

# Actuarial Mortality Assumptions

## HYMANS ROBERTSON'S RESPONSE TO THE BOARD FOR ACTUARIAL STANDARDS' DISCUSSION PAPER ON ACTUARIAL MORTALITY ASSUMPTIONS, AS ISSUED IN MARCH 2008.

This is the response of Hymans Robertson LLP to the invitation to comment on the discussion paper 'Actuarial Mortality Assumptions' published by the Board for Actuarial Standards (BAS) in March 2008. We are responding in our capacity as advisors to UK occupational pension schemes – as such we have not commented on those aspects of the paper which relate to the life insurance industry.

### General comments

Over recent years we have seen considerable changes in pensioner longevity. We are aware that assumptions used for funding and accounting for pension schemes have, at times, lagged behind the emerging evidence and the communication of issues relating to mortality assumptions used in actuarial calculations has not always been clear and comprehensive. As such we believe it is appropriate for the BAS to give the 'mortality' (or more positively, the 'longevity') assumption scrutiny and to encourage actuaries to make appropriate allowance for future longevity.

We welcome the efforts made by the BAS in producing the discussion paper, which is well-informed and thoroughly researched, with clear and well-reasoned discussion. Overall, there is much in the paper with which we agree, and we believe that the document will be of particular help to actuaries who do not specialise in this area.

### Specific Questions raised in the discussion paper

Our comments on the specific questions raised in section 7 of the discussion paper are below.

Q1. Do respondents have any views on the significance of the adverse effects that the over- or underestimation of future mortality may have on pension scheme members, scheme sponsors, life insurance policyholders and life insurance companies, as set out in section 2?

Our response to this question relates only to those comments made in section 2 in relation to pension scheme stakeholders. We are in broad agreement with the comments made on the impact of over- or underestimation of future mortality on pension scheme stakeholders. However, we would make the following comments:

- For public sector schemes, there are risks to the taxpayer (for example future generations of taxpayer will be required to meet any shortfalls in respect of over-estimated mortality of today's pensioners as those shortfalls emerge over time).
- The discussion paper appears to overlook the impact of, and on, the Pension Protection Fund (PPF) in relation to occupational pension schemes. For example:
  - If the mortality assumptions used for valuing the PPF are insufficiently strong, the PPF's finances will appear healthier than they actually are, levies may consequently be set at too low a level and the PPF may become insolvent.
  - If the mortality assumptions used for valuing the PPF are overly strong, levies may be set at too high a level, increasing the strain on scheme sponsors and hastening the closure of defined benefit schemes.

- The risk set out in the discussion paper in relation to scheme underfunding if mortality is over-estimated is generally only relevant if an insolvency event occurs in relation to the sponsoring employer with the scheme insufficiently funded to secure its benefits in full. In most cases the scheme is transferred to the PPF though some schemes will be able to secure more than the PPF level of benefits. It should be noted that the issue of under funding relative to buy out costs is not one of mortality alone; most schemes do not fund to this level as a matter of policy and it would be over simplistic to make a link to the mortality assumption alone when schemes wind up with insufficient funds to secure benefits in full.

The main risk of over-estimating mortality in the funding of an ongoing scheme is that the sponsoring employer will be required to make good the shortfall in the future. Therefore, the significance of this risk is dependent on the strength of the employer covenant. There are many factors to be taken into account when considering scheme funding and they are all inextricably linked. As such, there is a danger of misleading users of actuarial information of the BAS focussing on individual assumptions in the manner it has in its consultation. It is the whole picture that is important. Choosing a relatively weak mortality assumption where there is a very strong employer covenant (and all parties are aware of this) is not as risky compared to the same assumption being used where the employer is weak. We would urge the BAS not to lose sight of the big picture and to avoid making its focus too narrow.

- The paper seems to focus, within the pensions context, on the valuing of liabilities in relation to defined benefit arrangements. There is also the potential for adverse effects from the over- or under-estimation of future mortality in relation to the following:
  - Advice given to defined contribution schemes  
*For example the design of such schemes is reliant on estimates of future investment returns and pensioner longevity – overestimating future mortality would result in members receiving lower-than-expected benefits, and will have adverse effects on the members, taxpayers (as there will be increased reliance on state benefits) and the confidence in the pensions industry as a whole. We are aware that BAS reviewed Technical Memorandum 1 (TM1): Statutory Money Purchase Illustrations in April 2008 and would fully support BAS’ plans for further review of TM1 in light of the responses to its discussion paper on mortality. However, in our opinion, insurers are generally pricing on a stronger mortality basis than is used in TM1.*
  - Liability-driven investment strategies  
*Actuaries are often called upon to provide projections of future emerging cashflows from pension schemes to inform complex investment strategies designed to hedge financial risks such as inflationary and interest rate risk, and increasingly longevity risk. In such circumstances over-estimation of future mortality would result in projections of benefit payments which do not last sufficiently long. Similarly under-estimating future mortality will result in projections of benefit payments which continue for too long in to the future. In both circumstances this can lead to pension schemes having an unexpected exposure to financial risk, for example by introducing a duration mismatch into a bond portfolio.*

We have one other comment on section 2. Paragraph 2.8 states that actuarial advice in a “wide range of public sector and government matters” is outside the scope of BAS standards. We find this surprising and ask for some clarity as to what the BAS believes falls within its remit; advice from GAD to the government on mortality, advice from consultancies to the government, advice from consultancies to public sector schemes (funded and unfunded), etc.

Q2. The BAS has discussed some of the issues surrounding mortality assumptions in section 3. In that context:

- a) Do respondents have views on appropriate methods of communicating the extent and impact of the inherent uncertainty involved in mortality assumptions?
- b) Do respondents agree that the use of separate assumptions for base mortality and future changes in mortality, not taking the form of margins in other assumptions, would be desirable?
- c) Do respondents have views on appropriate methods of communicating the significance of assumptions, both in absolute terms and relative to that of other assumptions?

a) We agree with the comments made in the sub-section on 'risks and uncertainties' in section 3: the paper sets out the issues in a coherent and well-informed way.

We agree with the BAS that it is of the utmost importance that users of actuarial information and advice which includes, or is based on, assumptions about mortality understand the risks and uncertainties inherent in those assumptions. There are many ways in which the extent and impact of these uncertainties can be expressed and different ways will be better suited to different circumstances (depending, for example, on the recipients of the advice/information, the nature of the actuarial calculations and the underlying population for which the calculations are being performed). We would therefore encourage the BAS to permit actuaries flexibility in the way in which the risks and uncertainties are communicated. We would prefer the standard to concentrate on the importance of communicating risks and uncertainties and their impact in a way which is suitable for the intended audience, rather than prescribing methods of communication.

We see no particular merit in communicating the impact of uncertainty as an equivalent change in the discount rate. This may be useful for actuaries but is unlikely to be particularly helpful to trustees or employers who will not necessarily readily know the extent to which changes to the discount rate will affect actuarial calculations. We find the focus in section 3 suggesting comparisons with changes in other assumptions, particularly the discount rate, to be unhelpful. In particular, we think that the statement made by the BAS in 3.39 to be misleading that such a comparison would illustrate the relative significance of two assumptions. By equating a change in longevity to a change in the discount rate, the BAS makes no comment about the chances of either happening. If we were to make a comparison in the manner suggested by the BAS, readers would assume that a statement was being made about two events equally likely to happen. Such an approach would, therefore, be misleading and potentially make the communication of the risk less transparent. Furthermore, by suggesting that changes in longevity be equated to a change in discount rate risks diluting the message that it is not good practice to take margins in other assumptions (in particular the discount rate) as a proxy for allowing for longevity improvement.

We would also suggest that the equivalent change in discount rate is very specific to where the calculations relate to a present value – if, for example, the assumptions were required to carry out benefit projections from a defined contribution arrangement, a far more meaningful way to communicate the uncertainty is as a range of possible benefit values.

b) We firmly believe that any longevity assumption can, and should, be split into the composite elements of baseline mortality, i.e. recent mortality rates which are observable and therefore objective; and future improvements: the inherently uncertain and hence subjective allowance for how longevity will change in the future. As such we welcome the BAS encouraging actuaries and users of actuarial information to think of the longevity assumption in these terms. We also believe that where actuaries are calculating present values it would be beneficial to encourage the splitting of the result into the present value excluding future improvements and the 'reserve' for future improvements.

We agree that it is generally not good practice to take margins in other assumptions (in particular, to adjust the discount rate) as a proxy for allowing for future mortality improvement as such an approach lacks clarity. It should be noted, though, that whilst the actuaries taking this approach have been able to justify their methodology, we believe that it has often been driven, by system constraints (the actuarial systems in question could not use the year of birth approach to mortality). As new systems are developed, this is less likely to be an issue and we expect that most consultancies will move away from using such approaches.

c) It is important for users of actuarial advice and information to understand the significance of the actuarial assumptions. For example, in scheme funding, the actuarial assumptions must be set by the trustees, after taking advice from the actuary, and the trustees should understand the significance of the assumptions they are required to set.

As with the communication of the risks and uncertainties inherent in mortality assumptions, there are a number of ways in which the significance of mortality assumptions can be communicated. Again, we urge the BAS to be flexible rather than prescriptive in its approach, concentrating on the importance of clear and appropriate communication. In short, to make any guidance principles driven.

Q3. Some proposals regarding the use of summary statistics and benchmarks in reporting on mortality assumptions are considered in section 3.

a) Do respondents foresee any practical difficulties in communicating the assumptions about subsequent changes in mortality rates underlying life expectancy statistics?

b) Do respondents have suggestions for summary statistics that can be used to describe changes in mortality rates?

c) Do respondents think that the use of benchmarks is useful, and if so, should the development of standard benchmarks for future changes in mortality be encouraged?

a) and b) It is important that actuaries can communicate the assumptions about future changes in mortality rates. We see no problem with using life expectancy statistics to communicate such changes. The discussion paper notes shortcomings of both period and cohort life expectancies; whilst we do not disagree with the issues, we believe they can be overcome with suitable communication. In particular period and cohort life expectancies can be a very useful way of contrasting two sets of mortality assumptions – each of which is made up of a different base mortality and set of future rates of change.

For example, period life expectancies are extremely useful for comparing one set of base mortality assumptions with another. Whilst period life expectancies make no allowance for future changes in mortality, this concept is not difficult to explain to trustees, especially if trustees are familiar with the concept that the mortality assumption comprises two elements (i.e. the base table and the allowance for future variation). All of our clients are comfortable with this distinction.

Cohort life expectancies can be used to illustrate the effect of future changes in mortality. By keeping the base mortality table fixed and calculating cohort life expectancies with differing allowances for future mortality variation, trustees (and other recipients of actuarial advice) can see the effect of changing the allowance for future mortality variation.

In our view, the use of period and cohort life expectancies is much more useful as a tool for illustrating changes in mortality assumptions than comparisons of tables of mortality rates or comparisons of annual rates of mortality change. The latter can be largely meaningless to pension scheme trustees and may result in trustees focussing

on the shape of the mortality curve or the difference in rates at the less significant ages, which may have little impact on the actuarial calculations.

Presentation of a series of period and cohort life expectancies with no explanation would not be helpful. However, with a suitable explanation and a clear method of presentation, life expectancies are exceptionally useful summary statistics.

There are other useful summary mortality statistics – for example in pension scheme funding, the use of annuity rates as summary statistics gives trustees an indication of the impact of changes in mortality assumptions on the scheme's funding position. Again, we would urge the BAS not to be prescriptive in the use of summary statistics but instead to stress the importance of clear and appropriate communication.

c) We do not believe that the use of benchmarks has merit. The limitations of such an approach are set out in paragraph 3.61 of the discussion paper – to which we would specifically add the risks of 'herding' and of the benchmarks becoming 'outdated'. That of herding is a particular risk for pension schemes. Each scheme has its own characteristics and any tool or measure which puts pressure on trustees to ignore this (and benchmarks do have the effect of shifting focus from one's own scheme to what others are doing) will be unhelpful for scheme specific funding. In our view, those limitations pose significant difficulties in setting and standardising such benchmarks.

Other comments on section 3.

- This discussion paper is aimed not only at actuaries but at those outside the profession. As such, care is needed when making statements such as those in 3.6. The 'cohort effect' is an incredibly complicated concept with doubts as to whether it is happening in a uniform way across the UK population. To cover this point in this manner could be misleading and runs the real risk of mis-informing readers about this topic – this is especially the case when the 'cohort projections' commonly in use relate to the cohort seen in the CMI data and relates to a generation centred on 1926 (and broadly spanning 1910 to 1942) whilst the cohort effect referred to in 3.6 relates to the national population.
- We would observe that 3.14 refers to random variation (or 'process error') as a source of 'uncertainty'. Using the distinction presented in 3.7-3.9, we would argue that if assumed mortality rates were an accurate estimate of the true underlying rates, then random variations in the observed rates would be a 'risk' (i.e. there would be a mathematical basis for assigning probabilities) rather than an 'uncertainty'. If the BAS wishes actuaries to distinguish between risk and uncertainty then we believe that clarity on this point would be helpful.
- The last sentence in 3.46 is a little confusing. Whilst stating the life expectancy of a member aged 65 tells us little about the life expectancy of a 45 year old, this is easily remedied by stating the life expectancy of a 45 year old as well.
- We are not sure we would agree with 3.56 and in particular other approaches exist which can help recipients of actuarial information understand the allowance for future changes. For example
  - Comparing a current period life expectancy for someone currently aged 65 with a cohort life expectancy for someone currently aged 65
  - Comparing cohort life expectancies for example for someone reaching 65 in 2028 compared to someone who is 65 now.

We believe that both of these approaches are better than using period life expectancies at different points in time – essentially for the reasons you give in 3.54. In particular by using the two approaches above in

combination it is possible to provide clear explanations which are free of the confounding of base mortality and future changes referred to in 3.55.

Q4. The BAS would welcome any general comments that respondents may have on the various possibilities for standards set out in section 4. In particular:

- a) Do respondents agree that the BAS should set some standards for mortality assumptions?
- b) Do respondents agree that reporting standards would play a significant role in increasing the transparency of assumptions and their comprehensibility to users of actuarial information?
- c) Do respondents have any comments on how to assess the likely impact of possible BAS standards for mortality assumptions?

a) We agree that standards for mortality assumptions should exist though these should be restricted to communication and high level principles as to how they are set.

b) Reporting should be such that assumptions are transparent and comprehensible to the users of actuarial information. However the diverse nature of users of actuarial information makes the formulation of any such reporting standard problematic. For example, a body of lay trustees may require significantly different issues to be covered than would an actuary obtaining specialist mortality analysis from another actuary.

An inflexible reporting standard would, unless very narrow in scope, result in some users of actuarial information being provided with additional information they did not need. This would unnecessarily increase costs and may reduce the 'relevance' of the information provided.

We believe that any reporting standard should be flexible and allow actuaries to tailor the matters covered to the specific needs of the recipients. In particular, we would strongly counsel against the prescribed use of the CMI's terminology as this will be meaningless to non actuarial users. For example, a reference to the assumption "100% of PNMA00base (no age rating) rolled forward to 2005 with long cohort and with PSAC\_Male\_Ass\_2005\_50 thereafter" will be meaningless to almost all trustees and pension scheme members.

c) To the extent that any BAS standards for mortality assumptions are successful, they will result in better informed decision making by the users of actuarial information. Without knowing in detail the extent to which current decision making by such users is not fully informed and the impact of this, it is not possible to assess the likely impact of any proposed BAS standard.

As noted above, though, for ongoing defined benefit pension schemes the impact is likely to be limited in terms of whether members receive their benefits in full. Pension scheme valuations are budgeting exercises with the mortality assumption being one part. Strengthening the mortality assumption will change the pattern of contributions and may increase security for some members; though for the majority standards are unlikely to have a discernable impact.

Other points on section 4.

- Paragraph 4.4 – We would encourage BAS to bear in mind the wording of regulations covering the funding of defined benefit pension schemes. These funding regulations require trustees to use *prudent principles* when choosing demographic assumptions, including the mortality assumptions, This is not the same as choosing prudent assumptions and means that a scheme's circumstances must be considered when setting assumptions – indeed using these principles would not necessarily lead trustees to adopt assumptions that incorporate a margin over best estimate. We refer BAS to our response to the Pension

Regulator's consultation on assumptions (with particular reference to mortality) for further details in this regard.<sup>1</sup>

- We do not think that it is feasible to place a limit on assumptions as outlined in paragraphs 4.22 to 4.26.

Q5. In section 5 the BAS considers possible standards for assumptions about base mortality.

a) Do respondents believe that it would be desirable for a BAS standard to require the use the most recent applicable published tables, taking into account both the communication problems and the practicality of setting a limit on the tables to be used?

b) Do respondents have any comments on the proposals for possible requirements for reporting on assumptions about base mortality, criteria that assumptions should meet, or limits that should be observed when setting assumptions? Respondents are asked to focus on:

- any practical problems that might arise in complying with them; and
- whether they would further the BAS's aim of increasing the transparency of assumptions and their comprehensibility to users of actuarial information.

a) We concur that it is sometimes a challenge to communicate the use of a heavily adjusted historic table. However, with the exception of the forthcoming CMI SAPS tables, there are no published tables that are *relevant* to the population of occupational pension schemes. Furthermore, the membership of these schemes is very diverse and so the mortality experience of individual schemes is likely to differ markedly from the average over all self-administered schemes. When communicating with users of actuarial information we believe that it is important for users to be aware that the population on which the published table is based will differ not only in the time over which it was observed but also in its profile in terms of longevity predictors such as socio-economics, affluence, health etc... The reason for adjusting a standard table is to compensate for such differences. We believe therefore that it is inappropriate to prescribe that certain tables should not be used – instead we would encourage standards which suggest that tables published before a certain date should only be used *if* it can be demonstrated that they provide a statistically better fit than more recently published tables (suitably adjusted).

Of primary importance is to get the base table 'right' and not be constrained because the best fit for a scheme is actually an 'out-of-date' table. To exclude an 'out-of-date' table when it is the best for the job would be perverse and may have potentially adverse, and embarrassingly, consequences. (Consider the scenario where a pension scheme knowing used a non best-estimate mortality simply because a table which had the best shape was excluded on grounds of communication – if the adverse situations described in 2.17 and 2.18 were to happen how would the actuarial profession, BAS and the FRC be perceived?)

b) Whilst we agree in broad terms with the content of paragraphs 5.37-5.55 we would highlight a number of practical difficulties with the proposals.

5.41 addresses the information that should be disclosed where base mortality rates are derived by graduating or fitting a statistical model to the mortality experience of a group of lives. We would suggest that whilst a)-c) are meaningful disclosures (data source, amount of experience and method) the disclosure of the estimated values of any parameters poses a problem since for many models there will be a limited number of parameters with little direct meaning to the recipients of actuarial advice. For example survival models are increasing being used within the actuarial profession – a common such model, the Cox proportional hazards model, fits an 'average' curve, and the parameters indicate how different groups of people differ from this 'average'. Here the parameters

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<sup>1</sup> <http://www.hymans.co.uk/media/consultationresponses/Pages/TriggerHappy1.aspx>

are of relevance in discussions with other practitioners, but will do little to aid the comprehensibility of the assumptions to the users of actuarial information.

We believe that a much more meaningful disclosure than the fitted parameters (and one currently not required under 5.41) is the resultant mortality rates along with the relevant summary information which should include:

- life expectancies, or similar such single measures which help the users of the information understand the results
- an indication of the 'quality of fit' to the underlying data
- an indication of the uncertainty in the 'fit'

5.42-5.45 considers the information which should be disclosed when the base mortality assumption is derived from adjusting a published table. We concur with the suggested disclosures but believe that the following should also be disclosed:

- Where the adjustments are based upon the experience of a group of lives, the 'risk' in the adjustments. In the language of paragraph 3.8 this 'risk' is the range of possible adjustments which the observations would be consistent with. Where actuarial information does not do this we believe that the users treat the information as having a greater certainty than is appropriate. As an example consider the ratios of 'actual' to 'expected' deaths collated in 3.31 of the Mortality Research Working Group Report – it would be misleading for this information to be presented to consumers of actuarial information in a way which conveyed these historic ratios as certainties. For this reason we encourage BAS to include actuarial research within the remit of any standards it produces on mortality.
- Where the adjustments are based upon the characteristics of a group of lives, how the interactions between these dependencies have been allowed for. For example if the adjustment is based upon the socio-economic profile of a group of individuals and the average pension amounts, what measures have been taken to avoid 'double-counting' as those in higher socio-economic groups will typically have higher pensions?

We agree with the criteria for choosing base mortality rates (5.50-5.55) with the exception of our comments about using the most recently published tables.

We concur with BAS' comments on the difficulties of setting limits on the base mortality rates. We believe that actuaries should be encouraged to apply caution in using tables published before a certain date, however we do not see any merit in prohibiting the use of any published tables, in fact we would actively encourage their use if they provide the best fit for a scheme.

Other points on section 5:

- 5.9 describes how it is often necessary to allow for the passage of time between the point in time to which the derived base mortality rates relate (e.g. the mid-point of an experience investigation) and the date at which calculations are being performed. The discussion paper claims that this can be done using published information about known changes. Whilst this might inform part of the 'roll-forward' the delay in publication of actual changes means that it would be usual to have to make some subjective assumption about the rate of change for at least part of the period involved. We would suggest that BAS acknowledges this in any future standards.

Q6. In section 6 the BAS considers possible standards for assumptions about future changes in mortality.

a) Do respondents agree there is no objective basis for differentiating the future changes in mortality likely to be experienced by a particular small group of lives from those likely to be experienced by the population as a whole? If respondents disagree, the BAS would be interested in examples to the contrary, together with supporting evidence.

b) Do respondents have any comments on the proposals for possible requirements for reporting on assumptions about future changes in mortality, criteria that assumptions should meet, or limits that should be observed when setting assumptions? Respondents are asked to focus on:

- any practical problems that might arise in complying with them; and
- whether they would further the BAS' aim of increasing the transparency of assumptions and their comprehensibility to users of actuarial information.

a) We are strongly of the view that any standard should not preclude differentiating future changes in mortality for different subgroups. In our view, the key question is not whether there is an objective basis for such differentiation today, but whether there may be a basis for such differentiation in the period before any standard is reviewed.

There are a number of reasons why objective bases for such differentiation may exist now, or in the future, for example:

- 2.15 of the Mortality Research Working Group Report states 'there should be no discontinuity between past rates of change and those assumed in the future'. This view is reflected in 6.62 and 6.63 of the discussion paper. If a subpopulation can be shown to have had (statistically significant) differences to the whole population in the past, then this would imply different future improvements (at least in the short term).
- 6.23 and 6.38 address the debate on how future improvements may vary by socio-economic class. We would make the following observations:
  - What is not considered is that there could in future be known different drivers for currently similar populations. As an example, if policies on long term spending on health, provision of care for the elderly, or demographic structure in different countries within the UK were in future different, there may be an objective basis for differentiating between individuals with currently similar characteristics in different UK countries.
  - There is a considerable volume of research looking at differences in mortality experience by socio-economic classes and the reasons for this. To give just one example the ONS has shown how the propensity to give up smoking has varied by socio-economic class and by birth generation therein<sup>2</sup>. This disparity in social classes is acknowledged in the NHS Cancer Plan which has specifically targeted the resulting health inequality<sup>3</sup> - we believe it would be undesirable to prevent actuaries from making an allowance for such information.
- Combined explanatory and expectation-based models may provide a basis for assessing the balance between the alternatives presented in 6.23 (i.e. access to latest medical advances for higher socio economic groups vs. 'catching up' for lower socio economic groups).

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<sup>2</sup> Source: Smoking behaviour and socio-economic status: a cohort analysis, 1974 to 1998 (Health Statistics Quarterly 14)

<sup>3</sup> Source: p6, NHS Cancer Plan, September 2000

We also note that 6.60 suggests 'future changes in mortality should differentiate between the sexes' as a possible criterion which should be met. This is an example of differentiating the future changes in mortality between two subsets of an overall population and in our view this conflicts with the statement in question 6a).

We would also draw BAS' attention to the data volumes underlying a number of widely used projections. For example the CMI cohort projections reflect the smoothed experience between 1992 and 1999 of around 300,000 male lives<sup>4</sup>, and 'width' of the ensuing projections was based upon data relating to just 135,000 male lives<sup>5</sup> in 1999. One could infer from 6.38 that the CMI cohort projections are based on a 'small subgroup' and that BAS is therefore advocating actuaries should only use projections based upon population data.

Further, the very largest occupational pension schemes will have access to similar data volumes to that underlying the CMI cohort projections, and by pooling data occupational pension schemes<sup>6</sup> will have much larger data volumes enabling them to identify trends within groups of people. By understanding these trends, it may be possible in future to differentiate rates of change (at least in the short to medium term) between different subgroups of people.

Consequently, we believe that there should be differentiation between the expected future changes in mortality of different groups to the extent that there is objective justification for doing so. We would add that where there are subjective arguments for different approaches, the actuarial profession should be fully involved in such debate. We view it appropriate for individual actuaries to take their own view on the arguments and believe that they should present a balanced picture to users of actuarial information. If users of actuarial information are aware of the counter arguments, they are in a better position to understand the level of uncertainty inherent in such projections.

b) We agree in broad terms with paragraphs 6.47 to 6.66, with the following exceptions:

- 6.51 c) refers to disclosing the estimated parameters used. The values of parameters within models for future changes in mortality will in many cases mean little to the users of actuarial information, and so their disclosure may not improve comprehensibility. We would suggest that the most appropriate disclosure relating to parameters would vary from model to model, but could be the rationale behind the chosen parameter, or the method of setting the parameter.
- Our comments in section 3 carry through to 6.53 to 6.55.
- Comments on 6.60 (which we support to the extent it can be objectively justified) have been provided above.

Other points on section 6:

- 6.16 refers to how the paper *Two-dimensional mortality data patterns and projections* provides evidence for cohort effects in Japan, Germany and the USA. We would suggest that for balance the discussion paper should also note that the same paper suggest that period effects may dominate over cohort effects within England & Wales.

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<sup>4</sup> Source: CMI Working Paper 1, Appendix A2.1

<sup>5</sup> Source: CMI Working Paper 2, Appendix A2.2

<sup>6</sup> E.g. from initiatives such as Club VITA ([www.clubvita.co.uk](http://www.clubvita.co.uk))

In addition to the specific questions listed above, the BAS invites respondents' views on any other aspects of possible standards for mortality assumptions in actuarial calculations. To ensure that the significance of their point is fully appreciated by the BAS, respondents are encouraged to indicate how their comments address the BAS' aim of increasing the transparency of assumptions and their comprehensibility to users of actuarial information.

We have no further comments to add at this stage.

**Further information**

If you have any questions regarding our response please direct them to Steven Baxter ([steven.baxter@hymans.co.uk](mailto:steven.baxter@hymans.co.uk)).