
— Beneficiaries were assumed to join the population annually below the age of 35 in proportion to the level of 2012 beneficiaries within each age
— Beneficiaries were assumed to leave the population due to mortality – the mortality assumptions were as follows:

Age	Male	Female
Before age 60	SA85-90 (light)	SA85-90 (light) with a three year age reduction
Age 60 onwards	PA(90)-1 (Males)	PA(90)-1 (Females)

— No additional decrements were allowed

- Assumptions related to child dependants changing membership status were as follows:
  - Child dependants above the age of 25 were assumed to remain child dependants for life
  - Child dependants between 21 and 25 were assumed to immediately convert to principal member or adult dependant status
  - In addition, child dependants were assumed to convert to principal member or adult dependant status upon reaching age 21
  - Child dependants were converted to principal member or adult dependant status depending on the proportion of principal members and adult dependants within the specific plan
- No plan movements (eg buy-ups or buy-downs) were allowed for
- Chronic prevalence was assumed to increase by age in line with the total chronic prevalence by age evident in the 2012 membership profile (without allowing for chronic prevalence decreases)
- Tenure on the scheme was assumed to increase annually.

Results

Scenarios were considered according to the total number of beneficiaries assumed to join the membership population per year. The initial population size is approximately 544,000 beneficiaries. Scenario A was chosen such that the total number of beneficiaries joining the population in the first year was equal to the total number of beneficiaries expected to leave the population due to death. Scenarios B and C are also provided as comparative scenarios.

Table 13 provides the impact after three years, from three to five years, and from five to ten years into the future of 5,255 beneficiaries joining the population per year (Scenario A). The impacts shown are in terms of annual increases in claims and contributions per beneficiary per annum ('pbpa').

Table 13 Scenario A: 5,255 beneficiaries joining per year (0.97% of initial membership)

Period	Number of beneficiaries	Claims increase pbpa	Contribution increase pbpa	Net cost increase pbpa
First 3 years	542,627	0.1%	0.9%	(0.8%)
3 to 5 years	540,957	1.1%	0.6%	0.4%
5 to 10 years	535,048	1.0%	0.6%	0.4%

Observations from Scenario A are as follows:

- The number of beneficiaries is expected to decrease by approximately 0.2% per year over the longer term as the rate of mortality increases
- The net cost improves in the first three years but in the longer term worsens by approximately 0.4% per year

— Despite resulting in a consistent long-term cost increase due to membership profile, this is not significant relative to expected inflationary increases.

TABLE 14 Scenario B: 2,627 beneficiaries joining per year (0.48% of initial membership)

Period	Number of beneficiaries	Claims increase pbpa	Contribution increase pbpa	Net cost increase pbpa
First 3 years	534,753	0.4%	1.0%	(0.6%)
3 to 5 years	527,848	1.4%	0.8%	0.6%
5 to 10 years	508,914	1.3%	0.7%	0.5%

Observations from Scenario B are as follows:

— With a reduced number of young members joining the population relative to Scenario A, the number of beneficiaries is expected to decrease by approximately 0.7% per year
— Due to a lower proportion of younger members cross-subsidising the older costlier beneficiaries, net costs are expected to increase by 0.5% in the longer term
— Net cost increases remain manageable relative to expected inflationary increases.

TABLE 15 Scenario C: 10,509 beneficiaries joining per year (1.93% of initial membership)

Period	Number of beneficiaries	Claims increase pbpa	Contribution increase pbpa	Net cost increase pbpa
First 3 years	558,375	(0.4%)	0.6%	(1.0%)
3 to 5 years	567,174	0.5%	0.4%	0.1%
5 to 10 years	587,318	0.5%	0.4%	0.1%

Observations from Scenario C are as follows:

— The population would be expected to grow by approximately 0.7% annually in the longer term
— With an annual level of new young beneficiaries representing 1.9% of the initial population, net costs are only expected to increase minimally in the longer term
— Medical schemes would therefore be protected from additional costs due to ageing and profile change.

Based on the scenarios above, the impact over the next ten years of a membership profile change is not expected to be significant. This includes when the number of new young beneficiaries joining the population is minimal relative to the level of the population.

Based on the membership profile considered, the level of new membership entering the risk pool would need to represent a level of approximately 2.0% of the membership in the risk pool in order to prevent increasing costs related to a worsening

profile. This implies annual growth in the medical scheme population of approximately 0.8%.

Annual growth of 0.8% is well below the average annual growth of total beneficiaries in the consolidated medical scheme industry from 2007 to 2011 of 3.6%. However the variability by scheme is of concern in this paper. Therefore, given the current levels of growth in the industry, there is little need for concern regarding any threat to viability due to a membership profile change overall provided that the levels of new membership do not decrease significantly. However this is likely to vary by individual scheme where the rate of new membership joining can have more of a significant impact.

Given the relatively manageable net increases in the scenarios considered above, a further scenario was considered where no new entrants were assumed to join the population over a ten-year period.

Table 16 Scenario D: No new entrants

Period	Number of beneficiaries	Claims increase pbpa	Contribution increase pbpa	Net cost increase pbpa
First 3 years	526,879	0.7%	1.2%	(0.5%)
3 to 5 years	514,739	1.7%	0.9%	0.7%
5 to 10 years	482,779	1.6%	0.9%	0.7%

Observations from Scenario D are as follows:

— The population is expected to decrease by 1.2% per annum over a ten-year period
— Net costs are expected to increase by 0.7% over the longer term
— Even in a scenario with no new entrants over a ten-year period, net cost increases remain manageable relative to expected inflationary increases.

Scenario E was prepared to test the impact of young members opting out of the population upon reaching adulthood, once they no longer form part of the population as a child dependant. Scenario E builds upon Scenario D, in that no new entrants were assumed to enter the population, and 75% of child dependants were assumed to withdraw from the population at the age of 21. The results of this scenario are shown below

Table 17 Scenario E: Young members opting out of population at adulthood

Period	Number of beneficiaries	Claims increase pbpa	Contribution increase pbpa	Net cost increase pbpa
First 3 years	504,489	1.4%	0.9%	0.5%
3 to 5 years	480,021	2.4%	0.7%	1.6%
5 to 10 years	419,610	2.4%	0.8%	1.6%

Observations from Scenario E are as follows:

— The population is expected to decrease by at least 2.5% per annum over a ten-year period
— Net costs are expected to increase by 1.6% over the longer term
— Net cost increases under this scenario are fairly significant.

The net cost increases under Scenario E are expected to be significant. In the long term should membership profile changes lead to increases of 1.6% year-on-year, this may drive further anti-selection by younger members and threaten longer-term viability of the industry.

In addition, mortality improvements at older ages have not been considered. Should older costlier members begin to live for longer periods, this may result in additional cost pressure on the industry.

Finally, Scenario F considers the impact of young members anti-selecting and opting out of the medical scheme population over and above when they reach adulthood. This includes an allowance for 20% of members younger than 35 to opt out per year, above the withdrawals assumed in Scenario E above. This can also be considered as a case study of how individual schemes can be impacted by significant increases through younger members joining other schemes due to an inability to compete.

Table 18 Scenario F: Young members opting out of population (anti-selection)

Period	Number of beneficiaries	Claims increase pbpa	Contribution increase pbpa	Net cost increase pbpa
First 3 years	402,747	6.5%	4.0%	2.4%
3 to 5 years	351,506	5.5%	2.4%	3.0%
5 to 10 years	282,455	3.6%	1.1%	2.5%

Observations from Scenario F are as follows:

— The population is expected to decrease by at least 4.3% per annum over a ten-year period
— Net costs are expected to increase by between 2.4% and 3.0% per annum over the period
— Net cost increases under this scenario are significant and could result in a 'death spiral' where further anti-selective withdrawals are caused by the cost increases.

Management of Risk related to Membership Profile

Given the medical scheme environment which is subject to open enrolment and community rating, an older age profile is expected to result in increased claim costs for medical schemes and, in turn, increased contributions, all else being equal. This dynamic was initially supposed to be supported through implementation of a risk equalisation mechanism between schemes in order to provide protection from

competition based on membership profile. However, in Circular 47 of 2011 the Council for Medical Schemes announced that it was highly unlikely that a risk equalisation mechanism would be implemented in the near future. This has resulted in difficulties for schemes with poor or worsening membership profiles to compete in the market.

The following mechanisms however remain available to medical schemes to manage risks related to ageing and worsening membership profiles:

— **Attracting new younger members** This can be done through marketing and distribution channels within an open scheme or through employer relationships in a restricted scheme. However this gives rise to the risk of 'cream skimming' or 'cherry picking' practices whereby schemes compete for younger members.
— **Benefit design** Certain benefits are utilised more by older beneficiaries and similarly others by younger beneficiaries and therefore benefit design can be used to differentiate options accordingly, thus attracting a particular profile. However, with the prescribed minimum benefits, the scope to differentiate benefits is mostly through hospital benefits.
— **Contribution structure and level** Income bands allow for lower contributions for lower-earning members and cost increases can be funded from contribution increases
— **Reserves** can be used to subsidise a poor membership profile but this is not a long-term solution unless specifically set up on a long-term funding basis for ageing.
— **Provider reimbursement arrangements** Capitation fees and other alternative reimbursements structures may assist but are normally annually reviewable
— **Preventative care** at younger ages can assist with reducing longer-term claims costs at older ages
— **Managed care** Ensuring appropriate treatment can improve beneficiary health and reduce costs

Not all schemes are able to utilise the above mechanisms to the same degree. Therefore, even in an environment where the medical scheme industry is partially protected from the impact of ageing, certain schemes may struggle to manage the impact of increased costs. For example, restricted schemes have less ability to attract a significant number of young members. Smaller schemes may also not have the ability to fund for the increased expenses related to managed care, and may not have the bargaining power to negotiate for favourable provider reimbursement arrangements. Schemes with low reserve levels are also not able to subsidise losses from these reserves. As a result individual schemes may face significant risk. This has been seen to be one of the drivers behind consolidation of schemes within the industry in recent years.

7. CONCLUSIONS AND RECOMMENDATIONS

The analysis set out in this paper is an attempt to quantify the age cross-subsidy in medical scheme contributions and to test the sustainability of this in the context of

ageing and partial medical scheme regulation. The analysis was based on a sample of the medical scheme risk pool. Further research can be done to include more medical schemes and over a longer period of time.

Linear Modelling Analysis

Medical scheme claims, contribution and membership data were obtained for the years 2010 to 2012 from eight South African medical schemes. This included four open medical schemes and four restricted medical schemes, and 36 scheme plans. A total of 544,274 beneficiaries were analysed in 2012.

Linear regression was used in order to produce formulas for expected claims per beneficiary, allowing for the impact of various demographic factors. Age and chronicity were found to be the most significant drivers of claims costs in Rand terms.

Potential evidence for anti-selection was seen through beneficiaries claiming more during their first three years of membership. Anti-selection may also be evidenced by principal members claiming more than adult dependants in open schemes and vice versa in restricted schemes.

Cross-over Ages

The cross-over age was defined as the age above which beneficiaries start to represent a cost to medical schemes when claims net of contributions were considered. Those below this age provide cross-subsidisation for the older beneficiaries.

At any point in time, those below the age of approximately 67 on new generation plans, 60 on traditional plans and 59 on hospital plans were seen to provide a net income to medical schemes. This is materially impacted by a change in the age profile. An increase in average age will necessitate a higher age cross-over age to cross-subsidise the larger proportion of older beneficiaries. Therefore as a medical scheme ages, the age at which the cross-subsidy cross-over age occurs increases thus exacerbating the need for cross-subsidy.

Cross-subsidisation by Age

The maximum net income within open schemes was found for beneficiaries between the ages of 25 and 40 approximately, and was similar at these ages. Whereas within restricted schemes, the maximum net income was found at approximately age 25 and decreased steadily for each year above 25. This may be as a result of an increased tendency to buy-up in the open scheme industry, possibly due to a wider range of plan selection available.

Cost per Year of Ageing

Based on 2012 experience by age, the overall average increase in claims costs per year of age was calculated to be 1.9% for the population considered. When contribution increases per year of age were deducted from this, the net impact was calculated to be –0.2% due to the sharp increase in contributions for young adults. This implied that

for the overall population considered, the impact of ageing was not concerning over a one-year period given the expectation that contributions would also increase with age. Benefit option buy-ups at older ages also contribute to the maintenance of the cost increases.

This indicates that the medical scheme industry would be protected from claims costs due to ageing should the industry maintain the ability to continue to retain child dependents upon reaching adult ages as well as attract new members at young ages.

When those aged 25 or above are considered, the overall average increase in claims per year of ageing was 2.9%. The net increase in cost was 1.1%. Should the proportion of the membership profile in the industry shift more to the older ages, the impact of ageing would worsen.

The lowest net increase in costs due to ageing was on traditional plans. This is expected to be due to outpatient benefit costs not increasing to the same degree due to age as inpatient benefit costs.

When assessing the future claims trajectory of 25-year-olds, ageing and chronicity were expected to increase claims costs by 2.5% and 1.2% annually respectively from the age of 25 to 80.

Late Joiner Penalties

Late joiner penalties (LJP) is one of the mechanisms available to medical schemes to provide protection against adverse selection by older entrants. LJP were found to be more than sufficient if they were regarded as providing compensation for lost cross-subsidisation between the age of 35 and the older age at which a beneficiary joined the scheme population.

However, if the loss of cross-subsidy was considered from the age of 21 rather than 35, the LJP were found to be mostly in line with the loss of cross-subsidies for those joining after than age of 40. Schemes were however seen to be at risk of losing the cross-subsidies from beneficiaries between the ages of 21 and 40. On an individual scheme level, the protection may not be available if members move from one scheme to another and therefore the application of the LJP is limited in practice.

Medium to Longer-Term Implications for the Medical Scheme Industry

When considering the future implications to the industry of various scenarios in terms of the level of younger members joining the medical scheme population, the impact of ageing on the viability of the industry was found to be dependent on the rate of new members, members withdrawing and their age profile, the extent of benefit option buy-ups and contribution increases.

Calculations indicated that the membership pool would need to grow by 0.8% annually as a result of members below the age of 35 joining the population should child dependants remain in the population. In the current environment, annual growth of 0.8% is expected to be relatively easily achievable in light of average annual growth in the medical scheme industry of 3.6% from 2007 to 2011. However for individual

schemes this may be more difficult to achieve. In the open-scheme environment, schemes compete directly for this younger risk profile, while restricted schemes depend on the underlying profile of the employees within the eligible employer base. In addition, within the restricted-scheme environment, child dependants would not be expected to remain on the scheme upon reaching adulthood.

Annual growth of 0.8% attributable to young members joining the population might be considered slightly optimistic given that older members joining the population have been excluded. However, this is offset by the late joiner penalties payable by these members. In addition, the net cost increases on more conservative scenarios were also not found to be significant relative to expected inflationary increases on claims. In the longer term however, these cost increases may become more significant. For example, should medical scheme cover become more expensive it may result in an "actuarial death spiral", where healthier individuals continue to opt out of medical scheme cover causing ever increasing costs.

The industry should therefore be continually mindful of ensuring attractive cover is provided for younger individuals. In particular, child dependants opting out of the medical scheme population upon reaching adulthood was seen to result in significantly higher cost pressures (1.6% net cost increase per annum if 75% opt out at age 21).

The ability to manage net cost increases due to profile change may differ significantly by individual medical scheme. Schemes with a higher proportion of beneficiaries within the costlier higher age ranges may struggle to compete on a contribution level while ensuring cross-subsidies exist from their younger beneficiaries. In particular, restricted schemes with older age profiles may experience a less manageable degree of cost due to ageing on an annual basis as a result of not being able to draw on a marketing mechanism to assist with new member growth.

Should an inability by certain medical schemes to compete due to their membership profile cause younger members to opt for alternative medical scheme cover, this further exacerbates the impact on cost due to profile change. In a scenario where 20% of those below 35 were assumed to leave the population, net cost increases were expected to be approximately 2.5% annually as a result of profile change. This scenario could also be seen as a possible risk for the medical scheme industry as a whole if it starts to be perceived as being too expensive, relative to the alternative of seeking cover in the public sector.

The trend by employers to reduce post-retirement subsidies for medical scheme contributions means that many employees are self-funding for healthcare both pre- and post-retirement. With escalating costs of medical scheme cover, it is likely that benefit option buy-ups at retirement will reduce due to affordability pressures. In addition to this, the pre-retirement subsidisation in favour of a total cost-to-company approach might also impact the take-up of cover by younger members and subsequent buy-ups. These are likely to negatively impact the rate at which schemes can cover the impact of ageing.

The current regulatory framework of open enrolment without mandatory cover together with community rating and the absence of risk equalisation leaves individual medical schemes exposed to the cost impacts of an ageing population and competition for a younger, healthier risk profile. This is likely to lead to older schemes becoming less competitive and over the medium to longer term needing to dissolve in some manner, be it through amalgamation or liquidation. The industry is currently experiencing consolidation and these impacts are likely to further provide further impetus for consolidation. On an overall industry level however the attraction and retention of younger members is key to its sustainability.

The impending National Health Insurance (NHI) reforms which have recently kicked off represent a long-term change to the healthcare environment. It is possible that, on the introduction of NHI cover, the younger, healthier members exit the medical scheme risk pool and rely on this cover. This would leave the medical scheme risk pool with an older and more expensive population thus putting pressure on claim costs and affordability of contributions. The impact of the regulatory environment on the medical scheme industry in terms of young members anti-selecting should be borne in mind with the implementation of the NHI to ensure that the impact on the medical schemes industry is in line with the role envisaged for this sector. It is therefore important that the development of the NHI roadmap consider the interim impact of ageing and how that would transition into a fully-fledged reformed system.