

# MARKET VALUES IN LIFE INSURANCE AND PENSIONS

THE DANISH SOCIETY OF ACTUARIES

Market values in Life Insurance and Pensions  
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**Preface \***

In 1998, the Danish Minister of Economic and Business Affairs appointed a committee whose main task was to prepare methods for valuation of commitments in life insurance and pension companies at market value.

The rationale of appointing the committee was a change in the tax law serving to change the taxation basis of bond returns from using adjusted cost price to using market values. Following the change in tax rules, Danish legislators wanted the valuation of bonds to be changed to market values in financial reporting.

The committee was given only a few years to complete its assignment.

It is no exaggeration to say that the plan to introduce market values at such short notice was met with a great deal of scepticism.

We had seen colleagues in other countries devote years to this project – and yet still have many years of work ahead of them. Our colleagues abroad shook their heads at us.

To the industry – and the actuaries – this seemed a rather futile exercise, to say the least, and it was incomprehensible to many people why Denmark did not follow the international development – and why the highly complex field of life insurance was to take the lead. A similar requirement was not imposed on other financial industries, which do not apply market values.

The industry was also somewhat sceptical about the arguments put forward to justify why it was necessary to change the system then and there.

All this put aside, this report is the story of a success. It is the story about how – against all odds – we managed to come through in Denmark and introduce a system which is a clear improvement to all parties concerned, including the customers. It is also the story about how we all gained much greater insight into how things cohere.

We realise that there are still some "I's to dot and T's to cross". We have knowingly postponed some issues for future development and consideration. However, we have managed to cover a lot of ground. During and after the implementation period, we have continually come

\* Translation of the original Danish preface, dated September 2004

to new realisations and have gained new knowledge about coherences which we probably would not have acquired without the transition to market values.

Thanks to the work of the committee, Denmark is far ahead of the game in this field. To our knowledge, no other country calculates provisions, comprising bonus-eligible insurance policies, at market value in financial reporting.

The Danish Society of Actuaries is proud to have been part of the process.

Please note that this report has been prepared solely by the Danish Society of Actuaries. The Society's sole purpose has been to provide an objective account of the process and we hope we have succeeded in doing so.

We at the Danish Society of Actuaries would like to extend our sincere thanks to the members who have been in charge of preparing the report.

Peter Melchior  
Chairman

## 1. Introduction

In 1998, the Danish Government adopted a series of law amendments – in the form of the *Whitsun fiscal package* – with significant implications for the Danish insurance industry. The main acts adopted as part of the Whitsun fiscal package were the Pension Savings Returns Tax Act<sup>1</sup>, replacing the Real Interest Tax Act, and an act to amend the Insurance Business Act and other acts<sup>2</sup>, comprising changes to the investment rules.

The adoption of the Pension Savings Returns Tax Act meant a transition from a system of real interest rate-dependent tax rates to a system of fixed tax rates on pension savings return. At the same time, the assessment rules were changed to the effect that taxable returns were to be calculated based on changes in the market value of assets, thus replacing the former practice for bonds where their taxable returns were calculated at book value, fixed at cost and using a purchase price adjusted for maturity shortening.

Given that the valuation rules were changed in relation to tax calculations, it was decided that the amended rules (market values rules – the principle of “marking-to-market”) were also to apply to insurance financial reporting. As far as the insurance companies were concerned, this amendment could be passed into law through an executive order, but the amendment was announced through the simultaneous amendment to the Danish Insurance Business Act on investment rules, etc. As far as ATP (the Danish Labour Market Supplementary Pension Fund) is concerned, the valuation rules are statutory.

In connection with the adoption of the law package, it was stated that the transition to market values on the asset side would require an adjustment of the valuation rules on the liability side, so as to ensure compliance between the asset and liability sides. As such valuation methods were not available, the explanatory notes to the act specified that a committee was to be appointed – the Market Value Committee – to deal with this issue. A deadline was given for the completion of the Committee’s work, as the transition to market values on the asset side was to be phased in, for tax purposes, over a five-year period from 2001.

In the light of this, the Market Value Committee was appointed to operate under the auspices of the Danish Financial Supervisory Authority (FSA). The Committee’s terms of reference were as set out in Appendix 1, specifying, among other things, that the Committee was to “draw

<sup>1</sup> Bill L 97, adopted as Act No. 428 of 26 June 1998.

<sup>2</sup> Bill L 112, adopted as Act No. 490 of 1 July 1998.

up guidelines for valuation of pension commitments (liabilities), so as to ensure that the statement of the liability side was prepared in compliance with valuation of assets at market value.” The Committee was made up of representatives of the Danish Financial Supervisory Authority (FSA), the Danish Insurance Association, the Danish Association of Company Pension Funds, ATP and LD, the Danish Society of Actuaries, the Danish Institute of State Authorised Public Accountants (FSR) and the Danish Ministries of Finance and Taxation.

At the time the Market Value Committee started its work, deliberations to introduce market value accounting for insurance companies also started internationally. The time horizon of the international work was considerably longer than the deadlines specified by Danish legislators. The first proposal from the International Accounting Standards Committee (now the International Accounting Standards Board) took the form of an Issues Paper, released in 1999<sup>3</sup>. Deliberations contained in this Issues Paper formed part of the work of the Market Value Committee. In 2000, the Committee submitted a collective Danish response to IASC<sup>4</sup>. The work to draw up international market value accounting standards for insurance companies, including formulating a definition of insurance contracts, is still ongoing. On 31 March 2004, the IASB issued the first standard (the IFRS 4) for insurance contracts<sup>5</sup>.

In addition to drawing up the actual guidelines (financial reporting standards), the Committee was to analyse the implications of the new tax rules in the context of the insurance companies’ ability to meet the pension commitments made. Falling interest rates meant that this issue dominated the first period of the Committee’s activities and the Committee reported separately on this issue in March 1999<sup>6</sup>.

The Committee was also to analyse the nature and extent of various pension commitments in order to enable it to assess the implications of the accounting rules in a scenario of plunging prices. Pension commitments based on a contractual technical rate of interest of 5% were to be assessed in particular and the rules were to be assessed in relation to ensuring compliance with the contribution principle. Finally, compliance obviously had to be ensured with all applicable EC directives. One of the issues debated in that context was the use of *bonus potential on paid-up policy benefits* and the subsequent restoration of the bonus potential. These discussions were not completed under the auspices of the Committee. The Danish Financial Supervisory Authority has subsequently established rules to this effect in the executive order on the contribution principle.

<sup>3</sup> See [http://www.iasb.org/current/iasb.asp?showPageContent=no&xml=16\\_61\\_67\\_01012004.htm](http://www.iasb.org/current/iasb.asp?showPageContent=no&xml=16_61_67_01012004.htm)

<sup>4</sup> See [http://www.iasb.org/docs/ins/in\\_cl117.pdf](http://www.iasb.org/docs/ins/in_cl117.pdf)

<sup>5</sup> See [http://www.iasb.org/news/index.asp?showPageContent=no&xml=10\\_116\\_25\\_31032004\\_31032005.htm](http://www.iasb.org/news/index.asp?showPageContent=no&xml=10_116_25_31032004_31032005.htm)

<sup>6</sup> (Report on tax on pension savings returns, interest rate developments and guarantees issued – available in Danish only), the Danish Financial Supervisory Authority, March 1999.

The Committee started its work in the autumn of 1998 when a sub-committee was appointed to prepare drafts and presentations for an executive order on accounting. The most recent meeting of the Committee and the sub-committee was towards the end of 2001, enabling the Danish Financial Supervisory Authority to issue the executive order on accounting of 13 December 2001.

The Committee has not convened since then and apart from the separate report on taxation and the actual executive order on accounting, the Committee has not yet completed and documented its analyses.

Much valuable insight gained by the Committee has thus not been published. This report seeks to shed light on the most significant considerations and deliberations of the Committee.

### **1.1 The working group of the Danish Society of Actuaries**

Following the issuance of the executive order on accounting, the Danish Society of Actuaries saw the need – both inside and outside our membership – to have the deliberations upon which the provisions of the executive order were based, summarised and published. To that end, the Society appointed a working group to collate material from the Market Value Committee and prepare a report based on this material, going through and reviewing the market value accounting rules. The Danish Insurance Association has kindly assisted in collating the notes and records of the Market Value Committee.

The notes of the Market Value Committee are in the nature of working documents, designed to help the Committee in the process towards formulating the rules. This obviously influenced the work of the working group. The notes contain no authoritative and adopted rules and there are no official memoranda of the Committee's work.

The working group members were: Chresten Dengsøe (chairman), Andreas Kühle, Erik Johansen, Steen Kristiansson, Ole Haugegaard Nielsen, Vibeke Thinggaard and Frank Rasmussen.

Several members of the Market Value Committee have received draft versions of the Danish version of this report prepared by the working group. We would like to thank Jesper Dan Jespersen, Jens Perch Nielsen, Nina Christensen, Helen Kobæk and Klaus Grünbaum for their constructive comments to the report.

The English version of the report has been edited at a later time af-

ter there have been wishes for the translation from various sides. It should be pointed out, that where the report refers to the latest legislation, it is to be understood as the legislation in force at the time of publishing the Danish report (September 2004).

### **1.2 Report contents**

Chapter 2 of the report provides a historical summary of relevant events from approximately 1980 onwards until the introduction of market value accounting. Chapters 3 and 4 outline the work and deliberations of the Market Value Committee. These chapters are widely based on the notes of the Market Value Committee.

Chapters 5 through 10 provide a topic-based review of market value accounting rules in terms of interest rates, risk, costs, market value margins, surrender and unit-linked insurance policies. This review is supplemented by a description of the earliest experience with the application of these rules. This experience was gained, among other venues, at the *Hands-on courses*, organised by the Danish Society of Actuaries' Committee for Continuing Education. A review of possible subsequent developments is also provided, including decisions in principle by the Danish Financial Supervisory Authority.

Chapter 11 then provides deliberations on market value rules and the contribution principle and chapters 12 and 13 outline the overall experience gained with market value accounting and its future development.

While the Committee's work was ongoing, the Danish Insurance Business Act was in force. This Act was subsequently replaced by the Financial Business Act. Although the Committee thus referred to the Insurance Business Act in its work, all legal references in this report have been updated to the corresponding provisions of the Financial Business Act, except where such update would lead to changes on points of facts. Similarly, references to the executive order on accounting have been updated to the latest executive order on accounting (at the time of finishing the Danish version of the report), except for provisions that have been amended.

## **2. Market value accounting – 20 years in the making**

Since 1980, we have seen trends towards the introduction of market value accounting, with market value considerations being included in many contexts. Yet it took a political decision to make the use of market values a reality in life insurance accounting.

### **2.1 G 82 and determination of the technical interest rate**

The work to establish the calculation basis used by many companies, the G82 basis, caused the mechanical bonus systems of former times to be replaced by professionally more well-founded bonus systems, making it possible to illustrate more directly how bonus funds are allocated between individual policies.

The new basis was prepared in accordance with the accounting rules applicable at the time under which bonds were recorded at cost and retained at that price for as long as they were in the company's possession. Equities were also shown at cost (max the market value) with a possibility on revaluation in case of lasting appreciation; however, company equity holdings were modest.

The premium reserve – the current life insurance provision – was calculated based on the underwriting rate of the calculation basis – the technical interest rate. The calculation rate was, however, to be lowered in case of market rate falls. Such lowering was, however, considered totally unrealistic during that period, with rates surging past the 20% mark. Though these very prudent accounting rules did have a stabilising effect, the resulting financial statements were not transparent and were criticised for not giving a true and fair view of the companies' financial position in the usual accounting sense. The so-called “deposit accounts” referred to these accounting rules and the corresponding average interest rate universe. However, allowance had to be made for the difference between book values and market values when policyholders prematurely abandoned this universe on policy surrender.

The period around 1980 was a time of high interest rates and there was considerable political pressure for a high technical interest rate. The technical interest rate of the G82 basis – 5% – was determined, among other factors, in view of real interest rate considerations based on the interest and inflation rates applicable at the time. For typical pension products, where the premium was related to the salary with a percentage, the premium followed the development of salaries – and when the technical rate at the same time was close to the real interest,

bonus would in practice “automatically link” the pension for instance to the development of prices or salaries. It means it was fairly simple to understand and communicate, given that pension commitments would thus reflect the net present value of pensions (i.e. the value of pensions in “today’s money”).

At the same time, a technical interest rate of 5% opened up the possibility of fully converting old pension portfolios to the new basis without companies having to implement cost-intensive strengthening measures in order to maintain the guarantees at the transition.

When the Real Interest Tax Act was tabled and adopted in 1982, Danish companies were in full swing planning the introduction and conversion from the old portfolios. The project on a new industry-wide basis of calculation had been eight years in the making and it would not be acceptable if the original timetable was not kept.

Therefore, a technical interest rate of 5% was retained, despite the fact that the adoption of the Real Interest Tax Act should have resulted in a interest rate of 3%, given that the Real Interest Tax Act in reality opened up the possibility of a maximum real interest rate of 3%.

## **2.2 Market value accounting for groups**

Large insurance groups were founded in the mid-1980s, prompting the need for life insurance financial statements to be consolidated in group financial statements. This triggered accounting dilemmas, given that market valuation was used in group accounting, while a valuation based on book value was, as previously mentioned, applied by life insurance companies – the latter method generating results which differed from current market values. Balance values in the form of ‘hidden values’ in life insurance companies were thus capitalised for consolidation of group financial statements.

It was during these years of falling interest rates that large non-booked added values were generated by life insurance companies. Inevitable temptations were associated with the different methods of preparing financial statements. Thus the same funds (mainly in the form of customer capital in the life insurance company) were sometimes used by the management both for the purposes of bonus projections and to serve as regular equity in the parent (the group).

<sup>7</sup> Eigil Mølgaard was the Director General of the Financial Supervisory Authority.

## **2.3 Bonus projection models**

Industry disagreement over the preparation of bonus projections

was at its highest in the mid-1980s. To resolve this disagreement, the *Mølgaard Committee*<sup>7</sup> was appointed, leading to the preparation of a set of guidelines from the Consumer Ombudsman and the Financial Supervisory Authority, establishing that bonus projections were to be prepared in a bona fide manner and based on a industry-wide shared set of assumptions, i.e. the same market conditions as regards future inflation, investment returns and real interest tax.

The basic elements of these guidelines are that it must be possible to meet the bonus projections using a shared set of assumptions, incorporated in the company-specific investment policies, and that any deviation must be explainable based on the difference between assumptions and the actual course of events.

In the early 1990s, methods were developed for making professionally sound bonus projections in compliance with the guidelines issued by the Consumer Ombudsman and the Danish Financial Supervisory Authority, based on contributions, benefits and costs in 15-year progressions.

#### **2.4 Introduction of official key ratios and key figures in 1995**

The mid-1980s onwards saw increasing focus on ensuring that the market, including policyholders, was provided with relevant and easy-to-understand information about companies. In a joint effort to ensure such information, the Financial Supervisory Authority and the insurance industry set up a committee, resulting in the formulation of 11 ratios and key figures based on market value accounting figures<sup>8</sup>.

While market value return ratios obviously provided valuable information, the bonus reserve attracted particular interest in a market value context, as the bonus reserve also comprises added values and the equity reserve.

#### **2.5 Challenges posed by the G82 5% portfolios**

In 1995, the maximum interest rate for underwriting was fixed at 3% for new insurance policies. Existing insurance policies at the G82 5% basis would, however, still account for a very large proportion of the insurance policies and in 1996 insurance industry members pointed out that problems might arise in terms of insurance policies taken out at the G82 5% calculation basis. To resolve this issue, the Danish Financial Supervisory Authority appointed a committee whose work resulted in a report<sup>9</sup>. Up until that point it had not been necessary to consider

<sup>8</sup> (Report on key ratios for life insurance companies and occupational pension funds), the Danish Financial Supervisory Authority, May 1995.

<sup>9</sup> (Report on payment of interest rate guarantee), the Danish Financial Supervisory Authority, January 1998

whether the guarantees issued were annual interest rate guarantees or benefit guarantees. The committee chose not to make a problem of this legal issue and noted in the report introduction that life insurance products are typically subject to a benefit guarantee, based on a more specifically defined technical (underwriting) interest rate.

The approach of the report was how 5% policyholders were to pay for the additional interest rate risk relative to 3% policyholders. The report also unequivocally warned that serious problems could lie ahead. As early as 1998, one company launched a system under which bonus was allocated among insurance deposits without at the same time increasing the 5% pension commitments, and several other companies adopted this mindset in the following years.

## **2.6 The Market Value Committee**

In connection with a series of government interventions during Whitsuntide 1998 (the “*Whitsun fiscal package*”), it was announced in an explanatory note that the Danish Minister of Economic Affairs would appoint a “Market Value Committee” under the auspices of the Financial Supervisory Authority. The objective of the Committee would be to establish rules for valuation of life insurance liabilities in accordance with the market value principle. These rules were to be implementable by the FSA through an executive order.

The possibility of carrying on existing products as previously was a clear prerequisite to the positive participation of the industry – otherwise the industry might be faced with legal problems from their customers.

Under a market value regime, an interest rate rise of 3-5% could result in serious problems in terms of guaranteed surrender values under the G82 basis, combined with the provisions of the Third Life Insurance Directive, stipulating that life insurance provisions must at least be equal to the surrender value. Similarly, the legal rules governing transfer of pension rights in connection with job changing could turn out to be problematic.

The Financial Supervisory Authority and the accountant community put forward reflections on a transition from *transaction-based* to *value-based* financial reporting, stating that it should be possible to obtain a system that allowed comparison of accounting information from totally different sectors.

Actuaries expressed some scepticism towards the idea that the committee work could lead to more comparable financial statements – even within the insurance industry.

On the other hand, it was vital to the industry's stance on the issue that the hidden margins came to light and could contribute to results that could, in turn, be used to enhance products for the benefit of customers.

### **2.7 The great realisation of 1999**

Many have the opinion that market value accounting cannot be very difficult when you are able to value assets at market value.

If you know the market value of the company's insurance provisions, you inherently know the value of its equity. But how do you determine the market value of the company's insurance provisions? To that end it appears to be necessary – as was also the case with the bonus projection models – to determine the schedule of benefits, including bonus.

This means that it is possible technically to allow for the operational risk charge on equity; to ensure that a prudent buffer is maintained throughout the term of the insurance contract; and to ensure that – once the schedule of benefits has been calculated “to the end of the insurance term” – it will be possible to discount the whole thing.

The Committee decided to take the direct road to useful results by, in normal cases, having life insurance provisions to equal the retrospective reserve or the so-called “insurance deposit” – or an increased value if it was assumed that part of the bonus reserve was used for bonus projections and a lower value if the bonus reserve was negative. In this situation, the value of the insurance deposit equals to the deposit less a deduction for hedging, if applicable.

In order to make the system operational, it was decided simply to fully deduct from the life insurance provisions any negative bonus reserves resulting from interest rate rises, even though there was bound to be a margin in this situation. Under the previous regime of the accounting rules and bonus projection models, it was, in fact doing a situation of rising interest rate harmless to experience.

*The bonus potential on paid-up policy benefits* was soon seen as an essential quantity. Calculations of paid-up policy benefits are based on the deposits of policyholders. The bonus potential on paid-up policy

benefits equals the difference between the value of the insurance deposit and the value of the paid-up policy benefits.

When the value of paid-up policy benefits is lower than the value of the insurance deposit, the difference expresses the value of the bonus allowable under prevailing market conditions.

Industry representatives saw an opportunity to enhance products by using bonus potentials on paid-up policy benefits as investment buffers in case of wide fluctuations, so as to obtain the freedom to pursue a more prudent long-term investment strategy.

The issue raised by the industry in 1998 concerning a strengthening of life insurance provisions found a natural place in the system under the concept: (The value of) *Guaranteed benefits*. When *Guaranteed benefits* exceed deposits, bonus potentials are zero. In such cases, it is clearly irresponsible to increase pension commitments.

Thus funds deriving from the realised results that are allocated among insurance deposits should be used to secure guaranteed benefits to the extent that this was not contrary to the terms of the insurance contract.

Possibilities of bonus systems more fair and just were also envisaged under which allowance should be made for the bonus potential of the individual policyholder, given that the bonus potential depended on the underwriting basis, the product, its age and term to maturity. The bonus potential could bear the investment risk and be disbursed in case of favourable risk developments.

The Danish Financial Supervisory Authority was also very interested in introducing the quantity: *Bonus potential on future premiums*. This quantity expresses the size of margins in the calculation bases when it comes to future premiums. This concept is vital when the calculation basis or bases could no longer be prudent. The FSA members on the Committee thus found that life insurance provisions should be divided into three components: *Guaranteed benefits*, *Bonus potential on future premiums*, and *Bonus potential on paid-up policy benefits*.

At the time, the industry did not see the value of calculating the *bonus potential on future premiums*. However, the Financial Supervisory Authority maintained that life insurance provisions were to be divided into three components, and the industry accepted.

## 2.8 Efforts to speed up the process in 2000 and 2001

Just one year later, the industry found the tripartition highly relevant in terms of mixed policies – the reason being that subsequent premium increases on the 3% and 2% basis for policies that had originally been taken out at the 5% basis could be highly significant in case of a negative *bonus potential on future premiums*, which could, seen in isolation, relate to the 5% portions of these policies. Obviously such full-policy considerations and calculations should be possible when subsequent increases could be said to fall under the original contract and it could be maintained that benefit guarantees were involved. For more information, please refer to chapter 11 of this Report, section 11.8.

Another issue debated long and hard by the Committee was that of the degree of *safety* required in the calculations.

This was a somewhat odd situation, given that insurance industry representatives found that an appropriate safety margin was to be required – at least as far as calculations of life insurance provisions on the 5% policies were concerned. Initially, this stance was not considered to be in compliance with international accounting ideals under which the best possible estimate was to be used.

Luckily, this issue was resolved when it was stipulated that, in addition to the best possible estimate, a *market value margin* was to be applied. If parameters with an appropriate margin were selected, this premium could be said to have been factored in.

The determination of interest rate assumptions for discounting purposes was also debated: Should a single interest rate be used, a few interest rates, or a yield curve?

The insurance industry advocated that a single interest rate should be used, given that results could otherwise be manipulated. The Committee members agreed, however, that a zero-coupon yield curve should be used.

Another issue under debate was that of future costs. Relevant estimates in terms of future costs are included both in *Guaranteed benefits* and in *Guaranteed paid-up policy benefits*, but what about total life insurance provisions? Is it possible to make some kind of professionally reasonable adjustment with the same mode of operation as the *deferred acquisition costs*<sup>10</sup>?

<sup>10</sup> I.e. a deduction in life insurance provisions equivalent to the portion of future premium payments that is to cover non-amortised acquisition costs.

Again, reasonable forward and backward calculations should be performed. These calculations include both the prospects of second-order cost assumptions held out to the customer under the given assumptions and relevant estimates of future costs.

On the value side, estimated costs are used in forward calculations, while, on the liability side, prevailing second-order cost assumptions are used. Where the latter quantity is larger, there will be a cost gain. This gain may be discounted, so that the life insurance provisions include the insurance deposit less the discounted cost gain. This may be especially important for investment policies in case estimated costs have a totally different profile from the actual cost deductions. In this case, it is important to allow for the probability of surrender in the calculations.

On the risk side, it was decided not to include similar calculations, given that, on an ongoing basis, there is typically good consistency between estimated risk costs and market value margins less bonus on risk premiums.

Towards the end of 2001, the Financial Supervisory Authority issued an executive order on accounting, based on the still unfinished work of the Committee, and the FSA decided to stop the committee work without presenting a committee report as documentation of the work.

### **3. Committee deliberations**

The Committee's deliberations, as described in this chapter, are based on the material issued ahead of the committee meetings. A number of issues have subsequently been developed and clarified as will appear from chapter 5 onwards. While the presentation given in the chapter may not be completely exhaustive for all items, it reflects the material submitted to and discussed by the Committee. Similarly, chapter 4 presents the Committee's conclusions as implemented in the Financial Supervisory Authority's executive order on the financial statements of life insurance companies and occupational pension funds at the time the Committee completed its work.

In the sections on the Committee's deliberations, the notations and definitions used in individual sub-sections have been adapted to the universe of the sections involved with a view to describing the particular issue dealt with in that particular section. Hence notations may in some cases have been simplified, but not to the extent that the presentation suffers in the specific context, see the general appendix 14.2 of definitions and notations.

The Committee started its market value work by noting that:

“The task of the Committee is to analyse and make the necessary adjustments to the supervisory rules, so as to enable a transition to market values in life insurance companies and pension funds. It has been assumed that, in future, bonds shall be valued at market value. Therefore, the pension commitments of life insurance companies shall also be valued at market value. The latter issue prompted the need for a special Committee to be appointed as it was specified in the explanatory notes that “currently, there are no generally accepted methods for valuation of the liability side at market value.”

The Committee thus based its work on an accounting approach, including an assessment of the latest developments (1999) in international accounting principles. Though the life insurance business has particular characteristics to set it apart from other types of business, it is important that the accounting rules for life insurance companies be formulated so as to enable comparison of financial results and equity statements with similar results and statements from companies in other sectors. Comparability between accounting information from various sectors is a prerequisite to ensuring an efficient capital market.

Further to the preparation of the market value rules, the Market Value Committee also deliberated the relationship with provisions of EC directives.

### **3.1 EC directives and valuation of life insurance commitments at market value**

The Committee also deliberated whether EC directives put restrictions on Member States' use of market values (fair values) in terms of the pension commitments of life insurance companies. The starting point of these deliberations was whether or not the requirement set out in the Third Life Insurance Directive to the effect that life insurance provisions must, at a minimum, be equal to the guaranteed surrender value at the same time, constrains the possibility of having the pension commitments recorded in the financial statements at a value equivalent to a market value.

Article 18 of the Third Life Insurance Directive stipulates that: "Where the surrender value of a contract is guaranteed, the amount of the mathematical provisions for the contract at any time shall be at least as great as the value guaranteed at that time"<sup>11</sup>.

The preamble of the directive on insurance financial statements states that life insurance provisions are to be calculated using actuarial principles, established within the framework of other insurance directives. The directive on insurance financial statements defines the entry life insurance provisions as follows: "The actuarial value of the insurance company's pension commitments shall be carried under this entry, including bonus already allocated, less a deduction for the actuarially calculated value of future premiums". It thus appears that the non-allocated bonus is not included in the entry. If the traditional calculation of life insurance provisions is assessed on the basis of a fair value approach, the entry may be viewed as a composite entry consisting of the value of the pension commitments the insurance company has guaranteed to the policyholders, but now valued at market value with the addition of a margin that varies according to the current excess interest rate, understood as the difference between the market rate and the technical rate. Breaking down life insurance provisions into two entries in the financial statements would thus be a possibility: 'guaranteed pension commitments', calculated at market rate, and 'forward-looking conditional bonus commitments', which is the margin equivalent to the current interest premium. The sum of these two entries in market value accounting may subsequently be treated as the entry understood by the directive as life insurance provisions.

<sup>11</sup> Now Article 20 of Directive 2002/83/EC of 5 November 2002 concerning life insurance..

The concept “guaranteed surrender value” is not defined in detail in the Third Life Insurance Directive. The concept is open to several interpretations. The concept may cover the payout to which the policyholder is, in all circumstances, entitled if the insurance is cancelled, for whatever reason, irrespective of the fact that the policyholder’s opportunity to cancel is not present or is limited to the extent that the insurance may be cancelled only if certain conditions are met, such as a job change.

Another possibility would be for the guaranteed surrender value to be interpreted as the amount which (experience shows) may be expected to be surrendered based on the opportunities and conditions for surrender open to the policyholders. This interpretation seems to comply with the basic accounting prerequisite of the company as a ‘going concern’.

On account of the uncertainty as to the interpretation of the concept ‘guaranteed surrender value’, the Committee resolved to write to the Danish Ministry of Economic Affairs. The Committee specified that, based on the formulation in Article 18 of the Third Life Insurance Directive, there was hardly any doubt that the directive provision applied on a contract-by-contract basis and thus hardly made it possible to factor in the probability of the policyholder in fact surrendering the insurance policy. In connection with an interest rate rise, leading to a price fall, this provision in market value accounting for insurance contracts with guaranteed surrender values could mean that the company would not be able to meet its solvency requirement, irrespective of the fact that the policyholders are entitled to surrender their insurance policies only in case of job change or emigration. A risk-oriented approach to this issue would be to factor in probabilities of surrender in calculations of the guaranteed surrender commitment. International accounting trends are also towards adopting market-based values.

The Market Value Committee concluded that, in its opinion, the directive provision, by its wording, prevented surrender probabilities from being factored in; however, the Committee found it both inevitable and proper that in market value accounting it should be possible to factor in surrender probabilities. Consequently, the Committee approached the Ministry of Economic Affairs to inquire whether the Ministry would accept that, in its further work, the Committee used the directive text so as to allow the factoring in of surrender probabilities despite the wording of the text.

The Ministry of Economic Affairs responded that – provided proper accounting rules could be prepared and reservation be made for the provision of the Third Life Insurance Directive – surrender probabilities could be factored into calculations of guaranteed market values.

In a response to the Ministry of Economic Affairs, the Financial Supervisory Authority pointed out that the issue regarding the directive would be highlighted in the Committee's final report. For the sake of good order, the letter pointed out that it was not possible to include a reservation for the directive text in the upcoming amendment to the executive order on accounting, which was due to be implemented before the Committee's final report would be available.

### **3.2 Move from transaction-based to value-based accounting**

By way of introduction, the Committee noted that the transition to market value accounting was yet another step from transaction-based to value-based accounting. The existing set of rules prior to the introduction of market values was already a mix of the transaction-based and value-based theories, for instance shares were recorded at market value.

Transaction-based accounting theory is based on companies' individual financial transactions and their outcomes. The values are recorded in the financial statements at the prices used in the actual transactions. The realisation principle, according to which gains may not be recorded in the financial statements until such a time as they have manifested themselves in a sale, forms part of this theory. The accrual basis of accounting, according to which revenue and expenditure shall be accrued to the period in which they were earned or incurred, is the central principle behind the emergence of assets and liabilities. The *prudence concept* is also rooted in the transaction-based accounting theory, as companies are not allowed to make allowance for gains until such a time as they have manifested themselves in a transaction. On the other hand, allowance should be made even for pending losses.

The value-based accounting theory is based on the company's assets and liabilities. The interim result according to this theory emerges as the difference between the (market) value of assets and liabilities from the beginning of the period until the end of the period. The company's equity is equivalent to the difference between its assets and pension commitments. Assets and pension commitments are recognised in the financial statements when they can be reliably measured. The start-

ing point is that they are to be measured at fair value. *Fair value* is synonymous with current value, market value, etc.

In transaction-based theory, the balance sheet is derived from the income statement. In value-based theory, the income statement is derived relative to the balance sheet.

### **3.3 Life insurance companies' liabilities in the accounts**

The Committee then moved on to describe the pension commitments of life and pension insurance companies under the terms of contracts concluded.

A life insurance company undertakes to pay out, for a payment, a previously stated amount on the occurrence of subsequent, more closely defined, events. This consideration is always payable in advance. Assumptions regarding three factors are included in the determination of the premium: Risk, interest rate and costs. In the underwriting basis, the three factors are conservatively assessed, implying that the premium calculated with the addition of interest on amounts prepaid must be expected to be higher than necessary to cover the company's costs and pension commitments. The return provided in the technical basis is referred to as the technical interest rate. The technical interest rate and the other basis elements are used to calculate the value of future premium payments and the value of the pension commitments undertaken by the company. In other words, future cash flows are capitalised allowing for the probability that the payments will, in fact, take place, which depends on the insurance events for which insurance cover has been agreed.

The pension commitments undertaken by the life insurance company by entering into the insurance contracts are reflected in the financial statements in the following three entries: Life insurance provisions, bonus equalisation provisions, and claims provisions. Life insurance provisions are equivalent to the difference between future contribution payments and future benefit payouts discounted to the time of calculation using the technical interest rate. Life insurance provisions thus reflect the sum of the pension commitments undertaken by the company towards each individual policyholder.

When the realised risk, interest rate and cost developments are better than assumed at the time of the determination of the premium, a profit is generated. The part of the profit accruing to the policyholders is referred to as bonus<sup>12</sup>. In order to facilitate a steady development in

<sup>12</sup> This bonus definition follows from the explanatory notes to section 21 of the Financial Business Act as quoted in 3.4. In a bonus review draft prepared by the Financial Supervisory Authority, bonus is, however, redefined as being bonus allocated only

bonus allocations, life insurance companies often choose not to allocate the entire profit in the individual year; instead, they transfer part of the return to the bonus equalisation provisions.

Based on the accounting practices applied so far, life insurance provisions are traditionally seen as the sum of benefits guaranteed by the company. The amount is determined by discounting the promised future benefits by a fixed rate of interest equivalent to the technical interest rate. Similarly, the value of future agreed premiums is deducted. As the technical interest rate is assumed to be prudent, i.e. lower than the market rate and lower than the expected investment results over the term of the pension commitments, this means that the pension commitments are calculated at a fixed, low rate of interest, independent of market rate fluctuations. This is usually justified by prudence considerations. It may also be seen as a manifestation of the realisation principle. In accordance with this principle, allowance shall not be made for the interest premium until such a time as the interest premium has been realised. The company should allocate bonus only concurrently with the realisation of the interest premium as the actual annual return exceeds the technical interest rate. Under this accounting perception, the commitment to allocate bonus does not exist until the interest premium has been realised. The policyholders are not to be given their fair share until the additional return has been realised.

This view is not tenable in fair value accounting. In fair value accounting, assets and liabilities are, in principle, calculated at the present value of future cash flows. When future cash flows from assets are based on a rate of interest exceeding the technical interest rate, the life insurance company has a real commitment to pay a bonus equivalent to the excess interest rate at the time of calculation. Obviously, allowance should be made for this obligation in the calculation of pension commitments. Moreover, in fair value accounting, pension commitments are not calculable using a fixed discount rate – instead pension commitments have to be discounted at the market rate prevailing at the time of calculation. Relative to the value at which life insurance provisions have been calculated using the practice applied so far, a fair value calculation thus implies that ‘something’ has to be added, equivalent to the bonus commitment at the current interest rate level, and ‘something’ has to be deducted, equivalent to discounting the pension commitments at an interest rate higher than the technical interest rate, i.e. the market rate. Combined, the forward and backward calculation has no bearing on the base amount.

The conclusion is that when the bonus commitment is included, the calculation of life insurance provisions at fair value (basically) results in the same amount as that resulting from the approach used so far<sup>13</sup>.

Under the accounting regulation applied so far, bonus equalisation provisions are described as amounts “set aside for equalisation of bonus allocations over a multi-year period”. If bonus equalisation provisions are to be understood more precisely in an accounting context, they must be seen as a current commitment in relation to the policyholders. The commitment is rooted in “the contribution principle”. Under the contribution principle, the insurance company is under an obligation to pay the policyholders their share of the profit. The company is not, however, under an obligation to allocate to the individual policyholders their share of the return concurrently with its manifestation in the financial statements. Thus the company may temporarily withhold bonus allocations.

Bonus equalisation provisions are such bonus amounts which the company is basically under an obligation to distribute under the current fair value calculation of assets, but which the company has so far withheld. Bonus equalisation provisions belong to the policyholders as a collective amount. The policyholders are entitled to the money under the contribution principle.

### **3.4 Life insurance bonus commitments**

By way of introduction to valuation of bonus commitments, the Committee described these pension commitments in more detail.

Under most Danish life insurance contracts, the insurance company guarantees to the customers that they will receive certain, minimum benefits. In addition to these guaranteed benefits, prospects are held out to the customers of receiving a bonus depending on the profit generated over the term of the insurance policy. The calculation of the current value of guaranteed benefits does not give rise to any difficulties of principle, given that a relevant current interest rate is used, possibly with the addition of a market value margin.

However, it is most crucial in financial reporting (i.e. in the calculation of the company’s financial results and the size of its equity) that the current value of the company’s bonus allocation commitment can also be determined. The emergence of a commitment over and above the value of guaranteed benefits follows from the stipulation in the

<sup>13</sup> This conclusion applies only if any future margin to equity is disregarded (operational risk charge).

Insurance Business Act that the calculation basis for determination of guaranteed benefits must be prudently fixed. The stipulation regarding a prudent basis of calculation normally implies that the policyholders pay an excess premium relative to the guaranteed benefits in return for being ensured reimbursement (by virtue of the *contribution principle*) of the profit resulting from the excess premium in the form of bonus.

The right to bonus is not unconditional. Bonus is comprised partly of the profit generated or expected to be generated as a result of premiums already paid and partly of the profit expected to be generated in future as a result of the agreement on future premium payments.

The bonus commitment based on profit already generated by the company as a result of premiums paid may be reduced as a result of changes in the value of the company's assets. One might say that this bonus commitment serves as a buffer. On the other hand, the bonus commitment based on the expected future profit on premiums already paid, as well as on agreed future premiums, cannot be used in the same manner to secure guarantees already issued, given that this bonus commitment is an individual safety margin under the individual insurance contract; therefore it has to be ascertained before it can be used as bonus.

In other words, there is a backward-looking as well as a forward-looking commitment to allow bonus. The backward-looking commitment to allow bonus involves the profit already generated by the company as a result of premiums paid, whereas the forward-looking commitment to allow bonus relates to the individual safety margins under the insurance contracts.

Market value or fair value accounting should be rooted in value-based accounting theory, the centre-piece of which is measurement of the company's assets and liabilities at the end of a reporting period. The company's equity is the difference between the value of its assets and the value of its pension commitments. Thus the company's financial result is the difference in its equity deriving from the difference between the value of its assets and pension commitments at the beginning and the end of the reporting period.

In other words, it is crucial in financial reporting (and thus for the company's financial results for the period) that it is possible to determine the value of the company's assets and pension commitments.

As far as life insurance companies are concerned, the determination of its bonus commitments (in addition to the determination of the value of its guaranteed commitments) is thus crucial in financial reporting. The measurement of guaranteed benefits delimits and defines these commitments relative to the bonus commitments. However, the delimitation and definition of total pension commitments relative to equity is what is most crucial in financial reporting. Ultimately, the value of the life insurance company's total pension commitments (i.e. the sum of guaranteed commitments and bonus commitments) is thus what matters. In this context, the accuracy of the measurement of the individual elements of the pension commitments is thus not imperative. For instance, if the measurement of guaranteed benefits generates a slightly higher value, this will usually result in a correspondingly lower value of the bonus commitments, and vice versa. Determination of the principles for value-based accounting for life insurance companies thus presupposes that it is determined how bonus commitments are to be measured.

The bonus to which the policyholders are usually entitled is not of a specific quantity, given that the final bonus depends on the future profit generated by the insurance company. Bonus commitments are governed by "the contribution principle". This appears from the Danish Financial Business Act, which reads as follows: "The rules reported for calculation and allocation of realised results, see section 20(1)(3), should be clear and precise, resulting in fair allocation."

The explanatory notes to this provision read as follows:

"Pursuant to sub-section 2, the rules for allocation of the company's realised results should be formulated, so as to ensure that it appears clearly and precisely how the company's realised results shall be used for allocation among individual insurance policies, provisions for the insurance portfolio as such (collective bonus potential and the like) and equity, etc. Moreover, the allocation of the company's realised results shall be fair in relation to the entitled parties. This implies that the allocation of the realised results shall be based on the so-called contribution principle under which the realised results are allocated to the entitled parties in accordance with their contributions to the profit generation. The proportion of the company's realised results subsequently accruing to the policyholders (the bonus) shall be released in a fair manner over the term of the insurance contract".

The reason why a commitment materialises in addition to the value of

the guaranteed benefits is overall the requirement that the calculation basis for determination of the guaranteed benefits shall be fixed prudently, combined with the requirement that the rules for calculation and allocation of profits shall result in a fair allocation of same. Once the profit for the year has been calculated, it shall be determined, based on special rules for allocation as a part of the contribution principle, how much of the profit is to accrue to the policyholders. In this assessment, allowance may be made for the fact that a fair share of the profit shall be allocated to equity to reflect the extent of the risk borne by equity in the form of its liability for pension commitments to the insurance portfolio.

The share of the profit for the year thus accruing to the insurance portfolio is not necessarily allocated fully to life insurance provisions. The allocation is usually effected by bonus revaluation of guaranteed rights and is subsequently included in the calculation of guaranteed commitments. However, the company may, within reasonable limits, choose to transfer part of the insurance portfolio's share of the overall profit to future bonus or to use it to secure guaranteed benefits.

Over and above this backward-looking commitment to allow bonus – founded in the fact that the profit generated in individual years is not necessarily fully allocated to the life insurance provisions for the individual year – the company also has a forward-looking commitment to allow this bonus – founded in the fact that the calculation basis for determination of guaranteed benefits shall be prudently fixed. Basically, excess premiums are paid to obtain guaranteed benefits; thus, there will be a difference between the market value of guaranteed benefits and the market value of the sum of paid and future premiums at any time of calculation. An expected future bonus is founded in this difference in market value. Any calculation of this commitment will be based on the rate of interest, insurance risk and costs prevailing from time to time and will thus fluctuate from day to day with interest rates and with changes in insurance risk and costs. For the purposes of this report, the backward-looking commitment to allow bonus will be termed 'accumulated bonus', while the forward-looking commitment to allow bonus will be termed the 'bonus potential'.

It follows from the contribution principle that the policyholders are entitled to a proportionate share of the profit generated or expected to be generated by the company at any time and that this proportionate share of the profit already ascertained or expected to be generated in the future is not necessarily allocated to the individual policyholders

right away, but may be transferred to bonus provisions. Depending on the guarantees issued by the company, there will be a greater or smaller need for building bonus provisions to counter any adverse developments in investment as well as any adverse developments in insurance risks.

One could say that the policyholders have a collective right to the accumulated bonus, whereas the bonus potential is an individual safety margin, related to the individual insurance contract, which may not be allocated as bonus until it has been ascertained.

### **3.5 The value of life insurance bonus commitments**

The first method. The Committee then moved on to consider two different bonus commitment valuation methods.

*The first method* described by the Committee was based on a method based on calculation quantity known as the market benefit, to calculate the value of the bonus commitment.

For the purposes of determining the bonus potential, the market benefit is defined as the benefit achievable based on agreed future premiums, retrospective provisions including bonus, the market rate at the time of calculation, and the average mortality and disability rates without any safety margin at the time of calculation. Retrospective provisions are equivalent to premiums already paid less a deduction for payment of risks and costs and with addition of interest.

Thus the bonus potential is the market value of the difference between the market benefit and the guaranteed benefit. If any requirements in terms of an additional return on equity are disregarded, the bonus potential will be equivalent to the difference between retrospective provisions including bonus and the market value of guaranteed benefits.

This calculation will provide a snapshot of the forward-looking bonus commitment. If market rates did not change over the term of the contract, bonus potential would, on average, be allocated to the contract.

The proportion of ascertained profits accruing to the policyholders for individual years is determined in accordance with the contribution principle. These proportions may be used to increase life insurance provisions or to increase the accumulated bonus. The bonus proportion that may remain in the form of accumulated bonus depends on

the risk of the insurance contracts, including the size of the company's equity, and the guarantees attached to the contracts. Finally, bonus must be released in a fair manner over the term of the insurance contract. The rules and provisions in force do not specify any principles for what is to be considered the necessary and adequate size of accumulated bonus. The accumulated bonus serves as a buffer against fluctuations in the value of assets and against adverse developments in insurance risks.

In connection with the assessment of the definition of the bonus potential given above, it was specified that the bonus potential was thus made independent of the actual bonus allocation capacity of the individual company – instead the bonus potential came to represent a market bonus potential. In the bonus potential definition, the entry 'retrospective provisions including bonus' was therefore changed to 'the market value of retrospective provisions including bonus'. The market value of retrospective provisions including bonus means the value of assets corresponding to retrospective provisions including bonus. In a company having positive bonus equalisation provisions under the accounting regime applied so far, the market value of retrospective provisions in terms of the individual insurance policy is equal to the sum of life insurance provisions pertaining to the insurance policy and the policy's share of the bonus equalisation provisions.

The bonus potential may subsequently be divided into the margin pertaining to funds already paid into the scheme, along with the derived paid-up policy guarantees, and the margin on agreed future premium payments.

If <sup>14</sup>

$M^{prov^{retro}}$  is the market value of retrospective provisions including bonus,

the market benefit  $Y^M$  is the benefit achievable from  $M^{prov^{retro}}$  and future premiums using the market value basis,

and  $Y^G$  is the guaranteed benefit from the underwriting basis,

then it follows that  $Bonus\ potential = (Y^M - Y^G) liab^{M-rate}$

<sup>14</sup> For further information, please refer to the appendix of definitions and notations.

The bonus potential may then be divided into two parts

$$\text{Bonus potential} = (M\text{prov}^{\text{retro}} - FP^G \text{liab}^{\text{M-rate}}) + \\ (P \text{asset}^{\text{M-rate}} - YP^G \text{liab}^{\text{M-rate}})$$

Here the  $FP^G$  represents the paid-up policy using the underwriting basis and  $YP^G$  represents the benefit achieved for future premiums using the underwriting basis.

The first term of the equation may be construed as the margin on rights accrued, while the second term may be construed as the margin on the proportion of guaranteed rights based on the agreement on future premium payments.

The bonus potential cannot be negative, but the question is whether this is sufficient. If, for example, the margin on rights already accrued is negative, while the overall bonus potential still remains positive, this means that a proportion of the margin on the future premium is needed in order to ensure that adequate funds are available to cover guaranteed paid-up policy commitments. This immediately seems to imply that the margin on funds already paid must be positive in order to ensure that there will be no shortage of funds in case of cessation of premium payments. It should also be considered whether it is possible – for the insurance portfolio as a whole – to include probabilities for the actual cessation of premium payments, analogously to the issue about factoring in surrender probabilities. Finally, the issue remains of the approach to be taken if the overall bonus potential is positive, while the margin on future premiums is negative.

Equity has to be included in the determination of the size of  $M\text{prov}^{\text{retro}}$ . Under the accounting regime applied so far, life insurance commitments will be covered in advance by assets and the residual assets of the company will subsequently be divided between equity and the insurance portfolio in accordance with the contribution principle for calculation. It would be possible to extend this method to allocate to the insurance portfolio and equity, in advance, the proportion of assets equivalent to the sum of the traditional retrospective provisions and equity at the beginning of the year. In case there are further assets to be allocated in the company, such assets will be allocated in accordance with the contribution principle for calculation. If there are

minor assets, these assets will also be allocated in accordance with the contribution principle; however, the margin on premiums already paid shall, at a minimum, be positive.

*The second method* considered by the Committee focused on ensuring that adequate funds were available to secure guaranteed benefits. However, this method makes no consistent distinction between provisions set aside for guaranteed commitments and provisions set aside for bonus commitments.

Under this method, market provisions are set aside as a maximum of provisions for guaranteed benefits and provisions for paid-up policies.

If

$$MprovY^G = Y^G liab^{M-rate} - P asset^{M-rate}$$

$$MprovFP^G = FP^G liab^{M-rate}$$

and

$Mprov^G$  is market provisions for guaranteed benefits for the entire portfolio of insurance policies,

then this method defines:

$$Mprov^G = \sum \max(MprovY^G, MprovFP^G),$$

The bonus potential represents the proportion set aside by the company for this purpose.

While the method is simple in its description and seems easy to implement, it provides no information on the various elements of the bonus potential. The method may be extended to:

$$Mprov^G = \sum MprovY^G + \sum \max(P asset^{M-rate} - YP^G liab^{M-rate}, 0),$$

$$\text{where } YP^G = Y^G - FP^G.$$

The last conversion provides an interpretation of the addition to provisions for guaranteed benefits. The addition implies that the margin on future premiums relative to the guaranteed benefits arisen from these premiums is a guaranteed commitment in line with the guaranteed benefit. It may seem to be against the nature of the margin on the future premium to define it as a guaranteed commitment, given that the margin on the future premium is a bonus potential that will be allocated to guaranteed commitments only if market conditions remain unchanged. There is hardly any doubt, however, that the margin pertaining to future premiums cannot be used as a buffer to cover capital losses on assets, given that the company's survival could then ultimately depend on continued premium payments.

### **3.6 Choice of method**

In autumn 2000, the discussions of the Committee concluded in its having to choose between the two methods described above for market valuation of life insurance commitments.

In short, a choice had to be made between the following two methods:

1. The market value of the guaranteed portion of the insurance policy should be valued at the market value of the paid-up policy. The agreement on future premium payment should be factored in only if the agreement on future premium payment had become a commitment to the company, i.e. the market rate had fallen below the underwriting rate. Under this method, the bonus commitment was equal to the bonus commitment on the paid-up policy.
2. The market value of the guaranteed portion of the insurance policy should be valued at the value of the entire guaranteed benefit, both the portion deriving from the paid-up policy and the portion deriving from the agreement on future premiums. Under this model, the bonus commitment is equivalent to the sum of the bonus commitment on the paid-up policy and the bonus commitment on the future premium. Under this model, the value of guaranteed benefits and bonus commitments on future premiums is equivalent to the value of the paid-up policy set out in method 1.

The two methods are alike when the market rate is lower than the underwriting rate. When, on the other hand, the market rate is higher than the underwriting rate, application of method 1 means that the entire potential future bonus on the agreement on future premium

payments will emerge as a guaranteed commitment. Application of method 2 means that the entire potential future bonus on the agreement on future premium payments will emerge as a bonus commitment.

At committee meetings, two arguments were put forwards against application of method 2:

As far as new insurance policies are concerned, the method means that provisions for guaranteed commitments are negative, which may prove difficult to explain to the non-insurance community. Moreover, bonus commitments on future premiums cannot be used to cover capital losses, etc., and should thus not appear in the financial statements in line with bonus commitments on paid-up policies. The difference between the two bonus commitments is that the bonus commitment on the paid-up policy has been realised relative to the market value of assets, meaning that it may decline as a result of price falls, whereas the bonus commitment on future premiums is a non-realised future bonus commitment to be realised only if the calculation assumptions remain unchanged in future. Thus only the bonus commitment on the paid-up policy may serve as a buffer against any price falls. This means that the reader of the financial statements may be misled when it comes to an assessment of the real 'cushioning' of the company.

The arguments for using method 1 are that these two main problems of method 2 are resolved. The primary objection against method 2 seems to derive from concern over how to disclose accounting information to customers in future. If method 1 is applied, the expected future maximum bonus on the agreement on future premiums could be disclosed in a note to the financial statements.

The argument for method 2 is that this method is based on the insurance contract as a whole. It is difficult to argue in favour of considering only the portion of the agreement attributable to the already paid portion of the insurance policy. It further complicates the argumentation for using method 1 that the agreement on future premiums should still be included when the market rate is lower than the technical rate. Finally, under method 2, the expected bonus commitment on the agreement on future premiums emerges as a bonus commitment, rather than a guaranteed commitment (as was the case under method 1).

Thus it may seem difficult to argue in favour of method 1 qualifying as a market valuation method as far as the portion of the insurance

contract is concerned that pertains to the agreement on future premium payments. Finally, it may be stated that if the overall portion of life insurance commitments deriving from guaranteed commitments in the financial statements is negative, this is a statement that if the company was not at the same time under an obligation to allocate bonus to the insurance policies, then the insurance portfolio would generate a future income of this amount to the company; this must be considered relevant information for the reader of the financial statements.

In the light of this, the Committee chairman announced that the Financial Supervisory Authority had reached the conclusion that method 2 for valuation of the liability side at market value best complied with the Committee's terms of reference and consequently this method was to be used in the further work of the Committee.

### **3.7 The Committee's preliminary deliberations regarding certain items in the executive order on accounting**

Based on the method chosen, the accounting entries were subsequently determined.

*Guaranteed benefits* should be calculated as the sum of a calculated present value for each individual insurance policy of the benefits guaranteed under the insurance policy, as well as the present value of expected future costs for administration of the insurance policy less a deduction for the present value of agreed future premiums and with addition of a market value margin.

The following elements are used in present value calculations:

1. the best possible estimates of the insurance risks involved, including mortality and disability estimates, etc.;
2. the best possible estimates of the costs at which the insurance policies are, on average, expected to be administered under the prevailing market conditions; and
3. a rate of interest, calculated in compliance with the guidelines set out by the Danish Financial Supervisory Authority, for this purpose.

Irrespective of item 3, a rate from a zero-coupon yield curve in the same currency and reduced by the tax rate under the Pension Savings Returns Tax Act may be applied to each individual payment.

Once a company has decided to use a zero-coupon yield curve, it cannot subsequently revert to a flat rate. It should be possible to use the zero-coupon yield curve on one or more sub-portfolios, while using a flat rate on other portfolios.

The value of guaranteed benefits should include a market value margin equivalent to the estimated price that the company is expected to have to pay in the market to an acquirer of the company's insurance portfolio in order for the acquirer to assume the risk of fluctuations in the sizes and payment dates of the guaranteed benefits. The principles applied for calculation of this premium must be disclosed. The idea behind this formulation is that it is possible to implicitly calculate the market value margin by determining insurance risks, costs and interest rates as second order quantities. This implicit determination of the market value margin is seen as a transitional scheme and the companies are expected to be able to determine the market value margin explicitly within a shorter time horizon and to subsequently disclose the size of the market value margin in a note to the financial statements.

For each insurance policy, the *bonus potential on future premiums* should be calculated as the difference between the present value of future premiums and the present value of the portion of guaranteed benefits based on the payment of agreed future premiums.

For each insurance policy, the *bonus potential on paid-up policy benefits* should be calculated as the difference between the value of retrospective provisions and the present value of guaranteed paid-up policy benefits.

In case the bonus potential on paid-up policy benefits for the individual insurance policy is negative, it should be specified as zero for this insurance policy.

In case the bonus potential on future premiums for the individual insurance policy is negative, it should be specified as zero for this insurance policy. Notwithstanding this provision, the bonus potential on future premiums for the individual policy contract may be included as a negative value in case the bonus potential on paid-up policy benefits for this insurance policy is included as a value which implies that the sum of the overall bonus potential on the insurance policy is greater than or equal to zero.

At the heart of the definition of guaranteed benefits is the concept that the pension commitments undertaken should be guaranteed. This means that the policyholders may individually assert a claim to these benefits disregarding subsequent developments in market conditions. Conditional nominal guarantees should also be included in calculations of guaranteed benefits. A stipulation to the effect that the assumed calculation elements relating to the technical interest rate, insurance risks and costs may be changed, will not have any impact on the value of guaranteed benefits until the assumed calculation elements are actually changed.

On the other hand, conditional pension commitments that are not subject to a nominal guarantee should be included in the bonus potential on paid-up policy benefits. Amounts that are individualised relative to the insurance policies, but which do not give rise to any bonus revaluation of guaranteed benefits, are not included in guaranteed benefits, but they are included in the bonus potential on the paid-up policy benefits.

The Committee deliberated how an operational risk charge could be included in the calculations, but agreed to postpone this issue until a later revision of the set of rules<sup>15</sup>.

<sup>15</sup> But see 7.2 of this Report, Administration result, in which a deviation from the general decision is described.

#### 4. Committee conclusions

Having established the quantities to be included in life insurance provisions, the Committee moved on to the more precise definition and calculation method to be used for individual quantities.

##### 4.1 Definition of certain accounting quantities

In the Financial Supervisory Authority's executive order on the financial statements of life insurance companies and occupational pension funds, incoming quantities are initially defined at individual policy level; subsequently, the accounting entries are calculated by summation. Moreover, the two potentials are determined indirectly as residuals between other entries.

*Guaranteed benefits for each insurance policy* are calculated as the present value of guaranteed benefits with addition of the present value of expected future costs for administration of the insurance policy less a deduction for the present value of the premiums agreed (the full premium). *The value of guaranteed benefits* is then the sum of *Guaranteed benefits for each insurance policy* with addition of the premium the market will charge for taking on the uncertainty as to this present value (the market value margin on guaranteed benefits).

*Guaranteed paid-up policy benefits for each insurance policy* are calculated as the present value of the benefits guaranteed under the insurance policy in case the policy is converted to a paid-up policy, with addition of the present value of expected future costs for administration of the paid-up policy. *The value of guaranteed paid-up policy benefits* is then the sum of *Guaranteed paid-up policy benefits for each insurance policy* with addition of the premium the market will charge for taking on the uncertainty as to this present value (the market value margin on paid-up policy benefits).

<sup>16</sup> In subsequent executive orders on accounting, the *Value of retrospective provisions for each insurance policy* has been defined as *Retrospective provisions for each insurance policy* with the increase, respectively reduction, that may have been made to the insurance policy in the allocation of realised results in accordance with the principles for allocation of realised results applicable to the insurance policy.

*Retrospective provisions for each insurance policy* are calculated as premiums paid less a deduction for benefit payouts, payment of costs, and risk adjustment and with addition of interest accrued, etc., on each insurance policy. This is the traditional way of calculating retrospective provisions. *The value of retrospective provisions for each insurance policy* was defined by the executive order on accounting of 13 December 2001 as the value of the company's overall assets for which provisions have been made in respect of the pension commitments under each insurance policy<sup>16</sup>. *The Value of retrospective provisions* is then the sum of the *Value of retrospective provisions for each insurance policy*, less a deduction for the present value of an ex-

pected future administration result and with addition of the premium the market will charge for taking on the uncertainty as to this present value (the market value margin on overall pension commitments). The present value of the expected future administration result should be reduced by the probability of insurance policies being converted to paid-up policies or being surrendered.

*Life insurance provisions for each insurance policy* before any addition for the surrender value are determined as the maximum of *guaranteed benefits for each insurance policy*, *guaranteed paid-up policy benefits for each insurance policy*, and *the value of retrospective provisions for each insurance policy* less a deduction for the insurance policy's proportion of the expected future administration result and with addition of the insurance policy's proportion of the market value margin on overall life insurance provisions.

#### **4.2 Definition of certain accounting entries**

Now it is possible to calculate the entries included in the financial statements: Entry 6.1. *Guaranteed benefits*, Entry 6.2 *Bonus potential on future premiums*; and Entry 6.3 *Bonus potential on paid-up policy benefits*.

*Guaranteed benefits* are calculated as the *value of guaranteed benefits*. This value may be calculated without allowance for any future conversion of the insurance policies to paid-up or surrendered policies, but it may also be taken into consideration that some insurance policies must be expected to be converted to paid-up policies or be surrendered. If *life insurance provisions for each insurance policy* are lower than the value guaranteed on surrender of the insurance policy, entry 6.1. is increased by the difference. The increase may be reduced by the overall probability that the insurance policy is surrendered before the expiry of the insurance policy.

*The bonus potential on future premiums* is calculated as the difference between *the value of guaranteed paid-up policy benefits* and *the value of guaranteed benefits*.

*The bonus potential on paid-up policy benefits* is calculated as the difference between *the value of retrospective provisions* and *the value of guaranteed paid-up policy benefits*.

If the value of *guaranteed paid-up policy benefits for each insurance policy* is less than the value of *guaranteed benefits for each insur-*

*ance policy* for a given insurance policy, *guaranteed paid-up policy benefits for each insurance policy* for this insurance policy are specified as equal to the value of *guaranteed benefits for each insurance policy*. This corresponds to specifying as zero the bonus potential on future premiums when the potential on individual insurance policies is negative.

If the value of *retrospective provisions for each insurance policy* is less than the value of *guaranteed paid-up policy benefits for each insurance policy*, the value of *retrospective provisions for each insurance policy* for this insurance policy is specified as equivalent to the value of *guaranteed paid-up policy benefits for each insurance policy*. This corresponds to specifying as zero the bonus potential on paid-up policy benefits when the potential on individual insurance policies is negative.

Similarly, it applies to the entire portfolio of insurance policies eligible for bonus that if the calculation of the overall bonus potential on paid-up policy benefits, respectively future premiums, is negative, then the potential in question is specified as zero.

The sum of entries 6.1., 6.2. and 6.3. subsequently makes up *life insurance provisions*, with allowance for reinsurance for own account. In calculations of the entries, allowance should also be made for the proportion of the commitment that has been transferred to claims provisions, and IBNR provisions should be made.

#### **4.3 Definition of market value margin and calculation assumptions**

*The market value margin* is defined as the estimated additional premium the company must be expected to have to pay in the market to an acquirer of the company's insurance portfolio in order for the acquirer to take on the risk of fluctuations in the sizes and payment dates of guaranteed benefits.

In calculations of present values of entries 6.1., 6.2. and 6.3., the following elements are used:

- the best possible estimate of the insurance risks involved;
- the best possible estimate of the costs at which the insurance policies are, on average, expected to be administered in the market;

- a rate of interest specified in accordance with the guidelines laid down by the Financial Supervisory Authority to this effect, see *the guidelines on discount rates*.

#### **4.4 Interpretations, experience drawn and discussions**

It has been somewhat unclear what should or could be allocated to *Guaranteed benefits* and *Bonus potentials*. This applies in the discussion of whether a policy benefit should actually be seen as a guaranteed benefit or as a conditional guaranteed benefit. The issue of whether a policy benefit is guaranteed or only conditionally guaranteed has been dealt with in the decision handed down by the Financial Supervisory Authority on 26 June 2003, see below.

In this connection, reference should be made to the last three sub-sections of 3.7 of this Report from which it appears that the Committee had originally taken a position on some of the unclear points.

The decisions in principle regarding section 52(1) and (3) of the executive order FN 205 of 18 December 2002 (financial statements) on the treatment of non-guaranteed policy benefits.

It should be noted that two decisions have been handed down in the same case. The first decision is dated 26 June 2003. This decision was subsequently brought before the Danish Company Appeals Board and after renewed deliberations, the Financial Supervisory Authority with its decision of 18 December 2003 resolved to repeal its decision of 26 June 2003.

##### **First decision**

*"The decision of the Financial Supervisory Authority of 26 June 2003 regarding the treatment of non-guaranteed policy benefits in the valuation of life insurance provisions at market value.*

##### **Statement of case:**

*In connection with the reporting of its technical basis for the valuation of life insurance provisions at market value, a company has reported that provisions for non-guaranteed policy benefits are not included in the accounting entry *Guaranteed benefits*, but instead in the accounting entry *Bonus potential on paid-up policy benefits*.*

*The company has notified its customers of the size of non-guaranteed policy benefits. The customers have been notified, however, that the company may subsequently reduce the benefits.*

**Decision/Statement of grounds:**

*It appears from section 52(1) of the executive order of 18 December 2002 on the financial statements of life insurance companies and occupational pension funds that the entry Guaranteed benefits is calculated using the benefits guaranteed under the insurance policy.*

*The Financial Supervisory Authority notified the company that, in an accounting sense, the customer is guaranteed the company's non-guaranteed benefits until such a time as the company notifies the customer that the non-guaranteed benefits have been reduced or have lapsed. Thus provisions for non-guaranteed benefits should be included in the entry Guaranteed benefits and not in the entry Bonus potential on paid-up policy benefits."*

The decision was appealed to the Danish Company Appeals Board and with the decision of 18 December 2003, the Financial Supervisory Authority's decision of 26 June 2003 was repealed.

**Second and applicable decision**

"The decision of the Financial Supervisory Authority of 18 December 2003 regarding the treatment of non-guaranteed policy benefits in the valuation of life insurance provisions at market value.

**Statement of case:**

*On 31 July 2003, the Financial Supervisory Authority published on its website a decision of 26 June 2003 to the effect that provisions for non-guaranteed policy benefits should be included in the accounting entry Guaranteed benefits and not in the accounting entry Bonus potential on paid-up policy benefits.*

*This decision was subsequently brought before the Danish Company Appeals Board.*

***Decision/Statement of grounds:***

*Following renewed deliberations, the Financial Supervisory Authority resolved to repeal its decision of 26 June 2003.*

*Given that the company has notified its customers of the size of non-guaranteed policy benefits, the Financial Supervisory Authority has ordered the company to adjust the rules reported to the effect that it appears that the company cannot use the portion of the Bonus potential on paid-up policy benefits deriving from separate non-guaranteed policy benefits to cover losses, until such a time as the customer has received notification that the allocated non-guaranteed supplementary policy benefit has lapsed or been reduced as a result of allocation of negative bonus in accordance with the terms of the insurance policy to this effect.”*

## 5. Interest

### 5.1 General deliberations

Measurement of the value of life insurance commitments and future premiums for calculation of provisions must necessarily include discounting of these cash flows that will often take place at some remote future date. To that end, discounting factors should be established. Before the transition to market value accounting, discounting of future cash flows was based on the technical interest rate. After the transition to market value accounting, discounting should be based on a market rate. This means that the market rate should be defined in more detail.

The IASC Issues Paper from 2000 (article 370) makes the following comments on this matter: "The Steering Committee concluded in sub-issue 6F that the measurement of insurance liabilities should reflect the risk that would be reflected in the price of an arm's length transaction between knowledgeable, willing parties. To the extent that estimated cash flows reflect this risk, the discount rate should be a risk-free rate."

In other words, the IASC starting point is that cash flow discounting should be based on a risk-free interest rate. In case a risk-free rate is used for each individual payment date, this will lead to the use of a risk-free yield curve.

### 5.2 Committee deliberations

In the initial stages of its work, the Committee analysed a number of simple valuation examples.

#### *Example 1:*

The focus is entirely on the interest-rate effect and it is assumed that the return generated in the individual year is allocated to pension benefits, meaning that bonus equalisation is disregarded. Calculations of bonus commitments are also disregarded, so that the value of life insurance commitments are calculated based on best estimate. If you consider a long-term savings product without any kind of insurance risk, but only an interest-rate risk related to a technical interest rate, you may ask: "What is the market price of such a commitment?" There are no exchanges for such pension commitments, but it could be assumed that the company wanted to sell the commitment. What would an acquirer charge for taking on the commitment. He would charge an amount based on the rate of interest he would assume he could get in the market. If, at the time of acquisition, he could not find an invest-

ment combination of the same duration as the commitment taken on, he would have to fix a price for the risk he would incur by having to reinvest the amount. The acquirer's risk-taking approach will depend on his financial strength.

The traditional provision method, based on the prudently determined technical interest rate, calculates the commitment at the value of the guaranteed benefit less a deduction for the value of future premiums. The full bonus accrued each year will be used to increase the guaranteed benefit.

If the commitment is to be based on best estimate, it may be broken down into two parts – one pertaining to the commitment resulting from premiums already paid and one pertaining to the future commitment to receive premiums and provide insurance benefits. The commitment resulting from premiums paid is the paid-up policy commitment. At any time a best estimate of this paid-up policy commitment may be calculated based on the market rate. If the expected future interest rate is equivalent to the technical interest rate applied, the value of the commitment to receive premiums in future is zero. If the market rate is lower than the technical interest rate, the company will have to set aside the cost of the difference between the actual, expected earnings and the return promised to the customer. The annual bonus accrued will also in this case be used for bonus revaluation, i.e. bonus revaluation of the paid-up policy commitment. The best estimate method calculates only the guaranteed commitment, and the bonus potential arising when the market rate is higher than the technical interest rate – either from premiums paid or from the future premiums – is not factored in.

*Example 2:*

Based on the valuation of a simple financial contract, the example is subsequently extended to include a single premium life insurance under which the sum insured is paid on the death of the policyholder. We will start by considering a contract under which the customer – against a premium of 1 – is guaranteed a benefit payout of

$$(1+r)^n.$$

It is not possible to reclaim the premium in the course of the term of the insurance contract and the premium carries a fixed rate of interest of exactly  $r$ . According to economic theory, a product like that will be priced at:

$$(1+r)^n / (1+r_n^{\text{zero-coupon}})^n.$$

If discounted by the zero-coupon rate, this represents the value of the guaranteed benefit payout.

The definition of the zero-coupon rate is that, at any time, it is the same for all payments maturing on the same date after this time, irrespective of the credit or exchange rate risk-free bond involved. If the zero-coupon rate was known, the problem would be solved, but the zero-coupon rate is not directly readable from the market; it has to be estimated based on the credit and exchange rate risk-free bonds sold in the market.

The existence of the zero-coupon yield curve is based on an arbitrage argument, assuming that the value of an investment in an  $n$ -year bond should be the same as the values of  $n$  successive investments in 1-year bonds at the same time. The rate of interest on the successive 1-year bonds is known as the forward rate – thus there is an unambiguous correlation between forward rates and the zero-coupon yield curve.

There is no need for a theoretical market value margin in a market trading in credit and exchange rate risk-free bullet loans with arbitrary maturities. Any future movements in the zero-coupon yield curve have no bearing, as the company may choose, at the time of entering into the contract, to invest in the related bullet loan with a maturity of  $n$  years, i.e. to fully hedge its commitment. In that market, the zero-coupon rate thus represents the risk-free rate.

The practical use of the theory implies, however, that it has to be decided which method to use for estimation of the zero-coupon yield curve. In other words, the determination of best estimate of the zero-coupon yield curve involves uncertainty as to model and estimation method. The estimate uncertainty grows with the length of maturity, given that long-dated bonds are not traded very often. In practice, the traders in the market will have to consider whether the sensitivity of choice of model and the estimate uncertainty attached to the model requires a market value margin to be added to the theoretical price. Any market value margins as a result of model and estimation errors must be assumed to have already been reflected in the market prices in the sense that the market prices factor in an implicit margin to cover such factors of uncertainty.

In the field of life insurance, large portions of the maturities of the pension commitments may be between 40 and 60 years. Given that trading is very limited in securities with maturities in excess of 30 years<sup>17</sup>, it will be necessary to extrapolate the zero-coupon yield curve based on knowledge of bond prices with maturities below 30 years. Such extrapolation requires a significant safety premium to be added to the price, if only for the reason that it is not possible to hedge the commitment; thus all future movements in the zero-coupon yield curve will play a pivotal role in the assessment of the cost of the commitment.

If we subsequently revert to the simple financial contract referred to above and extend the example to include a single-premium whole-life insurance, we encounter the problem that there is no known maturity, given that the maturity depends on the time of death of the policyholder. Here the price will be:

$$(1+r)^n / (1+r_t^{\text{zero-coupon}})^t.$$

where  $t$  is the residual life expectancy of the policyholder. If  $t$  is greater than  $n$ , the price is 0. Given that the maturity is not known, it is not possible to hedge the commitment and consequently it is unclear which zero-coupon rate to choose.

In an insurance company with a large insurance portfolio, one might argue that some measure of hedging is possible, given that the company knows how many people die on average each year.

The conclusion is that the zero-coupon yield curve provides a natural building block for the valuation of single-premium whole-life insurance policies at market value. The method seems to be extendable to include general cash flows with stochastic expiration dates, as long as the expiration dates may be assumed to be independent of the zero-coupon yield curve. The method cannot, however, be extended to directly embrace the issue of factoring in surrender probabilities, given that such probabilities depend on the development of the zero-coupon yield curve.

The Committee also found that if a company decides one year to use interest rates derived from the zero-coupon yield curve, it cannot revert to a rate based on the government bond yield curve the next year.

<sup>17</sup> There are, however, some long-dated swaps.

### **5.3 The rules defined by the Financial Supervisory Authority**

In the Financial Supervisory Authority's discount rate guidelines, issued 20 December 2001, the Authority specifies three methods of determining a discount rate to be used for calculating life insurance provisions as defined in the executive order on the financial statements of life insurance companies and occupational pension funds.

The first method is a schematic determination, based on a basket of three government bonds, weighted so as to obtain a duration of 10, with the addition of the spread between the rate on a 10-year interest-rate swap and the yield on a 10-year government bond and less a deduction for the tax rate under the Pension Savings Returns Tax Act (the current rate being 15%). Each business day, the Financial Supervisory Authority publishes the applicable discount rate on its website.

The second method is to use for each payment date an applicable interest rate derived from a zero-coupon yield curve, reduced by the tax rate under the Pension Savings Returns Tax Act. The zero-coupon rate represents the risk-free rate and is calculated based on exchange rates and credit risk-free bond trades in the market.

The third and last method is to choose interest rates derived from a zero-coupon yield curve with ranges exceeding one year, or to use a different summary method based on the yield curve; however, interest rates must not exceed the interest rates following from the yield curve with one-year ranges.

It also appears from the guidelines that both the interest rate determined based on the basket of government bonds and the interest rates derived from the zero-coupon yield curve may be reduced by a margin of 5%. That way, the market value margin as defined by the executive order on accounting is considered to have been factored in. While, for purposes of calculation, the market value margin is linked to the interest rate, the formulation is general and thus also covers the market value margin on costs and insurance risk. It should be added that the market value margin may also be determined based on the conditions of the individual company.

### **5.4 Interpretations, experience drawn and discussions**

On the Danish Society of Actuaries' continuing education courses on market values (*hands-on courses*), the working groups formed reached the general conclusion that the market rate in the form of a yield curve provides the theoretically most correct financial statements and

gives a more true and fair view of the state of affairs of the company than does a flat rate (flat yield curve). The working groups agreed that while a company may opt out of using a fixed rate in favour of a yield curve, the reverse is not possible. Opinions differed as to whether or not it would be expedient to have a common market yield curve. An argument for a common market rate parameter, for instance formed/quoted by the Financial Supervisory Authority on a daily basis, was that such a parameter would provide for easier comparability of financial statements between companies. An argument against a common market rate was that such a rate might make it impossible to make an expedient adjustment between the market rate and series of benefits.

It was pointed out that companies that had decided to use their own yield curve generally based the curve on swap rates in Danish kroner or euros. For more information, please refer to the decision of the Financial Supervisory Authority of 26 June 2003 on the use of swap rates in euros, see below. On the point of yield curve estimation it was pointed out that results are sensitive to the choice of estimation method; thus this choice should form part of the officially reported technical basis. Reference was made to various methods, such as Extended Nelson-Siegel, Cubic Spline, Hybrid, etc. Each method has different characteristics and abilities to describe short-term and long-term interest rates.

The decision in principle of the Financial Supervisory Authority regarding section 52(4)(3) of the executive order FN205 of 18 December 2002 (financial statements) on the use of euro swap rates to determine the discount rate:

*“The decision of the Financial Supervisory Authority of 26 June 2003 on the use of euro swap rates for determining the discount rate for the valuation of life insurance provisions at market value.*

**Statement of case:**

*In connection with the reporting of its technical basis for the valuation of life insurance provisions at market value, a company has reported that the discount rate used is based on euro swap rates.*

**Decision/Statement of grounds:**

*Section 52(4)(3) of the executive order of 18 December 2002 on the financial statements of life insurance companies and occupational*

*pension funds specifies that in calculations of the entries Guaranteed benefits, Bonus potential on future premiums, and Bonus potential on paid-up policy benefits, a rate of interest should be used that represents an estimate of the interest obtainable in the market. The Financial Supervisory Authority has prepared a set of guidelines on how to determine the interest rate, see the guidelines of 20 December 2001 on the discount rate.*

*The guidelines specify that if a life insurance company makes its own discount rate estimation, the company shall use for each payment date an applicable interest rate based on a zero-coupon yield curve. The guidelines also specify that a zero-coupon yield curve shall be determined for each currency in which the company's pension commitments are denominated.*

*The Financial Supervisory Authority notified the life insurance company with pension commitments denominated in Danish kroner that the company was to use Danish interest rates when determining the zero-coupon yield curve, given that its pension commitments were denominated in Danish kroner.*

*The company has appealed against the decision to Danish Company Appeals Board."*

### **5.5 Future developments**

In March 2004, the Financial Supervisory Authority appointed a working group, commissioned to prepare proposals for rules to govern the choice of discount rate.

Taking International Accounting Standards (IAS/IFRS) as its starting point, the working group is to consider the principles for determining discount rates for use in measurement of insurance and pension commitments to be included in a Danish IAS compatible set of accounting rules.

Based on these principles, the working group is to propose rules for yield curve estimation. These rules are to be prepared for the purpose of ensuring, in so far as possible, that similar pension commitments are measured at the same value in different companies.

## 6. Insurance risks

### 6.1 General deliberations

Insurance risks relate, in particular, to mortality and disability rates, but in certain circumstances conversion of an insurance policy to a paid-up or surrendered policy is also seen as events subject to inherent risks.

An issue relevant in determining these parameters is the extent to which an expected future development is to be factored in and how it is to be estimated. Another issue is what the market will charge for taking on the risk pertaining to fluctuations in these risks. To that end, it is relevant to consider whether or not it may be argued that fluctuations in insurance risks are diversifiable. Finally, it should be considered whether small and large portfolios of insurance risks will be valued at the same price as far as the risks pertaining to future developments and fluctuations are concerned.

### 6.2 Committee deliberations

The Committee discussed insurance risks in various contexts, but no written material on insurance risks is available.

### 6.3 Provisions of the executive order on accounting regarding insurance risks

Section 52(4) of the executive order on accounting states as follows about insurance risks:

*“In calculations of entries 6.1-6.3 (Guaranteed benefits, bonus potential on future premiums, and bonus potential on paid-up policy benefits, ed.)..., the following should be applied:*

*1) the best possible estimates of the insurance risks involved, including mortality and disability estimates, etc....”*

Section 51 of the executive order on accounting refers to risks pertaining to surrender and paid-up policies:

*“The present value of the expected future administration results should be reduced by the probability of the insurance policies being converted to paid-up policies or being surrendered.”*

### 6.4 International deliberations regarding insurance risks

The IASC Issues Paper on Fair Value, Sub-issue 6C, states as follows:

### **Sub-issue 6C – Should Assumptions Reflect Current Information at the Date of the Financial Statements or Long-term Expectations?**

The Steering Committee favours an approach to measurement that focuses on current information and assumptions. If deferral mechanisms like the corridor approach in IAS 19, Employee Benefits, are considered appropriate, financial statements will be more understandable and transparent if any deferrals are computed and presented separately from underlying measurements.”

In its Comments Letter 103, the International Actuarial Association, IAA makes the following comments:

“The IAA considers it appropriate to reflect current expected values of future cash flows over the duration of the obligation. These expectations would normally be based on the most recently available documented information, to the extent relevant and credible, and the best judgement of an expert if sufficient relevant historical information is not available (for example, in the case of a start-up operation).

The IAA believes that any deferral of recognition of changes in experience assumptions, whether through a corridor or any other approach, would be inappropriate. Efforts to smooth earnings as a result of the use of average long-term historical experience would not be appropriate. Such approaches tend to hide the financial impact of underlying changes in experience, which in turn hinder transparency and reduce comparability of financial statements.”

The issue is treated in more detail in CL 103G to the IAA Comments Letter: “Market Expectations Regarding Experience Assumptions”, which states as follows:

“Estimates of expected cash flows will by necessity reflect judgment. Someone will have to either observe the results of these estimates or *expectations* will be developed. One potential source of difference could result from who develops the expectations - management, the actuary, or the market as implied by market transaction prices. One example of a situation that may arise is the estimation of the rate of future mortality improvements that should be expected - the expectations of two actuaries could differ substantially, one may assume current levels to continue while the other may expect a one percent annual improvement.”

This altogether indicates that the general position of the IAA is that while life expectancy increases should be factored into provision calculations, such expected increases may be difficult to determine objectively and unambiguously when there is no efficient market to provide market expectations. Obviously, the objective expectations should reflect the price at which a portfolio can be traded.

#### **6.4 Insurance risk experience**

The issue of insurance risks has been discussed on various occasions, e.g. the "*Hands-on*" courses mentioned above, arranged by the Danish Society of Actuaries. At this stage, no actual experience has been gained in this respect.

## 7. Costs

### 7.1 General deliberations

Initially, it should be considered whether or not costs should actually be factored into the valuation of life insurance commitments at market value. The question is whether it can be assumed to form part of the life insurance contract that it costs money to administer the contract. One might take the view that the commitment to administer insurance contracts is a cost incumbent on equity – and thus a cost that should not be factored into life insurance commitment calculations.

On the other hand, one might argue that the product purchased under a life insurance contract is comprised of two elements: An entitlement to pension benefits *and to the administration* required over time to handle these benefits until they fall due. In their pricing of life insurance commitments, potential acquirers of such pension commitments will factor in the cost of ongoing administration of the contractual pension commitments they are looking to take on.

Ideally, this means that in an efficient market, the price a potential acquirer will be able to charge for taking on the administrative commitment will be equivalent to the price the market may charge. Given, however, that, on the one hand, there is no efficient market and, on the other, that service levels differ in this field, the only practicable approach is probably to apply the actually observed costs of the individual companies as input for this pricing.

It also follows from the deliberations above that the only costs to be factored into the commitment on the individual insurance contract are those directly related to the insurance contract in question, meaning that costs related to, say, new insurance contracts should not be factored in.

### 7.2 Committee deliberations

Below you will find a summary of the Committee's deliberations in terms of costs, cost bonus and administration results in market value accounting, including its deliberations on the final choice of model. The Committee looked into two different issues:

1. Under the existing accounting rules, it was possible to set off non-amortised acquisition costs against overall life insurance provisions. What would happen to this possibility at the transition to market value accounting?

2. How are ongoing administration costs relative to individual insurance contracts to be factored into the following quantities: *Guaranteed benefits*, *Bonus potential on future premiums*, and *Bonus potential on paid-up policy benefits*? For the purposes of clarifying this issue, the Committee considered three different models.

In the presentation, a simplified formula universe was used to illustrate the issues. Thus the formulas were not designed to provide a complete mathematical description.

*Non-amortised acquisition costs:*

By way of introduction, the Committee established that the concept “non-amortised acquisition costs” belongs to the transaction-based accounting method and as such has no justification in market value accounting.

*Valuation of the bonus commitment on administration costs:*

The bonus commitment in terms of the individual insurance contract should reflect the company’s commitment to allocate bonus under the contract. Thus the bonus commitment in terms of costs should be equal to the value of overall cost contributions on a first order basis less a deduction for the value of overall costs, including underwriting costs relative to the insurance contract.

This calculation of the bonus commitment in terms of costs is independent of the consequences for the company of a cessation of premium payments, given that the basis of the valuation of the insurance contract, including the bonus commitment, is that the future premium is paid in full. Any option towards a broker of repayment of fees in case of early surrender is without value, given that the condition for ensuring that the option has value is that premium payments have ceased.

Model 1:

The Committee considered a model under which the bonus potential on the future premium was calculated according to *the net premium* using the underwriting basis  $\pi$ .

The bonus potential on costs may subsequently be calculated as follows<sup>18</sup>:

$$(P-\pi) \text{ asset}^{M\text{-rate}} - \text{adm}^{\text{fut.}} - \text{non-amort. underwriting costs}$$

<sup>18</sup> For further information, please refer to the appendix of definitions and notations.

This model is based on the assumption that cost contributions are charged to the ongoing premium. The method may be extended to include cases of cost contributions via the interest-rate differential.

Model 2:

*Alternatively*, the bonus potential on costs could be calculated as the value of the cost bonus the company intends to allocate pursuant to its reported bonus regulations. Using this formulation, a position should no longer be taken on the value of non-amortised underwriting costs, as these costs will be implicitly included. However, this method is inexpedient in the sense that this bonus commitment will not be determined by objective accounting quantities.

Model 3:

If, instead of factoring in costs, one considers *the lapse of market benefits* entailed by the actual costs, a method emerges for reducing bonus potentials as a result of the charging of costs to individual insurance contracts. The method depends exclusively on actual costs and is thus independent of the technical basis reported by the individual company.

If the market value of the costs pertaining to a new insurance contract may be calculated as follows:

When  $cost^{total} = cost^u + cost^{curr} asset^{M-rate} + cost^{deferr} liab^{M-rate}$ ,  
 where  $cost^u$  = *underwriting costs (over time written down)*,  
 $cost^{curr}$  = *annual costs during the premium payment period, and*  
 $cost^{deferr}$  = *annual costs after the transition to pension,*

then the market benefit and the overall bonus potential may be determined as:

$$Y^{M-rate} = (Vprov^{retro} + P asset^{M-rate} - cost^{total}) / liab^{M-rate},$$

$$Bonus\ potential = (Y^{M-rate} - Y^G) liab^{M-rate}$$

This potential may be broken down into two components:

and  $(P - cost^{curr}) asset^{M-rate} - cost^u - YP^G liab^{M-rate}$   
 $Vprov^{retro} - cost^{deferr} liab^{M-rate} - FP^G liab^{M-rate}$

In the financial statements, provisions will then look as follows:

$$\text{prov}Y^G = Y^G \text{liab}^{M\text{-rate}} - P \text{asset}^{M\text{-rate}} + \text{cost}^{\text{curr}} \text{asset}^{M\text{-rate}} + \text{cost}^{\text{deferr}} \text{liab}^{M\text{-rate}}$$

$$BP = P \text{asset}^{M\text{-rate}} - \text{cost}^{\text{curr}} \text{asset}^{M\text{-rate}} - \text{cost}^u - YP^G \text{liab}^{M\text{-rate}}$$

$$BF = V\text{prov}^{\text{retro}} - \text{cost}^{\text{deferr}} \text{liab}^{M\text{-rate}} - FP^G \text{liab}^{M\text{-rate}},$$

and  $\text{Life ins. prov} = V\text{prov}^{\text{retro}} - \text{cost}^u.$

This method for factoring in costs thus depends on the way in which the cost contributions are paid on the first and second order bases. The method is based exclusively on the assumption that actual costs may be described by breaking them down into the three components  $\text{cost}^u$ ,  $\text{cost}^{\text{curr}}$  and  $\text{cost}^{\text{deferr}}$ .

For the purposes of calculating guaranteed benefits, it has been decided that  $\text{cost}^{\text{curr}}$  and  $\text{cost}^{\text{deferr}}$  should, in principle, be the cost quantities (margins) charged by the market for administering the insurance contract in question. In calculations of bonus potentials, on the other hand, the company's actual  $\text{cost}^{\text{curr}}$  and  $\text{cost}^{\text{deferr}}$  should be set off, given that the company is only under an obligation to allocate costs bonus in accordance with its ability to do so.

Back to model 1:

Using the method specified above to calculate the bonus potential on costs based on the use of *the net premium* (model 1), it is possible to determine overall provisions in respect of the individual insurance contract as follows:

$$V\text{prov}^{\text{retro}} + \text{adm}^{\text{fut.}} - (\text{load exp}^{\text{1. order}} - B\text{cost}^{\text{fut.}})$$

where  $\text{adm}^{\text{fut.}} = \text{cost}^{\text{curr}} \text{asset}^{M\text{-rate}} + \text{cost}^{\text{deferr}} \text{liab}^{M\text{-rate}},$

and  $B\text{cost}^{\text{fut.}} = \text{future bonus on load exp.}$

This result may seem like a good solution, given that the difference between the value of the cost premiums less a deduction for expected bonus on costs shall cover the costs of the future ongoing administration and any outstanding underwriting costs.

If it is assumed that the cost premiums are covered through premium payments, then the life insurance provisions could be written as follows:

$$V_{prov}^{retro} - [(P - \pi) \text{asset}^{M-rate} - Bcost^{fut.}] + adm^{fut.}$$

That way, outstanding underwriting costs do not figure directly in calculations of life insurance provisions.

However, this method deviates from the point of view of principle than any operational risk charges cannot be capitalised and be included in calculations of life insurance provisions. This is due to the fact that if the value of outstanding underwriting costs is less than the difference above between  $adm^{fut.}$  and the value of the cost premiums after bonus, then this will be equivalent to capitalising the operational risk charge on the cost elements.

The method also depends on the technical calculation basis reported by the individual company, given that the method focuses on how costs are paid.

If the cost premiums on the first order basis are comprised of a deduction in the gross premium  $P$  of  $k\%$  and a cost and safety premium of  $s\%$ , as known from the technical calculation basis, G82, then the life insurance provisions of are obtained by replacing the square parentheses by the following:

$$([Y^G \text{liab}^{M-rate-s} - (1-k)P \text{asset}^{M-rate-s}] - [Y^G \text{liab}^{M-rate} - P \text{asset}^{M-rate}]) - (Bcost^P + Bcost^F)$$

where  $Bcost^P$  and  $Bcost^F$  are bonuses on future cost premiums on the future premium and on the paid-up policy savings.

In other words, this method means that the deduction that can be made in the value of retrospective provisions with the addition of the cost of future administration, is equivalent to the difference between market provisions for guaranteed benefits less a deduction for the cost premiums and market provisions without a deduction for cost

premiums. This exactly represents the value of the cost premiums. The portion of the cost premiums that the company has reported, at the time of presenting its financial statements, that it intends to allocate in the form of bonus is finally subtracted.

The question then is how  $Bcost^P$  and  $Bcost^F$  are to be valued. Should the company be at liberty to choose its valuation method, or should the bonus regulations with related parameters as reported to the Financial Supervisory Authority be used as the basis and how should companies handle any negative cost results?

Under this calculation method, life insurance provisions at policy level are negative until adequate savings have been made under the policy. Whether or not this is being acceptable must depend on how guaranteed surrender values are treated in market value accounting.

**Choice of model for treating costs in market value accounting**

In conclusion of the discussions of treatment of costs in market value accounting, the Committee endorsed the final proposal of the Financial Supervisory Authority for the choice of model.

The philosophy behind the model is to perceive costs as benefits in line with insurance benefits. The agreed premium and the value of retrospective provisions can be used to cover these costs.

Have  $Adm^{fut.} = Adm^{fut., FP} + Adm^{fut., P}$ ,

where  $Adm^{fut., FP}$  = the cost of the future administration of the paid-up policy, and

$Adm^{fut., P}$  = the cost of the future administration of the agreement on premiums.

Provisions will be as follows in the financial statements.

$prov Y^G = Y^G liab^{M-rate} + Adm^{fut.} - P asset^{M-rate}$

$BP = P asset^{M-rate} - YP^G liab^{M-rate} - Adm^{fut., P}$

$prov FP^G = FP^G liab^{M-rate} + Adm^{fut., FP}$

$$BF = Vprov^{retro} - (load\ exp - Adm^{fut.}) - FP^G\ liab^{M-rate} - Adm^{fut., FP}$$

$$Life\ ins.\ prov = Vprov^{retro} + Adm^{fut.} - load\ exp.$$

Here  $provFP^G$  is equivalent to the sum of  $prov Y^G$  and  $BP$ , and  $Life\ ins.\ prov$  is equivalent to the sum of  $provFP^G$  and  $BF$ . Whether or not a company wants to specify  $provFP^G$  in its financial statements depends on whether the company believes that this quantity will enhance the reader's understanding of the new rules.

### Administration result

In the calculation of life insurance provisions above, the value of the administration result is thus deducted – the administration result being defined as the value of cost premiums less a deduction for future administration costs.

If the company expects the value of these premiums after administration bonus, if any, to exceed the expected future administration costs, this quantity thus triggers a deduction in life insurance provisions. However, the administration result should be reduced by the probability of the insurance policies being converted to paid-up policies or being surrendered.

In this connection, it should be noted that with this model it has been decided to depart from the general principle that any proportion of the operational risk charge of the bonus potentials cannot be calculated and deducted in so far as the administration element is concerned.

### 7.3 Implementation of the model chosen in the executive order on accounting

In the provisions of the executive order on accounting<sup>19</sup> on calculation of life insurance commitments, costs are included in the following provisions:

Section 51(1)(1, 3, 5 and 7 and 52), including, in particular, section 51(4)(2). Section 51 is a definitional provision, specifying the quantities forming part of the calculation of provisions as established by section 52.

Section 52(4) states:

“In calculations of entries 6.1-6.3 [Life insurance commitments], [...] the following elements are used:

<sup>19</sup> The most recent executive order on the financial statements of life insurance companies and occupational pension funds of 20 October 2003.

- 1) the best possible estimates of the insurance risks involved [...]
- 2) the best possible estimates of the costs [...]
- 3) a rate of interest in the form of an estimate of the interest obtainable in the market. [...]"

There has been doubt as to the rate at which the value of future administration costs should be calculated. Section 52(4)(3) states that all values should be based on the same rate of interest, i.e. the rate obtainable in the market.

Section 51(1)(1) states:

*"Retrospective provisions for each insurance policy:*

Premiums paid less a deduction for benefit payouts, **payment of costs**, adjustment of risk and with addition of interest accrued, etc., on the individual insurance policy."

The costs referred to in this provision are the actual costs collected in respect of the individual insurance contract.

Section 51(1)(3) states:

*"The value of retrospective provisions:"*

The sum of the value of retrospective provisions for each insurance policy, see section 51(1)(2), less a deduction for **the present value of an expected future administration result** [...]. The present value of the expected future administration result should be reduced by the probability of the insurance policies being converted to paid-up policies or being surrendered."

The present value referred to, is equivalent to the quantity (*cost premium* –  $Adm^{fut.}$ ) as described in the section *Choice of model for treatment of costs in market value accounting*.

In this connection it should be mentioned that the set of rules does not clearly specify whether the cost premiums specified should be calculated before or after bonus.

Section 51(1)(5) states:

*"Guaranteed benefits for each insurance policy:*

The present value of the benefits guaranteed under the insurance contract, and **the present value of the expected future costs for**

**administration** of the insurance contract less a deduction for the present value of the agreed future premiums.”

The present value referred to is equivalent to the quantity  $Adm^{fut.}$  as described in the section *Choice of model for treatment of costs in market value accounting*.

Section 51(1)(7) states:

*“Guaranteed paid-up policy benefits for each insurance policy.*

The present value of benefits guaranteed in case the insurance policy is converted to a paid-up policy, and the present **value of the expected future cost for administration** of the paid-up policy.

The present value referred to is equivalent to the quantity  $Adm^{fut., FP}$  as described in the section *Choice of model for treatment of costs in market value accounting*.

It should be noted that in the executive order it has been decided to describe bonus potentials as differences between provisions instead of as independent quantities. For this reason, the quantity  $Adm^{fut., P}$  is only an implied part of the set of rules as the difference between  $Adm^{fut.}$  and  $Adm^{fut., FP}$ .

#### **7.4 Experience with determination of costs**

The overall experience gained with the determination of the quantities  $Adm^{fut.}$ ,  $Adm^{fut., P}$  and  $Adm^{fut., FP}$  is that there is great variation in companies’ choice of parameterising these quantities.

Moreover, there has been great uncertainty as to a framework for how to calculate the quantity “the value of the administration result” pursuant to section 51(1)(3). In particular, there has been much doubt as to whether the basis for the calculation of this value should be the maximum costs chargeable, or whether the basis should be the costs that the company actually charges pursuant to its costs after bonus on cost premiums reported.

In its decision in principle of 26 June 2003, the Financial Supervisory Authority specified that:

*“ORDER FN205 of 18 December 2002 (financial statements), section 52(1) and (3), on the calculation of a future administration result  
The decision of the Financial Supervisory Authority of 26 June 2003*

*regarding the calculation of the expected future administration result in the valuation of life insurance provisions at market value.*

**Statement of case:**

*In connection with the reporting of its technical basis for the valuation of life insurance provisions at market value, a company has reported that the expected future administration result is determined based on the difference between the expected administration income before allocation of bonus and the expected actual administration costs.*

**Decision/Statement of grounds:**

*Section 51(1)(3) of the executive order of 18 December 2002 on the financial statements of life insurance companies and occupational pension funds states that the value of retrospective provisions should be calculated as the sum of the value of retrospective provisions for each insurance policy with a deduction for the present value of the expected future administration result. The present value should be reduced by the probability of the insurance policies being converted to paid-up policies or being surrendered.*

*The Financial Supervisory Authority notified the company that the expected future administration result should be determined as the difference between the expected administration income after allocation of bonus and the expected actual administration costs.*

*The rationale for the decision of the Financial Supervisory Authority was that otherwise the company – when writing an insurance contract – would immediately realise the expected value of future administration results, without allowing for the fact that future administration profits should later be transferable back to the customer in the form of bonus.”*

Thus it has been established that the value should be calculated based on the second order rates reported to the Financial Supervisory Authority.

On the Danish Society of Actuaries' continuing education courses on market values (*hands-on courses*), it was ascertained by the working groups formed that it is necessary to make an overall reassessment of each type of cost based on the market value philosophy. An independent reassessment of the cost structure in the calculation bases, designed specifically for the transaction-based accounting theory,

may be required. Thus administration costs are financially complex depending on their objective (acquisition, one-off and ongoing costs) and they may be either actual or expected.

Thus the treatment of administration costs, using market value rules, may for each type of cost in itself give rise to very complex problems and interpretations that will only serve to detract from the readability of the financial statements. For example, it was ascertained that it is not possible to make reasonable comparisons between companies based on the cost parameters chosen, among other things because the calculation methods chosen are not standardised.

One of the conclusions drawn was that there would probably be a number of situations in which the market value method chosen would not affect the administration result in itself, but would instead affect the relationship between the value of *Guaranteed benefits* and *bonus potentials*.

Questions were raised as to whether the administration statements, in their current form, allow interpretation of issues as significant as where in the financial statements the profit is generated and how the underwriting basis relates to the bonus calculation basis.

One of the issues raised was about adjustment (indexation) of expected costs.

Another issue raised was that of the reasonableness of continuing to allow investment costs (gross) to lead a more or less "hidden" life in the financial statements.

### **7.5 Comments on the current formulation of the set of rules**

If the value of the administration result pursuant to section 51(1)(3) is negative, then this value will serve to increase the bonus potential on paid-up policy benefits under this set of rules. If, on the other hand, the value of the administration result is negative, this represents a deficit in terms of the administration costs relative to the administration contributions. Thus it hardly makes any sense for the value of the bonus commitment in terms of paid-up policy benefits to increase as a result. On the contrary, the commitment to allocate bonus should have decreased as a result of the deficit on the administration element. This part of the set of rules thus leaves a certain measure of uncertainty as to the approach in a situation of negative administration results.

A negative administration result reflects a situation in which the administration statements do not break even. It may thus seem wrong if the provisions do not increase as a result of this deficit. Whether or not overall provisions should increase as a result of a deficit on the administration statements depends on the type of agreement the individual company has signed with its customers in terms of entitlement to bonus.

If, for example, the customer's entitlements are in the form of a benefit guarantee and a bonus entitlement in case of an overall profit on the customer's contribution payments relative to this benefit guarantee, an additional commitment on the company's part as a result of the deficit on the administration statements will not arise until such a time as the deficit in this respect triggers an overall deficit on the benefit guarantee measured in terms of the value of the funds paid and the agreement on future premium payments.

If, on the other hand, the customer has been promised an element bonus in the sense that the deficit on interest, insurance risk and administration, respectively, cannot be offset against the profit on the other elements, then a deficit on administration should immediately cause life insurance provisions at market value to be higher than the provisions calculated based on the underwriting basis.

## 8. Market value margin

### 8.1 General deliberations

A general question to be raised relative to the valuation of life insurance commitments at market value is whether the pension commitments should be calculated at an expected realistic value relative to the knowledge of risks available at the time of the conclusion of the contract, or whether it should be expected that the market will charge a premium in excess of this value.

The IASC (now IASB) specifies in its 1999 Issues Paper that

*“the measurement of insurance liabilities should reflect risk to the extent that risk would be reflected in the price of an arm’s length transaction between knowledgeable, willing parties.”*

This Issues Paper was submitted to a hearing and the International Actuarial Association, IAA, in its Comments Letter to this Issues Paper declared its agreement to this mark value approach. In addition, the IAA made the following comments on the definition and determination of the market value margin:

*“The fair value of liabilities should represent the amount of money that would have to be transferred in order for a willing third party to take over the obligations that give rise to the liabilities.”*

The IAA then proceeded by describing the difference between “fair value” and “expected value”:

*“Therefore, the fair value of the liabilities will not equal the expected value of liability, but rather the expected value plus a reward for the risk. This reward is defined here as the Market Value Margin (MVM).”*

The IAA also noted that

*“The MVM is consistent with IASC’s concept of the “premium included by the marketplace for bearing the uncertainty inherent in estimated future cash flows”, ... Hence, the MVM is not a prudent margin in the normal actuarial sense, but rather a margin demanded by the market in recognition that the cash flows are not risk free.”*

### 8.2 Committee deliberations on market value margin – an example

During the Committee's work, the following example was used to illustrate the effects of the market value margin:

Using the G82 calculation basis, an example has been calculated for a male policyholder, whose pension scheme comprises an annuity deferred until age 65, written at age 20. An amount of DKK 24,000 is paid into the pension scheme each year and the company uses a technical interest rate of 2%. The company allocates the full bonus, which is used for bonus revaluation of benefits.

If the market rate is  $m\%$ , then:

$$Mprov Y_x^G = Y_x^G liab_x^{m\%} - P asset_x^{m\%},$$

$$BP^{m\%} = P asset_x^{m\%} - YP_x^G liab_x^{m\%},$$

and  $BF^{m\%} = Mprov_x^{retro} - FP_x^G liab_x^{m\%},$

where  $FP_x^G = prov_x^{retro} / liab_x^G$

and  $YP_x^G = P asset_x^G / liab_x^G.$

The calculations put  $Mprov_x^{retro} = prov_x^{retro}.$

It should also apply that  $BF^{m\%}$ , which is the margin on the rights accrued, should be positive. Given that the overall bonus commitment should be positive,  $BP^{m\%}$ , which is the margin on future premiums, should be higher than  $-BF^{m\%}$ .

If it is assumed that the market assesses the uncertainty on long-term interest rates to be 0.5% of a point, then the overall market value margin may be fixed at the difference between  $Mprov Y_x^G$  calculated using a rate of interest of  $(m - 0.5)\%$  and  $m\%$ . This results in:

$$\begin{aligned} \text{Market value margin} &= Y_x^G (liab_x^{(m-0,5)\%} - liab_x^{m\%}) \\ &\quad - P (asset_x^{(m-0,5)\%} - asset_x^{m\%}) \end{aligned}$$

This premium should be deducted from the bonus potential. If  $m_1$  denotes the portion of the market value margin to be deducted from the margin on rights already accrued, while  $m_2$  denotes the portion to be deducted from future premiums, then

$$m_1 = BP^{(m-0,5)\%} - BP^m\%$$

$$m_2 = BF^{(m-0,5)\%} - BF^m\%$$

If a market rate of 5% is used, then:

Age		Exclusive of market value margin	Inclusive of market value margin
20	<i>Mprov Y<sup>G</sup></i>	(274,152)	(263,244)
	<i>BP</i>	274,152	263,244
	<i>BF</i>	0	0
	<i>Life ins. prov</i>	0	0
40	<i>Mprov Y<sup>G</sup></i>	161,961	228,207
	<i>BP</i>	154,656	141,992
	<i>BF</i>	513,404	459,822
	<i>Life ins. prov</i>	830,021	830,021
65	<i>Mprov Y<sup>G</sup></i>	3,709,436	3,849,326
	<i>BP</i>	0	0
	<i>BF</i>	1,001,805	861,915
	<i>Life ins. prov</i>	4,711,241	4,711,241

As will appear, the life insurance provisions of the example chosen do not change if a market value margin is factored into the calculation. On the other hand, the example illustrates the effects on bonus potentials.

### 8.3 Implementation of the market value margin in the executive order on accounting

In market value accounting, the entry *Value of guaranteed benefits*, see section 51(1)(6) of the executive order on accounting, is calculated as the sum of *Guaranteed benefits for each insurance policy* including the market value margin, see section 51(1)(9). Section 51(1)(9) defines the market value margin as:

*“The estimated premium which the company should be expected to have to pay in the market to an acquirer of the company’s insurance portfolio in order for the acquirer to take on the risk of fluctuations in the sizes and payment dates of guaranteed benefits.*”

The market value of nominal pension commitments is thus defined

based on the premium that an external acquirer of the pension commitments will charge. This premium will depend exclusively on the characteristics of the pension commitments, including the contract, and not on circumstances and conditions pertaining exclusively to the “surrendering” company. The external acquirer of the pension commitments should also be considered in light of the fact that the commitment to be honoured is that of guaranteed benefits (including guaranteed paid-up policy benefits), see the definition of the market value margin. The bonus commitment is not mentioned in the provision.

### **The size of the market value margin**

Section 52(4) states about the choice of parameters for calculation of guaranteed benefits and bonus potentials that the best possible estimates of risks and costs should be used, as well as a rate of interest estimating the interest obtainable in the market. Reference is then made to the guidelines issued by the Financial Supervisory Authority on this rate of interest.

The Financial Supervisory Authority’s guidelines of 20 December 2001 on discount rates provide an option between using a discount rate calculated by the FSA on a daily basis and a zero-coupon yield curve (reduced by the current rate under the Pension Savings Returns Tax Act), determined by the individual company. Irrespective of the option chosen, item 7 of the guidelines also allows for the possibility of reducing the rate(s) by a margin of 5%. In that connection, it is stated that:

*“When this margin is used, the market value margin referred to in section 52(1)(9) of the executive order on accounting shall be considered to have been factored into the calculation. Pursuant to section 52(1)(9) of the executive order on accounting, the market value margin shall, in other cases, be calculated in accordance with the conditions of the individual company.”* (In the latest executive order on accounting, section 52(1)(9), as referred to above, is section 51(1)(9).)

The quoted passage makes no reservations to the fact that only the portion of the market value margin attributable to interest may be calculated in this manner or to the fact that market value margins pertaining to risks from other sources should be added in supplement, cf. that the market value margin should cover “the risk of fluctuations in the sizes and payment dates of guaranteed benefits”. When this (summary) method is used for factoring in market value margins, it

is thus assumed implicitly that the full risk (approximatively) may be calculated proportionately with the cash flows discounted by the selected (reducing) discount rate(s).

#### **8.4 Experience gained with market value margins**

As far as the market value margin is concerned, a group of actuaries stated at the Danish Society of Actuaries' continuing education course on market values (*hands-on course*) that the greatest significance of the market value margin lies in the relationship between the value of *Guaranteed benefits* and *bonus potentials* (except when it is necessary to change the premium). The group concluded – based, among other things, on a number of reportings of technical bases to the Financial Supervisory Authority – that the premium should also reflect “the level of the guarantees issued”.

The reason stated for this interpretation was that the market value margin, according to the comments of the IASB, “cannot be interpreted as a safety margin in the traditional actuarial sense, but rather as a margin “motivated” by the market as a result of stochastics and uncertainty as to future *cash flows*.”

According to the group, the market value margin should capture and reflect

- risks pertaining to interest rates, insurance risks and costs;
- uncertainty attached to estimates; and
- the level of the guarantees issued.

## 9. Surrender

### 9.1 General deliberations

When a market value regime allows bonus potentials on paid-up policy benefits to be used to cover negative realised results, life insurance provisions may end up being lower than the surrender value of an insurance policy. Thus, there may not necessarily be adequate provisions in the extreme situation that all policies are surrendered. This obviously applies, in particular, in the case of guaranteed surrender values and mainly when there are no limits on policyholders' ability to surrender policies.

### 9.2 Committee deliberations on guaranteed surrender values

#### Value of the addition on life insurance commitments

The Committee exclusively considered insurance policies unhedged for foreign exchange exposure. As far as hedged insurance policies were concerned, it was assumed that hedging was factored into the calculation of the size of the surrender commitment and hence it seemed unnecessary to also factor in surrender probabilities in terms of these insurance policies.

The Third Life Insurance Directive prescribes that life insurance provisions in terms of an insurance policy with a guaranteed surrender value shall, at any time, at least be equivalent to the guaranteed surrender value. The directive provision stipulates that – in a situation in which all policyholders claim payment of their entitlements at the same time – life insurance companies shall have sufficient funds. This provision seems to conflict with the accounting rule stipulating that accounting values shall be calculated under the assumption that the company is a going concern and will continue its operations.

If the traditional insurance model, based on the state active, disabled and dead, is extended to include the state surrender with the attached surrender intensity, i.e. a transition is made from active to surrender, and the surrender value is referred to as  $G$  and the market value provisions as  $M$ , it will be possible to intuitively value the addition for guaranteed surfrender value at market value as follows:

$$p^{surr} \max(G_x - M_x, 0)$$

Based on a memorandum prepared for the Market Value Committee by Mogens Steffensen of the University of Copenhagen, it may be ascer-

tained that if the intuitive expression is to be on the safe side, then  $G_x$  must be replaced by the full first order provision.

Moreover, the Committee drew the conclusion that  $p^{sur}$  should be the accumulated probability from the presentation of the financial statements up until the expiry of the individual policy.

In its assessment of surrender probabilities, the Committee made a distinction between mandatory and voluntary schemes.

Under a mandatory scheme, it is usually not possible for individuals to surrender their insurance policies except in extraordinary situations, such as emigration or job change. For such schemes under which the access to the guaranteed surrender value is limited, there seems to be no immediate impediment for the estimation of surrender intensities to be based on the historical experience of the probability of emigration or job change. In that connection, it should be examined whether the job changing rate seems to depend on economic trends. If there is found to be a positive correlation between job changing rates and economic trends, then an estimation of surrender intensities based on historical experience of job changing should be assessed relative to possible future economic trends.

Under voluntary insurance schemes, there are usually no limits on policyholders' ability to surrender their policies, possibly subject to submission of health data. If a voluntary insurance policy also carries a guaranteed surrender value, there may be an incentive for policyholders to surrender their insurance policies in case of significant interest rate rises in order to reinvest the funds at the new investment rate.

Surrender intensities for voluntary schemes must thus be assumed to depend primarily on the difference between the guaranteed surrender value and the market value provisions and on expectations in terms of future new investment rates. Moreover, it is general experience that the age of the policy has considerable significance for the surrender intensity. The younger the policy, the higher the surrender intensity.

There are, however, certain limitations in this connection, providing for a certain sluggishness in the surrender behaviour of the policyholders.

1. On the surrender of a policy, a deduction is made which is most

often a percentage rate of the underwriting provisions of the insurance policy.

2. The normal tax rate on surrender is 60%. In order for surrender not to have any tax implications, surrender should be effected through a transfer pursuant to the Pension Savings Returns Tax Act. Under the terms of the Act, the policyholders cannot freely transfer policies – the only transfers allowable are transfers to a pension scheme of the same type or one with a longer term; thus the policyholders do not have free access to make transfers between average rate and new investment environments.

Given that under the accounting rules in force so far, it has not been necessary to track the surrender behaviour of the insurance portfolios, there is currently a lack of experience with the correlation between surrender of policies and market developments. Consequently, it will initially be necessary to act prudently when it comes to the choice of these probabilities.

The doubt as to how restrictively the directive provision was to be interpreted prompted the Committee to approach the Ministry of Economic Affairs, see 3.1 of this report. It appears from these references that it was permitted to operate with surrender probabilities.

### **Transfer rules and transition to market value**

Special rules apply to the calculation of surrender values under the transfer rules in connection with job changes. The aim of the transfer rules is to ensure that employees have access to transfer the pension entitlements accrued under their old pension scheme to the new one following a job change from one employer to another, each with a mandatory pension scheme with annuity payments.

The transfer rules were drawn up because – at the time the decentralised labour market schemes were set up – it seemed necessary in order to ensure job mobility that a person changing jobs and at the same time transferring to a new pension scheme should be able to integrate his or her pension entitlements under the new scheme. That was the basis of the job changing rules set out in the Danish Insurance Business Act<sup>20</sup>.

The minimum requirement under the job changing rules confers a right – but not an obligation – for a policyholder changing jobs from one employer to another, each with a mandatory pension scheme

<sup>20</sup> The provision of the act was subsequently extended to include transfer rules for company conversions and company ownership transfers.

with annuity payments, to transfer his or her vested rights. Under the existing system, this is effected by transferring the retrospective provisions with just a small deduction by the surrendering company. The receiving company may not charge a fee for receiving ‘the job changing’ funds. The financial rationale for allowing just a small deduction for transfers in job changing situations is the assumption that there is equilibrium between job changing transfers. The notes to the job changing rules did, however, allow the Financial Supervisory Authority an ‘emergency brake’ mechanism:

“In special circumstances – if a pension institution may be expected to be faced with a situation of non-equilibrium between pension transfers to and from the institution – the Financial Supervisory Authority may, however, allow the pension institution to charge a fee for a specified period of time.”

This possibility has never been used.

Moreover, the industry has drawn up a set of voluntary agreements, allowing transfer of retrospective provisions in virtually all job changing situations.

An example may be used to illustrate the effect on the job changing rules of the transition from the existing accounting regime to a marked value regime. In the example, two insurance companies each have a policyholder with retrospective provisions of 100. For accounting purposes, these provisions are covered by assets booked at 100 and the companies also have an off-balance sheet entry in the form of a capital loss of 20. In other words, the market value of the companies’ assets is 80. If the two policyholders swap companies (corresponding to the principle of equilibrium), there will be no accounting impact as long as the companies do not realise the capital loss for liquidity reasons.

In market value accounting, on the other hand, the value of the companies’ assets is 80, which is counterbalanced by a corresponding reduction to 80 of the *value of retrospective provisions*. The retrospective provisions are still 100 and may be perceived as a target for the bonus addition to the policyholders – a contribution figure.

If the two policyholders swap companies once again, the requirement of transfer of the retrospective provisions implies that both companies will be subject to an additional commitment of 20, irrespective

of the fact that the principle of equilibrium has been complied with. In other words, the 'emergency brake' mechanism may not be applied in this connection.

In market value accounting, it thus seems to be in keeping with the market value accounting mindset to transfer the *value of retrospective provisions*, i.e. 80. The contribution figures should also be carried on.

### **The inquiry to the Ministry of Economic Affairs**

In the light of this, the Committee decided to approach the Ministry of Economic Affairs with a view to amending the job changing rules.

The Committee pointed out that when the rules were drawn up in 1988, the value the insurance companies were under an obligation to transfer was the net reserve of the insurance policy, i.e. the value of the pension commitment pursuant to the calculation basis upon which the insurance contract was taken out. In a situation of significant capital losses on bonds (representing a reduction in the company's assets), a transfer of the net reserve is a strain on the remaining policyholders, given that the company does not have assets to honour the net reserve commitment. Other policyholders, wishing to surrender their insurance policies in a situation like that, do not receive the net reserve, but rather the net reserve reduced to a certain extent.

In a situation of significant capital losses, job changing policyholders are thus favoured over other policyholders under the prevailing rules, which was not the aim of the job changing rules. On account of the asset valuation principles, reductions in asset values relative to booked values were previously not very likely. As the asset valuation principles have been changed to market values to a greater extent, it is more likely to see reductions in asset values relative to booked values. However, it is not fully visible in the booked financial statements whether or not the favourable situation has occurred. Following a transition to market value accounting, it will be fully visible to the individual reader of the financial statements when the advantage exists.

In outline, the change on the transition to market value accounting means that any reductions in asset values relative to booked values are set off, within the framework of the contribution principle, against the value of bonus commitments towards the policyholders.

Based on this, the Committee reached the conclusion that the value to be transferred following a job change should be altered, so as to ensure that – following the transition to market value accounting – the value transferred was the market value of the life insurance commitment rather than the net reserve (which is currently the case), the rationale being that in future the market value will represent the value of the pension commitment from which the company is released following the job change in case the policyholder chooses to transfer his or her pension assets. This will ensure, on the one hand, that job changing policyholders are not favoured over other policyholders and, on the other, that the transfer rules do not adopt a commitment in case of job changing that goes further than the company's pension commitments under the pension agreements made. The Committee finds that with this proposal, the aim of the transfer rules of 1988 has been fulfilled.

With the proposed change, there will, however, be situations in which it is obviously unfavourable for the policyholder to transfer his or her funds. One such situation is in the case of significant capital losses on assets. On the other hand, if no changes are made as to the assets to be transferred in case of job change, there will be situations in which it is obviously unfavourable for the remaining policyholders if the policyholder transfers his or her funds. Given that job changing policyholders are free to choose whether or not they want to transfer their pension assets in a job changing situation, the Committee considers it unfair favouritism of the job changing policyholders if the value to be transferred in a job changing situation is not altered as specified above.

In the inquiry to the Ministry of Economics, the Committee chairman also specified that, originally, the job changing rules were as politically charged as they were technically complex, and he asked whether the Ministry had any comments on the proposal, including, in particular, whether the Ministry found it necessary to amend the act to implement the proposed change.

The Committee never received any response to its inquiry.

### **9.3 The rules established**

Based on the Committee's deliberations, a rule was established in section 52(5) of the executive order on accounting, stating that "If *the life insurance provisions for each insurance policy before any addition on the guaranteed surrender value*, see section 51(1)(4) are lower than

the value guaranteed for surrender of the insurance policy, then entry 6.1, *Guaranteed benefits*, see sub-section 1, shall be increased by the difference. As specified in the first sentence, the difference may be reduced in consideration of the overall probability that the insurance policy is surrendered before the expiry of the policy.”

#### **9.4 Experience gained and subsequent developments**

The job changing rules have now been incorporated in the explanatory notes to section 20(1)(7) of the Financial Business Act. To a great extent, the original explanatory notes from 1987 (the Insurance Business Act) have been repeated, not including, however, the requirement to the effect that the net reserve is what is to be transferred. In other words, the text is now unclear as to which amount is to be transferred. As far as costs are concerned, it is specified, however, that a fee may be charged on net provisions on a per thousand basis (the net provisions concept is not further defined). This provision made sense when it was clear from where the fee was to be deducted, but without this information, the provision seems unclear.

The Financial Supervisory Authority subsequently made the following decision in principle as to the amount to be transferred:

#### **”The Insurance Business Act, section 30(1)(7)**

*The decision of the Danish Financial Supervisory Authority of 18 December 2003 on the rules on transfer of pension schemes in case of job changes .*

#### **Statement of case**

*Pursuant to section 30(1)(7) of the Insurance Business Act, each company shall report rules according to which pension schemes with ongoing benefit payouts or pension schemes taken out as mandatory schemes with an insurance company or a pension fund may be transferred to or from the company if a policyholder changes place of employment. Pursuant to the explanatory notes of the act on the provision in question, the net reserve (defined as the value of the pension commitment pursuant to the calculation basis (underwriting basis) under which the insurance policy was taken out) shall be transferred in connection with a job change. It is possible to reduce the net reserve by a small fee.*

*The aim of the job changing rules is to ensure that the decentralised labour market pension system does not hamper labour market mobility.*

*As life insurance provisions are now valued at market value for accounting purposes, the Financial Supervisory Authority has assessed what implications this is to have on the special rules for job changing transfers.*

***Decision/Statement of grounds:***

*Following the transition to market value accounting for life insurance provisions, it is necessary to alter the value to be transferred following a job change, so as to ensure that the value transferred is the market value of the life insurance commitment rather than the “net reserve” (which is currently the case), the rationale being that in future the market value will represent the value of the pension commitment from which the company is released following the job change in case the policyholder chooses to transfer his or her pension assets.*

*In order to ensure that the rights of the policyholders are not curtailed relative to the terms of the insurance contract, the transfer amount cannot be lower than the surrender value of the insurance policy.”*

## **10. Unit-linked insurance policies and insurance policies without bonus entitlements**

### **10.1 Committee deliberations**

Pursuant to the directive on accounting by insurance companies, unit-linked insurance policies, under which the policyholder bears the entire investment risk, should be treated separately from other insurance business for accounting purposes. Under the current executive order on accounting, provisions in terms of unit-linked policies should be named 'insurance provisions under which the policyholder bears the investment risk' and assets should be named 'investment assets attached to insurance policies under which the policyholder bears the investment risk'. Basically, the provisions are equal to the value of the assets. Under the new market value accounting rules, the value of retrospective provisions for traditional insurance products may correspond to provisions for unit-linked insurance policies.

Though unit-linked insurance policies with a nominal guarantee could be treated analogously to traditional insurance products, it is not unproblematic to record unit-linked insurance policies with a nominal guarantee along with traditional insurance products, considering the significantly different bonus entitlements pertaining to the two types of insurance. In particular, there does not seem to be a clear case for allowing assets related to unit-linked insurance policies and assets related to traditional insurance products to be combined. It is important to know which assets form part of the average interest rate system and which do not. This is also the case in a bankruptcy situation. Finally, the company's investment risk pertaining to the two types of insurance varies significantly.

In the light of this, the Market Value Committee reached the conclusion that unit-linked insurance policies with a nominal guarantee cannot be recorded alongside traditional insurance products with an average interest rate.

The Committee subsequently outlined three solutions for unit-linked insurance policies with a nominal guarantee:

1. For accounting purposes, unit-linked insurance policies with a nominal guarantee are recorded alongside unit-linked insurance policies without a nominal guarantee. Assets could be recorded separately for the two groups of unit-linked insurance policies, possibly in a note to the financial statements. Similarly, provisions could be

divided according to underwriting basis, possibly in a note to the financial statements.

2. Nominal guarantees could be separated out and be recorded for accounting purposes under the same rules as and alongside traditional insurance policies. The unit-linked portion is recorded for accounting purposes under the same rules as and alongside pure unit-linked insurance policies.
3. Unit-linked insurance policies with a nominal guarantee are recorded for accounting purposes separately from traditional insurance products, as well as from pure unit-linked products with no nominal guarantee.

The Committee discussed insurance policies with no bonus entitlements in various contexts, but no written material is available.

### **10.2 Handling in the accounts**

The handling of unit-linked insurance policies in the accounts is to record pension commitments related to these policies as separate main entries on the liabilities side of the balance sheet. These insurance policies are thus not included in the rules on calculation and division of pension commitments under the general rules, unless they are issued with a guarantee of a certain minimum return.

Insurance policies with no bonus entitlements are calculated as an overall item, with the addition of the value of guaranteed benefits, the value of guaranteed paid-up policy benefits, and the value of retrospective provisions. As no bonus potentials are attached to these insurance policies, they are not included in the divisions made for insurance policies with bonus entitlements.

## 11. The contribution principle and market values

### 11.1 General deliberations

When valuing life insurance commitments at market value, the valuation of guaranteed benefits is the least of the problems.

The valuation of bonus entitlements – to which most insurance policies in Denmark are subject – at market value is much more difficult.

Bonus entitlements under Danish life insurance contracts are conditional entitlements to a proportion of any profits generated under the insurance contract during the term of the policy.

Bonus commitments are potential pension commitments that may lapse entirely without ever becoming payable. They may be divided into individual and collective pension commitments. The individual potential commitment towards the individual policyholder is included in the accounting entries: *Bonus potential on future premiums* and *Bonus potential on paid-up policy benefits*. The collective potential commitment towards the portfolio of policyholders is included in the accounting entry: *Collective bonus potential*.

It is technically and legally complex (and possibly even questionable) to talk about an actual market value of bonus commitments – the reason being that these pension commitments are conditional commitments, depending on the company's (rather than the market's) ability to honour the commitment.

To that end, it is necessary to discuss the contents of the contribution principle, which may be described in brief as a statutory minimum requirement in terms of the bonus entitlement. This requirement has to be met, unless otherwise agreed.

### 11.2 Committee deliberations on the collective bonus potential

The difference between the value of assets, on the one hand, and provisions for guaranteed benefits and provisions for bonus potentials on future premiums and paid-up policy benefits, on the other, is made up of the company's equity and the collective bonus potential. *The collective bonus potential* is made up of the amounts set aside collectively by the company for insurance policies with bonus entitlements. The size of the collective bonus potential is determined by the contribution principle, given that the company's realised results are allocated to its owners and policyholders in accordance with the contribution principle used for

calculations under which the owners may be eligible for an additional payment – an operational risk charge equivalent to the risk assumed relative to the policyholders. To the extent that the insurance portfolio's share of the realised results has not been allocated to individual policyholders, the amount is placed in the collective bonus potential.

The collective bonus potential depends both on the value of the company's assets and on the market rate. The value may fall and could even disappear altogether as a result of a fall in the market rate, for instance because the bonus potentials are reset to zero, meaning that life insurance provisions are enhanced relative to the calculation basis. The value may also fall and could even disappear altogether as a result of a fall in the value of the assets, losses on the insurance risk or on administration. The proportion of these losses that may be charged to the insurance policies is also controlled by the contribution principle. Pursuant to the new executive order on accounting, the bonus potential on the paid-up policy may not be reduced in case of losses on the company's assets as long as there is still some collective bonus potential left. The same applies to each partial portfolio individually, assuming, though, that the collective bonus potential is or may be divided between partial portfolios.

### **11.3 Implementation of the collective bonus potential in the executive order on accounting**

Section 31 provides an overall description of the content of the accounting entry *Collective bonus potential*.

*The Collective bonus potential* comprises pension commitments to allow bonus in addition to the bonus amounts already added to *life insurance provisions*. In addition to the description of the entry, the provision on *the collective bonus potential* also comprises rules stipulating how *the collective bonus potential* may be reduced and a number of consecutive provisions for reductions of *the collective bonus potential*, respectively *the bonus potential on paid-up policy benefits*. Structurally, these provisions are somewhere between the provisions of the executive order on the contribution principle and the executive order on accounting. The wording of the provisions is as follows:

"...(2). *The collective bonus potential* may be reduced only by transfer to another entry under insurance provisions or by any such negative realised results as may have been allocated to the insurance policies pursuant to the principles for allocation of realised results applying to each insurance policy, see (3).

(3). The proportion of bonus eligible insurance policies of negative realised results shall be recorded primarily by a reduction of *the collective bonus potential* and may not affect the value of entry 6.3. *bonus potential on paid-up policy benefits*, see section 52(3) until such a time as *the collective bonus potential* has been depleted. When entry 8. *Collective bonus potential* has been divided between partial portfolios, the rule set out in the first sentence shall apply to each partial portfolio individually.”

The valuation rules for the collective bonus potential are set out in section 53, the wording of which is as follows:

“Section 53. Entry 8. *Collective bonus potential* shall be calculated at the amount provided collectively by the company for bonus eligible insurance policies in addition to the amounts calculated (but see subsection 2) in *Life insurance provisions net of reinsurance*, see section 29, and *Claims provisions net of reinsurance*, see section 30.

(2). The amount shall, at a minimum, be of a size, so as to ensure that the amount, along with *Life insurance provisions* and *Claims provisions*, is equivalent to the entitlements of the insurance policies under the insurance contracts and the contribution principle, based on the current value of the company’s assets individually and collectively, see section 31 in the Insurance Business Act and the executive order on the contribution principle.”

The formulation above may convey the impression that the contribution principle pertains only to the division of the value of the assets. For the sake of good order, it should therefore be mentioned that what is involved is division of all types of profit, including division of profit on the payment of insurance risk and profit on administration.

As will appear from the formulations, the contribution principle sets limits for the minimum size of the collective bonus potential. For the sake of good order, it should be mentioned that the provisions of the executive order on the contribution principle also set limits for the maximum size of the collective bonus potential.

Finally, it should be noted that the set of rules does not directly specify how the collective bonus potential should be calculated, given that the contribution principle is a framework principle, specifying only the framework for possible divisions of profits or losses.

#### **11.4 Committee deliberations on the bonus potential on premiums, respectively paid-up policy benefits (individual bonus potentials)**

Reference is made to 3.4 – 3.7 of chapter 3 of this Report, ‘Committee deliberations’.

#### **11.5 Implementation of individual bonus potentials in the executive order on accounting**

Section 29 provides an overall description of the content of the accounting entries *Bonus potential on future premiums* and *Bonus potential on paid-up policy benefits*.

*The Bonus potential on future premiums* comprises pension commitments to allow bonus pertaining to premiums agreed, but not yet due. *The Bonus potential on paid-up policy benefits* comprises pension commitments to allow bonus pertaining to premiums, etc., already paid. The wording of the provisions is as follows:

“Section 29. [...] Under entry 6.2. *Bonus potential on future premiums*, pension commitments shall be recorded for bonus eligible insurance policies to allow bonus pertaining to premiums agreed, but not yet due, see section 52(2). Under entry 6.3. *Bonus potential on paid-up policy benefits*, pension commitments shall be recorded for bonus eligible insurance policies to allow bonus pertaining to premiums, etc., already paid, see section 52(3) [...]”.

The valuation rules for *Bonus potential on future premiums* and *Bonus potential on paid-up policy benefits* appear from section 52, the wording of which is as follows:

“Section 52. [...]”

(2) Entry 6.2. *Bonus potential on future premiums* is calculated for the portfolio of bonus eligible insurance policies as the difference between *the value of guaranteed paid-up policy benefits*, see section 51(1)(8), and *the value of guaranteed benefits*, see section 51(1)(6), but see also sub-section 7.

(3) Entry 6.3. *Bonus potential on paid-up policy benefits* is calculated for bonus eligible insurance policies as the difference between *the value of retrospective provisions*, see section 51(1)(3), and *the value of guaranteed paid-up policy benefits*, see section 51(1)(8), but see also sub-section 8.”

As far as the references to section 52(7) and (8) are concerned, please

refer to sections 11.6-11.9 of this report on the resetting to zero of negative bonus potentials.

As will appear from the quote from section 52 above, section 51 has to be scrutinised in order to establish the “contents” of individual bonus potentials. In the presentation below, we have chosen to disregard, for simplification purposes, the entry “Gross claims provisions”, any additional provisions in the form of additions to guaranteed surrender values, and provisions for any claims that have occurred, but have not yet been reported:

### **Bonus potential on future premiums:**

*The value of guaranteed paid-up policy benefits*, see section 51(1)(8):

The sum of *guaranteed paid-up policy benefits for each insurance policy* [...] including the market value margin [...].

Where *Guaranteed paid-up policy benefits for each insurance policy* are:

The present value of benefits guaranteed under the insurance contract in case the insurance policy is converted to a paid-up policy, and the present value of the expected future costs of administration of the paid-up policy.

I.e. the value of guaranteed paid-up policy benefits

$$= \sum_{x \in \text{the portfolio}} (\text{FP}_x^G \text{liab}_x^m + \text{Adm}_x^{\text{FP},m}) + \text{MVM}^{\text{FP}}$$

*The value of guaranteed benefits*, see section 51(1)(6):

The sum of *guaranteed benefits for each insurance policy* [...] including the market value margin [...].

Where *guaranteed benefits for each insurance policy* are:

The present value of the benefits guaranteed under the insurance contract, and the present value of the expected future costs of administration of the insurance policy less a deduction for the present value of the agreed future premiums.”

I.e. *the value of guaranteed benefits*

$$= \sum_{x \text{ the portfolio}} (Y_x^G \text{liab}_x^m + \text{Adm}_x^m - P \text{asset}_x^m) + \text{MVM}^Y$$

Altogether, *the bonus potential on future premiums* – disregarding section 52(7) – is equivalent to:

$$\begin{aligned} BP &= \sum_{x \text{ the portfolio}} (\text{FP}_x^G \text{liab}_x^m + \text{Adm}_x^{\text{FP},m}) + \text{MVM}^{\text{FP}} \\ &- \left\{ \sum_{x \text{ the portfolio}} (Y_x^G \text{liab}_x^m + \text{Adm}_x^m - P \text{asset}_x^m) + \text{MVM}^Y \right\} \\ &= \sum_{x \text{ the portfolio}} (P \text{asset}_x^m - [\text{YP}_x^G \text{liab}_x^m + \text{Adm}_x^{\text{BP},m}]) + \text{MVM}^{\text{FP}} - \text{MVM}^Y, \end{aligned}$$

Where  $\text{YP}_x^G = Y_x^G - \text{FP}_x^G$

$$\text{Adm}_x^{\text{BP},m} = \text{Adm}_x^m - \text{Adm}_x^{\text{FP},m}$$

Disregarding the difference between the market value margins on paid-up policies, respectively guaranteed benefits, *the bonus potential on future premiums* may thus be interpreted as the excess value generated by future premiums over and above the cost of the guaranteed benefits based on these premiums and the cost of their administration.

### **Bonus potential on paid-up policy benefits:**

*The value of retrospective provisions*, see section 51(1)(3):

The sum of *the value of retrospective provisions for each insurance policy* [...] less a deduction for the present value of an expected future administration result [...] and including the market value margin [...].

Where *the value of retrospective provisions for each insurance policy* is:

*The retrospective provisions for each insurance policy* [...] including any increase or reduction that may have been made in the allocation of realised results to the insurance policy pursuant to the principles for allocation of realised results applying to the insurance policy.

Where *the retrospective provisions for each insurance policy* is:

Premiums paid less a deduction for benefit payouts, payment of costs, adjustment of risk and with addition of interest accrued, etc., on the individual insurance policy.

I.e. *the value of retrospective provisions*

$$= \left( \sum_{x \text{ the portfolio}} V \text{ prov}_x^{\text{Retro}} \right) - V \text{ Adm}^{\text{Result,m}} + \text{MVM}^{\text{Vprov}}$$

*The value of guaranteed paid-up policy benefits*, see section 51(1)(8):

See the definition above under the calculation of *bonus potential on future premiums*. From this it appears that:

*The value of guaranteed paid-up policy benefits*

$$= \sum_{x \text{ the portfolio}} (\text{FP}_x^{\text{G}} \text{liab}_x^{\text{m}} + \text{Adm}_x^{\text{FP,m}}) + \text{MVM}^{\text{FP}}$$

Altogether *the bonus potential on paid-up policy benefits* – disregarding section 52(8) – is equivalent to:

$$\begin{aligned} BF &= \left( \sum_{x \text{ the portfolio}} V \text{ prov}_x^{\text{Retro}} \right) - V \text{ Adm}^{\text{Result,m}} + \text{MVM}^{\text{Vprov}} \\ &\quad - \left\{ \sum_{x \text{ the portfolio}} (\text{FP}_x^{\text{G}} \text{liab}_x^{\text{m}} + \text{Adm}_x^{\text{FP,m}}) + \text{MVM}^{\text{FP}} \right\} \\ &= \sum_{x \text{ the portfolio}} (V \text{ prov}_x^{\text{Retro}} - \{\text{FP}_x^{\text{G}} \text{liab}_x^{\text{m}} + \text{Adm}_x^{\text{FP,m}}\}) - \\ &\quad - V \text{ Adm}^{\text{Result,m}} + \text{MVM}^{\text{Vprov}} - \text{MVM}^{\text{FP}} \end{aligned}$$

Disregarding the portfolio-based quantities of the formula above, *the bonus potential on paid-up policy benefits* may thus be interpreted as the excess value generated by *the value of retrospective provisions* over and above the cost of guaranteed benefits promised for premiums already due and their administration.

### 11.6 Committee deliberations on the resetting to zero of bonus potentials

No material from the Committee's work is available to shed light on this issue in particular. Even so, the issue has been treated in two separate sub-sections in the executive order on accounting.

As this issue is particularly interesting in an economic scenario in which there is great risk that the bonus potentials for large parts of the insurance portfolios will be negative, we have decided to treat this element of the set of rules separately in this report.

### **11.7 The rules of the executive order on accounting on the resetting to zero of bonus potentials**

It appears from section 52(7) and (8) that:

“Section 52, [...]”

(7) If *guaranteed paid-up policy benefits for each insurance policy*, see section 51(1)(7), are lower than *guaranteed benefits for each insurance policy*, see section 51(1)(5), then *guaranteed paid-up policy benefits for each insurance policy* shall be specified as equal to *guaranteed benefits* for this insurance policy. If *the value of guaranteed paid-up policy benefits*, see section 51(1)(8), for the portfolio of bonus eligible insurance policies is lower than the portion of entry 6.1. *Guaranteed benefits*, see (1), pertaining to bonus eligible insurance policies, then *the value of guaranteed paid-up policy benefits* for these insurance policies shall be specified as equal to the portion of entry 6.1. *Guaranteed benefits* pertaining to bonus eligible insurance policies.

(8) If *the value of retrospective provisions for each insurance policy*, see section 51(1)(2), is lower than *guaranteed paid-up policy benefits for each insurance policy*, see section 51(1)(7), then *the value of retrospective provisions for each insurance policy* for this insurance policy shall be specified as equivalent to *guaranteed paid-up policy benefits for each insurance policy*. If *the value of retrospective provisions*, see section 51(1)(3), for the portfolio of bonus eligible insurance policies is lower than the portion of *the value of guaranteed paid-up policy benefits*, see section 51(1)(8), pertaining to bonus eligible insurance policies, then *the value of retrospective provisions* for these policies shall be specified as equal to the portion of *the value of guaranteed paid-up policy benefits* pertaining to bonus eligible insurance policies.”

(7) deals with the resetting to zero of a negative bonus potential on future premiums, while (8) deals with the resetting to zero of a negative bonus potential on paid-up policy benefits.

It applies to both sub-sections that the first sentence deals with the resetting to zero of negative bonus potentials at policy level, while the second sentence deals with the resetting to zero of negative bonus potentials at portfolio level.

The executive order does not directly mention the resetting to zero of negative bonus potentials – the reason being that the focus of these provisions is on part provisions on the way towards calculating the overall life insurance provisions rather than bonus potentials. 10.5 above specifies how bonus potentials are calculated. The formulas show that the first sentence of the provision deals with the situation in which *guaranteed paid-up policy benefits for each insurance policy* ( $FP_x^G liab_x^m + Adm_x^{FP, m}$ ) are lower than *guaranteed benefits for each insurance policy*

( $Y_x^G liab_x^m + Adm_x^m - P asset_x^m$ ); in that situation, the difference should be reset to zero.

I.e.

$$BP = \sum_{x \text{ the portfolio}} \max[(P asset_x^m - [Y_x^G liab_x^m + Adm_x^{BP, m}]); 0] + MVM^{FP} - MVM^Y$$

Similarly, it applies that if  $RT^{FP} < RT^Y$ , then this differential is to be reset to zero and subsequently the overall *BP* is to be calculated as:

$$BP = \max \left\{ \sum_{x \text{ the portfolio}} \max[(P asset_x^m - [Y_x^G liab_x^m + Adm_x^{BP, m}]); 0] + MVM^{FP} - MVM^Y; 0 \right\}$$

As will appear, the need to reset bonus potentials to zero at portfolio-level arises because the market value margins on individual “partial provisions” may – pursuant to the set of rules – be determined independently of each other, which is why the differences may subsequently result in negative values.

Similarly, the provisions of section 52(8) mean that the overall *BF* is to be calculated as:

$$BF = \max \left\{ \sum_{x \text{ the portfolio}} [(Vprov_x^{retro} - \{FP_x^G liab_x^m + Adm_x^{FP, m}\}); 0] - V Adm^{Result, m} + MVM^{Vprov} - MVM^{FP}; 0 \right\}$$

### **11.8 Resetting to zero of bonus potentials on mixed policies**

For insurance policies with a benefit guarantee and bonus entitlement on the overall benefit guarantee, it is unclear from the formulation of the set of rules whether the bonus potential on future premiums, respectively on paid-up policy benefits, is to be reset to zero at the level of the underwriting basis, or whether the resetting should be at policy-level.

The Danish Financial Supervisory Authority has subsequently made a decision in principle on this issue. To follow up on this decision, the decision contents were further clarified in correspondence between the Danish Insurance Association and the Danish FSA. Below, the decision in principle and the subsequent correspondence are reproduced.

#### ***“Section 31 of the Danish Insurance Business Act***

The Danish Financial Supervisory Authority, 27 December 2001

*On 11 October 1999, the Danish Financial Supervisory Authority sent a letter to all Danish life insurance companies and occupational pension funds on the subject of determination of a maximum calculation rate. In this letter, the FSA specified as follows:*

*“As far as insurance policies are concerned which contain several interest-rate guarantees and are subject to an annual interest-rate guarantee, each guaranteed portion shall be treated separately. If, on the other hand, an insurance policy contains only a benefit guarantee and is not subject to a guarantee of an annual return on the individual portions of the policy, based on different interest-rate assumptions, the decision of whether or not an increase in provisions is needed may be based on an average interest rate.”*

*The Danish FSA has subsequently considered whether the above should apply in all situations and the work with market value accounting has shown that the use of an average rate shall not be permissible if it means tapping into the bonus potentials on future premiums.*

*The issue was subsequently submitted to the Financial Business Council. Based on this, the Danish Financial Supervisory Authority shall make the following statement:*

*In case of a need to enhance life insurance provisions, provisions for each insurance contract may be permitted to be calculated based on the average contractual technical rate of interest applying to the individual insurance contract, provided that the following conditions are met:*

*- The funds included at a lower technical interest rate than the one originally applying to the policy, are funds that may be considered as an integral part of the original insurance contract, including bonus additions and mandatory contribution payments.*

*- No explicit prospects have been held out to policyholders – either in the contract, the bonus regulations or in other material – to the effect that bonus will be used to purchase additional insurance policies subject to the same terms and conditions as the original insurance policy.*

*In other situations, including for new payments that are not an integral part of the original contract, provisions shall be calculated separately, unless otherwise agreed, even though the funds have been paid or will be paid into the scheme under the same policy number.*

*In the light of this, companies shall ensure that – as far as future new payments are concerned – it is recorded whether or not these payments may be considered an integral part of the original insurance contract.*

*Moreover, it should be emphasised that when set-off may be exercised – pursuant to the above – by using bonus on the policy-portion with a low technical interest rate to cover a strengthening of the policy-portion with a high technical interest rate, then only the bonus potential on paid-up policy benefits may be used – not the bonus potential on future premiums.”*

The last paragraph of the decision gave rise to doubt as to its interpretation in the insurance industry. This prompted the Danish Insurance Association to send a letter to the Danish Financial Supervisory Authority with the following wording:

“The last paragraph of the Financial Supervisory Authority’s letter of 27 December 2001, which has given rise to doubt, is formulated as follows:

*“Moreover, it should be emphasised that when set-off may be exercised – pursuant to the above – by using bonus on the policy-portion with a low technical interest rate to cover a strengthening of the policy-portion with a high technical interest rate, then only the bonus potential on paid-up policy benefits may be used – not the bonus potential on future premiums.”*

In other words, the basic premise is that reference is made to insurance contracts for which the increases form an integral part of the original contract and for which provisions may thus be calculated based on an average technical interest rate. The doubt as to interpretation applies to the use of bonus potentials on paid-up policy benefits, respectively future premiums.

The Danish Insurance Association interprets the letter to mean that provisions for policies subject to more than one technical interest rate should be calculated using two different assumptions:

- 1) that the customer continues to pay the premiums agreed for the whole insurance policy – i.e. both for the portion with the high technical interest rate and the portion with the low technical interest rate;
- 2) that the customer ceases to pay future premiums on the whole insurance policy – i.e. both the portion with the high technical interest rate and the portion with the low technical interest rate. The insurance company shall be required to make provisions for the larger of the two amounts.

This interpretation is in compliance with the basic premise, being that the insurance policy should be considered as an integral whole, even though increases have been made on an ongoing basis using a technical interest rate different from the one originally used. The bonus potential on future premiums cannot be used to cover any required strengthening of the paid-up policy portion. However, the bonus potential on future premiums shall be calculated based on an average technical interest rate; consequently, a required strengthening pertaining to future premiums, arising from an isolated calculation of the portion of the policy subject to the high technical interest rate, may be covered by the bonus potential on future premiums for the portion of the policy subject to the low technical interest rate.

The bonus potentials on paid-up policy benefits, respectively future

premiums, may be calculated separately using an average technical interest rate.

Obviously, this does not, however, relieve the company of the obligation to make an actuarial assessment of the contracts concluded and the customers' possible behaviour if the policy is converted to a paid-up policy. If it is possible for the customer to surrender the portion of the policy subject to the low technical interest rate, while retaining the portion subject to a high technical interest rate, the actuary needs to allow for the probability of such behaviour in his or her provision calculations. This applies both in relation to paid-up policy calculations and in relation to calculations of continued premium payments."

The Financial Supervisory Authority responded as follows:

"By letter of 14 January 2002, the Danish Insurance Association has requested an interpretation of the FSA's letter of 27 December 2001 on provisions and bonus calculations for policies subject to more than one technical interest rate.

Referring to the request, the Financial Supervisory Authority informs the Danish Insurance Association that the Financial Supervisory Authority agrees in the interpretation specified by the Insurance Association."

### **11.9 Deviation from the principle of resetting to zero of bonus potentials at policy-level**

As will appear from the set of rules, negative bonus potentials – both on individual policies and on entire portfolios – shall be reset to zero.

A deviation from the principle that bonus potentials shall be reset to zero at policy-level has been incorporated in the rules for situations in which the underwriting basis factors in average margins. In these situations, the rules specifying that *the value of retrospective provisions for each insurance policy* shall be replaced by *guaranteed paid-up policy benefits for each insurance policy* shall not apply. Similarly, the rule specifying that *guaranteed paid-up policy benefits for each insurance policy* shall be replaced by *guaranteed benefits for each insurance policy* shall not apply.

This appears from section 52(9) of the set of rules that reads as follows:

“For underwriting bases that factor in average margins on individual elements, the limitations specified in (7), first sentence, and (8), first sentence, shall not apply.”

One example could be a unisex basis, for which the underwriting basis assumes that men and women will receive the same benefits, even though the cost of the individual risk elements differs for the two genders.

To clarify this, we will go through an example below.

Consider two annuities in payment for a 65-year-old man and a 65-year-old woman. Both annuities have been taken out on a unisex basis, based on the assumption that there is an equal number of men and women. As the annuities are in force, the bonus potential on the premium is equal to zero. It is assumed that the market-determined calculation rates are equivalent to the assumptions of the underwriting basis, implying that the bonus potential on the paid-up policy is zero.

The calculation liability for men is 10.64, relative to 11.99 for women. On a unisex basis, the calculation liability is thus 11.315. Assuming that the annual pension is 1,000, the overall calculation is as follows, the BP being zero:

GY	22,630
BF	0
Total	22,630

In case section 52(9) had not been incorporated into the set of rules, the provisions of section 52(8) would have had the following results:

For the woman	GY	11,990
	BF	max(- 675.0)
	Total	11,990

For the man	GY	10,640
	BF	675
	Total	11,315

Implying that total provisions amount to:

GY	22,630
BF	675
Total	23,305

The provisions of section 52(8) mean that – even though the market assumptions are equivalent to the underwriting basis and the gender allocation is also as assumed in the underwriting basis, the result that should be expected under a unisex basis, was not achieved.

Thus the solution to this problem was that for insurance policies for which average margins had been assumed in the underwriting basis, the rules on resetting to zero of bonus potentials at individual-policy level should not apply.

Or, phrased differently: For insurance policies taken out on a unisex basis, it is an integral part of the contract concluded that men and women share costs irrespective of the actual risk they each contribute. This contract has special significance in terms of the value of the bonus entitlements for the policyholders, given that the value of the guaranteed benefits will be a function of the actual risks when concluding these contracts, including whether the guarantee is issued to a man or a woman. This means that in the example above, the value of BF calculated pursuant to section 52(9) is equivalent to  $-675 + 675 = 0$  i.e. not  $\max(-675, 0) + 675 = 675$  as it would be pursuant to section 52(8).

## **12. Experience based on the financial statements presented in year one after the adoption of the new principles**

### **12.1 Choice of annual reports**

The experience referred to below is based on 11 annual reports for the 2002 financial year. These annual reports were selected as representative of both life insurance companies and occupational pension funds. Another source was ATP, which also presented its 2002 financial statements in accordance with the market value principle; ATP is, however, subject to special legislation in the form of a separate executive order on accounting, issued by the Danish Financial Supervisory Authority<sup>21</sup>.

On account of the time pressure on the issuance of the executive order of 13 December 2001 on the financial statements of life insurance companies and occupational pension funds<sup>22</sup> the executive order contained transitional provisions. As far as the valuation of liabilities at market value was concerned, these transitional provisions enabled companies to opt out of applying the new calculation principles to their 2002 financial statements.

Most Danish companies and co-administered pension funds, as well as ATP, were, however, expected to present their 2002 financial statements in accordance with the market value principle.

### **12.2 Transition to market value accounting**

How have the companies described their transition to market value accounting and how have they sought to ensure comparability with previous financial years (2001)?

There is very considerable variation in the description of this transition in the annual reports. Some companies have chosen to focus on the change of principles and the derived effects and to integrate the mention thereof in the Management and Directors' report, specifying that a significant change of method is involved, with implications for the financial statements. Others have chosen a more subtle mention. However, the companies all provide formal information about the change, including more technical descriptions of the new financial items, under "Applied accounting policies".

<sup>21</sup> FSA executive order no. 82 of 5 February 2003.

<sup>22</sup> FSA executive order of 13 December 2001.

Several of the companies feel called upon to specify that "*the transition to the valuation of pension commitments at market value has affected neither the balance sheet total nor equity as at 1 January 2002, as*

*the change has affected only the breakdown of pension commitments”*

At the same time, it should be noted that elsewhere it is specified that *“The policyholders’ share of negative realised results is covered by a collective bonus potential until this potential has been depleted. Subsequently, the bonus potential on paid-up policy benefits is reduced until it has been depleted. The rest is covered by equity.”*

As regards derived effects from the transition to market value accounting, the following general conditions should be mentioned:

The executive order on the contribution principle, establishing the basis and methods to be applied to the generation of profit through the realised results, is closely connected to the new accounting rules. This means, among other things, that this executive order governs the vital relationship between return on equity (ROE) and insurance provisions. In this connection, most companies have chosen to comment on this executive order<sup>23</sup>. As a result of the change in profit conditions, the Danish Financial Supervisory Authority allowed companies the opportunity to make a one-off retrospective adjustment of the profit allocation between equity and bonus reserves for a number of years back. The companies have naturally decided to refer to this unique equity enhancement in words and figures.

Several of the companies mention use of financial contracts or interest-rate hedging instruments, which have become quite prevalent in use. Some companies only mention the use of interest-rate hedging in relation to insurance portfolios with high technical interest rates. Others – as a derived effect of the new accounting rules – emphasise financial contracts as part of their investment strategy and reliability in risk management. One company has thematised its use of interest-rate hedging instruments as a necessary element of ensuring the controlled elimination of the interest-rate sensitivity – i.e. matching – between assets and liabilities, mainly for the purpose of protecting the bonus potential.

### **Communication and understandability of the new principles**

Several of the annual reports are clearly characterised by good will and the ability to communicate highly complex and difficult material to the target group of the annual report.

A couple of the companies thus succeed in giving the reader of the annual report some overall understanding of the implications of the change to market value accounting.

<sup>23</sup> The following three executive orders, issued by the Financial Supervisory Authority, on the contribution principle are in effect in the period in question: Executive order no. 59 of 29 January 2001, executive order no. 1221 of 17 December 2002, and executive order no. 71 of 30 January 2003.

One company writes:

*“The advantage of the transition to market value accounting is that there is greater covariation than previously between the value of the pension fund’s pension liabilities and the value of its assets. This serves to enhance the freedom of investment, thus opening up the company’s possibility of increasing the expected future return on assets.”*

Another company writes as follows:

*“Under the new accounting rules, life insurance provisions (having hitherto been recorded in the financial statements as a single amount) are divided into three amounts: guaranteed benefits, bonus potential on future premiums, and bonus potential on paid-up policy benefits (pertaining to pension contributions already paid).*

*The bonus potential is the accounting value of expected future profits if the current market conditions remain unchanged. The new division is thus an attempt to disclose possible future profits.*

*The bonus potential on paid-up policy benefits may to some extent be used to cover losses. This additional degree of freedom may be important in the planning of the future investment policy.”*

Though much competency is demonstrated in communicating financial statements to the reader, the complexity of the financial statements has increased considerably following the transition to market value accounting. One reason is that a number of additional detailing requirements are made to the financial statements – another that standard parameters for calculations are now to be reassessed by the companies themselves in view of the market conditions. Though the financial statements are presented under virtually the same market conditions for investments, movements in insurance provisions, etc., are very difficult to interpret – even for insurance specialists.

### **Technical calculation parameters – now as competition parameters**

A large number of calculation parameters, which have so far been established in the calculation bases reported by the companies to the Financial Supervisory Authority, now need to be reassessed by the companies in view of the market conditions.

<sup>24</sup> As the parameters form part of the technical bases of the companies, they must be reported to the FSA and, as such, they are in the public domain.

Though several of these parameters have a very significant impact on the size of provisions, there is no requirement for the most sensitive calculation parameters to be disclosed in the financial statements.<sup>24</sup> For instance the interest rate differential at year-end 2002 between

applying the market rate set by the Financial Supervisory Authority and one of the reported yield curves, resulted in an effective increase in the Financial Supervisory Authority's calculation rate of some 0.3 of a percentage point. For an annuities portfolio, this is estimated to equal a change in accounting provisions for guaranteed benefits of 5-6 per cent.

For those interesting in information on the discount rate/yield curve applied, it can be ascertained that as far as the 11 financial statements were concerned, it was possible only for a small number of these to deduce which type of market rate or yield curve the company had used.

These calculation parameters, which are "invisible" to the readers of the financial statements, may trigger unnecessary mistrust and misinterpretations.

### **Key ratios**

On the issuance of the executive order on accounting of 13 December 2001, the preparation of a set of market value accounting ratios was yet outstanding. Thus it would make no sense to assess the financial statements based on ratios prepared on the basis of abandoned accounting principles<sup>25</sup>.

A set of ratios based on market value accounting principles was incorporated in the new executive order on accounting in the course of 2003<sup>26</sup>.

### **Transparency of financial strength**

The very issue of assessment of financial strength seems to be ambiguous – not least in light of the lack of updated ratios and in-depth analyses. The new rules do, however, provide a sharper division between equity and insurance capital. Moreover, all companies are subject to the stress tests of the Financial Supervisory Authority (the "traffic lights"), but these tests provide only limited information about the financial strength of companies. Thus the interest-rate sensitivity attached to the stress tests may be fully controlled. It takes at least Asset/Liability Risk Management – and subsequently a combination of a suitable asset mix and interest-rate hedging instruments.

With the adoption of the new market value rules, it is thus difficult to assess the significance of being "wealthy". There are indications to suggest that (long-term) wealth is not merely related to the funds

<sup>25</sup> Reference is made to the website of the Financial Supervisory Authority at ([www.ftnet.dk/sw2974.asp](http://www.ftnet.dk/sw2974.asp)).

<sup>26</sup> Executive order no. 9733 of 20 October 2003, issued by the Financial Supervisory Authority, on the financial statements of life insurance companies and occupational pension funds and executive order no. 48 of 28 January 2004, issued by the Financial Supervisory Authority, on the financial statements of ATP.

of the collective bonus potential, but is equally to be assessed based on high earnings and, at the same time, control over the interest-rate sensitivity.

Though the market value rules provide increased insight, this insight will still be insufficient, in individual customer relationships, to assess the future bonus at policy-level. As opposed to previously, it is, however, possible to obtain knowledge about the company's bonus potentials.

### **Comparability**

It will, as already specified, be highly difficult to compare companies, even using the new ratios.

Though comparisons will be made, it will remain difficult for individual customers to assess whether these comparisons represent the relevant reality, or whether, for example, ratios may be used only as the basis of a dialogue with the individual company. The financial statements used in this analysis were only to a limited extent suitable for company-to-company comparisons.

### 13. Future developments – in Denmark and internationally

#### 13.1 International developments

During the work of the Market Value Committee, there was general agreement among committee members that the set of rules prepared was a “first attempt” at market value accounting and that a need for changes would probably materialise once the rules were implemented and experience was gained.

As mentioned in the introduction, work is also underway internationally, under the auspices of the International Accounting Standards Board, to prepare market value accounting rules for insurance companies.

Experience gained, as well as implementation of international rules, may give rise to changes to the Danish set of market value rules.

As previously mentioned, the Danish set of rules was prepared with knowledge of the IASC Issues Paper from 1999. In certain respects, this paper was not very detailed and provided only few guidelines and instructions. This is particularly the case as regards the treatment and valuation of bonus commitments, which play a pivotal role in the Danish set of rules. In this respect, the Market Value Committee thus had to devise its own Danish solution.

The international work with market value rules, which the EU is expected to incorporate in the accounting directives, operates with two phases. Phase 1 is expected to be implemented in 2005, while Phase 2 is expected to be implemented in 2007 or 2008. This is described in a note from the EU Commission of 27 August 2003<sup>27</sup>.

Phase 1 is expected to have only small and limited implications on the Danish set of rules. The implications of Phase 2 are not yet known.

#### 13.2 Danish work

In the articles *An Actuarial Analysis of Participating Life Insurance*, August 2000, published in *Scandinavian Actuarial Journal* 2003, 153-176, and *Comparison of the Net Premium and Paid-Up Benefit Valuation Principles*, presented at the Groupe Consultatif meeting in Copenhagen on 1 June 2001 as part of the celebrations of the 100<sup>th</sup> anniversary of the Danish Society of Actuaries, Per Linnemann goes through the elements of market value accounting, i.e. Guaranteed benefits, Guaranteed paid-up policy benefits and bonus potentials, ap-

<sup>27</sup> See [http://www.europa.eu.int/comm/internal\\_market/insurance/docs/markt-2527-03/markt-2527-03\\_en.pdf](http://www.europa.eu.int/comm/internal_market/insurance/docs/markt-2527-03/markt-2527-03_en.pdf)

plying a mathematical approach by listing relevant differential equations. The former article shows that life insurance provisions should not be smaller than guaranteed paid-up policy benefits, which is in compliance with the set of rules.

In a third article, *Valuation of Participating Life Insurance Liabilities*, April 2002, published in *Scandinavian Actuarial Journal*, March 2004, pages 81-104, the model is developed further, incorporating probabilities of a transition to a paid-up policy and surrender of the policy and it is demonstrated that in some cases, the minimum life insurance provisions may exceed the larger of Guaranteed benefits and Guaranteed paid-up policy benefits. This may have an impact on the future formulation of rules for bonus potential calculations and the rules that bonus potentials may not be negative, see section 52(7 and 8) of the executive order on accounting.

Thomas Møller and Mogens Steffensen in 2001 and 2002 prepared four memos to be used as material for a course on the theoretical aspects of the valuation of life insurance commitments at market value.

In memo 1, *Aspects of valuation in life and pension insurance: Deposits and market values*, Mogens Steffensen describes some mathematical deliberations regarding market values under deterministic interest rates. In the memo, he emphasises the importance of bonus potentials based on an assumption of optimum strategies for policyholders' exercising paid-up policy and surrender options. For a more scientific review of such options, please refer to *Intervention Options in Life Insurance*, *Insurance: Mathematics and Economics*, (31): 71-85, 2002.

In memo 2, *Aspects of valuation in life and pension insurance: Interest rate theory*, Thomas Møller generalises the presentation in memo1 to a situation of stochastic interest rates, combined with bond market investment. In the memo, Thomas Møller goes through the theoretic foundations that are the prerequisites to such generalisation.

In memo 3, *Aspects of valuation of life and pension insurance: Bonus, binominal and Black-Scholes)* Mogens Steffensen generalises the presentation in memo 1 to a situation of equity investment. Mogens Steffensen also goes through the theoretic foundations that are the prerequisites to such generalisation. For a more scientific presentation, please refer to *Surplus-linked Life Insurance*, sent to *Scandinavian Actuarial Journal*.

In memo 4, *Aspects of valuation in life and pension insurance: Integrated actuarial and financial valuation*, Thomas Møller discusses more general aspects of the problems arising in valuation of life insurance contracts, using finance theory methods. A market in which parts of the risk pertaining to a contract can be hedged (e.g. financial risk), while others cannot (e.g. insurance risk), is referred to as an incomplete market. Thomas Møller goes through some methods for valuation of life insurance contracts in an incomplete market. For more scientific presentations, please refer to *Risk-minimizing hedging strategies for unit-linked life insurance contracts*, ASTIN Bulletin, (28):17-47, 1998, and *Hedging equity-linked life insurance contracts*, North American Actuarial Journal, (5): 79-95, 2001.

The four memos have all been translated into English and make up chapters 2-5 in a 7-chapter book script, which has been sent to Cambridge University Press.

### **Areas of future changes**

Treatment and valuation of bonus commitments, treatment of costs, surrender, discount rate, market value margin and minimum life insurance provisions are among the areas in which the future international work and Danish research could be envisaged to give rise to solutions other than those used in the current Danish set of rules.

Initially, the future rules may depend on a choice as regards the definition of what is to be understood by market value. To that end, it is discussed in various forums whether a market or a company-specific approach should be applied.

Moreover, the discussion pertaining to the size of the market value margin is related to the issue of determining the basis of "best estimate" parameters. This issue will also depend on future rules governing companies' solvency ratios.

## 14. Appendix

### 14.1 Terms of reference for the Market Value Committee

*[Translation of a memorandum, dated 16 September 1998, from the Danish Financial Supervisory Authority:]*

#### TERMS OF REFERENCE for THE MARKET VALUE COMMITTEE

##### Appointment of the Committee

The Explanatory Notes to Bill L. 112, enacted as Act No. 490 of 1 July 1998, read as follows:

*“As far as bonds are concerned, there shall be a transition from adjusted cost price to market value in the calculation of financial results. This transition shall be gradual, however, so as to allow the industry the necessary time to prepare for the change of principles. The phasing-in will start in the year 2001.*

*With the transition from adjusted cost price to market value, the capital market will become more efficient, and at the same time locking-in effects will be avoided.*

*Therefore, the Minister of Economic Affairs will appoint a Committee to be given the task of preparing a model for changing the current valuation rules for bonds, so as to introduce valuation of bonds at market value as well, rather than the current adjusted cost prices.*

*The adjusted cost price is calculated at cost, adjusted for the market value changes emerging as a result of the reduction in the term to maturity in case of a constant yield to maturity. Application of the adjusted cost price ensures a steady development in the value of the bond portfolio – and thus its return. This is in conformity with the companies’ calculation of life insurance provisions, which is effected at a fixed (guaranteed) interest rate, implying that the liabilities side of the companies’ financial statements is not calculated at market value, either.*

*The rationale for setting up the Committee is that, at present, there are no generally accepted methods for the valuation of the liabilities side at market value. Thus the main task of the Committee will be to seek to develop such methods. It is expected that the necessary adjustment may be implemented by the Danish Financial Supervisory Authority in the form of an executive order.”*

In the light of this, the Minister of Economic Affairs appoints this Committee. The task of the Committee will be to analyse and prepare the necessary adjustments of the supervisory rules, so as to enable a transition to market values in life insurance companies, pension funds, ATP (the Danish Labour Market Supplementary Pension Fund) and LD (the Employees Capital Pension Fund).

The Explanatory Notes to Bill L 97, enacted as Act No. 428 of 26 July 1998, further state as follows:

*“In connection with the transition from the current regime of taxation of real interest to nominal taxation of the ongoing return on funds under pension savings schemes, it may occur – in case of falling interest rates coinciding with other factors – that pension commitments of a certain return may be more difficult for pension institutions to meet than under the current rules.*”

*Studies conducted by the Danish Government do not indicate that any Danish pension institutions will be unable – as a result of the Bill – to meet the pension commitments made. The Government will, however, follow developments closely. Should it turn out – contrary to expectations – that a legal claim of pension savers for a benefit based on a guaranteed technical interest rate will not be satisfied, the Government is prepared to adapt the proposed rules.”*

Against this backdrop, the Committee will also be commissioned to analyse whether – in case of falling returns – pension institutions may be faced with general problems of meeting the pension commitments made, including whether the change in taxation may cause such problems.

### **The tasks of the Committee**

In future, all assets in life insurance companies, pension funds, ATP and LD are to be valued at market value. In addition to preparing accounting rules for the valuation of bonds at market value, the Committee shall prepare guidelines for valuation of pension commitments (liabilities), so as to ensure that the calculation of the liabilities side is in conformity with the valuation of assets at market value.

In this connection, the Committee shall analyse the nature and extent of the various pension commitments of the institutions and consider how the institutions will be able to meet their pension commitments in situations of plunging prices; the Committee shall also consider the accounting treatment of provisions for such price falls.

To that end, the Committee shall analyse the pension commitments based on a guaranteed rate of return of at least 5% p.a. and consider whether they must be anticipated to be difficult for the institutions to satisfy due to the change in conditions, including the change in taxation.

The considerations should allow for the provisions of the relevant EC directives, given that it follows from the Third Life Insurance Directive, among other things, that life insurance provisions shall, at a minimum, be equivalent to the guaranteed surrender values. The Committee shall also consider possible changes in the rules for determination of the maximum technical interest rate, given that the directive provisions to this effect depend on the valuation method.

Finally, the allocation of profit to policyholders/members shall be analysed with a view to ensuring that the provisions built in order to protect a company from price falls benefit the relevant parties once the pension commitments have been met.

The Committee shall prepare the necessary amendments to executive orders.

### **Composition of the Committee**

The Committee chairman is Erik Johansen, Deputy Director General of the Danish Financial Supervisory Authority. Other Committee Members are five representatives of the Danish Insurance Association, one representative of the Danish Association of Company Pension Funds, one representative of ATP and LD (the Danish Labour Market Supplementary Pension Fund and the Employees' Capital Pension Fund), one representative of the Danish Society of Actuaries, one representative of the Danish Institute of State Authorised Public Accountants, one representative of the Danish Ministry of Taxation and three representative of the Danish Financial Supervisory Authority. The Financial Supervisory Authority is in charge of the Committee Secretariat.

## 14.2 Definitions and notations

This appendix provides an overview of the definitions and notations used in the report.

Quantity	Definition
$M\text{prov}^{\text{retro}}$ $M\text{prov}_x^{\text{retro}}$ $V\text{prov}^{\text{retro}}$ $V\text{prov}_x^{\text{retro}}$	Market value of retrospective provisions, including bonus
$\text{prov}^{\text{u-base}}$ $\text{prov}_x^{\text{retro}}$	Value of guaranteed benefits, calculated using the assumptions of the underwriting basis
$M\text{prov}Y^G$ $M\text{prov}Y_x^G$ $\text{prov}Y^G$ $GY$	$Y^G \text{liab}^{\text{M-rate}} - \text{Passet}^{\text{M-rate}} + \text{Adm}^{\text{fut}}$
$M\text{provFP}^G$ $\text{provFP}^G$	$\text{FP}^G \text{liab}^{\text{M-rate}}$
$Y^M$ $Y^{\text{M-rate}}$	<p>The benefit available for the and future premiums measured based on the mark-to-market basis</p> $Y^M = \frac{M\text{prov}^{\text{retro}} + \text{Passet}^{\text{M-rate}}}{\text{liab}^{\text{M-rate}}}$
$Y^G$ $Y_x^G$	<p>The guaranteed benefit, calculated using the underwriting basis.</p> <p>Traditionally, it is calculated as</p> $\frac{\text{prov}^{\text{u-base}} + \text{P asset}^{\text{u-base}}}{\text{liab}^{\text{u-base}}}$
$\text{FP}^G$ $\text{FP}_x^G$	<p>The guaranteed paid-up policy benefit, calculated using the underwriting basis.</p> <p>Traditionally, it is calculated as</p> $\frac{\text{prov}^{\text{u-base}}}{\text{liab}^{\text{u-base}}}$
$Y\text{P}^G$ $Y\text{P}_x^G$	<p>The portion of the guaranteed benefit based on future premiums, calculated using the underwriting basis. Mathematically it may be expressed as</p> $Y^G - \text{FP}^G$

Quantity	Definition
$P$	The annual premium (usually the annual net premium, i.e. the annual premium after payment of costs)
$\pi$	In examples including both the annual gross and net premiums, represents the net premium
$\text{asset}^{\text{M-rate}}$ $\text{asset}_x^{\text{m\%}}$	The net present value of a premium payment of DKK 1, calculated using the mark-to-market basis
$\text{asset}^{\text{u-base}}$ $\text{asset}_x^{\text{G}}$	The net present value of a premium payment of DKK 1, calculated using the underwriting basis
$\text{liab}^{\text{M-rate}}$ $\text{liab}_x^{\text{m\%}}$	The net present value of a pension benefit of DKK 1, calculated using the mark-to-market basis
$\text{liab}^{\text{u-base}}$ $\text{liab}_x^{\text{G}}$	The net present value of a pension benefit of DKK 1, calculated using the underwriting basis
$\text{adm}^{\text{fut}}$ $\text{Adm}_x^{\text{fut}}$ $\text{Adm}_x^{\text{m}}$	The net present value of future administration costs, calculated using the mark-to-market basis. May, for example, be calculated as $\text{cost}^{\text{curr}}\text{asset}^{\text{M-rate}} + \text{cost}^{\text{deferr}}\text{liab}^{\text{M-rate}}$
$\text{Adm}^{\text{fut,FP}}$ $\text{Adm}_x^{\text{FP,m}}$	The value of the costs of future administration of the paid-up policy, calculated using the mark-to-market basis
$\text{Adm}^{\text{fut,P}}$ $\text{Adm}_x^{\text{P,m}}$ $\text{Adm}_x^{\text{BP,m}}$	The value of the costs of future administration of the agreement on premium payments, calculated using the mark-to-market basis
$\text{cost}^{\text{u}}$ $\text{cost}^{\text{curr}}$ $\text{cost}^{\text{deferr}}$	Underwriting costs, annual costs during the premium payment period and annual costs, respectively, after the transition to pension (deferred)
BP	Abbreviation of the bonus potential on the premium
BF	Abbreviation of the bonus potential on the paid-up policy

Quantity	Definition
load exp <sup>l.order</sup> load exp	Loading for expense to the underwriting basis
Bcost <sup>fut</sup>	Bonus on future costs relative to the underwriting basis, calculated using the mark-to-market basis
Bcost <sup>p</sup>	Bonus on future costs on future premium payments relative to the underwriting basis, calculated using the mark-to-market basis
Bcost <sup>f</sup>	Bonus on future costs for premiums already paid relative to the underwriting basis, calculated using the mark-to-market basis
<i>Cost and safety premium of s%</i>	For some underwriting bases, part of the technical interest may be used to cover costs and insurance risk
$p^{surr}$	The probability that a policy is surrendered before its “natural” payout
$G_x$	The surrender value of a policy if the policy is cancelled prematurely
The Life insurance provision $M_x$	Provisions included in the financial statements for each policy
$MVM^{FP}$	Market value margin on the provisions for the guaranteed paid-up policy benefits of a ins. portfolio
$MVM^Y$	Market value margin on the provisions for the guaranteed benefits of a portfolio
$MVM^{Vprov}$	Market value margin on the overall provisions of a portfolio
$VAdm^{Result,m}$	The value of expected future administration results under the assumption of the underwriting basis, calculated using the mark-to-market basis

### 14.3 Memorandum by Mogens Steffensen

## Commentary on Memorandum on Guaranteed Surrender Values

Mogens Steffensen

12 July 2001

It is emphasised that this commentary should be seen not as my personal view of how to handle the issue of surrender of policies in general, but as a specific commentary on the memorandum “Guaranteed Surrender Values”.

### 1. Verification of formula for surrender provisions

The point of departure is a model without surrender, triggering two provisions:

$$\begin{aligned} V^1 &: \text{provisions for guaranteed benefits } (= \text{Prov } Y^G), \\ V^2 &: \text{provisions for bonus } (= BP+BF). \end{aligned}$$

The quantity  $V^1 + V^2$  is referred to as “the value of retrospective provisions”,  $V_{prov}^{retro}$ . We write differential equations and closed-form expressions for these reserves, given that the policyholder is alive. We disregard disability, as disability would serve only to make the notation more complicated. The calculation concerns a whole-life insurance with the sum  $S$  and the premium  $\pi$ . It would be tedious to add a possible savings cover. Bonus will be paid out at the rate of  $\tilde{b}$  as long as the policyholder is alive.

The risk-free interest rate is denoted by  $r$ , assumed to be constant as in all sections of the first version of the market value accounting standard, and constitutes the only investment possibility.

In the given model with a deterministic risk-free interest rate and mortality intensity  $\mu$ , it is natural to choose  $\tilde{b}$  deterministic (e.g. the contribution plan).

The verification result shown below can, however (as far as I can tell offhand), be generalised to a situation in which  $V^2$  is invested (partly) risky  $\tilde{b}$  and is adapted to the return achieved in a pre-specified manner.

The differential equation for  $V^1$ ,

$$\frac{dV_t^1}{dt} = rV_t^1 + \pi - \mu_t(S - V_t^1),$$

$$V_{T-}^1 = 0$$

leads to the explicit expression

$$V_t^1 = \int_t^T e^{-\int_t^s r+\mu} (\mu_s S - \pi) ds,$$

whereas

$$\frac{dV_t^2}{dt} = rV_t^2 - \tilde{b}_t + \mu_t V_t^2,$$

$$V_{T-}^2 = 0$$

leads to the explicit expression

$$V_t^2 = \int_t^T e^{-\int_t^s r+\mu} \tilde{b}_s ds$$

We now introduce a surrender possibility with the surrender intensity  $\nu$  and surrender value  $G$ . We write the differential equation for the overall reserve,  $V$ :

$$\frac{dV_t}{dt} = V_t r_t + \pi - \tilde{b}_t - \mu_t(S_t - V_t) - \nu_t(G_t - V_t),$$

$$V_{T-} = 0.$$

We now wish to find an explicit expression for the additional provisions  $V^3$  in addition to  $V^1$  and  $V^2$ , triggered by the surrender risk. It is suggested that

$$V_t^3 = \int_t^T e^{-\int_t^s r+\mu+\nu} \nu_s (G_s - V_s^1 - V_s^2) ds,$$

meaning that the differential for  $V^3$  is

$$\frac{dV_t^3}{dt} = -\nu_t(G_t - V_t^1 - V_t^2) + (\mu_t + \nu_t + r_t)V_t^3.$$

Now specify  $\tilde{V} = V^1 + V^2 + V^3$ . We will verify the suggested expression  $V^3$  by comparing the differential for  $\tilde{V}$  with the differential for  $V$ .

$$\begin{aligned} \frac{d\tilde{V}_t}{dt} &= \frac{d(V_t^1 + V_t^2 + V_t^3)}{dt} \\ &= rV_t^1 + \pi - \mu_t (S - V_t^1) + rV_t^2 - \tilde{b}_t + \mu_t V_t^2 \\ &\quad - v_t (G_t - V_t^1 - V_t^2) + (\mu_t + v_t + r_t) V_t^3 \\ &= r_t \tilde{V}_t + \pi - \tilde{b}_t - \mu_t (S_t - \tilde{V}_t) - v_t (G_t - \tilde{V}_t) \end{aligned}$$

It turns out that the differential for  $\tilde{V}$  matches the differential for  $V$ . Since also  $V_{T-} = \tilde{V}_{T-}$ , it applies that  $V = \tilde{V}$ , and our conclusion is that

$$V = V^1 + V^2 + V^3$$

with the suggested definition of  $V^3$ . Please note that  $V^1$  and  $V^2$  in the definition of  $V^3$  and in the verification argument appear only through the sum of  $V^1 + V^2$ .

Thus the result will not be affected if, for example, “BP” is moved from  $V^2$  to  $V^1$ . On the other hand, differential equations to be used for the verification of this alternative breakdown of  $V^1 + V^2$  will be significantly more involved.

One might be tempted to suggest the prudent version of  $V^3$

$$\int_t^T e^{-\int_t^s (r+\mu+v)} v_s (G_s - V_s^1 - V_s^2)^+ ds,$$

under which only surrender losses are included. On the other hand, this would mean that a fair correlation as described above could not be maintained.

## 2. Assessment of the provisions

Let  $V^0$  denote the first order reserve, referred to as the retrospective provisions. If the first order basis is conservative relative to the market basis, it will apply that

$$\begin{aligned} V_t^0 &\geq V_t^1, \\ V_t^0 - V_t^1 &\geq V_s^0 - V_s^1 \quad \text{for } s \geq t. \end{aligned}$$

$V_t^0 - V_t^1$  measures the present value of the expected future safety contributions. The inequalities above follow immediately if these safety contributions are positive.

For a general bonus plan, it applies that

$$\begin{aligned}
 V_t^3 &= \int_t^T e^{-\int_t^s (r+\mu+\nu)} v_s (G_s - V_s^1 - V_s^2) ds \\
 &= \int_t^T e^{-\int_t^s (r+\mu+\nu)} v_s \left( G_s - V_s^1 - \int_s^T e^{-\int_s^\tau (r+\mu)} \tilde{b}_\tau d\tau \right) ds \\
 &= \int_t^T e^{-\int_t^s (r+\mu+\nu)} v_s \left( G_s - V_s^1 - e^{\int_t^s r+\mu} V_t^2 + e^{\int_t^s r+\mu} \int_t^s e^{-\int_t^\tau r+\mu} \tilde{b}_\tau d\tau \right) ds \\
 &= \int_t^T e^{-\int_t^s (r+\mu+\nu)} v_s (G_s - V_s^1) ds + \int_t^T e^{-\int_t^s \nu} v_s \int_t^s e^{-\int_t^\tau r+\mu} \tilde{b}_\tau d\tau ds - V_t^2 p_t^g,
 \end{aligned}$$

where

$$p_t^g = \int_t^T e^{-\int_t^s \nu} v_s ds,$$

is a measure of the probability of surrender after time  $t$ .

Now assume that the company follows the contribution plan, so that  $\tilde{b}_t$  is determined by the safety contribution at time  $t$ . It then applies that

$$\begin{aligned}
 V_t^3 &= \int_t^T e^{-\int_t^s (r+\mu+\nu)} v_s \left( G_s - V_s^1 - e^{\int_t^s r+\mu} V_t^2 + e^{\int_t^s r+\mu} \int_t^s e^{-\int_t^\tau r+\mu} \tilde{b}_\tau d\tau \right) ds \\
 &\leq \int_t^T e^{-\int_t^s (r+\mu+\nu)} v_s \left( V_s^0 - V_s^1 - e^{\int_t^s r+\mu} V_t^2 + e^{\int_t^s r+\mu} \int_t^s e^{-\int_t^\tau r+\mu} \tilde{b}_\tau d\tau \right) ds \\
 &= \int_t^T e^{-\int_t^s (r+\mu+\nu)} v_s \left( e^{\int_t^s r+\mu} (V_t^0 - V_t^1) - e^{\int_t^s r+\mu} V_t^2 \right) ds \\
 &= (V_t^0 - V_t^1 - V_t^2) p_t^g,
 \end{aligned}$$

where the second equality follows from the contribution principle. It is clear that  $V_t^0$  in the final form cannot be replaced by  $G_t$ . If the provisions are to be prudent and rely on a simple formula, the entire first order reserve has to be inserted as surrender value.

If the first order basis is imprudent relative to the market basis, it will apply that

$$\begin{aligned}
 V_t^0 &\leq V_t^1 \\
 V_t^0 - V_t^1 &\leq V_t^0 - V_t^1 \text{ for } s \geq t.
 \end{aligned}$$

The inequalities above follow immediately if the safety contributions are negative.

We now assume that  $\tilde{b} = 0$ , as negative safety contributions cannot be charged to the policyholder. It then applies that

$$\begin{aligned} V_t^3 &= \int_t^T e^{-\int_t^s (r+\mu+\nu)} v_s \left( G_s - V_s^1 - e^{\int_t^s r+\mu} V_t^2 \right) ds \\ &= \int_t^T e^{-\int_t^s (r+\mu+\nu)} v_s (V_s^0 - V_s^1) ds - p_t^g V_t^2 \\ &\leq 0. \end{aligned}$$

If the market basis is either conservative or non-conservative, we can thus use the prudent form

$$V_t^3 \leq \max(V_t^0 - V_t^1 - V_t^2, 0)$$

**Remark 1** *If the market basis is neither conservative nor non-conservative, i.e. if the risk-free interest rate may with positive probability cross the guaranteed interest rate, much will be completely different. In that case, not only the issue of surrender, but the entire construction of paid-up policy reserves, bonus potentials, etc., has to be reconsidered.*



