

THE UNIVERSITY OF MELBOURNE

**A SURVEY OF VALUATION ASSUMPTIONS  
AND FUNDING METHODS USED BY  
AUSTRALIAN ACTUARIES IN DEFINED BENEFIT  
SUPERANNUATION FUND VALUATIONS**

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# **A SURVEY OF VALUATION ASSUMPTIONS AND FUNDING METHODS USED BY AUSTRALIAN ACTUARIES IN DEFINED BENEFIT SUPERANNUATION FUND VALUATIONS**

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## **INTRODUCTION**

As a result of recent changes to Australian superannuation legislation, actuarial valuation reports on defined benefit funds must be made available to members and beneficiaries on request (9). This requirement is likely to prompt greater scrutiny of actuarial assumptions and methods, and comparisons of the bases used for different funds.

Similar legislation and accounting standards in the UK and USA have already had such consequences:

“Gone are the days when actuaries assumptions went unchallenged and there was little debate with the client - either the trustees or the employer. It would seem to be reasonable for them to ascertain whether the assumptions used by the actuary in order to compute the liabilities are pessimistic or optimistic by reference to typical actuarial liabilities.” (7)

In addition to external influences promoting a move to openness and scrutiny, discussions amongst Australian actuaries at the 1994 IAA Superannuation Forum also raised issues about current practice. These developments prompted this research into actuarial practice in superannuation fund valuation in Australia.

Our research is intended to investigate the valuation assumptions and funding methods used by actuaries for triennial reviews of Australian lump sum defined benefit funds regulated under the Superannuation Industry (Supervision) Act, 1993 (SIS). Topics investigated included:

- \* Financial assumptions, both long term and short term
- \* Decrement assumptions
- \* Influences on the basis chosen, including the influence of the client, the actuary's employer, and accounting standards
- \* Asset valuation methods and approaches to smoothing
- \* Funding methods commonly used and factors influencing the choice of method

We also hope that this paper will be beneficial to students who are studying the Institute's Superannuation subject, in developing a greater understanding of current actuarial practice in Australia.

## **A DESCRIPTION OF THE SURVEY AND RESPONSES**

### **ACTUARIES SURVEYED**

In 1995 we conducted a survey of 186 Fellows of the IAA, working in Australia in Superannuation. We requested responses in relation to triennial valuations completed for plans with a valuation date on or near 30 June 1994, for SIS-regulated defined benefit plans which were open to new members and providing predominantly lump sum benefits. We requested each actuary to provide data on two plans - if possible, covering one large plan (with more than 1,000 members) and one small/medium plan (up to 1,000 members).

63 actuaries completed surveys, covering 106 funds. More than 40 actuaries responded by stating they had not performed any actuarial valuations fitting the survey criteria. Three organisations provided one or two responses, stating that these were representative of the practice of all actuaries working in that organisation.

The actuaries who completed surveys stated that, in total, they perform approximately 412 valuations per year. Some actuaries sign only one valuation report per year, but others sign up to 30 valuations each year. The number of defined benefit funds in Australia is approximately 8,800 (based on ISC data as at 1992/93(13)). Assuming that each fund has a valuation every three years, this indicates that the actuaries included in our survey cover approximately 14% of all Australian defined benefit funds.

The responses came from actuarial consultants (86 funds), life offices (14 funds), and public sector actuarial services (6 funds).

### **FUNDS SURVEYED**

The responses covered 106 defined benefit funds, with a total of almost half a million members. This compares to ISC statistics (14) which show that as at 30/6/93, there were approximately 2.8 million members in defined benefit funds. The funds in our survey included about 22% of all public sector members and 13% of all private sector members in defined benefit funds, or 18% of all members of defined benefit funds.

The survey tended to be biased towards the larger funds, with 1,000 or more members.

**Table 1 : Coverage of Funds surveyed - by membership**

Fund Membership Category	PUBLIC SECTOR - ISC STATISTICS	PUBLIC SECTOR - SURVEY	PRIVATE SECTOR - ISC STATISTICS	PRIVATE SECTOR - SURVEY	PERCENTAGE OF TOTAL FUND MEMBERSHIP INCLUDED IN SURVEY
0-10	17	0	14,555	7	0%
11-100	741	0	42,690	1,470	3.4%
101-1,000	5,842	0	197,701	13,987	7.1%
1,001-10,000	77,160	7,000	312,008	72,350	20.4%
over 10,000	1,441,681	324,983	663,681	78,100	19.1%
<b>TOTAL</b>	<b>1,525,441</b>	<b>331,983</b>	<b>1,230,635</b>	<b>165,914</b>	<b>18.1%</b>

The employer-sponsors represented a wide range of industries:

**Table 2 : The number of funds surveyed in each industry group**

ALCOHOL&TOBACCO	2	INSURANCE	5
ARCHITECTURE	1	LOCAL GOVT	1
BANKING & FINANCE	9	MEDIA	2
BUILDING MATERIALS	7	MISC INDUSTRIAL	8
CATTLE/BEEF INDUSTRY	1	MOTOR	1
CHARITY	1	MUSIC	1
CHEMICALS	6	PAPER & PACKAGING	4
COMMUNICATIONS	1	PHARMACEUTICALS	2
COMPUTERS	3	PUBLIC SECTOR	1
CONSTRUCTION EQUIPMENT	1	RELIGIOUS	1
COSMETICS	2	RESOURCES	9
EDUCATION	5	RETAIL	9
ELECTRICITY	1	SECURITY PRODUCTS	1
ENGINEERING	14	TELECOMMUNICATIONS	1
ENTREPRENEURIAL	1	TOURISM&LEISURE	4
FOOD	4	TRANSPORT	6
INDUSTRIAL RELATIONS	1	WHOLESALERS	1
		NOT SPECIFIED	3
<b>TOTAL</b>			<b>120</b>

NB the total exceeds 106 since some funds covered two or more industrial categories.

Evidence from the UK indicates that gap assumptions tend to vary by industry, reflecting different expectations about salary increase rates in different sectors of the economy (3). No attempt was made to look at variations in assumptions by industry group, since the funds cover such a diverse group of industries

Many of the employer sponsors of these funds (40%) were owned or partly owned by an overseas parent company, most commonly the USA and the UK.

**Table 3 : Overseas parents of employer-sponsors**

COUNTRY	NUMBER OF FUNDS
USA	18
UK	15
JAPAN	3
SWITZERLAND	2
THE NETHERLANDS	1
SOUTH AFRICA	1
NEW ZEALAND	1
ASIA	1
TOTAL	42

It seems likely that Australian actuarial practice will be influenced by accounting and actuarial standards and practices applied overseas, where an overseas company has a substantial interest in an Australian employer-sponsor. This is confirmed to some degree by the results of our survey, e.g. in relation to choice of funding method.

## **VALUATION ASSUMPTIONS**

### **SALARY SCALE**

Salary increases arise as a result of general wage rises (salary inflation) plus promotional increases. In some funds, a separate promotional salary scale is used - in other funds, a small increase in the salary inflation rate assumption is used to cover promotional increases.

For half of the funds covered by the survey, a separate promotional salary scale was used. A promotional salary scale was much more likely to be used for funds with a large number of members.

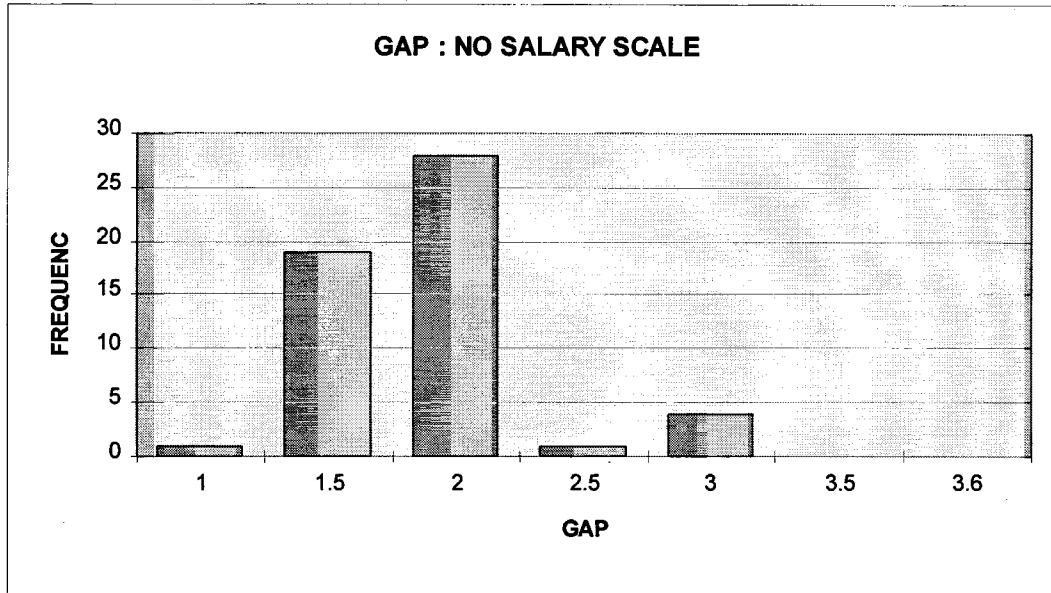
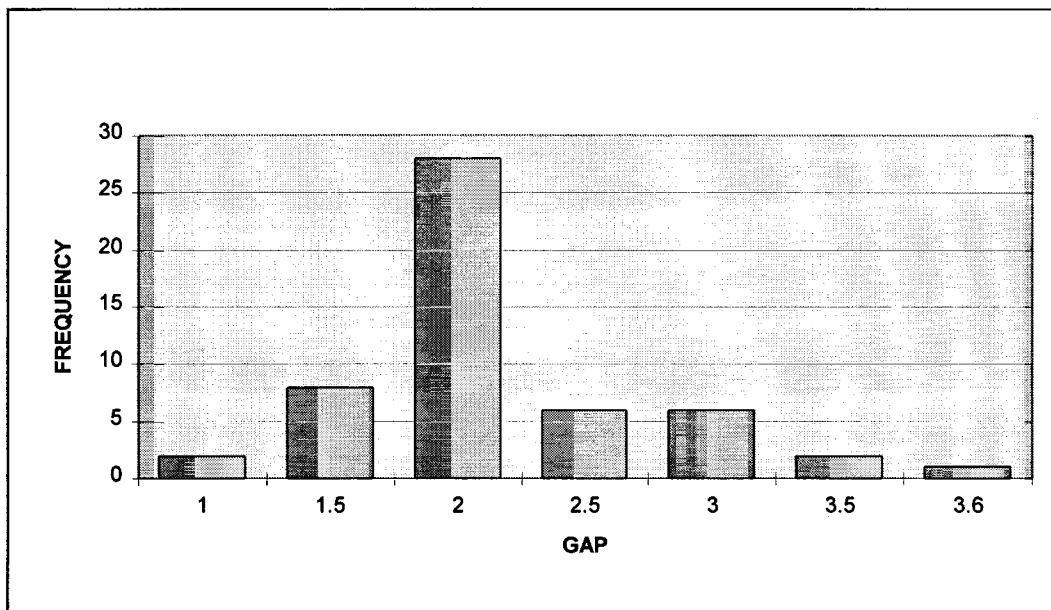
**Table 4 : The Use of Promotional Salary Scales : by Fund Membership**

Number of members	Percentage of funds using a salary scale	Number of funds in this category
0-100	19%	32
101-1000	54%	39
over 1000	74%	35
Total	50%	106

### **THE LONG-TERM GAP BETWEEN THE AFTER-TAX VALUATION RATE AND THE SALARY INFLATION RATE**

“The gap” refers to the difference between the expected rate of investment earnings (net of tax) and the expected rate of salary inflation. The long term gaps ranged from 1% to 3.6% p.a. with an average of about 2% p.a.

Where there is no promotional salary scale, actuaries allow for promotional increases by increasing the salary inflation assumption - leading to a narrower gap. Hence we would expect to find a narrower gap where actuaries do not use a promotional salary scale - our results confirmed that the average gap was 1.88% p.a. when no separate promotional salary scale was applied, and 2.14% when a separate salary scale was used.

**Figure 1 : Gap with no Salary Scale****Figure 2 : Gap with Salary Scale**

### **HOW DOES THIS COMPARE WITH THE ASSUMPTIONS USED IN THE UK AND THE USA ?**

In the UK, a survey by Bacon and Woodrow of the top 100 UK companies found that the most frequently used gap assumption was 2% p.a., with the vast majority in the range 1.5% to 2.5% p.a. All were between 1% and 3.5% p.a. (3)

Another survey, by Coopers & Lybrand, found that the average gap in the UK was about 2.25% p.a. excluding promotional increases (2). For more than 85% of the

funds it was assumed that the gap would be between 1.75% p.a. and 2.75% p.a. On top of this, a promotional salary scale was used for most schemes. The median values for the promotional salary scale were

at age 25, 1.1% p.a.  
at age 35, 0.7% p.a.  
at age 45, 0.5% p.a.

Hence it appears that assumptions commonly used in the UK are broadly consistent with the assumptions used in the Australian funds covered by the survey. However, it should be noted that compared to Australian funds, UK funds generally have a higher proportion of assets invested in equity-type assets; so *ceteris paribus*, we would expect UK funds to have higher gross long term investment returns. (11)

In the USA, a survey of 150 to over 250 large US pension plans (4) found that the average gap employed over the 5 years from 1989 to 1993, before salary scale, was approximately 2.75% p.a. There was little variation in the average gap over that period.

In the USA, the proportion invested in equity-type assets, for a typical private sector fund, is probably slightly lower than is typical in Australia. (11)

Thus there is some evidence that the gaps used by American actuaries are higher than those used in Australia, on average.

## **FACTORS WHICH MIGHT AFFECT THE SIZE OF THE GAP**

Factors which might affect the size of the gap include:

- \* asset mix
- \* number of members in the fund
- \* overseas parent
- \* best estimate or conservative assumptions

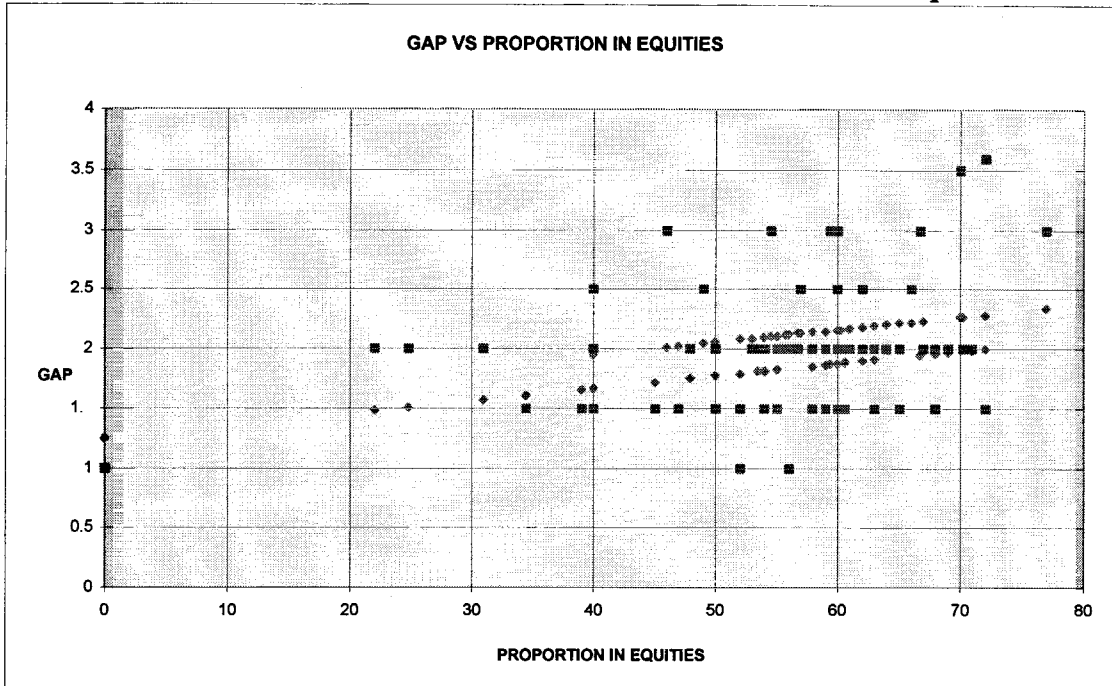
Some of these factors may be inter-related, for example size may be related to asset mix, and an overseas parent may require best estimate assumptions to meet their accounting requirements.

### (i) Asset Mix

Theoretically, the size of the gap should be correlated with the level of equity-type investments held by the fund. The results of our survey supported this hypothesis..

We fitted a regression line of the form  $G = xE + yS + z$ , where  $G$  is the gap,  $E$  is the percentage invested in equities (both Australian and overseas), and  $S$  indicates whether or not a salary scale was used ( $S=1$  if a salary scale was used). The results are shown in the following graph:



**Figure 3 : Gap vs Proportion of Assets in Australian & Overseas Equities**

The fitted relationship was  $G = 1.2533 + .2852 S + .0101E$ . The significance of the F-factor for the fitted line was 0.000422; the P-value for the equity coefficient was 0.027, and the P-value for the salary scale coefficient was 0.0071. This shows that these factors are strongly related to the gap assumptions.

#### (ii) Fund Membership

The results showed that a narrower gap was associated with smaller fund size. This was true regardless of whether or not a salary scale was applied. This implies that either small funds are invested more conservatively, or are valued more conservatively

**Table 5 : Average Size of gap by fund membership**

No of members	Without a salary scale	With a salary scale
0-100	1.77 (26 funds)	2.00 (6 funds)
101-1,000	2.00 (18 funds)	2.02 (21 funds)
more than 1,000	2.00 (9 funds)	2.27 (26 funds)

#### (iii) Best estimate or conservative assumptions

Approximately 60% of the actuaries we surveyed use "best estimate" assumptions. The others deliberately use conservative assumptions - the professional standards

allow this but require the actuary to be aware of the effect of such assumptions and to state the effect of such margins if significant. None of the actuaries in the survey claimed to use optimistic assumptions.

As expected, those actuaries using conservative assumptions had a lower average gap than actuaries using "best estimate" assumptions - but the margin was narrow.

**Table 6 : Average gaps : conservative vs best estimate assumptions**

	CONSERVATIVE	BEST ESTIMATE
NO SALARY SCALE	1.80% (25 funds)	1.96% (28 funds)
WITH SALARY SCALE	2.09% (18 funds)	2.19% (34 funds)
TOTAL	43 funds	62 funds

Long-term estimates of the after-tax rate and the salary inflation rate

The absolute levels of the long-term financial assumptions may also be of interest.

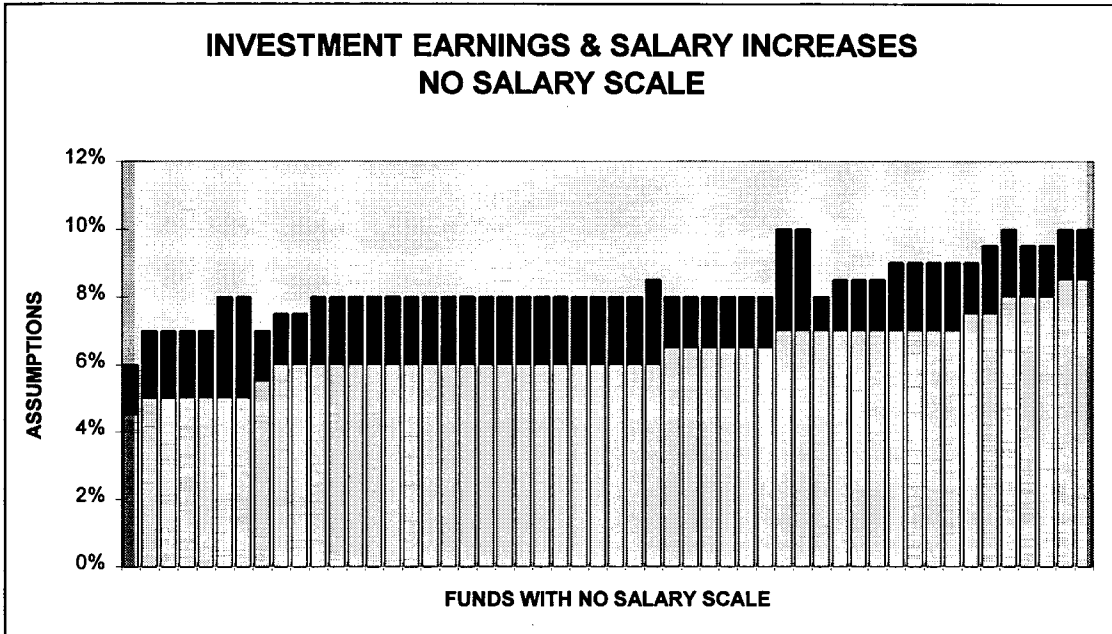
The salary assumptions ranged from 4.5% p.a to 8.5% p.a., with mean 6.32% p.a. and mode 6.0% p.a. The investment earning assumptions ranged from 6.0% p.a. to 10.5% p.a. with mean 8.3% p.a. and mode 8.0% p.a.

**Table 7 : Long term financial assumptions**

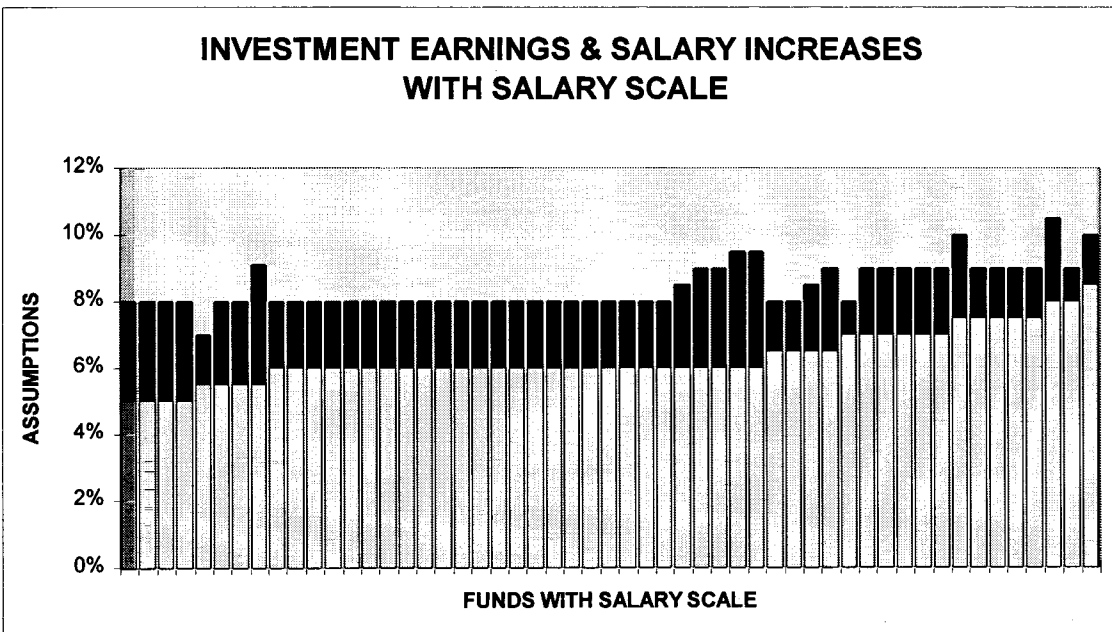
Salary increases	Frequency	Investment Earnings	Frequency
4.5% p.a.	2	4.5% p.a.	0
5.0% p.a.	10	5.0% p.a.	0
5.5% p.a.	5	5.5% p.a.	0
6.0% p.a.	48	6.0% p.a.	2
6.5% p.a.	10	6.5% p.a.	0
7.0% p.a.	16	7.0% p.a.	6
7.5% p.a.	7	7.5% p.a.	2
8.0% p.a.	5	8.0% p.a.	58
8.5% p.a.	3	8.5% p.a.	6
9.0% p.a.	0	9.0% p.a.	19
9.5% p.a.	0	9.5% p.a.	5
10.0% p.a.	0	10.0% p.a.	7
10.5% p.a.	0	10.5% p.a.	1
Total	106	Total	106

The most popular combination was 6% p.a salary increases combined with 8.0% p.a. investment earnings. The “bunching” of certain combinations reflects the standard bases used by some actuarial consultants (see the section on Influences on Assumptions).

**Figure 4 : Long term financial assumptions, no salary scale**



**Figure 5 : Long term financial assumptions with a salary scale**



## SHORT TERM FINANCIAL ASSUMPTIONS

More than one-third of the funds were valued using separate short-term financial assumptions.

It might be expected that separate short-term assumptions would be more likely to be used for large funds where a greater degree of sophistication could be justified. The survey results supported this view, although there were several small funds where short-term assumptions were used and a significant number of large funds where short term assumptions were not used. The difference between smaller and larger funds is greater if the analysis is restricted to funds where market value was used as the basis for valuing liabilities (as shown below, funds where smoothed market values were adopted for asset valuation are less likely to be valued using short-term assumptions).

**Table 8 : Percentage of funds which use short term financial assumptions**

	Small Funds 0-100 members	Medium funds 101-1000 members	Large Funds over 1000 members	All Funds
All funds	31%	36%	43%	37%
Funds which value assets using MV	31%	44%	52%	43%

Where short term gaps were used, the size of the gap is likely to vary with the date of the valuation, reflecting then-prevailing economic conditions and forecasts.

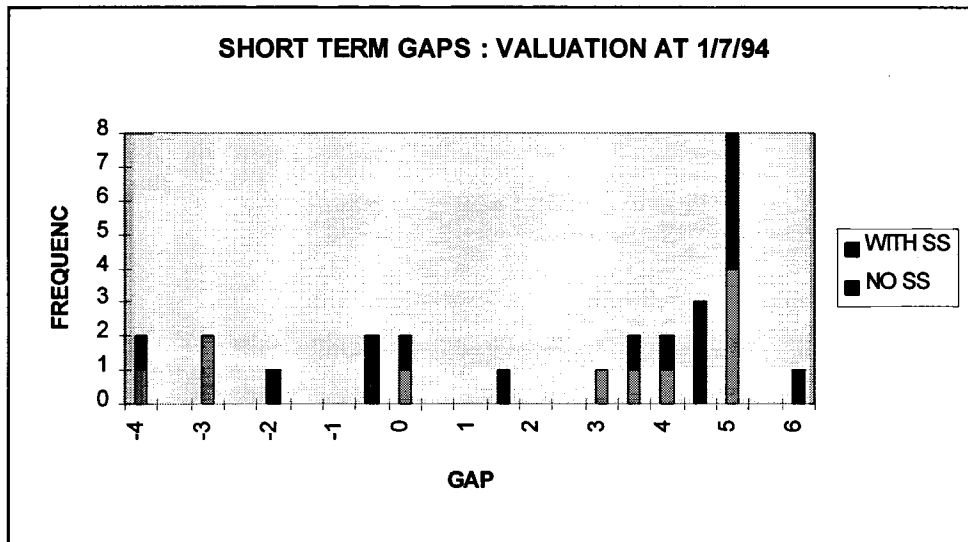
**Table 9 First year Gap Assumptions by Valuation Date**

Valuation date	Gap range	No of funds
31/12/92 or 1/1/93	4.5%	1
31/12/93 or 1/1/94	4% to 4.6%	3
1/3/94	5.0%	1
1/4/94	5.0%	1
30/6/94 or 1/7/94	-4.0% to +6.0%	27
1/9/94	5.0%	1
31/12/94 or 1/1/95	3.0% to 5.0%	5
Total	average 3.0%	39

It is interesting to note that the average short term gap assumptions over this period (3%) were wider than the average long term gap assumptions of approximately 2%: this.

The survey requested data on funds with a valuation date on or near 1/7/94 - and 27 of the 39 funds using short term assumptions had a valuation date of 30/6/94 or 1/7/94. For these funds, there was a wide variety of short term gap assumptions, as shown in the graph. The actual median gap for balanced funds over the period was about 1.9% p.a. excluding promotional increases.

**Figure 6 : Short term gaps for Funds with a 30/6/94 Valuation Date**



(NB gaps are rounded to nearest 1/2% p.a. in the graph)

How can we account for this range of assumptions ? Since actuaries might be performing the valuation at any time up to a year after the date of the review, the actuary will often have the advantage of hindsight in setting the first-year financial assumptions. This could influence the choice of short term assumptions. Over the year in question, investment returns were very poor for the first half of the financial year, but improved by the end of the financial year. Those funds where negative gaps were used may be reflecting experience as at the date the actuary set the assumptions.

## CHANGES IN FINANCIAL ASSUMPTIONS

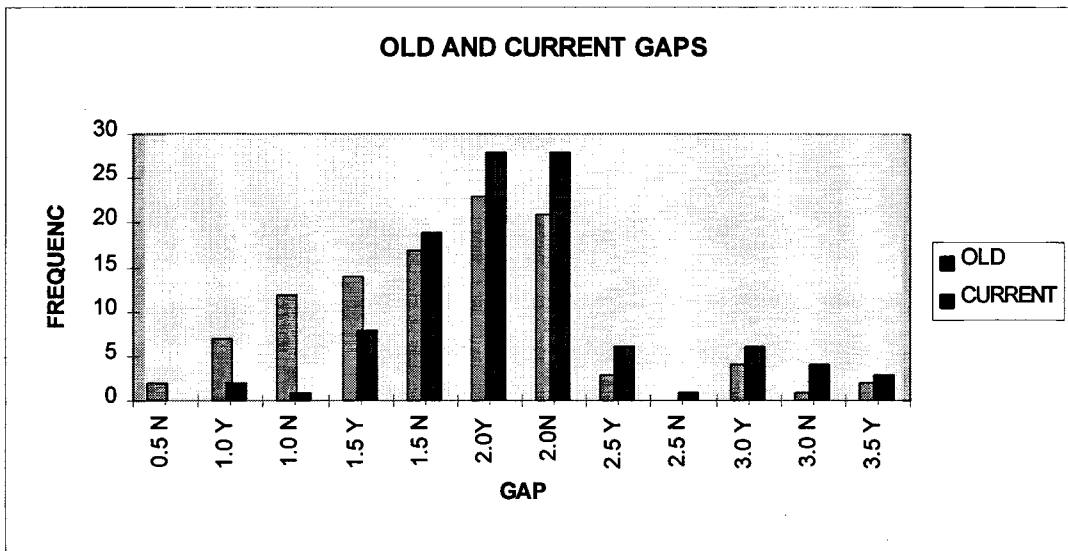
In the period since the last valuation, 56% of funds reported no change in the long-term gap assumption, 37% reported an increase, and only 1% of funds reported a decrease.

**Table 10 : Changes in long term financial assumptions since prior valuation**

CHANGE IN GAP (to nearest 1/2%)	PERCENTAGE OF ALL FUNDS
Reduce by 1/2%	1%
No change	56%
Increase by 1/2%	18%
Increase by 1%	18%
Increase by 1.5%	1%
No response or no prior valuation of relevance	6%

The average gap increased from 1.73% p.a. to 2.02% p.a. over this period, and the standard deviation of gaps reduced slightly, from 0.58% to 0.52%.

**Figure 6 : Gaps used at current and prior valuation**



Some possible reasons for a trend towards wider gaps, which were suggested at the 1994 IAA Superannuation Forum (8), are:

- \* a trend towards “best estimate” rather than conservative assumptions, based on professional standards and accounting standard requirements
- \* increases in the proportion of assets invested in growth-type investments

- \* the introduction of dividend imputation, offset by tax on earnings, in 1988
- \* the effects of financial deregulation
- \* the use of stochastic methods to predict future returns, which tended to result in larger gaps

The observed change in the gap follows a trend towards weaker financial assumptions which has been noted in the UK (1). In a study covering 66 valuations for 23 funds over the period 1983 to 1991, in 19 cases the gap increased (by 1/2% or 1% p.a.), in 43 cases there was no change, and in 4 cases the gap assumptions reduced by 1/2%. The author of this study suggested that this trend was caused by:

- \* “the exceptional investment returns that schemes were experiencing in the 1980s, which encouraged many actuaries to take a more optimistic view of the future,

and

- \* “a weaker basis reduces the recommended employer contribution rate which was likely to be seen as appropriate in view of the substantial levels of surplus emerging in many schemes over this period.”

In the USA, gaps have been more stable, but this probably reflects regulatory restrictions on valuation assumptions. (4)

For some funds in the survey (17%) the same gap was maintained, but the level of both the investment and salary assumptions had changed. For some other funds (4%) the short-term assumptions had changed while the same long-term assumptions were retained. Overall, for 61% of the funds the financial assumptions had changed in some way since the last valuation. For 34% there was no change, and for 5% of funds there was no response or no prior valuation of relevance.

## **SENSITIVITY TESTING**

### Multiple sets of valuation assumptions

We asked actuaries to state

- \* whether they had performed the valuation using more than one set of assumptions, and if so,
- \* whether they had presented more than one set of results to the trustees ?

55% of the funds were valued using more than one set of financial assumptions. For 71% of these funds, the trustees were presented with more than one set of results.

As stated below, in some cases a separate valuation was needed to meet the requirements of accounting standards.

### Stochastic assumptions

Stochastic assumptions are not frequently used by Australian superannuation actuaries: only 9 funds out of 106 funds were valued using stochastic assumptions. The stochastic valuations were all performed by consultants.

As might be expected, stochastic methods were more likely to be used for larger funds: five of these nine funds had more than 5000 members.

Where actuaries did choose to use stochastic assumptions, the following reasons were given:

It demonstrates uncertainties.

It indicates the sensitivity of results to fluctuations in key variables.

It gives the ability to “think tank” the robustness of the contribution strategy.

You can see the estimated distribution of the financial variables.

It gives confidence that the lower contribution rate may be expected to be maintained.

Able to assess the effect of the recommended company contribution rate on the solvency and funding position of the plan in the short to medium term.

No hidden margins. Can handle “best of both worlds” benefits.

In discussions at the 1994 IAA Superannuation Forum (8), several actuaries said that they do not believe that the benefits of a stochastic valuation are sufficient to justify the extra costs involved (or clients are unwilling to pay for the extra work required).

However it seems likely that stochastic methods will become increasingly common in the future, for the following reasons:

\* For Funding and Solvency Certificates, actuaries are required to make recommendations based on “reasonable expectations” over a five year period, and to specify “notifiable events” which indicate a threat to the solvency of the fund. Stochastic methods may be useful in identifying “notifiable events”.

\* Accumulation-type Minimum Requisite Benefits have been introduced into many defined benefit funds to meet SGC requirements. This introduces an option-type benefit structure, which is most accurately valued using a stochastic approach. (Research by Sherris (5) indicates the importance of using stochastic methods to value this type of benefit).



\* An increase in the level of Minimum Requisite Benefits over time, combined with a tendency to run down fund surpluses, means that solvency margins are likely to become narrower. Trustees will become more concerned with short-term fluctuations which may cause technical insolvency.

\* As actuaries become more familiar with stochastic methods, the cost of such analyses should fall.

## DECREMENT ASSUMPTIONS

### GENDER BASED ASSUMPTIONS

In the survey, we asked actuaries to state whether or not they used separate decrements and salary scale assumptions for males and females. As the table shows, this was relatively uncommon. As expected, gender-based assumptions were more common for the larger funds. It is interesting to note that gender-based rates are most likely to be used in setting withdrawal rates. It may be an area for further research to look at differences in withdrawal rates for males and females - are these narrowing as more and more women continue working even after having children ?

**Table 11 : Percentage of funds using gender-based assumptions**

ASSUMPTION	ALL FUNDS	LARGE FUNDS (over 1000 members)	SMALL FUNDS (1000 members or fewer)
MORTALITY	17%	26%	12%
DISABILITY	15%	22%	11%
WITHDRAWAL	26%	41%	18%
SALARY SCALE	9%	18%	5%

Where gender based assumptions were used, the assumptions were based on the fund's own experience, or the pooled experience of similar funds, or on a combination of these. A few actuaries referred to standard tables published by actuarial or demographic sources, adjusted for the fund's own experience.

Given that actuarial assumptions will now become more widely available, it may be useful for the IAA to collect and collate the assumptions used for funds in various industry groups, to provide better sources for the smaller actuarial consultancies which have limited access to a large pool of decrement data.

## EARLY RETIREMENT AND RESIGNATION RATES

In some cases, it is not considered worthwhile to use explicit early retirement rates: this may be because

- \* early retirement is not allowed or is uncommon, or
- \* the benefit design ensures that early retirement does not impose a significant financial strain on the fund, or
- \* the extra cost and complexity of calculation is unjustified, particularly for a small fund.

However, in most cases (81% of funds) the actuary did make specific allowance for early retirement decrements.

In some case, it is not considered worthwhile to use explicit resignation rates: this may be because

- \* resignations have little impact on the financial position of the fund: this is likely to become more relevant as the level of compulsory vesting is increasing under the SGC requirements

or

- \* because the actuary prefers to allow the surplus to emerge as resignations occur

or

- \* the extra cost and complexity of calculation is unjustified, especially for a small fund.

In most cases (91% of funds) the actuary did make specific allowance for resignations. However, discussions at the 1994 IAA Superannuation Forum indicated that even where resignation decrements are used, many actuaries use conservative assumptions.

## INFLUENCES ON THE CHOICE OF BASIS

Our survey asked questions to determine whether the actuary's choice of basis was influenced by the client, by the actuary's employer, and/or by accounting standards.

### CLIENT INFLUENCE

For 70% of the funds surveyed, the actuary reported that clients did not have any influence on the assumptions.

Where the client did have an influence, how did this affect the valuation assumptions?

Many actuaries simply reported that the proposed basis was discussed with the client; in some cases the actuary suggested a proposed basis and sought the client's approval or agreement prior to commencing calculations.

In some cases the actuary and the client discussed the extent of any margins to be included in the basis - two actuaries reported that clients requested that the basis should not be unduly conservative; one actuary reported that a client wanted to use best estimate assumptions but erring on the conservative side; and one stated that the client requested that best estimate assumptions should be used. It would be interesting to see if future surveys reflect increasing pressure from clients to use "best estimate" assumptions.

One actuary stated that "Note that client cannot instruct the actuary. The purpose of the discussion is to check if any other matters should be taken to account by the actuary"

In some cases the actuary sought advice from the client on specific matters relating to the company, e.g. :

- \* Most commonly, the client provided advice on expected future salary increases - this was mentioned in relation to 13 funds.
- \* In two cases, the client provided advice about expected future retrenchments.
- \* One actuary mentioned that they discussed expected growth in fund membership.
- \* In two cases the actuary and the client discussed expected short-term investment returns, e.g. based on forecasts from the finance department.

## EMPLOYER INFLUENCE

We asked :

- \* Does your employer have a standard basis which is recommended for all actuaries in the company ?
- \* If so, how much freedom do you have to vary standard assumptions ?
- \* Is there any peer review of the valuation assumptions which you choose ?

For about 39% of the funds surveyed, the actuary reported that the employer did recommend a standard basis - however, nearly all these actuaries stated that they had a great deal of freedom to depart from the standard basis where appropriate to the circumstances of a particular fund. (In future surveys it would be interesting to ask how often these actuaries do, in fact, depart from the standard basis).

Peer review is very common - for 87% of the funds surveyed, the actuaries reported that their valuation assumptions were subject to peer review.

## ACCOUNTING STANDARDS

We asked

- \* Did you do a separate valuation to meet the requirements of accounting standards ?
- \* If so, which accounting standards were relevant ? (AAS25, SSAP24, FAS87, or other ?)

Only 29 of the 106 funds surveyed required a separate valuation for accounting standards. Of these, the relevant standards are as shown in Table 12. As expected, for funds where an American company had a controlling interest in the employer sponsor, it was sometimes necessary to have a separate FAS87 valuation; for the funds where a UK company had a controlling interest in the employer sponsor, it was sometimes necessary to have a separate SSAP24 valuation.

**Table 12 : Accounting standards**

ACCOUNTING STANDARD	NUMBER OF FUNDS
AAS25	17
AAS25 + SSAP24	2 (1 with a UK owner)
AAS25 + FAS87	1
FAS87	5 (all with USA owners)
FAS87 + SSAP24	3 (all with UK owners)
ALL + ED53	1

## **ASSET VALUATION**

In the survey, actuaries were asked to state the method used for valuing assets for the purposes of determining the contribution rate. This topic was discussed at the 1994 IAA Superannuation Forum - opinion was divided between market value and adjusted (smoothed) market values.(8)

Several actuaries commented that market value is easier for clients to understand - and with the increasing involvement of other professionals who use market value (such as accountants) it is difficult to justify other approaches. Market value of assets must be shown in accounts, must be used in solvency tests required under SIS, and must be used in calculating the coverage of vested benefits under IAA Professional Standards. It may be confusing to trustees and members if other values are presented. If the adjusted market value is less than market value, it may appear overly conservative.

On the other hand, some actuaries felt that smoothed market value was theoretically more sound, since current market values do not necessarily reflect the value of assets on a long-term basis. However there is no consensus about the most appropriate method of smoothing asset values - as the survey confirms, a variety of methods have been adopted in practice.

For 82% of the funds surveyed market value was used for all asset classes (adjusted only for costs of realisation etc as required by accounting standards and IAA professional standards). Only 13% of funds were valued using adjusted market values for all asset classes. Another 5% used adjusted market value for some asset classes (equities and/or property) but used market value for other asset classes (e.g. fixed-interest and cash).

This is in contrast with actuarial practice in the UK, where “the most common method adopted in recent years has been to value the assets by discounting the future income stream expected from them, or from an appropriate notional portfolio”. (1) About 80% of UK funds use a discounted cash flow approach to asset valuation. (1)

It also contrasts with actuarial practice in the USA where it is more common to use smoothed market values, using an average over the last three to five years. (6)

## **FACTORS AFFECTING THE CHOICE OF ASSET VALUATION METHOD**

Factors which may affect the choice of valuation method include:

- \* consistency with the financial assumptions used in valuing liabilities
- \* the size of the fund - for cost reasons a simpler method such as market value may be adopted for a small fund
- \* the cash flow of the fund - where a fund has a negative cash flow at least some of the assets should be valued using market value

- \* maturity of the fund - For a mature fund, where assets are large relative to the size of the payroll and/or the value of future contributions, then a small change in the asset valuation can have a significant effect on the contribution rate that the actuary would recommend. If the employer requires stable contribution rates, it may be desirable to smooth the asset values.
- \* financial status - market value may be more relevant for a fund where short term considerations, such as solvency constraints, are of over-riding concern in setting the contribution rates.
- \* the nature of the assets - market value is clearly appropriate for some forms of investments such as cash and indirect investments where there is insufficient information about the underlying assets.
- \* accounting standards which require market value to be shown in accounts.

#### CONSISTENCY BETWEEN ASSET AND LIABILITY VALUATION

As a basic principle, the valuation of assets should be consistent with the valuation of liabilities (as stated in the draft IAA Guidance Note on Valuation of Superannuation Fund Assets(10)). Hence, in theory,

- \* if assets are valued at market value, then liabilities should be valued using short-term financial assumptions to reflect current market conditions. Note that in some cases, the short-term assumptions will be the same as the long term assumptions, where the actuary believes that current market values are consistent with expected long term assumptions, neither under-valued nor over-valued.
- \* if assets are valued using smoothed market value, then liabilities may be valued using long term assumptions.

The survey confirmed that there is a correlation between asset and liability valuations:

- \* of the funds where assets were valued at market value, 43% used short-term financial assumptions for liabilities which were different to the long-term assumptions
- \* of the funds where assets were valued using adjusted market values, only 11% used short-term financial assumptions for liabilities

## METHODS OF SMOOTHING ASSET VALUES

When asset values were smoothed, there was some variety in the methods adopted. Of the funds where smoothing was used **and** the smoothing method was described:

\* For six funds, the asset values were smoothed by deferred recognition of capital gains (both realised and unrealised). There were two basic approaches:

- taking a percentage of previously unrecognised gains at the valuation date, typically 25% or 30%; or

- spreading capital gains arising in any year over a specified period, typically from two to five years.

\* For six funds, the market value of assets was adjusted to reflect the expected rate of return on assets, according to the valuation basis. Any excess return was transferred to an amortisation account, which was then recognised at the rate of 30% p.a.

\* For two funds, a suitable index (e.g. the All Ordinaries index) was used and a trend line was fitted using linear regression, to work out an adjustment factor.

\* For two funds, ad hoc adjustments were made :

- for one fund assets were valued using a percentage of market values, depending on current market conditions, i.e. whether or not the share market was over-valued in the actuary's opinion

- for one fund the market value of assets was adjusted to take into account movements in the share market after the valuation date

\* For one fund invested in a pooled superannuation trust, the unit prices were smoothed.

As suggested at the 1994 IAA Superannuation Forum, further research on smoothing methods may be desirable.

## THE USE OF AUDITED ACCOUNTS IN VALUING ASSETS

The survey asked actuaries to state whether or not they relied solely on the audited accounts in determining the value of fund assets. Those who stated that they did **not** rely solely upon the audited accounts were asked to briefly describe the independent checks which were applied.

For approximately two-thirds of the funds, the actuaries reported that they relied upon audited accounts for the value of assets. Eight of these actuaries also reported that they had performed independent checks on the audited accounts.

For three of the funds, the actuary reported that audited accounts were not available at the time of the actuarial review. In this case, either the draft accounts or the investment manager's reports were used to obtain asset values.

For the remaining funds, the actuary did not rely solely upon the audited accounts. For actuaries who reported independent checks or other sources of information:

- \* Most stated that they had used investment managers' reports or custodians' reports in determining the value of assets (in many cases it was unclear whether these reports were the sole source of asset data, or whether these reports were used to check the audited accounts).
- \* Some stated that asset values were readily available because the funds were invested in life office policies or pooled superannuation trusts.
- \* Some stated that they had performed general reasonableness checks, for example by checking that the asset values were consistent with cash flows and the rates of return earned on different asset classes.
- \* One actuary (valuing two funds) reported that the auditor's report was relied upon for asset values, but any special cases or assets of significance were examined independently.
- \* One actuary (valuing two funds) stated that a full independent check was performed.
- \* For one fund the actuary had discussed the valuation of direct property investments with the fund trustees.
- \* For another fund the actuary had specified the valuation method to be used for a particular "non-standard" asset.

It is clear from the above responses that most actuaries place a great deal of reliance upon auditor's reports and investment manager's reports.



Under the draft Guidance Note on Asset Valuation (10) , reliance upon audited accounts is permissible **as long as** :

- \* the actuary is satisfied that the purpose of the asset valuation certified is not materially different from the purpose of a valuation certified by an Approved Auditor, and
- \* there is no reason for the actuary to believe that the values may be inappropriate in the circumstances.

Where audited accounts are not available, and the actuary relies upon other sources of information such as investment manager's reports, then the draft Guidance Note states this is permissible, **as long as** either :

- \* the actuary is satisfied that the value placed on assets is reasonable and is based on sound data;
- or
- \* the actuary's report is appropriately and prominently qualified.

## **FUNDING METHODS**

The most popular funding methods were Entry Age Normal and Aggregate Funding. PUC was used less frequently (usually for funds with USA or UK parents). Attained Age Normal was rarely used. Other methods, particularly “Target Funding” of various types, were also used occasionally.

**Table 14 : Funding Methods Used by Survey Respondents**

<b>FUNDING METHOD</b>	<b>NUMBER OF FUNDS</b>
ENTRY AGE NORMAL	44
AGGREGATE	37
PROJECTED UNIT CREDIT	17
ATTAINED AGE NORMAL	6
OTHER (Including Target funding)	8
TOTAL	112

Note that six funds were valued using two methods.

This contrasts with the methods commonly used in the UK and the USA at present.

In the UK, the Aggregate method was formerly the most commonly used method, but has now been superseded by the PUC method. (1)

Similarly, in the USA, about two-thirds of plans use the Projected Unit Credit of funding. (4)

Actuaries were asked to state their reasons for choosing the specified funding method. The factors which were mostly commonly mentioned as an influence on the choice of funding method were

- \* consistency with prior valuations
- \* fund size, i.e. number of members
- \* open or closed fund
- \* client preferences
- \* accounting standards
- \* simplicity (both cost of calculations and ease of understanding)

## REASONS FOR CHOOSING THE AGGREGATE FUNDING METHOD

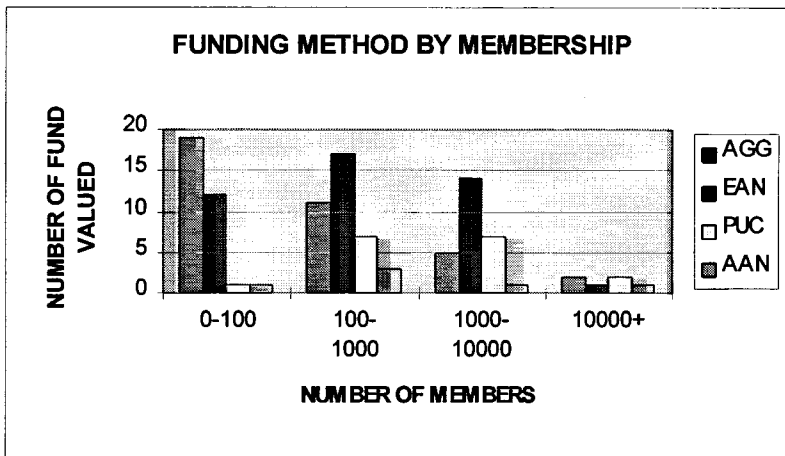
More than one-third of the funds were valued using the aggregate funding method. The aggregate method is most commonly used for small funds, for funds which are declining or closed to new entrants (where the new entrant method is clearly inappropriate). It is favoured by many actuaries because it is simple and easy to explain to clients.

It is interesting to observe that, where the aggregate funding method was used, twelve of the funds covered by the survey were either closed to new entrants or declining in membership or the defined benefit section of the fund was closed to new entrants. This could reflect the recent trend towards accumulation funds - particularly since the survey specifically asked for responses in relation to funds which were open to new members.

**Table 15 : Reasons for Choosing the Aggregate Funding Method**

REASON	No. of TIMES MENTIONED
Consistency with prior valuation	10
Simplicity / ease of understanding	10
Small fund	9
Closed fund or declining membership, few new entrants	14
Surplus/sound financial position	3
Stability of contribution rate	1

The following graph, showing funding method by size of fund, verifies that the aggregate method is more likely to be used for small funds, although it is occasionally used for larger funds as well. However, the New Entrant method is much more commonly used for the larger funds.

**Figure 11 : Funding method by Number of Members**

### REASONS FOR CHOOSING THE ENTRY AGE NORMAL METHOD

The new entrant funding method was the most commonly used method: more than 40% of funds were valued by this method. It is the preferred method for funds which have a steady flow of new entrants, i.e. reasonably large funds, open to new entrants, with a reasonable level of turnover and/or growth in membership.

Many actuaries commented that it is helpful for employers to know the long-term expected cost (i.e. the normal cost) for an ongoing fund, and the short term deviations from this long-term cost. Several mentioned that this method is easy to explain to trustees.

**Table 16 : Reasons for Using The New Entrant Funding Method**

REASON	No. of TIMES MENTIONED
Consistency with prior valuation	21
Simplicity / ease of understanding	6
Open/ongoing/New Entrants	17
Stability of contribution rate	3
Suitable for client's purposes	3
Flexibility in setting the contribution rate	1
Provides long term expected cost with short term variations	6

### REASONS FOR CHOOSING THE ATTAINED AGE NORMAL METHOD

The Attained Age Normal method is rarely used; only 6 funds out of 106 were valued using this method.

The AAN method compares the assets to the accrued liability, and any shortfall is

amortised over a specified period. This may be useful for a fund which is targeting coverage of accrued benefits. In fact the survey shows that the AAN method was sometimes combined with one of the target funding methods.

Reasons given for using the AAN method included :

“It allows demonstration of the cost of future service of current members. This can then be related to the cost of new members and the effect of surplus on adjusting the company contribution. rate”

“AAN was used for long term purposes because it provides value of accrued benefits and does not differ much from PUC for this fund. As fund had VBI<100% the main emphasis was on targeting values of the VBI over the next 10 years.”

### **REASONS FOR CHOOSING THE PROJECTED UNIT CREDIT FUNDING METHOD**

The Projected Unit Credit method is used less frequently than the Aggregate and New Entrant methods of funding, but it is still used fairly frequently : 17 out of 106 funds were valued using this method. The most common reasons given for choosing PUC are:

- \* client preference (especially for those with UK or USA parents)
- \* accounting standards or principles (ED53 and FAS87 were both mentioned)
- \* it gives lower levels of funding and/or avoids surplus

Of the 17 funds which used the PUC funding method, the sponsors of 10 had overseas ownership (3 British, 5 American, 1 Japanese, and 1 New Zealand).

It should be noted that PUC methods are increasingly popular in the UK: most large schemes now use the PUC method (1).

**Table 17 : Reasons for using The Projected Unit Credit Funding Method**

<b>REASON</b>	<b>No. of TIMES MENTIONED</b>
Consistency with prior valuation	3
Requested by parent company or employer	6
To comply with accounting standard (e.g. FAS87) or accounting principles	4
Lower level of funding required by client	2

## REASONS FOR CHANGING THE FUNDING METHOD

As seen from the comments above, most actuaries try to maintain consistency by using the same valuation method from one valuation to the next. However, in some cases it is necessary or desirable to change the method used.

The survey asked respondents to note any change in the method used, and the reasons for the change. The funding method had been changed for 21 (funds out of 106) since the prior valuation. The changes, and the reasons for the changes were:

- \* For eight funds, the funding method had changed to Aggregate Funding, generally as a result of fund closure or declining numbers of new entrants.
- \* For seven funds, the funding method had been changed to Projected Unit Credit, generally as a result of client preferences. In two cases the change occurred as a result of a request from a fund sponsor which was owned by UK interests. In three cases the employer wished to reduce the level of funding and/or avoid too much surplus. In one case accounting standards were significant. Another actuary mentioned that the fund had become a hybrid defined benefit/accumulation fund - since most of the benefits were accumulation benefits, an accrual funding method was considered more appropriate.
- \* For four funds, the funding method had changed to New Entrant Funding, on the grounds that it was considered more appropriate for an ongoing fund.
- \* For one fund, the funding method had changed to Attained Age, on the basis that there had recently been a change in benefits
- \* Two funds (both valued by the same actuary) had changed to a Target Funding method, using projected accrued benefits with a six-year time frame. This method was adopted because of "the irrelevance of other methods which assume that future benefits remain unchanged."

The popularity of the Aggregate method merely reflects the change in the Australian superannuation environment, with a trend towards accumulation funds.

The trend towards the PUC funding method apparently reflects a change in the basic approach to funding. It appears that an accounting-based approach to funding is being adopted for some funds. This could result in a lower level of security for members' benefits. In the past, it has been suggested that the Projected Unit Credit method will become more popular in the future (12). This prediction appears likely to be correct, but the transition is only occurring slowly.

The use of target funding methods seems likely to increase as a result of the SIS requirement for Funding and Solvency Certificates. In order to be considered solvent, employers must contribute at a rate which will be likely to be sufficient to cover SGC minimum benefits over a five-year time frame.

## **SURPLUSES, DEFICITS AND AMORTISATION PERIODS**

For most of the funds (67 out of 106) a significant surplus was recorded. Surplus was defined as an excess of assets over the present value of accrued liabilities. For 27 funds assets and accrued liabilities were roughly in balance, and a deficit was reported for only 12 funds.

### **TREATMENT OF DEFICITS**

Where a deficit was recorded, how was it treated ?

UK experience shows a trend to amortise surpluses quickly (e.g. by contribution holidays) while deficits are paid off more slowly (1). The survey results, although based on a small sample, show that in Australia there is also a tendency to pay off deficits over the long-term, e.g. over the future working life of the members. (This is a natural outcome for Aggregate funding, but it was also used with other funding methods). However a shorter amortisation period may be used if this suits the employer-sponsor.

**Table 18 : Treatment of Deficits**

TREATMENT	No. of funds	COMMENT
Paid off immediately	1	Required for industrial relations reasons
Amortised over 3 years	2	In both cases, after discussions with the employer-sponsor
Amortised over 10-15 years	1	
Amortised over future working life	6	In some cases, this is a natural result of Aggregate funding - but also used with other funding methods
Unfunded	1	Public sector fund
Not specified	1	

### **TREATMENT OF SURPLUSES**

For 67 funds, a significant surplus of assets over the present value of accrued liabilities was reported. How was the surplus treated ?

- \* In 57 funds the surplus was amortised
- \* In 8 funds the surplus was carried forward
- \* In 1 fund a part of the surplus was refunded to the employer, with the remainder carried forward and amortised
- \* In 1 fund a part of the surplus was used to improve benefits, with the remainder carried forward.

Where the surplus was amortised, many actuaries chose the shortest possible amortisation period, giving the employer a contribution holiday. For 29 out of these 58 funds, the actuary recommended a contribution holiday - for another 5 funds, the actuary gave a range of contribution rates including the option of a nil contribution rate.

Note that in eleven cases, funds which were valued using the Aggregate Funding Method were on also contribution holiday - this presumably indicates a surplus which is so large that there is expected to be no need for contributions over the remaining working lifetime of the members.

The following table shows amortisation periods chosen for funds where surplus was to be amortised:

Amortisation Period reported	Funds on Contribution Holiday	Funds with no Contribution holiday
1 year	2	0
2 years	2	1
2.5 years	2	0
3 years	1	0
4 years	1	0
5 years	2	0
6 years	1	1
7 years	2	0
8 years	1	0
9 years	0	1
10 years or more	2	5
Working Lifetime	6	11
Minimum period for contribution holiday	9	0
No reply/ unspecified	3	5
<b>TOTAL</b>	<b>34</b>	<b>24</b>

The survey asked actuaries to say how they chose the period of amortisation. The most common replies were:

- \* Where a contribution holiday was recommended, the amortisation period was set so as to give the employers a contribution holiday and/or to minimise the amortisation period (hence giving the largest possible reduction in contributions). In a few other cases, the actuary stated that the amortisation period was chosen in order to achieve "the required reduction" or "a significant reduction" in the contribution rate.



\* Where aggregate funding was used, the amortisation period is automatically set to be the remaining future working lifetime of members.

In only two cases was stability of contribution rates mentioned as a factor in choosing the amortisation period.

In this context, it is interesting to note the conclusions of a UK study which used simulation with historical data to assess the effect of different amortisation periods (1). The conclusions are in line with reasonable expectations:

“ Using a relatively long amortisation period can significantly reduce the variability of employer contributions, while potentially increasing both the incidence of insolvency and the average cost of the scheme. Amortising surpluses over a shorter period than deficits appears to have a relatively small effect on the average surplus, while increasing the incidence of insolvency.”

### **FURTHER RESEARCH**

We suggest that this survey be repeated regularly, say every three years, to monitor trends in actuarial practice over time. The authors would appreciate suggestions about any other topics of interest which should be included in future surveys.

It may also be interesting to make more detailed comparisons of Australian and overseas practice in valuations.

### **ACKNOWLEDGEMENTS**

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