

# A Practical Approach to the Use of Asset Shares in Managing Participating Business

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# 1 Introduction

Participating (also known as with-profit) business is condemned by many as being outdated, unfashionable and opaque. It is certainly true that sales of this type of product have dropped off significantly over the last couple of decades as the ISI statistics demonstrate. In the year ending June 1990 44,000 policies were sold with API of \$67m, compared to 1,200 policies with API of \$2.4m sold in the year ending June 2006. The modern desire for transparency and distinction between risk and savings elements has resulted in the effective closure of these products to new business.

However there is still over \$4.5 billion in funds held by life insurance companies for participating policyholders and so participating business continues to be a significant, if declining, part of New Zealanders' saving and insurance strategy. It remains as important as ever that such business is managed fairly and equitably with respect to the inherent discretions of the product, especially as funds decline.

Actuaries have a special responsibility in the management of this business, as they have the expertise to determine the fair and equitable distribution of profits to participating policyholders (although it must be noted that the ultimate decision lies with the Board of the life insurance company). Actuaries also have the responsibility of setting appropriate policy values to be paid to exiting policyholders who surrender their policies.

The purpose of this paper is to discuss how asset share techniques are used in the UK to set maturity payments and to demonstrate how asset shares can be used in New Zealand to determine appropriate bonus rates and surrender value bases. We will also highlight the issues that emerge when calculating asset shares for participating business in New Zealand. The paper is based on the authors' experience in implementing an individual asset share approach for setting bonus rates and surrender value bases for a large block of participating business originating from numerous life insurance companies.

The authors would like to thank our employers for providing the opportunity to work on such an interesting and challenging project, and Charlie Cahn for his invaluable advice and guidance.

## 2 Current Practice in the UK

In the UK asset shares have been in use in the management of with-profits business since at least the 1970's and they had reached the educational material by 1991. A paper titled "Asset Shares and their use in the financial management of a with-profits fund" by PD Needleman and TA Roff was presented to the Institute of Actuaries in 1995. This paper included the results of a survey of 38 With Profit companies which showed that all of them used asset shares as a guide to setting maturity values and 76% of the offices surveyed used them as a guide in setting surrender values. In the UK at the time it was felt that consumers wanted more information about the products that they were purchasing and were more likely to question the financial advice they received. This led the authors to state "If with-profits business is to survive and prosper we believe it must be managed effectively and fairly, and its virtues need to be well communicated to the public."

A key theme in the UK for a number of years has been the push for greater transparency in all aspects of actuarial work. In relation to participating or with-profit business this has meant an emphasis on disclosure to policyholders and potential policyholders. Companies were required to produce with-profit guides which gave details of how they managed their with-profit business. This was replaced in early 2004 by the requirement to produce a document covering the Principles and Practices of Financial Management (PPFM).

The Financial Services Authority (FSA) is responsible for the regulation of the UK market and has produced the FSA Handbook. Relevant sections in the Handbook are the Conduct of Business sourcebook, the Integrated Prudential sourcebook and the section on Supervision.

There are 13 pages in <sup>1</sup>COB 6.10 specifying the areas that the PPFM needs to cover. This includes

- the approach to setting annual and final (terminal) bonus rates
- the amount payable under a with-profit policy
- investment strategy
- business risk
- charges and expenses
- equity between the with-profit fund and shareholders

As you may expect these documents can become quite detailed and so firms must also make available to with-profit policyholders and potential with-profit policyholders a consumer friendly version of its PPFM, the CFPPFM. PPFMs along with the CFPPFMs are generally available on company websites.

The PPFM must state the target range for maturity payments. A typical statement may be that for over 90% of the sample policies the proportion of expected claim amount to asset share falls in the range 80% to 120%.

More detailed regulation around the use of asset shares can be found in COB 6.12 - Treating with-profits policyholders fairly. It states that firms must set a target range for maturity payments that should be expressed as a percentage of unsmoothed asset share which includes 100%. As we have mentioned above this range must be

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<sup>1</sup> COB 6.10 is the section of the Conduct of Business sourcebook that covers PPFMs

specified in the firm's PPFM. A firm must manage its business with the aim of making a maturity payment on each with-profit policy that falls within the target range.

Over the long term they should aim to pay, on aggregate, 100% of unsmoothed asset share. It states that surrender payments must be set with reference to unsmoothed asset share and the target range must also include 100%. The amounts paid on surrender must protect the interests of the remaining policyholders.

The definition of unsmoothed asset share allows the use of specimen policies with the same material characteristics as the with-profits policies they will represent. The rules and guidance for the calculation of an unsmoothed asset share is contained in <sup>2</sup>PRU 7.4.119R to 7.4.123R. Although these regulations cover the calculation of an unsmoothed asset share they are drawn up to be sufficiently flexible to accommodate the diversity of calculation methods used by firms, rather than to enforce any particular method. They simply set minimum standards that any method must meet and list the items that must be allowed for such as premiums, expenses, investment income etc.

The responsibilities of the actuary are covered in <sup>3</sup>GN41 – The Role of the With-Profits Actuary. GN41 refers to various sections of the FSA Handbook and highlights areas of <sup>4</sup>SUP 4.3 and the rules and guidance set out in COB 6.12. It states that the actuary must also take into account the PPFM. When giving advice or producing a report the actuary must state the way in which asset shares are calculated and the way in which levels of payouts relate to them. The actuary must also give their opinion on how any recommendations made maintain fairness between different categories of policy or policyholder and between policyholders and the firm.

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<sup>2</sup> PRU is the Integrated Prudential Sourcebook which is part of the FSA Handbook

<sup>3</sup> GN41: The Role of the With-Profits Actuary has been adopted by the Board for Actuarial Standards which was set up from April 2006 as an operating board of the Financial Reporting Council (FRC). Following the Morris review of the actuarial profession in March 2005 the FRC was given responsibility for the oversight of the UK actuarial profession.

<sup>4</sup> SUP 4.3 is the section of the FSA Handbook that covers the supervision of Actuaries.

# 3 Application of Asset Shares in New Zealand

## 3.1 Current Methodology for Setting Bonuses

While some companies in New Zealand use or have used individual asset shares to guide the setting of bonus rates, there is no generally accepted asset share framework or approach. In fact, there is no generally accepted methodology for setting bonus rates. There is no regulatory framework – it is entirely up to the actuary to determine appropriate bonus rates to recommend to the Board of the life company.

Anecdotally, it appears that many companies start with determining a “supportable” bonus rate. This would originally have been calculated from a bonus reserve valuation, and may have developed into using liability projection models. Margin on Services (MoS) profit reporting requires that a MoS supportable bonus be calculated as part of the valuation process (the bonus rate such that the MoS liability equals the Value of Supportable Assets).

Companies would have also taken into account competitors’ bonus declarations, trends in investment returns and solvency considerations. Fund level asset shares calculations may have been carried out to ensure that the participating assets were quantified accurately.

Further analysis would then be required to ensure equity between generations of policyholders. Even where groups of policies face the same broad expense and investment risks residual equity issues may arise between different groups of policies such as age groups, short term and long term, large and small, year of entry, and continuing and terminating policies.

In fact, using something like the change in the Margin on Services supportable bonus rate to actually set bonuses has major drawbacks in terms of ensuring equity. The MoS supportable bonus rate capitalises the impact of future experience assumptions, with the equity risk premium having a significant impact. If an assumption such as the equity risk premium changes, then the MoS supportable bonus rate can increase or decrease markedly. But a change to this investment assumption should not impact policyholders whose policies are due to mature shortly. A common approach is to assume that future reversionary bonus rates remain at their current level and use terminal bonus as the balancing item to calculate the supportable bonus – this implicitly assumes that the current reversionary bonus rate and structure is equitable, which may not be the case.

Again there is no generally accepted approach for ensuring equity – companies will have developed their own methodology. In some cases this issue may have been extensively studied years ago, with the development of bonus strategies and perhaps linkages. However, such strategies do need to be reviewed regularly, as circumstances do change. Takeovers and mergers can result in a fragmented approach being taken. It may be that each group of traditional policies has continued to be maintained using the methodologies inherited from each merged/acquired company, whereas a consistent approach across all business is desirable.

## **3.2 Asset Shares and Setting Bonuses**

The major advantage of using asset shares in setting bonus rates is the assistance that it gives in terms of maintaining equity between different groups of policyholders. This is becoming increasingly important as participating funds stopped writing any significant levels of new business years ago, and are starting to run down (although this is likely to be a slow process as lapse rates tend to be low for this business).

In order to use asset shares effectively, a company needs to have a bonus philosophy, a set of guiding principles as to how policyholder profits are passed to policyholders. This philosophy would cover such issues as the appropriate proportion of terminal bonus in claim values, the degree of shareholder risk the company is prepared to take, the desired stability level of the bonus rates etc. Once the philosophy is set, projected claim values can be assessed against asset shares and the degree of fit can be measured against the philosophy. If required, changes can be made to bonus rates, both in the short term, and as part of a longer-term strategy, to bring claim values into line.

Asset shares can be regularly updated and the process repeated, which gives a robust framework to monitor trends that is independent of changes to profit reporting methods.

Technology improvements have enabled calculation and roll-up of individual asset shares, and testing of different bonus rates and surrender value bases in a timely manner. In the past this would not have been possible or at least extremely slow. However, due to the inherent difficulties in calculating individual asset shares, especially for very old policies, it is likely that asset shares can only be used as a broad guide applied to groups of policies as a whole. See section 5 for an explanation of the issues that can arise when calculating individual asset shares. Applying the results directly for individual policies would only provide spurious accuracy and should usually be avoided. In any case, the concept of participating policyholders sharing risk is an inherent part of traditional business – it has never been a characteristic of such policies to have profit calculated at an individual policy level.

Using asset shares to set bonus rates is covered in more detail in section 6.

## **3.3 Other Uses of Asset Shares**

Asset shares can also be used to understand in depth the connections between future investment returns, asset shares, policyholder reasonable expectations (PRE), bonus rates, surrender values, and future capital requirements. By including asset shares in projections, a company can test its ability to maintain reversionary bonus at the current level in the future, test sensitivity to changes in assumed future investment returns, including the impact on capital requirements, and review the general appropriateness of the current investment mix into the future.

Asset shares can assist in the development and monitoring of surrender value bases. This is covered in detail in section 7.

# 4 Methodology

## 4.1 Summary

The process to calculate individual asset shares for in-force participating policies begins with gathering data for each policy sufficient to model future cashflows. It is preferable to have a program / package to carry out the roll-up, as spreadsheets will be unwieldy for anything but a very small volume of policies. The assets belonging to the group of policies being analysed needs to be quantified. If it is not possible to roll up the asset shares from inception, then start points need to be set, and the asset shares rolled up to the current date. Miscellaneous profit should then be allocated so that the total asset shares add up to the total assets. Then the asset shares are ready to project into the future.

## 4.2 Asset Share Roll up

The asset share for each policy can be calculated as:

	Asset share at beginning of year
<i>plus</i>	Premium paid in the year
<i>plus</i>	Investment Return
<i>less</i>	Expenses
<i>less</i>	Cost of Mortality
<i>less</i>	Tax
<i>less</i>	Shareholder Transfers
<i>plus</i>	Miscellaneous Profits
<i>equals</i>	Asset share at end of year

The investment return is calculated by applying the assumed fund return to the asset share. Premiums are assumed to be paid in accordance with the contract. The cost of mortality is taken as the probability of death during the period multiplied by the excess of the death benefit over the asset share, subject to a minimum of zero. The assumption is made that there are no surrenders and no deaths going forward. Recalibrating the total asset shares to the total assets each year allows mortality and surrender profit to emerge year by year as miscellaneous profits. Shareholder transfers will be calculated depending on the individual company's practice.

## 4.3 Start Points

The ideal approach for the calculation of asset shares is to start from each policy's actual commencement date, and roll up the asset share allowing for the company's experience, and for any alterations to the particular policy, such as cashing of bonuses.

However, given the age of many traditional participating policies (often commencing well before the use of computers) it is likely to be extremely difficult, if not impossible, to trace individual policy alterations. In addition, it is likely that any given policy will

have moved from computer system to computer system, and from life insurance company to life insurance company, as part of the many takeovers and mergers that the NZ insurance industry has seen over the years. Another major issue is that takeovers and mergers (and sheer passage of time) can make it very difficult to track down the appropriate assumptions to use in the roll-up.

A consequence of this is that individual policy asset shares are unlikely to be useful in determining appropriate maturity or claim values for an individual policy. Rather the individual asset shares can be filtered to remove problem policies and then aggregated into groups of similar policies. Patterns within policy groupings can then be examined to provide guidance as to appropriate bonus rates or surrender value bases that meet the company philosophy.

If it is not possible to roll up asset shares from policy commencement for all in-force policies, a starting point must be set, so that each policy can be allocated an opening asset share from when the roll-up calculation set out above can be applied. Two decisions must be made: what date to use and how the opening asset share is calculated.

The date is best set by determining how far back accurate assumptions are available, and being able to determine an accurate asset value at that date for the block of participating business being examined.

One option for setting the opening asset share that should be relatively easy to determine is to use a reserve type calculation for each policy. If this reserve basis was also used at the start date, then any excess participating assets can also be easily allocated to the starting points. This is done by increasing the starting points by the ratio of the total assets to the total reserves (for all policies in-force at the start date).

The use of a reserve calculation does rely to some extent on past actuaries having declared bonus rates that are equitable between bonus series and generations of policyholders in the past. If a given subset of policies has had an over-declaration of bonuses then they will be assigned an asset share that is higher than it should be – and vice versa. This will then be perpetuated by relying on this starting asset share.

Therefore it is worthwhile attempting to validate the reserve calculation against some individual asset share roll-ups from policy inception. It should be possible to identify some (maybe more recent) policies where assumptions from the policy commencement can be determined to a reasonably comfortable level of accuracy, and where it can be confirmed that the policies have not been altered over their lifetime. This exercise may demonstrate that the reserve calculation needs some amendment to match these individual calculations. One refinement to a standard reserve calculation that may be required is to make some allowance for the level of terminal bonus at the start date. This process will not impact the total asset shares, but rather how the total of the asset shares are split between policyholders.

## **4.4 Assumptions**

Once the start points have been set, then the assumptions to be used to roll up the asset shares need to be set. These assumptions can be difficult to determine, depending on how far back in time they are required, and the hoarding instincts of previous actuaries!

#### **4.4.1 Sources of Data**

There are many potential sources of useful data. All of the following were used by the authors:

- Financial Condition Reports
- Statutory Accounts
- Internal Accounting reports
- Life Act returns
- Tax returns
- Industry data
- Actuarial and other reports prepared for takeovers and mergers
- Implementation of MoS
- Demutualisation documents

#### **4.4.2 Investment Return**

Investment returns can usually be calculated from accounting information. It is important to ensure consistency from year to year, especially in the treatment of unrealised capital gains. It has been common to hold unrealised capital gains in an investment fluctuation reserve, but such gains should be attributed to the year in which they were experienced for asset share purposes. It is usually simpler to express investment fees as a deduction from the investment return, but care should be taken that they are not double counted and included in expenses as well. If there are any gaps in the data, index returns and typical asset allocations can be used.

#### **4.4.3 Mortality**

Mortality assumptions are probably the easiest assumptions to set. Even if company level mortality studies are not available, there are various NZSA studies going back a number of years. Also profit testing assumptions will usually be recorded. It should be noted that in our experience the asset share roll-up is not very sensitive to the mortality assumption.

#### **4.4.4 Expenses**

Unit costs can be very difficult to obtain, especially on an annual basis. It may be necessary to do a crude expense analysis to fill in gaps. Usually policy statistics and expenses split at a high level are available (from statutory returns and accounts). The unit cost calculation basis should be consistent from year to year, which can be difficult to confirm – it may be more straightforward to rework all the unit costs to ensure this. There have been industry surveys (but the availability will depend on company participation). It is important to ensure that unit costs include expense overruns, rather than assumptions that expect the overrun to disappear.

One problem with expense assumptions is that very small policies (which tend to be of very long duration and are often grouped together in the analysis process) can be swamped by a dollar per policy renewal cost, which will result in negative asset shares. These policies will pay out a positive claim value, so the allocation of a

negative asset share can distort the overall picture, and is of no help in setting bonus rates for those groups, as the obvious conclusion is that these policies should not be allocated any more bonuses in the future. This is likely to not meet policyholder expectations!

One way to adjust for this issue is to consider the level of renewal expense as a % of premium which would make the asset share (calculated as accurately as possible from the policy commencement) equal to the maturity benefit, for small policies due to mature. A range of sample Endowment policies, with the average sum assured, starting in different years, all maturing shortly, could be examined. This would result in the setting of a maximum level of renewal expenses, expressed as a percentage of the annual premium, to be applied to all policies. The impact of this is to redistribute assets from relatively larger policies to relatively smaller policies. Our experience is that this adjustment is not material to the larger policies, but is very significant for the smaller policies. This exercise requires judgment as to where to balance the adjustment.

#### **4.4.5 Tax**

Tax needs to be allowed for correctly, including the changes to the tax basis over the years.

#### **4.4.6 Miscellaneous Profits**

As asset shares are rolled up from the starting points to the current date, asset share surrender and mortality profit will have emerged from policies which went out of force over the period. While the participating assets as at the current date will be known, and can be compared to the rolled up asset shares to give the total amount of profit accrued over the period, it is desirable to try to allocate this miscellaneous profit to the year in which it emerged, rather than just spread it over the period evenly.

Known adjustments to the accounts should be allowed for, and applied to the appropriate group of policies as accurately as possible.

Post 1990, life office tax calculations of underwriting income may be able to be used to determine suitable adjustments for mortality and surrender profits by calendar year. There are a number of issues with using these calculations: the methodology is somewhat artificial, the tax reserve is probably not a very good proxy to the asset share and the tax reserve basis is likely to have changed over the years.

The simplest approach to allowing for such profits in the asset share roll-up is to express them as an addition to the net investment return. This spreads the profits in proportion to the individual asset share.

# 5 Issues with Asset Share Calculations

## 5.1 Paid-up Policies

The most accurate way of calculating an asset share for paid-up policies is to use the original sum assured, bonuses and premiums prior to the paid-up date and to roll-up from inception as for a normal policy. It may be suitable to charge a lower expense after the policy has ceased paying premiums as it would be expected that paid-up policies would incur lower administration costs.

However there may be major difficulties in getting the historic information required to do an accurate calculation. Administration systems may not record the original premium or the date the policy was made paid-up.

If the start point has been set as the reserve at a certain point then is this still valid for paid-up policies? If the policy was already paid-up prior to the start point then the reserve will take into account the paid-up sum assured and zero future premiums, so it should be a valid representation.

Policies that have been made paid-up between the current date and the start point date are more problematic. Ideally the original policy details prior to being made paid-up would need to be known so that the reserve could be calculated correctly at the start point. Then premiums could be allowed for up until they ceased. This relies on having the historic information readily available.

There are two types of paid-up policies:

1) Contractual paid-up policies, are policies that have a limited premium term and have reached the end of their premium paying term, so the sum assured and bonuses continue as normal but premiums have ceased.

For contractual paid-up policies the original premium and premium cease date are often available, or can be inferred from product codes, or looked up from standard rate tables, so these policies can be modelled accurately in terms of allowing for the correct premiums, and calculating the correct reserve at the start point.

2) Non-contractual paid-up policies, are policies that have been made paid-up during the premium paying term, so the sum assured is reduced, bonuses continue to accrue and premiums have ceased.

It is usually much more difficult to obtain the necessary information on these policies prior to being made paid-up as systems generally only hold the paid-up sum assured, and won't hold the original sum assured or premium.

There may also be issues with the method used to calculate the paid-up sum assured. For example if a policy had debt attached when it was to be made paid-up

this could have been cleared by adjusting the paid-up sum assured. As premium debt and loan debt are not allowed for in the asset share calculation, this sort of adjustment will distort the calculations.

If the necessary data cannot be found, then the only solution is to use approximate methods for these policies. One way would be to try to find historic data for a range of sample policies (maybe by looking up the paper files) and calculate the asset share for these as accurately as possible. This could be compared to the asset share calculated using the reserve as a start point to see if there is a clear relationship. A simple adjustment such as applying a ratio to the starting asset share could then be made to all paid-up policies.

## **5.2 Policy Alterations**

One of the most common types of alteration is from Whole of Life to Endowment. With regard to alterations similar comments apply as for paid-up policies. The main issue is the limited information available. Systems may not maintain records for the state of the policy prior to the alteration which makes it impossible to calculate the reserve correctly for the start point, or to roll up the asset share correctly.

## **5.3 Cashed Bonuses**

For some computer systems, it may be impossible to tell whether bonuses have been cashed on a policy except by looking up each policy individually (and even then the only information available may be the cash value rather than the face value of the bonuses cashed).

If bonuses have been cashed prior to the start point date then this will be taken into account in the starting reserve. However if bonuses have been cashed after that time it will be impossible to reflect in asset shares. These policies could be identified by comparing the current bonus level with that expected given the historical bonus rates. This needs to be taken into account, especially when small groups of policies are analysed.

## **5.4 Implications**

The key issue with altered policies is to ensure that they are allocated (in total) a fair share of the assets, whether their asset shares are calculated accurately or approximately. This will impact on the level of miscellaneous profit and consequently impact on the assets allocated to unaltered policies.

If approximate calculations are used, altered policies should be excluded from the detailed analysis for the determination of bonus rates and surrender values.

# 6 Bonus Setting

## 6.1 Philosophy

As mentioned in section 3.2, using asset shares to set bonus rates first requires the establishment of a bonus philosophy. This will depend on the circumstances of each individual company. A bonus philosophy would articulate the company's attitude to the following interlinking issues:

- **Equity:** The bonus declaration should result in all classes of policyholders receiving a fair allocation of the profits. The bonus philosophy would set out to what depth equity will be considered and what measure of success would be used. For example consideration could be given to the treatment of policyholders with different bonus series, products, terms, entry ages, durations and so on.
- **Stability:** The company should determine how stable and sustainable it wants its bonus rates (both reversionary and terminal) to be. This decision impacts on and is impacted by the asset allocation of the participating fund, the proportion of claim values made up by terminal bonus, and the amount of reserves held. The bonus philosophy would set out the target maximum variability of reversionary and terminal bonus rates from year to year, and the target proportion of claim values made up by terminal bonus.
- **Shareholder risk:** Underlying participating business there remain guarantees for original benefits and reversionary bonuses already declared. The shareholder ultimately underwrites these guarantees. Shareholder risk is increased by investing in growth assets (which meets policyholder expectations), but reduced by increasing the proportion of claim values comprising terminal bonus.
- **Policyholder expectations:** Through the relative stability of reversionary bonus rates over the course of most participating policies, policyholders will have expectations that rates will not fluctuate too greatly in the future. They will also expect to be exposed to growth assets.

The challenge is to achieve equity between the shareholder and policyholders, and between different groups of policyholders. Policyholders expect some exposure to growth assets, which has been promoted as being the most advantageous long term investment policy, but with reasonably stable bonus rates. Shareholders expect a reasonable return for the risk they take in providing guarantees. The interests of all parties need to be balanced to provide the optimum outcome.

## 6.2 Practical Approach

The first step towards implementing a bonus philosophy is to assess how well the current bonus rates and structures meet the aims. Asset shares can be used to

assess whether payouts at maturity (for Endowment policies) and at expected age of death (for Whole of Life policies) are at an appropriate level, ie 100% of asset share.

The bonus philosophy will set the level at which equity should be examined, for example a natural division could be to look at each product and then each bonus series within that product separately. This will provide a guide as to whether bonus rates need to be increased or reduced for each group of policies. In particular those policies reaching the payout point over the next few years should be targeted, to ensure that the bonus rates will progress smoothly over that period.

The following values could be calculated for each year into the future as far as is considered appropriate:

- Asset share
- Current claim value
- Terminal bonus amount included in claim value
- Current claim value / asset share
- Terminal bonus / current claim value

The results can then be assessed to see how closely the claim value gets to 100% of asset share and whether the proportion of terminal bonus is close to the target set in the bonus philosophy.

If claim values are not close to asset shares, it is often not straightforward to correct them. If claim values are too low, it is generally easy to increase them by increasing terminal bonus, but if they are too high it may be impossible to fix them in the short term. Changing reversionary bonus rates takes time to have an effect, and it may be necessary to reduce terminal bonus below the target proportion.

## **6.3 Issues**

### **6.3.1 *Insufficient Data***

If the data has been split into too many groups then there is a danger that the analysis is based on very small volumes of business and so is less credible.

It may also be that the particular distribution of policies means that there are no policies expected to claim over the next few years. In that case projections have to be made further out and the additional uncertainty borne in mind. On the other hand, this means more time to get the rates right!

### **6.3.2 *Product Design***

Some companies have sold products that are variations on the standard Whole of Life and Endowment products. One common example is the “bonus maturity” product where premiums are paid until a specified age, typically 60 or 65, at which point any bonuses, including terminal bonus, that have accrued are paid, sometimes with a proportion of the sum assured. After premiums cease the remaining sum assured may start to accrue bonuses again and the policy continues as a paid-up whole of life.

A number of issues arise when considering bonus strategy for these products:

- How to determine the portion of the asset share that should be paid out at bonus maturity, given that the remaining asset share must fund the future bonuses on the paid-up whole of life policy that is left;
- How to determine the relationship between the bonus rates pre and post bonus maturity.

Historical bonus rates for these products can be analysed to see if there is a pattern linking the two sets of rates. The bonus structure would need to be determined with the following constraints:

- The surrender value before and after bonus maturity is reasonable taking into account the amount paid out;
- The surrender value as a % of the asset share before bonus maturity is around the target (allowing for the surrender value of the bonus maturity amount to approach 100% at bonus maturity);
- The surrender value as a % of the asset share after bonus maturity is around the target;
- The claim value as a % of the asset share at the expected time of death is around 100%;
- The surrender value as a % of the asset share at the expected time of death is around the target.

### **6.3.3 Bonus Linkages**

The large number of takeovers and mergers in New Zealand has often resulted in bonus linkages being put into place. These would generally base the reversionary bonus rates for the different bonus series of one of the merging companies on one base bonus rate from the other company. They are often detailed in the transfer agreement or schemes of arrangement so the linkages either cannot be broken, or require some independent actuarial certification to be changed.

# 7 Surrender Values

## 7.1 Philosophy

Alongside the bonus philosophy a company needs to have a set of guiding principles as to what the surrender basis should achieve. This will cover similar issues to the bonus philosophy:

- Equity between exiting policyholders and those continuing in the fund: It might seem appropriate for a policyholder to receive an amount close to 100% of their asset share at surrender. However, as asset shares are equal in total to the total value of assets in the participating fund, there is a need to have a buffer between surrender values and asset shares to allow for variability in asset values, otherwise the solvency of the fund is potentially at risk. This is especially so given that policyholders can surrender their policy at any time and can effectively select against the company when asset values fall. The buffer could therefore also be seen to be related to the cost to the policyholder of the option to select against the company.

Current solvency requirements in New Zealand (set out in the NZ Society of Actuaries Guidance Note 5 Life Insurance Company Prudential Reserving (NZPR)) require that assets are at least equal to current surrender values. If surrender values are set to be equal to the value of assets, then a balanced type asset allocation would result in an additional capital requirement under NZPR (to provide for higher resilience reserves). This extra capital would generally have to be provided by the shareholders, who may not be willing or able to provide such capital. The only asset mix which would require no additional capital is 100% cash, which would not match policyholder reasonable expectations for those policyholders not exiting the fund. Effectively the closer the surrender values are to asset shares the more conservative the asset mix has to be, and the lower future expected returns and subsequently future bonus rates will be. A balance has to be struck between the interests of exiting policyholders and remaining policyholders. In the long term though, the majority of policyholders will benefit from investment in equity assets with their higher expected returns.

It should also be noted that there is a cost to realising long-term assets and this also may need to be taken into account (if only implicitly) in devising the surrender value basis, especially in the case of a fund with negative cashflows.

- Stability of surrender values: Policyholders do not usually expect their surrender value to be volatile. Surrender value bases should be set to result in steadily increasing surrender values, given no major change in the environment.
- Solvency and the degree of shareholder risk: The surrender basis should not be such that the security or reasonable expectations of continuing policyholders are endangered by an upsurge in surrenders.

- Ease of calculation: Even with the computing power available today, a fairly simple formula for the surrender value basis is preferable. This allows for manual calculations if required, ease of checking, minimises error and maintenance effort in the future and simplifies the production of illustrations.
- Consistency: The surrender values near maturity should be consistent with maturity values. Surrender values should be consistent with the values produced by policy alterations, and should be checked for anomalies.

Surrender values can be calculated on a retrospective basis, such as a set percentage of the asset share. This method would not be appropriate for many companies, due to the approximate nature of the asset share calculations. Therefore, the aim would be to set a surrender value basis for each identified group of policies which produces surrender values that are approximately the target % of asset share across most durations and terms outstanding, increasing to meet asset share at maturity.

## 7.2 Practical Approach

It is easier to start assessing the fit of the surrender value basis once the direction of the bonus rates has been determined. Also the interests of the continuing policyholders are then protected.

Generally a company will have to work within one of the standard prospective surrender value formulae, depending on system capability. It is possible to develop a generic formula for a surrender value basis which could cover all products within a company, with the use of factors and different mortality tables and interest rates to differentiate between groups of policies. Such a formula could be:

### For Paid-up Whole of Life policies

$$SV = SA \times SA_{Factor} \times A^1_{x+t} \\ + RB \times RB_{Factor} \times A^2_{x+t} \\ + TB \times TB_{Factor} \times A^3_{x+t}$$

### For Premium-Paying Whole of Life policies

$$SV = SA \times SA_{Factor} \times A^1_{x+t} \\ \times \max[ L \times t / m, B \times (1 - P1 / P2) ] \\ + RB \times RB_{Factor} \times A^2_{x+t} \\ + TB \times TB_{Factor} \times A^3_{x+t}$$

### For Paid-up Endowment and Pure Endowment policies

As for Paid-up Whole of Life policies but replace  $A_{x+t}$  with  $A_{x+t:n-t}$

### For Premium-Paying Endowment and Pure Endowment policies

As for Premium-Paying Whole of Life policies but replace  $A_{x+t}$  with  $A_{x+t:n-t}$

Where:

SA	Sum Assured
RB	Reversionary Bonus at the date of the surrender calculation
TB	Terminal Bonus at the date of the surrender calculation
x	Age at issue
m	Premium paying period in years
n	Policy term in years
t	Period the policy has been in force, in years
SAFactor, RBFactor, TBFactor, L, B	Constant factors depending on the SV basis
$A_{x+t}$ , $A_{x+t:n-t}$	Present value factors, based on a life table using an interest rate and mortality assumptions. The superscript indicates that different interest rate and mortality assumptions would be used for each A
P1	$P_x$
P2	$P_{x+t}$
$P_{x+t}$	$\text{Min} [(A_{x+t} + z\%)/a_{x+t}, A_{x+t+s}/a_{x+t+s}]$ for WOL $\text{Min} [(A_{x+t:n-t} + z\%)/a_{x+t:m-t}, A_{x+t+s:n-t-s}/a_{x+t+s:m-t-s}]$ for endowment
z	Zillmer adjustment
s	Sprague adjustment

To assess the suitability of the current and proposed surrender value basis the ratio of surrender value to asset share for policies grouped by outstanding duration would be considered. Ideally the ratios are close to the target % across all durations, increasing towards 100% close to maturity.

The interest rates, mortality table used or the weightings can be adjusted until the desired shape is achieved, although this process can be time consuming. Using a lighter mortality table will reduce surrender values across all durations outstanding and has greater impact at the longer durations outstanding. Reducing the interest rates used will increase surrender values but will also have a greater impact at longer outstanding durations. Using a higher weighting for the terminal bonus portion will increase surrender values for all policies but in particular those at short outstanding durations.

## 7.3 Issues

Policyholders will not expect a sudden reduction in surrender value although they may not have had previous surrender values communicated to them. Depending on the administration system in place it may be possible to store the surrender value on the current basis as a minimum. The surrender value on the proposed basis will increase over time and in most cases will be greater than this minimum within a few years.

If current death benefits are higher than asset shares and a policy is close to maturity it may be that the surrender value is greater than 100% of the asset share. It may also work the other way around - if the current level of guaranteed benefits are much lower than the asset share then it may not always be possible to increase the surrender value sufficiently, as the surrender value cannot be set higher than the current death benefit. Getting the surrender value correct in relation to the asset share is intrinsically linked to getting the bonus rates right, and in a similar way it can take some time to get the surrender values to move to the desired level.

## 8 Summary

There still remains a significant amount of participating business in New Zealand which requires careful management in order to distribute profits to policyholders equitably.

In the UK it has been common practice for many years to use asset shares in the management of with-profits business. Extensive rules and guidance have been produced to cover the calculation of asset shares and the disclosure to policyholders of the practices and principles that a company adheres to.

In the absence of a regulatory framework governing bonus declarations companies in New Zealand have used a variety of methods to set bonus rates. Using a MoS supportable bonus rate can have drawbacks in terms of ensuring equity between different groups of policyholders.

Modern technology has meant the calculation of individual asset shares for a substantial block of participating business is now possible but the whole process is still very time consuming. Sparse historic data means that selecting and validating a suitable start point is a key step in this process.

There are a number of issues to deal with when calculating asset shares and it would be inappropriate to use an asset share as a guide at an individual policy level.

However, in conjunction with a company's bonus and surrender value philosophy, asset shares provide a powerful framework for assessing the suitability of current bonus structures and surrender value bases, setting a strategy going forward and monitoring progress towards achieving the desired outcomes on an ongoing basis.