THE EFFECT OF SAM ON THE SOUTH AFRICAN MEDICAL-SCHEME ENVIRONMENT: A QUANTITATIVE ANALYSIS

By MD Ganz

ABSTRACT

The globalisation of the financial services industry and the increasing complexity of insurance products, among other factors, have led to the development of new regulatory systems for insurers globally (and, in particular, in South Africa). The primary intention of these systems is to protect the interests of policyholders by ensuring that insurance companies remain solvent in most foreseeable circumstances. In South Africa, new regulation, known as Solvency Assessment and Management (SAM), is expected in 2015, but this regulation is to apply only to insurance companies and not to medical schemes. This paper considers the implications of the application of capital requirements under Quantitative Impact Study 1 to the measurement of capital adequacy in South African medical schemes. Data from 2006, 2007 and 2008 were used to parameterise the non-SLT health-underwriting risk module (i.e. the risk module relating to health-underwriting risk that is not similar to life techniques), which was then used to determine the level of economic capital that schemes would have been required to hold in 2009. The results showed an overall reduction in the capital requirements of medical schemes, as compared with the current statutory minimum requirements, and therefore an increase in the proportion of medical schemes that are found to be solvent.

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Solvency II is not just about capital. It is a change of behaviour
Thomas Steffen, Former Chairman of EIOPA

1.   INTRODUCTION

1.1   Medical-scheme solvency is important to medical schemes and their members, as well as government. The solvency of medical schemes directly affects their existence, whereas members of medical schemes seek the assurance that their medical expenses will be covered as and when they arise. Insolvency of medical schemes could have adverse consequences for society and result in increased pressure on government to assume the responsibility of covering medical costs. It is therefore crucial that the capital-adequacy requirements of medical schemes achieve their designed purpose.

1.2   The importance of appropriate capital requirements cannot be overstated. If capital requirements are set too low the probability of ruin will be unacceptably high; if they are set too high the price of medical-scheme products might increase and the capacity of medical schemes to accept risk will be reduced. In economic terms, regulation (and therefore capital requirements) should be increased when the marginal benefit of the increased regulation exceeds the marginal cost of it.

1.3   The statutory minimum capital requirement for medical schemes has not been amended since the implementation of the Medical Schemes Act, 1998[1] in 2000. This paper therefore aims to consider implications of the application of the capital requirements of Solvency Assessment and Management (SAM) Quantitative Impact Study (QIS) 1 to the measurement of capital adequacy in South African medical schemes. It focuses on the medical-scheme underwriting risk; other types of risk are areas for further research.

1.4   In addition, the paper aims to review:
– research on medical-scheme solvency in South Africa, making comparisons, where necessary, between the methods that have been employed previously and those set out in the SAM QIS1 technical specifications; and
– the appropriateness of current capital requirements for medical schemes in South Africa.

1.5   The implications and costs of implementing a new solvency regime on the industry are beyond the scope of this paper.

1.6   The content of the paper is as follows. It begins by exploring the recent evolution of capital-adequacy requirements and highlights the major features of Solvency II and SAM. In section 3 the current and proposed future healthcare environments are discussed to provide context to the problem in question. Section 4 is a brief review of the existing literature

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1   Medical Schemes Act, 1998, Act no. 131 of 1998 as amended, Republic of South Africa

on South African medical-scheme solvency. The model and data used in this paper are detailed in section 5. The results of the model are analysed in section 6. Section 7 draws conclusions; section 8 considers limitations of the paper and areas of further research.

2. SOLVENCY II AND SAM

2.1   The current regulatory framework for insurance providers in the European Union (EU), known as Solvency I, has been in existence since January 2004.[2] Although Solvency I offers a degree of policyholder protection, it has been argued that that framework is inadequate as a capital-adequacy method.[3] This is because it is not a risk-sensitive capital measure and it does not create an economically efficient environment (market distortions can still exist).[4] (For more on the drawbacks of Solvency I, reference may be made to a working document of the Commission of the European Communities.[5])

2.2   As a result of the increasing complexity of insurance products (Sharara, Hardy & Saunders, unpublished), and with the development towards a single financial services market in the EU (Eling, Schmeiser & Schmit, 2007), new regulatory requirements have been proposed. Solvency II, the name given to the new requirements, is a principles-based insurance regulatory system that will apply to life, non-life and reinsurance business in the European Union (EU).[6] It is expected to be implemented from 1 January 2014[7] and is intended to improve risk management in the insurance industry.[8]

2.3   Solvency II has a three-pillar structure (similar to Basel II and Basel III[9]). The first pillar relates to quantitative requirements including "risk-based capital requirements that firms will be required to meet with assets and liabilities valued on a market consistent basis."[10] The other two pillars relate to qualitative requirements (such as governance and

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2   Financial Services Authority (FSA). Solvency II: A new framework for prudential regulation of insurance in the EU. A discussion paper prepared by HM Treasury. Accessed from: www. hmtreasury.gov.uk/d/solvencyII_discussionpaper.pdf, 09/04/2011

3   ibid.

4   ibid.

5   Commission of the European Communities. Commission staff working document – Accompanying document to the Proposal for a Directive of the European Parliament and of the Council concerning life assurance on the taking-up and pursuit of the business of Insurance and Reinsurance – Solvency II – Impact assessment report. Accessed from: eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=SEC:2007:0871:FIN:EN:HTML, 15/07/2012

6   FSA. Solvency II: A new framework for prudential regulation of insurance in the EU, supra

7   FSA. Background to Solvency II. Accessed from: www.fsa.gov.uk/about/what/international/solvency/background, 22/04/2012

8   FSA. Solvency II: A new framework for prudential regulation of insurance in the EU, supra

9   Deutsche Bank. Solvency II and Basel III, Reciprocal effects should not be ignored. Accessed from: www.dbresearch.com/PROD/DBR_INTERNET_EN-PROD/PROD0000000000278734.PDF, 09/04/2012

10 The Actuarial Education Company (ActEd). Subject SA3, 2012

risk management) and disclosure and reporting requirements respectively.[11] These latter two pillars are not considered in this paper.

2.4   In the first pillar, two capital requirements are stipulated, namely the solvency capital requirement (SCR) and the minimum capital requirement (MCR). These capital requirements are intended to prevent insolvency in the insurance industry in most foreseeable circumstances.[12] The MCR is a rules-based minimum capital requirement that is intended to act as a 'safety floor',[13] falling below it will result in intervention by the regulator.[14] The second level of capital requirements (the SCR) is the target level of capital that the company should hold.[15] It is to be based on the economic capital that the insurer needs for running its business (Eling, Schmeiser & Schmit, 2007). The standard SCR will be based on a 99,5% confidence level of remaining solvent to a one-year time horizon.[16] The SCR may be calculated by means of a standard formula, or subject to prior supervisory approval, a partially or fully internal model.[17]

2.5   In South Africa, the Financial Services Board (FSB) has proposed a set of insurance regulations that will apply to long-term and short-term insurers.[18] This new set of regulations is to be called Solvency Assessment and Management (SAM) and is expected to be implemented in January 2015.[19] It is largely based on the Solvency II three-pillar structure, although adaptations will need to be made to it in order for it to be more appropriate to the South African environment.[20]

3.   THE SOUTH AFRICAN HEALTHCARE ENVIRONMENT
3.1   THE CURRENT ENVIRONMENT
3.1.1   There are two distinct classes of health products on offer in the market in South Africa (McLeod, 2005):

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11 Deutsche Bank, supra

12 Official Journal of the European Union. Directive 2009/138/EC of the European Parliament and of the Council of 25 November 2009 on the taking-up and pursuit of the business of insurance and reinsurance (Solvency II). Accessed from: http://eur-lex.europa.eu/LexUriServ/ LexUriServ.do?uri=OJ:L:2009:335:0001:0155:EN:PDF, 04/04/2012

13 FSA. Background to Solvency II, supra

14 Association of British Insurers. SCR and MCR. Accessed from: www.abi.org.uk/Solvency_II/ SCR_and_MCR.aspx, 04/04/2012

15 ibid.

16 FSA. Solvency II: A new framework for prudential regulation of insurance in the EU,supra

17 The Actuarial Education Company (ActEd). Subject SA3, 2012

18 FSB. Solvency Assessment and Management (SAM) Roadmap. Accessed from: www. actuarialsociety.org.za/Portals/1/Documents/2d0c5d29-f609-4176-909a-7b28c49075d9.pdf, 09/04/2011

19 FSB. Solvency Assessment and Management 2012 Update. Accessed from: ftp.fsb.co.za/ public/insurance/SAM/SAM_2012_Update.pdf, 04/04/2012

20 FSB. SAM Roadmap, supra

– those that "provide assistance in defraying medical expenditure," which are only offered by medical schemes;[21] and

– those (commonly known as 'health-insurance policies') that typically provide a fixed amount should the insured suffer the loss of a limb or another specified injury.[22]

3.1.2   Short-term insurers are the predominant providers of health-insurance policies and they are supervised by the FSB, whereas medical schemes are registered and supervised by the Council for Medical Schemes of South Africa (CMS) (McLeod & Ramjee, 2007). A medical scheme is defined as solvent in South Africa if the member's accumulated funds are at least 25% of gross contributions with no credit for risk transfer.[23] (See ¶4.2 for a more detailed definition.) The demarcation of health insurance was re-defined in the Long-term Insurance Act, 1998[24] and the Short-term Insurance Act, 1998[25] together with the Medical Schemes Act, 1998[26] (McLeod & Ramjee, op. cit.) and the Insurance Laws Amendment Act, 2008.[27]

3.1.3   The importance of this legislated distinction to the research reported in this paper is as follows: whereas Solvency II will be applicable to all providers of insurance in the EU, SAM will be applied only to long-term and short-term insurers in South Africa. In other words, in 2015 the insurance industry will be required to move towards more risk-based capital requirements, whereas medical schemes will still use an approach based on a proportion of contributions.

3.2   PROPOSED FUTURE HEALTHCARE

3.2.1   In the Report of the Taylor Committee,[28] a four-phase reform strategy for healthcare was outlined, with the goal of guiding "the evolution of [the] health system toward the achievement of a universal contributory system." The report recommended that:

> … in the medium- to long-term South Africa move toward a National Health Insurance system compatible with multiple funds and a public sector contributory environment as defined in the 1995 NHI Committee Report.

3.2.2   Phase 2 of the reform entails the implementation of measures that will make medical-scheme cover both more affordable (because of subsidies) and of greater

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21 Medical Schemes Act, 1998, supra

22 Short-term Insurance Act, 1998, Act no 53 of 1998 as amended, Republic of South Africa

23 Medical Schemes Act, 1998, supra

24 Long-term Insurance Act, Act no. 52 of 1998 as amended, Republic of South Africa

25 Short-term Insurance Act, 1998, supra

26 supra

27 Insurance Laws Amendment Act, 2008, Act no. 27 of 2008 as amended, Republic of South Africa

28 Department of Health. Inquiry into the various social security aspects of the South African healthcare system: Policy options for the future, 2002. Accessed from: www.doh.gov.za, 31/07/2011

quality (McLeod, op. cit.). One of the measures envisaged is the creation of a 'Risk Equalisation Fund' (REF).[29] The REF aims to ensure that members of medical schemes pay the same community rate for a common package of benefits (McLeod, op. cit.). Risk-equalisation methods are often associated with open enrolment and community rating, although this is not currently the case in South Africa (ibid.). Figure 1 is a simplified illustration of the intended role of the REF in South Africa.

3.2.3   The REF payments that are made to or from each scheme, illustrated in Figure 1, will affect the scheme's solvency (McLeod et al., unpublished). It has therefore been argued that REF payments should be considered when determining solvency (ibid.).

3.2.4   One of the original intentions of the author's research was to consider the effect of a risk-equalisation mechanism on medical-scheme solvency in the light of the changing regulatory environment. This was to be done using the monthly returns that medical schemes have been required to send to the CMS under the REF 'shadow period'.[30] However, in a circular distributed by the CMS in 2011, it no longer seems likely that an REF will be implemented.[31] The effect of the REF on solvency was therefore not modelled in this paper.
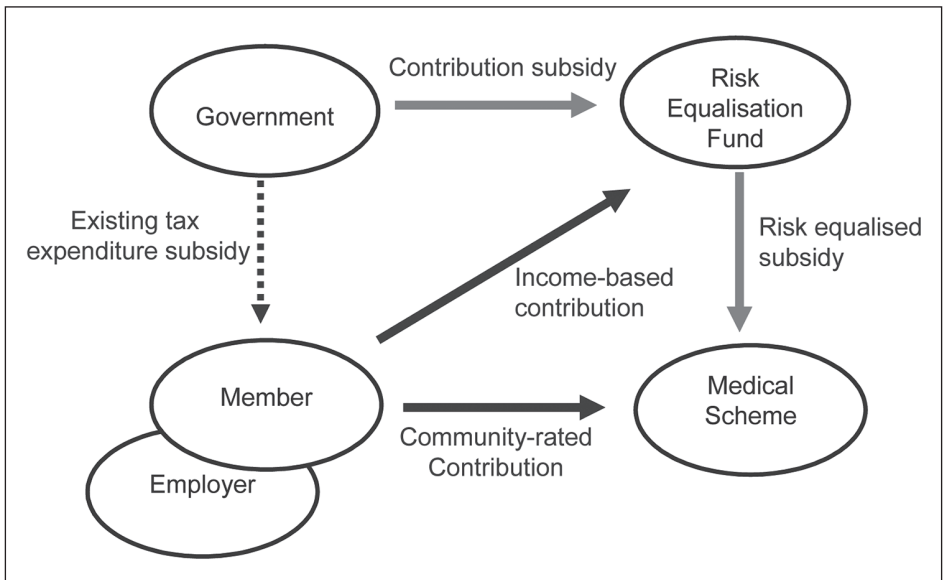

Figure 1. The role of the REF in South Africa (McLeod et al., op. cit.)

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29 Department of Health, supra
30 CMS. The analysis of REF shadow returns, 2009. Accessed from: www.medicalschemes.com/publications/ZipPublications/Risk%20Equalisation%20Fund/REFSubmission2009_20100831.pdf, 08/08/2011
31 CMS. Circular 47 of 2011: Update on the implementation of the Risk Equalisation Fund shadow process, 03/04/2012

3.2.5   More germane to the current environment is the implementation of National Health Insurance (NHI). In 2009, the Ministerial Advisory Committee on National Health Insurance was established in response to the African National Congress's resolution to introduce an NHI system.[32] The purpose of the Committee is to:

> [provide] recommendations regarding the relevant health system reforms and matters relating to the design and roll-out of National Health Insurance[33]

Medical schemes will still play a role in the provision of healthcare; however, this may be only voluntary over and above the mandatory membership of NHI.[34] The provision may include health cover on a 'top-up'[35] basis (i.e. health services not provided under NHI).

3.2.6   There has been no allusion, yet, as to how the solvency of medical schemes will be affected by the introduction of the NHI.

4.   SOUTH AFRICAN MEDICAL-SCHEME SOLVENCY

4.1   Kendal & McLeod (unpublished) state that:

> A medical scheme is solvent if its assets exceed its liabilities. For the purpose of regulation, a more stringent definition of solvency is used. This is meant to expose schemes that might become insolvent or experience financial distress in the future so that the regulator may take appropriate corrective action.

4.2   In South Africa, a medical scheme is defined as being solvent if it holds accumulated funds equal to at least 25% of gross contribution income, for the accounting year in question.[36] The original justification for this percentage is unclear.[37]

4.3   A medical scheme is a 'risk-taking entity'. It has therefore been argued that the solvency margin held by a scheme should reflect the risks that it is exposed to.[38] The characteristics of schemes that affect the risks it faces include *inter alia*:[39]
– the size of the scheme;
– the number of benefit options;
– the nature of the benefits offered;
– the investment strategy of the scheme; and
– the relationships with other parties (for example reinsurers and service providers).

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32 Department of Health. National Health Insurance in South Africa: Policy paper. Accessed from: www.health-e.org.za/documents/2bcce61d2d1b8d972af41ab0e2c8a4ab.pdf, 10/09/2011
33 ibid.
34 ibid.
35 ibid.
36 Medical Schemes Act, 1998, supra
37 Toth Resources cc. Report on the application of a Risk Based Capital solvency measure to the Nampak Group Medical Society.
38 Toth Resources, supra
39 ibid.

In this paper these risks are referred to as 'specific risks'. The reader may also find it useful to refer to Figure 2, in the context of medical schemes, in order to understand risks specific to medical schemes.

4.4   The current definition of solvency has been criticised for not being risk-specific. In a discussion paper on the appropriateness of this solvency requirement, prepared by the Registrar of Medical Schemes,[40] some of the issues that were raised were as follows:
–   This requirement ignores the size of claims and total expenditure of the scheme in question.
–   It does not account for risk transferred through reinsurance contracts or through managed-care agreements.
–   The specific risk of the scheme is ignored in this method of determination of solvency.

4.5   Similar problems with the requirement were raised by Cooper (unpublished), as cited in Kendal & McLeod (op. cit). Cooper recommended the adoption of a more risk-based capital (RBC) measure, "which would consider the specific risks faced by each scheme" (Kendal & McLeod (op. cit).

4.6   In the light of Cooper's (op. cit.) recommendations, Kendal & McLeod (op. cit.) investigated the effect that RBC requirements would have on medical-scheme solvency. This was done by considering how medical-scheme solvency requirements would be affected if either the RBC formula of the USA, or that of Australia, were applicable to South African medical schemes. They drew several conclusions from their research:
–   Both RBC systems had features that could be relevant to the South African environment.
–   The effect of RBC standards on medical-scheme solvency was ambiguous at the industry level. Whilst the US RBC standards would have required medical schemes in 2000 to hold substantially less than 25% of gross contribution income, the research done on the Australian standards did not provide a definitive answer to what their effect on South African medical-scheme solvency would be.
–   Under each RBC system some schemes would be required to hold more than 25% of gross contributions, whereas others would be able to hold less. Kendal & McLeod therefore submitted that the existence of either of these RBC standards in South Africa could create an economically inefficient environment as, with either of these standards in place, some schemes may enjoy a competitive advantage.

4.7   The author submits that Kendal & McLeod's work is outdated in two respects. The medical-scheme data used in his research were from 2000 and an analysis, of a

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40 CMS. Review of the factors that affect financial soundness of medical schemes: A discussion paper prepared by the Office of the Registrar of Medical Schemes. Accessed from: www.medicalschemes.com/publications/ZipPublications/Presentations%20And%20Reports/MEDICAL_SCHEME_FINANCIAL_SOUNDNESS_REPORT.pdf, 09/08/2011

similar level of detail, conducted with more recent data, may prove more meaningful to the understanding of issues relating to the solvency of medical schemes. In addition, capital-adequacy frameworks have undergone significant changes over the past few years, especially with the advent of Solvency II. It has been argued that, in non-life insurance, Solvency II imposes a more risk-sensitive capital requirement than the US (or Australian) RBC standards (Holzmüller, 2009). The author submits that it will provide valuable insight to consider medical-scheme solvency in the light of this new, topical capital-adequacy framework. This paper therefore aims to extend the work that was done by Kendal & McLeod (op. cit.).

4.8   More recent research regarding medical-scheme solvency was presented by A. Theophanides.[41] Her methodology was to "perform a risk-based capital assessment at the financial year ended 31 December 2008 for a sample of South African medical schemes." She considered 29 medical schemes covering about 57% of covered beneficiaries in South Africa. Her analysis involved "a total balance sheet approach where risk in both assets and liabilities [were] considered," although the impact of asset risk was not modelled explicitly as she argued that it might be of less concern to a medical scheme than liability risk. This is due to the restrictions on the choice of categories and types of assets that a medical scheme may invest in as stipulated in the Medical Schemes Act, 1998.

4.9   Theophanides's method was based on a modified version of that used in a report to the FSB by a financial-services company.[42] Her presentation addressed the solvency of medical schemes under the previously proposed regulatory framework, 'Financial Condition Reporting' (FCR). The capital requirement under FCR was simpler than SAM as it considered the capital charge only in respect of asset risk and insurance risk.[43] An heuristic sum-of-squares formula (similar to the National Association of Insurance Commissioners (NAIC) formula used to determine the minimum capital an insurer must hold in the USA[44]) was used to combine capital charges. The total capital requirement was calculated as follows:[45]

$$T = \sqrt{\left(\frac{A}{g_1}\right)^2 + \left(\frac{I}{g_2}\right)^2} \; ; \qquad (1)$$

41 A. Theophanides. Risk based capital. Accessed from: www.actuarialsociety.org.za/Portals/1/ Documents/e68c994a-adff-4f97-9f07-384cbbd19748.pdf, 06/08/2011

42 Deloitte & Touche. Report to the FSB, 2005, cited in Theophanides, supra

43 Deloitte. Financial Condition Reporting for South African Short-term Insurers, Calibration Project, October 2005. Accessed from: www.fsb.co.za/actuary/FSB-FCR-Report2005-12-02. pdf, 05/04/2012

44 Actuarial Society of South Africa Health Committee. Demystifying the US risk-based capital formula. Briefing note on www.assa.org.za

45 Theophanides, supra

where: T is the total capital requirement;

A is the asset capital charge;

I is the insurance capital charge;

g_1 is the grossing-up factor on asset charge; and

g_2 is the grossing-up factor on insurance charge.

4.10   Theophanides[46] found that (*inter alia*) for a 99,5% 'sufficiency level' the solvency requirement for:

– small-sized schemes was 24,8% of gross contributions;
– medium-sized schemes was 26,87% of gross contributions; and
– large-sized schemes was 13,09% of gross contributions.

In her study, a small scheme was defined as having less than 6000 members, a medium scheme was one that had more than 6000 members and a large scheme had more than 30 000 beneficiaries. These definitions were based on the CMS's size definitions. This is the same as the size definitions used in this paper (see ¶6.1.3.1).

4.11   The author submits that the model used and the results presented in this paper extend Theophanides' work. In the first place, few schemes formed part of her analysis. One of the main features that distinguishes this research from Theophanides's is that it aims to gauge the effect of risk-based capital requirements across the entire medical-scheme industry. Secondly, the method used in this paper is based on a more recent regulatory framework. SAM has superseded FCR and is therefore a more appropriate framework to use when assessing the solvency of a risk-taking entity. Thirdly, the medical-scheme data used in this paper were also more recent.

5.   EXPOSITION OF THE RESEARCH
5.1   TECHNICAL SPECIFICATIONS

5.1.1   Five quantitative impact studies (QISs) have been conducted between 2005 and 2010 by the European Insurance and Occupational Pensions Authority (EIOPA) in order to determine the appropriateness of Solvency II and the readiness of insurance companies to handle this regulatory change.[47] A QIS is a field test of how a particular set of rules (for valuing assets and liabilities and determining minimum capital) will affect the industry.[48] In 2011 the South African insurance industry undertook its first QIS. It published the results towards the end of 2011.[49] The technical specifications accompanying South Africa QIS1 (SA QIS1) were used as the basis of this research.

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46 supra

47 FSA. Quantitative Impact Studies. Accessed from: www.fsa.gov.uk/Pages/About/What/ International/solvency/qis/index.shtml, 9/4/2011

48 ActEd. Subject SA3, supra

49 Deloitte. Insurance Review: Preparing to turn the corner. Accessed from: www.deloitte.com/ assets/Dcom-SouthAfrica/Local%20Assets/Documents/Industries/Insurance%20Outlook%20 Final.pdf, 04/04/2012

5.1.2   When the author began this research, neither the SA QIS1 technical specifications, nor the results of the QIS were available. However, even though Solvency II QIS5 technical specifications were originally used, the SA QIS1 technical specifications are largely consistent with those of Solvency II QIS5. For the purposes of this paper, there is no difference between the calculations of the capital requirement under these QISs.

5.1.3   Figure 2 below shows the composition of the SCR for an insurance company (set out in SA QIS1) and Table 1 defines the headings of each of the main branches of Figure 2.

5.1.4   It can be seen from the figure that the SCR standard formula is calculated with a modular approach. Capital requirements are assessed for each risk type and several sub-risks, and these are then aggregated with a correlation matrix. A 99.5% VaR up to a one-year time horizon is set for each sub-risk and for the overall requirement.[50]
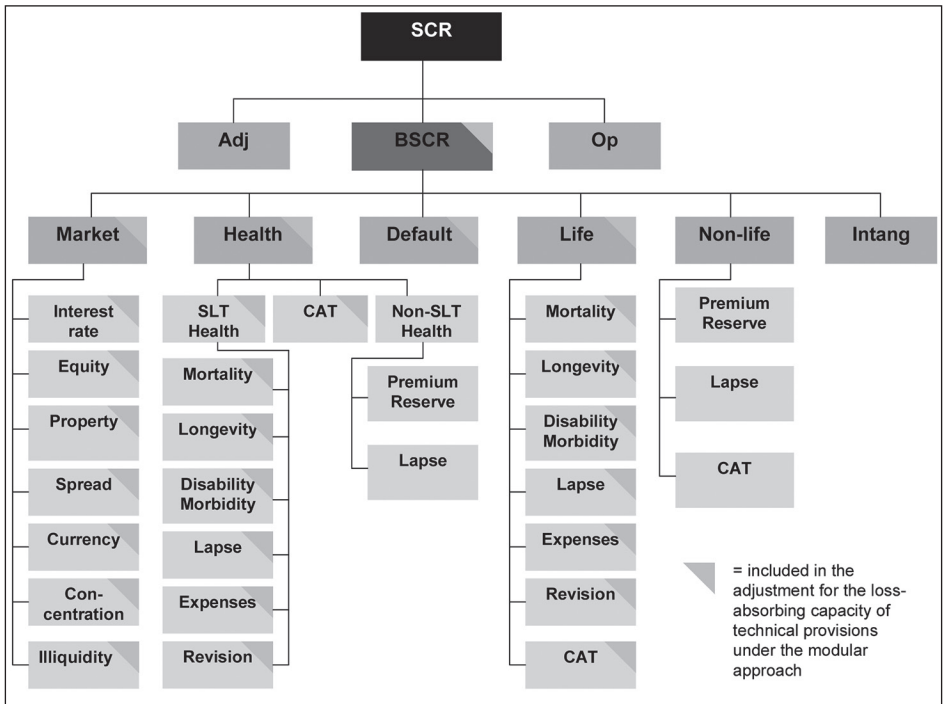

Figure 2. Composition of the SCR[51]

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50 K. Morgan & A. Olesen. The Solvency II Actuary. Accessed from: www.actuaries.org/ASTIN/Colloquia/Manchester/Papers/morgan_olesen_paper_final.pdf

51 FSB. SAM SA QIS1: Technical Specifications, Accessed from: www.fsb.co.za/insurance/SAM/SAQIS1/SAQIS1TechnicalSpecificationsPdfversion.pdf, 03/04/2011

Table 1. Explanation of branch headings in Figure 2

Heading	Explanation	Heading	Explanation
SCR	solvency capital requirement	Market	market-risk module
BSCR	basic solvency capital requirement	Health	health-underwriting-risk module
Adj	deferred-tax adjustment	Default	counterparty-default-risk module
Op	operational-risk module	Life	life-underwriting-risk module
Non-life	non-life-underwriting-risk module	Intang	intangible-asset-risk module

5.1.5   Since medical schemes are risk-taking entities, they are exposed to similar risks to those faced by insurers. The risk modules that could be relevant to a medical scheme in Figure 2 are:
– Market
– Default
– Intang
– Adj
– Op; and
– Health (reflecting medical-scheme underwriting risk).

5.1.6   The data available (medical-scheme statutory returns were used in this paper) are not sufficiently detailed either to produce an economic balance sheet (required under SAM pillar I) or to determine each risk module relevant to medical schemes. The balance sheet produced for statutory purposes was therefore used in this paper and only medical-scheme underwriting risk was modelled. The simplifications made should be viewed in the light of the fact that a QIS can be an onerous exercise for a company (QIS1 technical specifications were released in May 2011 and submissions were required by 16 September 2011[52]) often requiring detailed company-specific information, an economic restatement of the company's balance sheet, and complex calculations. Although the approach is not ideal, it does allow for the effect of SAM pillar-I requirements on medical-scheme solvency to be considered broadly. The author submits that these simplifications are reasonable given what is available.

5.1.7   Although the consideration of only one risk module could be considered a limitation of the paper, the author submits that this is not entirely unreasonable: the results of QIS1[53] showed that the capital charge for non-life-underwriting risk constituted most of the BSCR as seen in Figure 3 below.

5.1.8   In addition, market risk is likely to be much smaller for medical schemes than for short-term insurers because of the restrictions imposed on medical schemes on

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52 Deloitte. Insurance Review, supra
53 FSB. SAM. Report on the Results of 1st South African Quantitative Impact Study (SA QIS1). Accessed from: ftp://ftp.fsb.co.za/public/insurance/SAM/SAQIS1/SAQIS1_Results_20111215.pdf, 07/04/2012

the choice and categories of assets that they are allowed to invest in (see ¶4.8). If the risk profile of medical schemes is broadly similar to that of short-term insurers (see ¶5.2.1), the approach adopted in this paper is likely to provide a fair approximation to what medical-scheme capital could look like under QIS1.

5.1.9   The inclusion of other risk modules is likely to increase the capital requirement; however, this increase will be less than the sum of the individual risk components because SAM recognises diversification across risk classes (the benefit of diversification is also shown in Figure 3).

5.2   MEDICAL-SCHEME UNDERWRITING RISK

5.2.1   Under SAM, health-insurance obligations are segmented according to their technical nature into:
– health insurance that is pursued on a technical basis similar to that of life insurance (SLT health); or
– health insurance that is not pursued on a technical basis similar to that of non-life insurance (non-SLT health).

('SLT' is an acronym used in SA QIS1 for 'similar to life techniques'.) The author submits that medical-scheme contracts are technically closer to non-life insurance policies than to life insurance policies. This is because both non-life insurance policies and medical-scheme plans are written on an indemnity basis (internationally) and both contracts are of a very short term (usually one year). As a result, the non-SLT health-underwriting-risk sub-module was used to determine the capital requirement for medical-scheme underwriting risk. However, only premium and reserving risk are considered in this paper (lapse risk is excluded because of the limited data available).
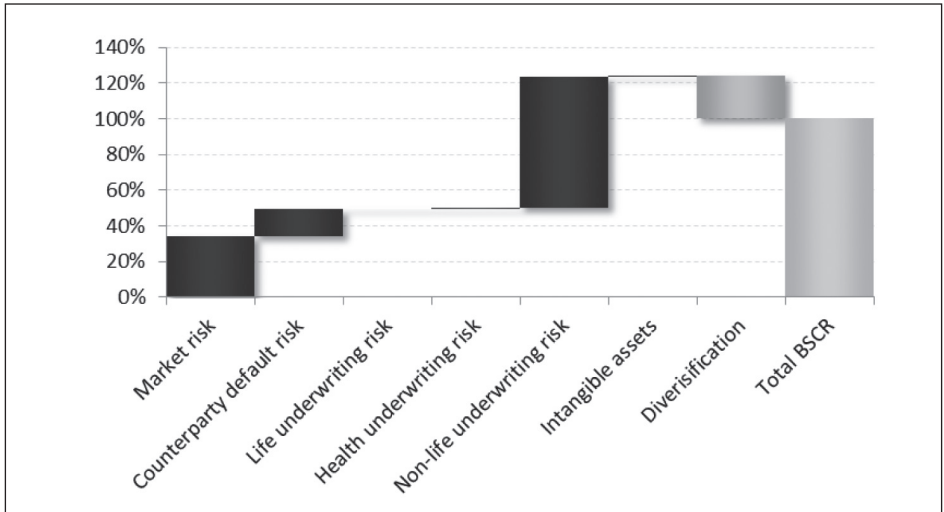

Figure 3. Contribution of risk components to BSCR (%) – non-life insurers

5.2.2   In the SA QIS1 technical specifications, 'premium risk' is defined as follows:

> Premium risk results from fluctuations in the timing, frequency and severity of insured events. Premium risk relates to policies to be written (including renewals) during the period, and to unexpired risks on existing contracts. Premium risk includes the risk that premium provisions turn out to be insufficient to compensate claims or need to be increased. Premium risk also includes the risk arising from the volatility of expense payments. Expense risk can be quite material for some lines of business and should be fully reflected in the module calculations. Expense risk is included implicitly as part of premium risk.

and 'reserve risk' as follows:

> Reserve risk results from fluctuations in the timing and amount of claim settlements.

5.2.3   The particular use of the standard formula here differentiates this work from that conducted by both Kendal & McLeod (op. cit.) and Theophanides (see ¶¶4.6 and 4.8).

5.3   THE MODEL AND DATA
5.3.1   THE MODEL

5.3.1.1 In order to carry out the premium and reserving risk calculation, insurers need:

– best estimates for claims outstanding for each line of business (LoB);
– estimates of net written premium for each LoB during the forthcoming year;
– estimates of net earned premium for each LoB during the forthcoming year;
– net written premium for each LoB during the previous year; and
– the present value of net premiums of existing contracts that are expected to be earned after the following year for each LoB.

5.3.1.2 The business written by a medical scheme can be considered as a single line of non-life insurance business. The capital charge for non-SLT health-underwriting risk is then:[54,55]

$$H = \rho(\sigma)(V_P + V_R);$$ (2)

where:

$$\sigma = \frac{\sqrt{(\sigma_P V_P)^2 + 2\alpha\sigma_P\sigma_R V_P V_R + (\sigma_R V_R)^2}}{V_P + V_R};$$

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54 Financial Services Board (unpublished). Solvency Assessment and Management First South African Quantitative Impact Study (SA QIS1) Technical Specifications, Accessed from: http://www.fsb.co.za/insurance/SAM/SAQIS1/SAQIS1TechnicalSpecificationsPdfversion.pdf, 03/04/2011

55 FSB. SAM SA QIS1. Technical Specifications, supra

$$\rho(\sigma) = \frac{\exp\left\{\Phi^{-1}(\alpha)\sqrt{\ln(1+\sigma^2)}\right\}}{\sqrt{1+\sigma^2}};$$

$\Phi^{-1}(\alpha)$ is the αth quantile of a standard normal distribution;

α is the confidence level, equal to 0,995 under SAM;

$\sigma_P = 0,04N$ is the standard deviation for premium risk;

N is an adjustment factor for non-proportional reinsurance;

$\sigma_R = 0,1$ is the standard deviation for reserving risk;

$V_P = \max\left(P_1^w, P_1^e, P_0^w, P^*\right)$ is the volume measure for premium risk;

P_1^w is an estimate of net written premium during the forthcoming year;

P_1^e is an estimate of net earned premium during the forthcoming year;

P_0^w is the net written premium during the previous year; and

V_R is the volume measure for reserving risk (i.e. the best estimate of claims outstanding (net of amounts recoverable from reinsurance and other special-purpose vehicles).

This is the amount of capital to be held so that, over a one-year period, one would expect the company to experience insolvency once every 200 times (a 99,5% value at risk)[56] from premium or reserving risk.

 5.3.1.3 The statutory returns do not include data of sufficient detail to permit the calculation of the volume measures for premium and reserving risk, nor do they give an indication of an adjustment factor for non-proportional reinsurance. However, Hürlimann (2009) sets out a method of estimating the volatility from past experience (for each insurer) and defines the volume measure slightly differently from the technical specifications of QIS1. These formulae were used to calculate the medical-scheme underwriting-risk capital charge in this paper. Since the standard deviation is estimated from past data, the model used should really be considered a partially internal model rather than an application of the standard formula. This is because medical-scheme-specific characteristics are reflected in the capital calculation through this parameter (the parameter, for each scheme, is a function of the claims reserves, net risk premiums and paid claims as stated below). The estimation may provide a more realistic view of the South African medical-scheme environment, as the prescribed standard deviations are taken from the Solvency II QIS 5 technical specifications, which means that they have been estimated from EU experience.

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56 PricewaterhouseCoopers. Gearing up for Solvency II: The new business environment. Accessed from download.pwc.com/ie/pubs/PwC_gearing_up_for_Solvency_II.pdf, 03/08/2011

5.3.1.4 The volume measure at the beginning of the year for which the one-year 99,5% VaR is determined (referred to below as the year of calculation—in this paper 2009) is calculated as:

$$V = P + R \; ; \tag{3}$$

where:

P is the net risk premium during the year of calculation; and
R is the claims reserve at the beginning of the year of calculation.

5.3.1.5 Hurlimann's (2009) estimate of the standard deviation is calculated as:

$$\hat{\sigma} = \sqrt{\sum_{k=1}^{m} \left\{ \left(\frac{P_k + R_k}{P^{\cdot} + R^{\cdot}} \right) \left(\frac{Y_k + R_{k-1}}{P_k + R_k} - \hat{\mu} \right)^2 \right\}} \; ; \tag{4}$$

where:

P_k is the net risk premium during the year k years before the year of calculation for $k = 1, 2,…, m$;
R_k is the claims reserve at the beginning of the year k years before the year of calculation for $k = 0, 2,…, m$;

$$P^{\cdot} = \sum_{k=1}^{m} P_k \; ;$$

$$R^{\cdot} = \sum_{k=1}^{m} R_k \; ;$$

$$\hat{\mu} = \frac{\sum_{k=1}^{m} \left(P_k + R_{k-1} \right)}{P^{\cdot} + R^{\cdot}} \; ; \text{ and}$$

Y_k is the paid claims during the year k years before the year of calculation for $k = 1, 2,…, m$.

5.3.2. THE DATA

5.3.2.1 The data used in this paper were the statutory returns[57] published by the CMS for the period 2006 to 2009. Data from the period 2006 to 2008 (inclusive) were used to estimate σ and the resulting model was then used to determine the economic capital that each scheme would have been required to hold in 2009. For each scheme

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57 A spreadsheet of the published information from medical-wscheme statutory returns was provided to the author by Discovery Health. The author checked whether the data provided by Discovery Health was consistent with the statutory returns published on the CMS's website for several schemes. The author does, however, rely on the aggregate data checks performed by Discovery Health for this research.

these results were compared both with the net assets held by the scheme in 2009 and with the minimum capital requirements that would have applied at that time.

5.3.2.2   In equations (3) and (4), net risk premiums were calculated as the sum of risk contribution income for the year in question. The claims reserves were calculated as the current liabilities of each scheme less trade and other payables. (This is equivalent to the sum of outstanding claims and savings provisions.) For each year, paid claims were calculated as the claims incurred during that year less the change in reserves over that year. The capital held by each scheme for 2009 was taken to be the net-assets figure that appeared in the medical-scheme accounts.

5.3.2.3   In total, 99 medical schemes formed part of the analysis, covering 6 593 531 beneficiaries. Schemes for which there were insufficient data over the four-year period were excluded from the analysis and are listed in Appendix A. Table 2 is a summary of some of the key features of the data used. Table 3 shows the numbers of beneficiaries and principal members included in the analysis year by year, per cent of the total numbers of beneficiaries and principal members respectively in the schemes for which data were available. (The reader may find it useful to refer to these tables when reading section 6).

Table 2. Summary of data used

Totals	total number of schemes covered	99
	total number of beneficiaries covered (2009)	6 593 531
	total number of principal members (2009)	2 925 942
	total capital held by the industry in 2009 (R'000)	27 355 558
Scheme type	number of open schemes	30
	number of restricted schemes	69
Scheme size	number of large schemes	32
	number of medium schemes	25
	number of small schemes	42

Table 3. Beneficiaries and principal members included in the analysis per cent of total

	2006	2007	2008	2009
% of total beneficiaries in year j	92,24%	88,00%	84,49%	81,74%
% of total principal members in year j	91,97%	88,56%	85,77%	83,91%

5.4   VALUE-AT-RISK AND TAIL VALUE-AT-RISK

5.4.1   In order to determine the minimum risk-based capital requirement of an entity, one requires both:
– an appropriate risk measure; and
– a relevant time horizon.

5.4.2   For a given time horizon t and confidence level α, the value-at-risk (VaR) risk measure can be defined as "the loss in market value over the time horizon t that is exceeded with probability $1 - \alpha$" (Duffie & Pan, 1997). As mentioned in ¶5.3.1.2, SAM uses a one-year, 1-in-200 VaR to determine minimum capital.

5.4.3   Although VaR has become a standard measure for assessing risk (Panjer, unpublished), Artzner et al. (1999) argue that it is inappropriate as a risk measure as it "creates aggregation problems" with respect to the addition of risks and it "prohibits diversification." They further propose that it is desirable for risk measures to be 'coherent', where a coherent risk measure is defined to be translation invariant, subadditive, positive homogeneous and monotonous (VaR does not satisfy the subadditive property).

5.4.4   In order for the analysis to be more robust, the author decided that two economic-capital formulae should be used: one with the VaR measure (as this is what is to be used in the EU and in South Africa) and another with a coherent risk measure.

5.4.5   There are a number of different coherent risk measures that could be chosen, however tail value-at-risk (TailVaR) was used in this paper. In the first place, TailVar has been characterised as "the smallest coherent risk and law invariant risk measure to dominate value-at-risk" (Tasche, 2002). (Tasche (op. cit.) describes 'law invariant' as "can be estimated from statistical observations only.") Secondly, as Panjer (op. cit.) states, TailVaR is particularly well suited to solvency applications. Thirdly, it is the risk measure that is used to assess solvency under other regulatory regimes (for example, the Swiss Solvency Test uses a 99,5% TailVaR over a one-year period[58]). Also, it has been discussed by certain stakeholders in the European insurance industry as an alternative risk measure to be used for assessing regulatory solvency.[59]

5.4.6   TailVaR is defined as the average of all losses greater than or equal to VaR i.e. the average loss in the worst $(1 - \alpha)$% of cases (Rau-Bredow, 2004).

5.4.7   In the EIOPA QIS2 specification it was stated that:

The 'target' standard is TailVaR at an equivalent level of prudence to VaR 99.5%. A broad assumption has been made that TailVaR 99% would meet this objective, and this is reflected in certain SCR parameters.[60]

However, the author determined the capital requirements under each risk measure using $\alpha = 99,5\%$. (The EIOPA assumption was motivated by the fact that under the normal distribution a VaR of 99% gives rise to a capital amount approximately equal to that of a 99,5% TailVaR.) Even though TailVaR will produce a greater capital requirement than that under the VaR measure (see ¶5.4.8) for the same level of α, the author has used a 99,5% TailVaR. In the first place, as mentioned above, this is the level of confidence used under the Swiss Solvency Test, as mentioned earlier. Secondly, the distribution of

58 A. Theophanides. Risk based capital, supra
59 Comité Européen des Assurances (CEA). CEA Working Paper on the risk measures VaR and TailVaR Accessed from: ec.europa.eu/internal_market/insurance/docs/2006-markt-docs/2534-06-annex-cea_en.pdf, 15/07/2012
60 CEA Working Paper on the risk measures VaR and TailVaR, supra

the risks will typically be more skewed than the normal distribution, meaning that a 99% TailVaR may not necessarily be equivalent to a 99,5% VaR. Also, a 99,5% TailVaR will allow a meaningful comparison with the 99,5% VaR results. This is because the size of the difference between the capital requirements under each risk measure will provide an understanding of the underlying risk distribution. (Risk distributions are likely to differ according to the splits below).

      5.4.8   A one-year TailVaR at a confidence level of α will produce a higher capital requirement than a one-year VaR at the same confidence level since, for the random loss amount, X, the TailVaR is equal to the VaR plus the expected excess above X i.e.

$$T(X) = V(X) + \mathrm{E}[X - V(X)|X > V(X)]; \tag{5}$$

where: $T(X)$ is the TailVaR of the random variable X; and
        $V(X)$ is the VaR of the random variable X.

      5.4.9   This greater capital requirement will naturally reduce the proportion of medical schemes that would be solvent (compared with VaR).

6.   MODELLING RESULTS

6.1   THE EFFECT ON MEDICAL-SCHEME SOLVENCY: INDUSTRY LEVEL

      This section analyses the effect that pillar-I requirements would have had on medical-scheme solvency at the industry level. This is done by comparing the Solvency II capital requirements for various aggregates against the accumulated funds for those aggregates. In the tables and figures that follow, all amounts are at 31 December.

6.1.1   AGGREGATE SOLVENCY

      6.1.1.1 Figure 4 depicts the total value of the three different capital requirements as well as the total accumulated funds.

      6.1.1.2 It is difficult to draw any conclusions regarding capital requirements from Figure 4. This is because each scheme will have specific characteristics and will be exposed to different risks, which will be reflected in its economic capital requirements. In essence, it is largely uninformative to aggregate capital requirements and to consider the industry as an entity, as each scheme is regulated separately and will therefore have different capital requirements. The figure is included to illustrate the economic efficiency of the medical-scheme industry as a whole. In other words, excessive capital requirements for the industry are economically inefficient. The reader should not interpret this figure and the comments pertaining to it to mean that capital is mobile between schemes. Other figures below, which involve division of the industry by certain criteria, allow more meaningful results regarding capital requirements to be inferred.

      6.1.1.3 In Figure 4, TailVaR has higher capital requirements than VaR—this is anticipated (see ¶5.3.1.5)—and the current capital requirement (25%) is greater than those suggested under each economic capital model. The figure seems to suggest that, in aggregate, medical schemes are inefficient.

6.1.2 AGGREGATE SCHEME SOLVENCY BY SCHEME TYPE

6.1.2.1 Figure 5 depicts the economic capital per cent of gross contribution income for each risk measure. The schemes are stratified by membership status (as open or restricted schemes) and an additional bar represents the total capital per cent of gross contribution.
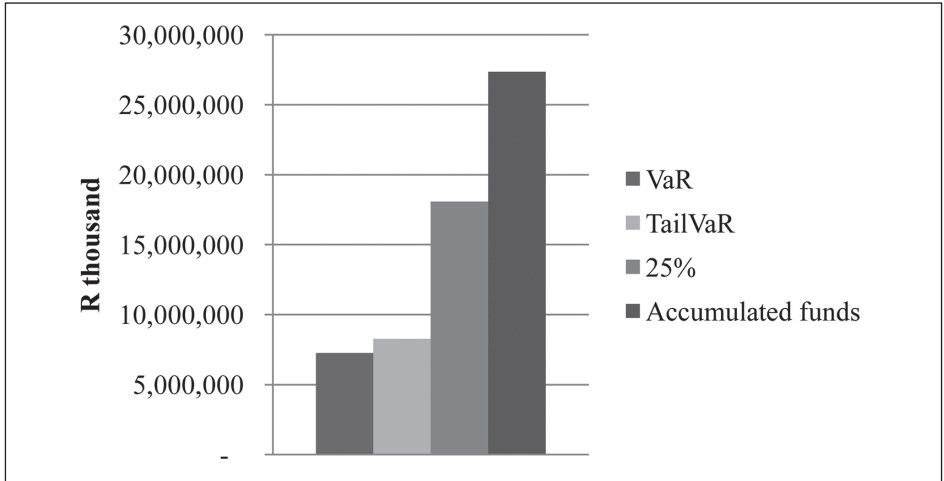

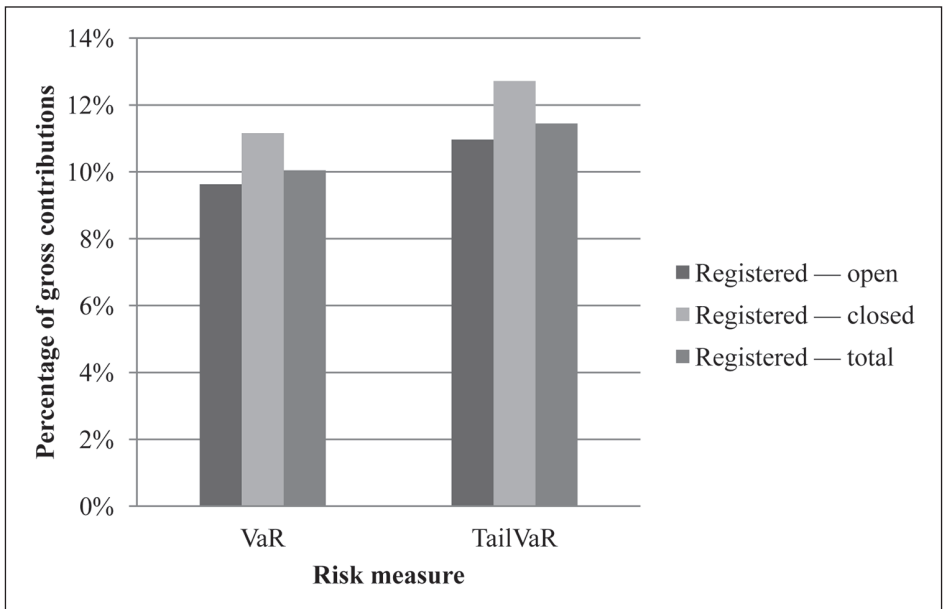Figure 4. Total capital requirements and accumulated funds

Figure 5. Capital requirements as a percentage of gross contributions by scheme type

6.1.2.2 The VaR measure would have resulted in a lower MCR for both open and restricted schemes. The total capital is about 10% of total gross contributions.

6.1.2.3 Under the TailVaR measure, both restricted and open medical schemes would have held sufficient funds for the accounting year 2009. In total, the schemes would have held about 2% more capital than under VaR. It appears that the current proportionate approach requires restricted and open schemes to hold more capital than their risk profiles would have required.

6.1.3   AGGREGATE SOLVENCY BY SCHEME SIZE

6.1.3.1 Figure 6 is similar to Figure 5, except that schemes are split by size instead of membership status. Schemes are classified as small (less than 6000 principal members); medium (more than 6000 principal members, but less than 30 000 beneficiaries); large (more than 30 000 beneficiaries). These size classifications are from the CMS annual report for 2009–2010.[61]

6.1.3.2 Under both VaR and TailVaR, small, medium and large schemes would have been required to hold less than the 25% minimum requirement. One sees that VaR requires lower capital than TailVaR for each scheme size, which is again as expected.

6.1.3.3 When the results illustrated in Figure 6 are compared with those of Theophanides, the following similarities and differences are identified:

– Theophanides found that medium-sized schemes have the highest capital requirements; this differs from what is depicted in Figure 6. However, she does note that her results for medium-sized schemes were distorted by the very large solvency requirements for one of the schemes.
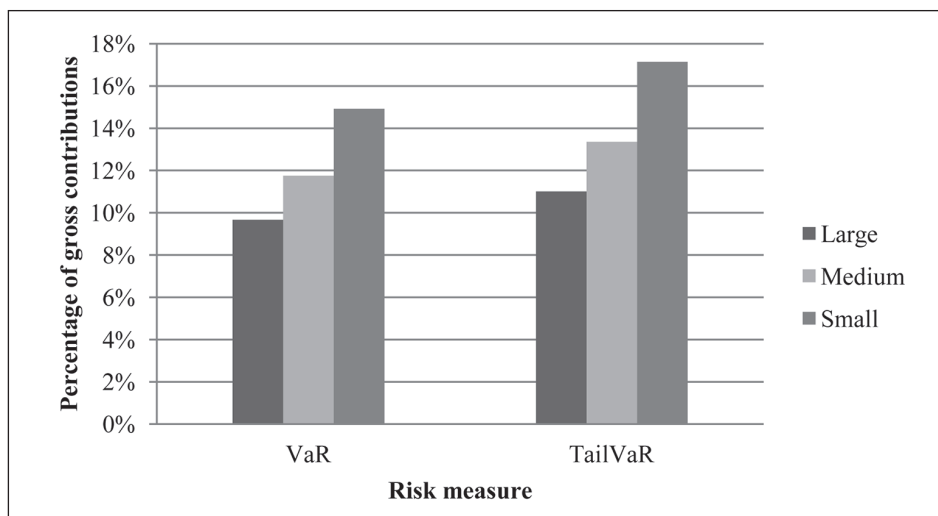

Figure 6. Capital requirements as a percentage of gross contributions by scheme size

61 www.medicalschemes.com/Publications.aspx

– The capital required to be held (as a percentage of gross contributions) is considerably lower than in her presentation. (Compare ¶4.10 with the VaR capital requirements in Figure 6.) The capital requirements may be lower here because Theophanides modelled more risk types, using a different model, or possibly even because the modifications that were made to make the method used more applicable to the South African medical-scheme environment. (It is also possible that the results are different because she considered fewer schemes.)

– This figure suggests that large schemes would have been required to hold less capital than small schemes, which is consistent with her results.

6.1.3.4   The last point in ¶6.1.3.3 requires elaboration. Stipp[62] argues that larger schemes tend to have better reserving and budgeting practices and should therefore have lower capital requirements. Larger schemes also tend to have increased operational efficiency through economies of scale. This argument is supported by Figure 6 and Theophanides's results. An alternative argument is that the more benefit options a scheme provides, the greater is the risk of anti-selection by members. This would result in more fragmented risk-pools requiring the scheme to hold more capital. Here this argument would hold if large schemes offer fewer benefit options or if schemes of different sizes offer the same number of benefit options. However, both of these scenarios seem unlikely.

6.1.3.5   In order to gain a better understanding of capital requirements by scheme size, large schemes were split into two further categories:

– quite large schemes (which had more than 30 000, but less than 100 000 beneficiaries); and

– very large schemes (which had more than 100 000 beneficiaries).

The decision to split scheme sizes further, and the new size definitions used, was based on advice given to the author by his supervisor at the time the research was conducted.

6.1.3.6   Table 4 is a summary of the number of quite large and very large schemes; the results of the split are illustrated in Figure 7.

Table 4. Number of "Quite Large" and "Very Large" Schemes

Scheme size	Number of schemes
Quite large	20
Very large	12
Total	32

6.1.3.7   Figure 7 is particularly interesting. To a certain extent this figure also supports Stipp's argument, as very large schemes would have been required to hold less capital than both small and medium schemes under both risk measures. However,

62 E. Stipp. Solvency. Accessed from www.bhfglobal.com/files/bhf/Emile%20Stipp%20-%20 BHF%20Solvency%20RBC.pdf, 07/08/2011

schemes that are defined as quite large would have had, on aggregate, higher capital requirements than smaller schemes, which is counter-intuitive. The quite-large scheme category distorts the overall picture of capital requirements for large schemes presented in Figure 6.

6.1.3.8   One possible explanation for this counter-intuitive result is that there are three quite large schemes with considerably larger capital requirements than the average of the category. One quite large scheme has capital requirements above 70% under both risk measures, while the other two are above 35%. For these schemes the average capital requirement is about 21% of gross contributions; without them, the average drops to about 16%. (The higher capital requirements for these three schemes appear to be caused by greater variability in reserve values over the period.)

6.2   THE EFFECT ON MEDICAL-SCHEME SOLVENCY:
      INDIVIDUAL SCHEME LEVEL

This section examines the effect that pillar-I requirements would have on medical-scheme solvency at the individual scheme level. The proportions of schemes that would have been solvent are considered and the range of capital requirements is discussed.

6.2.1   INDIVIDUAL SCHEME SOLVENCY

6.2.1.1   It was found that, in 2009, 82,83% of medical schemes were solvent at the 25% MCR. At a 99,5% VaR, 92,93% of medical schemes would have been solvent. The reason for this improved solvency is likely to be that the Solvency II formula is
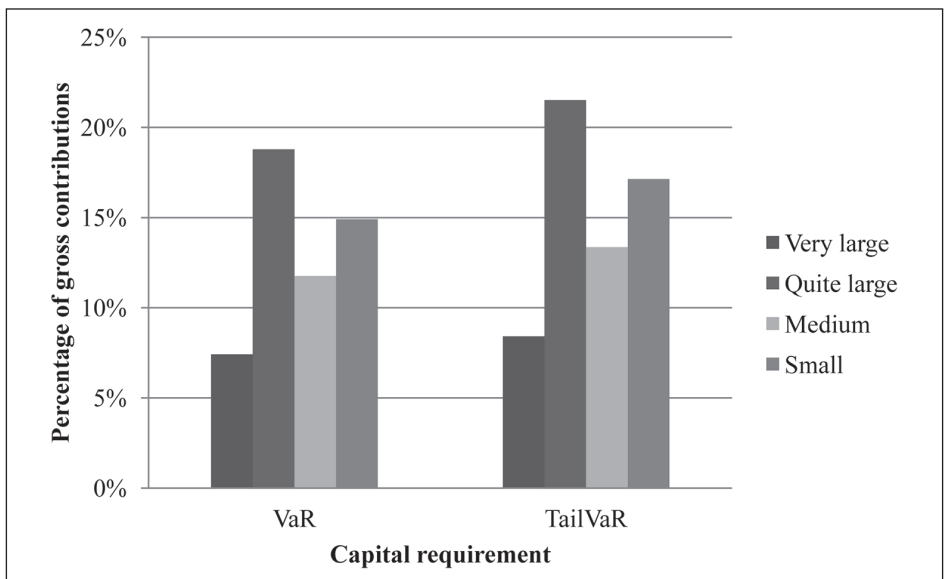

Figure 7. Capital requirements as a percentage of gross contributions by scheme size (with quite large and very large schemes)

more risk-sensitive than the 25% proportional approach. Table 5 is an illustration of the percentage of schemes that would have been solvent. Again, the schemes have been stratified by membership status.

Table 5. Percentage of schemes solvent: VaR vs. 25%

	Solvent: 25%	Solvent: 99,5% VaR	Percentage of total schemes
Open schemes	56,67%	86,67%	30,30%
Restricted schemes	94,20%	95,65%	69,70%
Total	82,83%	92,93%	100,00%

6.2.1.2 Although the total medical-scheme solvency is greater when the standard formula is used, the difference between the percentages is greater for open schemes; almost 30% more open schemes would have been solvent, while there would have been only a slight increase in the percentage of solvent restricted schemes.

6.2.1.3 The results on the basis of the TailVaR measure are summarised in Table 6.

Table 6. Percentage of schemes solvent: TailVaR vs. 25%

	Solvent: 25%	Solvent: 99,5% TailVaR	Percentage of total schemes
Open schemes	56,67%	80,00%	30,30%
Restricted schemes	94,20%	94,20%	69,70%
Total	82,83%	89,90%	100,00%

6.2.1.4 The structure of the changes in solvency is similar to Table 5. Since TailVaR produces more prudent results than VaR, the solvency improvements are lower than in Table 5. The increase in the number of solvent schemes is still about 7% of the total number of schemes.

6.2.2 RANGE OF CAPITAL REQUIREMENTS

6.2.2.1 Figure 8 depicts the number of schemes that would have been required to hold capital at various levels.

6.2.2.2 The most important finding shown in Figure 8 is the range of capital requirements. Under both the VaR and TailVaR measures some schemes would have needed to hold less than 25% of gross contributions as capital and some would have needed to hold substantially more. The vertical black line in Figure 8 represents the 25% capital requirement.

6.2.2.3 Both distributions are positively skewed, indicating that there would have been few schemes with onerous capital requirements (say greater than 40% of

contributions). From the figure, one can see that the TailVaR measure is more positively skewed than the VaR. This is as expected (see ¶5.4.8).

6.2.2.4 When the economic capital is calculated using the VaR measure, about 30% of the schemes would have been required to hold capital in the region of 15% of gross contributions. (This is similar under TailVaR.)

6.2.2.5 Figure 8 demonstrates that, for some schemes, on the result of the experience period, the risk-based capital requirements that they would have been required to hold would have been greater than the 25% regulatory requirement. In 2009, these schemes would have been vulnerable to events that occur more often than one in every 200 years (which would be unacceptable under either the VaR or TailVaR measure). It is therefore questionable whether the 25% capital minimum would have indeed protected members against the risk of insolvency as it was intended to do.

6.2.3 Individual Scheme Solvency by Scheme Type

6.2.3.1 Figure 9 shows the percentages of schemes of different types that would have been solvent under the various capital requirements.

6.2.3.2 Under each capital requirement, there would have been a lower percentage of open schemes that are solvent than closed schemes. This result may be distorted by the proportion of medical schemes that are open. (Tables 5 and 6 show that 30,30% of the 99 schemes are open.) The figure shows that the margin between the percentage of open schemes that are solvent and the percentage of all schemes that are solvent is larger under the 25% requirement than under the economic capital formulae. This means that more risk-sensitive capital requirements are needed (particularly by open schemes). In
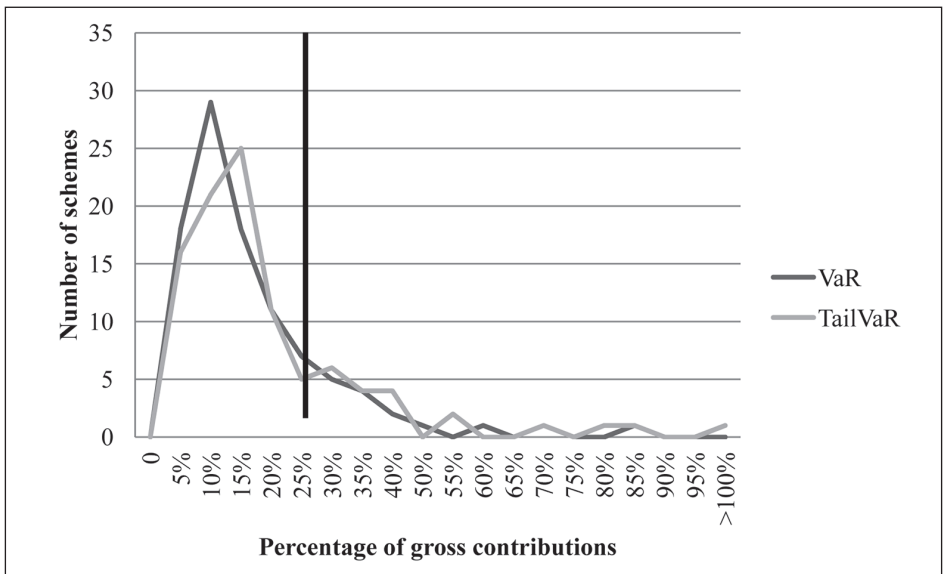

Figure 8. Distribution of capital requirements for medical schemes

essence, the 25% minimum was economically inefficient as the industry was required to hold more capital than was necessary.
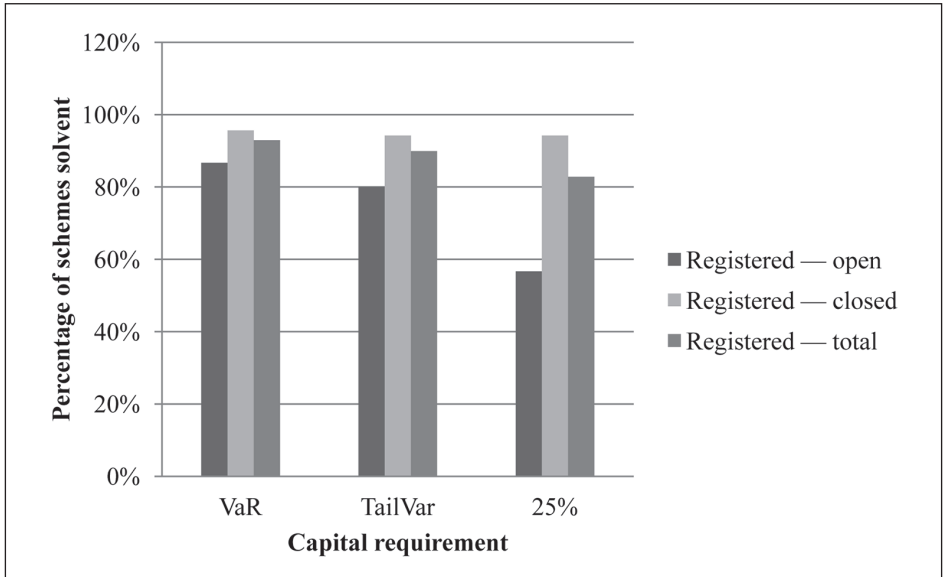

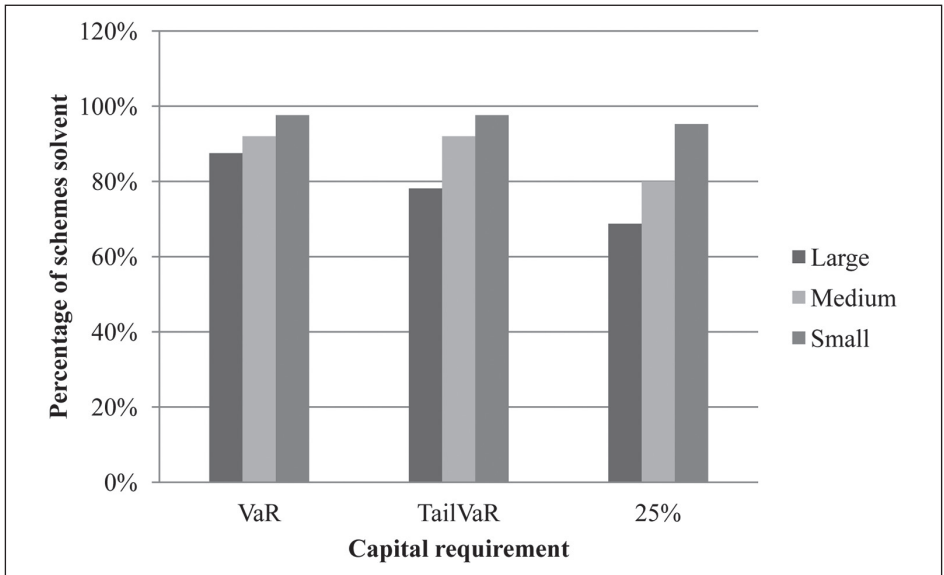Figure 9. Percentage of schemes solvent by scheme type

Figure 10. Percentage of solvent schemes according to the various scheme sizes

6.2.4   INDIVIDUAL SCHEME SOLVENCY BY SCHEME SIZE

6.2.4.1   Figure 10 illustrates the percentage of schemes of differing sizes that would have been solvent.

6.2.4.2   In each case, the percentage of small schemes that would have been solvent is about 95%. The differences between the percentages of small schemes that are solvent under the three capital requirements are very little. This is not the case with medium- to large-sized schemes. Whereas Figure 7 shows that large schemes had the lowest capital requirements, Figure 10 shows that they experienced the lowest solvency percentage. This may be attributed to the differing number of schemes in each size category. Large schemes do have the greatest increase in the percentage of schemes that are solvent on either risk-based approach relative to the 25% requirement. This is anticipated (see ¶6.1.3.4).

6.2.4.3   Again, large schemes were further split into quite large and very large schemes, as was done at the industry level (see ¶6.1.3.5). The results are shown in Figure 11.

6.2.4.4   The proportion of quite large schemes that are solvent distorts the overall percentage of large schemes that are shown as solvent in Figure 10. This is similar to what is shown in Figure 7. There is a noticeable difference between the proportions of very large schemes that are solvent under both risk measures compared with the MCR. Figure 11 illustrates how relatively onerous the 25% minimum capital requirement was for larger schemes. If risk-based capital requirements had been in existence in 2009, almost all very large schemes would have held sufficient capital to be considered solvent (relative to VaR).
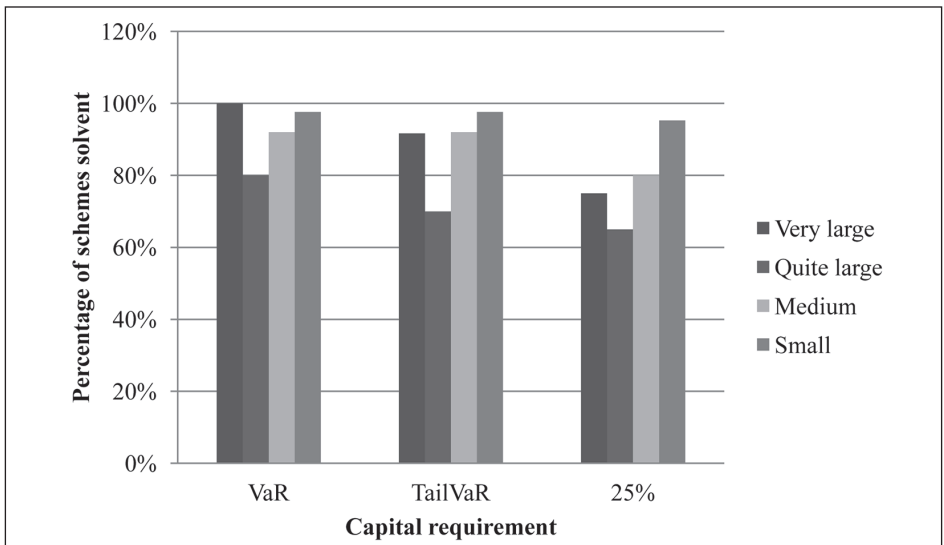

Figure 11. Percentage of schemes that are solvent according to the various scheme sizes (with large and very large schemes)

6.3   SUMMARY
    6.3.1   At the industry level:
– the medical-scheme industry in aggregate was found to be solvent under each of the capital requirements;
– both open and restricted schemes would have had to hold less capital as a proportion of contributions (under either VaR or TailVaR) than the 25% minimum requirement;
– large-sized schemes would have had the lowest capital requirements expressed as a percentage of gross contributions;
– quite large schemes would have had to hold the greatest capital requirements as a proportion of gross contributions ('quite large' is defined as more than 30 000 beneficiaries but less than 100 000); and
– schemes of all sizes would have been required to hold less than the 25% fixed capital requirement under the VaR and TailVaR risk measures.

    6.3.2   At the individual scheme level:
– under this application of Solvency II, under both VaR and TailVaR and for both open and restricted schemes, more schemes would have had adequate capital than under the current statutory minimum requirements;
– 83 schemes would have been required to hold less capital than the 25% requirement; 16 would have been required to hold substantially more;
– under each risk measure the proportion of restricted schemes that were solvent was greater than the proportion of open schemes that were solvent;
– small schemes experienced the highest solvency proportion under each risk measure; and
– the percentage of very large schemes that were solvent would have been nearly 100% under an economic capital formula based on VaR, as opposed to about 75% under the current 25% minimum.

7.   CONCLUSION

7.1   In the aggregate, the capital charge for non-SLT health-underwriting risk would have required medical schemes to hold less capital (in 2009) than the current 25% MCR. Large schemes would have had the lowest capital requirement as a proportion of gross contributions; however, they would also have had the lowest solvency proportion compared with other scheme sizes. Open scheme results were similar to the results of large schemes: they had the lowest capital requirements, yet the lowest solvency proportion relative to restricted schemes. The effect of SAM pillar-I requirements on South African medical schemes is not uniform: the solvency-position improvements are not the same either for different schemes of different sizes nor for schemes with different membership statuses.

7.2   As an alternative and, arguably, better risk measure, TailVaR could be used instead of VaR to determine economic capital requirements. Under TailVar the capital required is greater than that under VaR.

7.3   There is evidence that, based on the experience, the current capital requirements for medical schemes are inappropriate. This is because economic capital requirements, which are driven by the risk borne by a medical scheme, suggest the need for capital requirements to vary according to different scheme characteristics. In 2009, some schemes would have been required to hold more than 25% of gross contributions as capital and some less. These results imply that the current solvency requirement results in reduced competition among the schemes because many of them are overfunded. The requirement also leads to a strain on the consumer of medical-scheme products whose contributions are too high. A move to risk-based capital requirements will enable the protection of members' interests against the risk of medical-scheme insolvency as well as an economically more efficient environment than the current approach.

8.   LIMITATIONS AND FURTHER RESEARCH

8.1   The author is aware of several limitations in the research, which have been alluded to in the paper. These limitations, along with areas for further research, are addressed formally in this section.

8.2   In the first place, only medical-scheme premium and reserving risk are considered. Other risk types are not modelled explicitly. In addition, statutory returns are used as opposed to an economic balance sheet. The justification for these simplifications is outlined in ¶5.1.6.

Secondly, the data used to estimate the standard deviation is taken over a three-year period. However, sufficiency of data needs to be balanced with relevance. This is especially true in non-life insurance, which has been rapidly changing over the past several years. The author tried unsuccessfully to contact the CMS for more data. Thirdly, no back-testing of the model was performed to assess the adequacy of the fit. This was because of the limited data available. Also, the standard formula is not used for premium and reserve risk; parameters specific to medical scheme are estimated.

8.3   The ideal analysis of the implications of the application of SAM pillar-I requirements to medical schemes would be achieved by encouraging (or requiring) medical schemes to participate in a QIS. Alternatively, the CMS could consider collecting economic balance-sheet data from medical schemes and consider the effect using a broad-brush approach. This is similar to what was done for the REF shadow returns mentioned in ¶3.2.4. A further option is to collect the required data and information from a sample of schemes (if they are willing to provide this) and test the effect of pillar-I requirements on the sample. These are potential areas of future research.

8.4   Other areas of research could stem from trying to overcome the limitations set out in ¶8.2. For example, the capital required to support the risk of lapse in medical schemes could be modelled.

8.5   The paper does not consider the implications and costs of implementing a new solvency regime on the industry (for example, will SAM lead to greater consolidation in the industry?) nor does it go into great detail on the implications of the difference in required capital (this is mentioned briefly in the conclusion). Both of these points could be interesting topics for further research.

8.6   In the light of the evolving regulatory framework for insurance providers, both domestically and abroad, medical-scheme solvency will continue to be a fertile area of actuarial research

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APPENDIX A

LIST OF SCHEMES EXCLUDED FROM THE ANALYSIS

The following are the medical schemes that were excluded from the analysis because of insufficient data or other data issues:
– Keyhealth
– Purehealth Medical Scheme
– Afrisam SA Medical Scheme
– Gold Fields Medical Scheme
– Government Employees Medical Scheme (GEMS)
– Gen-Health Medical Scheme
– Lonmin Medical Scheme
– MBMed Medical Aid Fund
– Motohealth Care Medical Aid Fund
– Nedgroup Medical Aid Scheme
– Solvita Medical Scheme
– Stocksmed Medical Scheme