

# TAYLOR FRY

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CONSULTING ACTUARIES

## Department of Labour of the Government of New Zealand

### Review of the PricewaterhouseCoopers contributions to the March 2007 Budget Economic and Fiscal Update for the Accident Compensation Corporation



Richard G Brookes  
Fellow of the Institute of Actuaries of Australia  
Fellow of the Institute of Actuaries (London)  
Fellow of the New Zealand Society of Actuaries

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# 1 Conclusion and statement

## 1.1 Scope

This report documents Taylor Fry Consulting Actuaries' (TFCA) review of the PricewaterhouseCoopers' (PwC) valuation of the Accident Compensation Corporation's portfolio of outstanding claims as at 31 March 2007, as documented in their report dated 11 June 2007.

We have prepared our report in accordance with Professional Standard 100 of the Institute of Actuaries of Australia which covers the external peer review of general insurance valuations.

## 1.2 Statement

Our conclusions are as follows:

- We have reviewed the appropriateness of the data inputs and the data reconciliations undertaken and we are satisfied with these. However, note that a review of the data itself is excluded from our review and we draw no conclusions as to the actual validity of the data;
- We have reviewed the valuation methods used for suitability in the circumstances against current actuarial practice and conclude that they are suitable;
- We have reviewed the assumptions for consistency with available experience and trends. With the exception of the superimposed inflation allowance for social rehabilitation – serious injury, we conclude that they are consistent or, if not, that there are valid reasons for the assumptions used;
- We have reviewed the analysis of movement of valuation results;
- We have reviewed the judgements made for reasonableness and materiality;
- We have reviewed whether key risks, sensitivities and uncertainties, and their implications, have been identified. Where we believe that additional comment was useful we have included it in our report and we have made some suggestions for additions to future PwC reports;
- We have considered whether there have been departures from relevant legislation and Professional Standards and concluded that there are no significant departures;
- We have given weight to all material factors; and

- In the light of the reviews noted above, nothing has come to our attention that leads us to believe that PwC's valuation results are unreasonable, with the exception that we believe that either a larger allowance for superimposed inflation for social rehabilitation – serious injury is required or, alternatively, that further justification is required for the assumption adopted. See sections 1.3.2 and 1.3.4 below.

## 1.3 Recommendations

### 1.3.1 Overall quality of valuation

Overall we find the valuation to be well-executed and presented. Whilst we certainly have suggestions to improve the process these are, with the exception of the issues addressed in sections 1.3.2 and 1.3.4, presentational in nature only.

### 1.3.2 Superimposed inflation

We believe that PwC have conducted such analysis as they are able, given the data available. However, we do not consider the reasons given in the PwC report to be sufficiently strong that they would have caused us, had we been the primary actuary, to have adopted an allowance that is as low as has been adopted.

We recommend (refer to section 5.2.2) that for future PwC reports, either:

- The superimposed inflation assumption for social rehabilitation – serious injury is significantly strengthened; or
- Considerably more analysis is included in the report justifying the current assumption.

For avoidance of doubt, by future reports we mean the report covering the valuation as at 30 June 2007 and subsequent reports.

Without making any recommendation on an acceptable alternative allowance, we note that assuming 2% per annum superimposed inflation after five years, rather than the current allowance of 0% would add approximately \$1.22B to the central estimate of liabilities.

Given this sensitivity and the uncertainty of the assumption we recommend that the financial significance of this issue be given considerably more prominence in future PwC reports.

### 1.3.3 Claims expense assumptions

PwC have reduced projected growth in expenses by 3% per annum for the first three years. This reduces the expense provision by approximately \$80M. We recommend that future reports contain additional analysis justifying any such reduction.

### 1.3.4 Risk margin

It is not apparent that PwC have taken account of the uncertainty in the social rehabilitation - serious injury superimposed inflation assumption and

the sensitivity of the estimated liability to it in their assessment of the risk margin.

We recommend (refer to section 7.7) that PwC includes a discussion of this issue and its implications for the risk margin in future reports. We also suggest that further consideration of the uncertainty of this allowance might lead to an increase in the recommended risk margin from the current level of 12% (averaged across the accounts) of the central estimate or to a reduction in the assessed probability of sufficiency provided by a risk margin of 12% from the current level of 75%.

### *1.3.5 Presentation and completeness of information*

We recommend (refer to 7.8.1) that PwC include a table in their report showing the changes in the estimated liability for each payment type and account due to non-economic effects split by experience and changes in assumptions.

We recommend (refer to section 7.8.2) that the report shows graphs of recent continuance or decay experience, compared with assumptions, for each payment type as appropriate.

We recommend (refer to section 7.8.3) that future reports give more details on the process used to derive the smoothed diagonals. If they have not done so, PwC should evaluate their method against just using the raw diagonals of unsmoothed data and other methods of smoothing.

Neither the report nor the appendices give any detail of the expense allocation supplied by ACC, or the derivation of the percentages applied to the future claim payments. PwC have supplied additional material which we have reviewed. So long as the expense attribution supplied by ACC is robust we are comfortable that the method is reasonable and has been correctly applied. However, we recommend (refer to section 5.2.8) that future reports provide more detail.

## 2 Background and scope

### 2.1 Status of report

This report is final and replaces a draft dated 20 July 2007.

### 2.2 Background

Each year PricewaterhouseCoopers (PwC) undertake two valuations and projections of outstanding claims liabilities of the Accident Compensation Corporation (ACC) portfolio as at 30 June of that year, the first valuation being primarily based on 31 December data and the second valuation updating the results for data in the quarter to 31 March. The projections include estimated liabilities and claim payments for each of the next five years.

The results of the first valuation are used by ACC in compiling the Budget Economic and Fiscal Update (BEFU). The results of the second valuation are used by ACC for their financial statements at 30 June and the December Economic and Fiscal Update (DEFU).

The DOL has some supervisory responsibility for the ACC portfolio and as part of this role it appoints Taylor Fry Consulting Actuaries (TFCA) to review the actuarial reports, valuations and projections which underlie the BEFU and DEFU.

This is the fourth consecutive year that TFCA has undertaken this review. Our report reviewing the 30 June 2006 report (the previous PwC report) was signed by Richard Brookes dated 4 September 2006. We will occasionally refer to this report as “the previous TFCA report”.

### 2.3 Purpose and scope of report

This report is intended to document the results of Taylor Fry Consulting Actuaries' (TFCA) external peer review of the PricewaterhouseCoopers' (PwC) report entitled “Accident Compensation Corporation Valuation of Outstanding Claims Liabilities as at 31 March 2007”, dated 11 June 2007 and the valuation underlying that report. Our report should be read in conjunction with the PwC report.

The scope of our review is set out in a contract between TFCA and the DOL (unsigned at the date of this draft report). The relevant part of that contract states that review is to include:

- *“A review of the actuarial methodology and its suitability for the portfolio, data and benefit structure for which it is being used;*
- *A review of the suitability of the main actuarial assumptions (in terms of financial significance) with respect to recent experience implied by the data;*
- *A spot check of parts of the valuation calculations to ensure that they have been correctly executed;*

- *A review of the appropriateness of economic and discount rate assumptions;*
- *Any recommendations of improvement to any areas of process or information provided;*
- *Excludes any independent evaluation of the data; we do not wish to purchase a full independent calculation, or an exhaustive check of all the calculations being reviewed.”*

The review is also to

- *“Track the movement between the forecast approved for the December 2006 Economic and Fiscal Update (“2006 DEFU”) and the March 2007 BEFU; and*
- *Identify any significant changes in the methodology and assumptions between the 2006 DEFU and the March 2007 BEFU and quantify their impacts, with significant emphasis on the cost drivers including medical and social rehabilitation costs; and*
- *Identify and display any significant changes by ACC Account.”*

It should be noted that this report does not provide an additional valuation.

## 2.4 Addressee of report

This report was commissioned by Andrew Marshall of the DOL and is addressed to the DOL and Noeline Woof as the senior actuary responsible for the PwC report. DOL have informed us that this report will be available to the general public via the DOL and ACC websites. We draw the attention of all parties other than TFCA and DOL to the comments regarding third parties given in section 2.7.

## 2.5 Compliance

This report has been prepared in accordance with, and complies fully with, the requirements of the Institute of Actuaries of Australia’s Professional Standard 100 “External Peer Review for General Insurance and Life Insurance”. There is no equivalent New Zealand standard.

## 2.6 Actuary

The actuary responsible for this report is Richard Brookes, employed by TFCA. He is acting as a consultant to the DOL. Richard was employed by PwC from late 1999 to late 2004 and knows the three signatories to the PwC report in this context. Richard considers that he meets the definition of “external” as set out in section 5 of the Professional Standard 100. He does not believe that the associations set out above constitute a conflict of interest that prevents him from undertaking this review. No limitations have been placed on him over the course of the review. He was associated with (but not directly responsible for) TFCA’s review in 2005 and was responsible for TFCA’s review in 2006. Accordingly he meets the rotation requirement set out in section 5 of Professional Standard 100.

## 2.7 Reliances and limitations

This report is being provided to the addressees for the purposes outlined in section 2.3. It is not intended, nor necessarily suitable for any other purpose.

Third parties should place no reliance on this report that would create any duty or liability by TFCA to the third party.

We have prepared this report in conformity with its intended use by persons technically familiar with the areas addressed and for the stated purposes only. Judgements about the conclusions drawn in this report should be made only after considering the report in its entirety, and in conjunction with PwC's report dated 11 June 2007.

Finally, in undertaking this review, we have relied upon the accuracy of information supplied by the parties as outlined in section 3. We have used the information without independent verification. It has been reviewed where possible for reasonableness and consistency.

### 3 Information supplied

This section describes the data supplied to us from various sources:

- PwC's report dated 11 June 2007 and appendices, supplied by David Gifford of PwC;
- Some verbal and email advice on the technical details of PwC's calculations, supplied by David Gifford of PwC;
- A spreadsheet showing active claims and past quarterly payments, in 31 March 2007 values for Weekly non-fatal and in 31 December 2006 values the for medical payment types, hospital rehabilitation and weekly fatal, supplied by Swee Chang of ACC;
- A spreadsheet giving details of the serious injury claim cash flows, and a word document detailing the technical details of PwC's calculations, supplied by David Gifford of PwC;
- A spreadsheet containing details of the setting of the claims expense assumptions;
- Some verbal and email advice on the technical details of PwC's serious injury calculations, supplied by David Gifford of PwC
- Some discussion with Noeline Woof and David Gifford of PwC's reasons for the adoption of their superimposed inflation assumption for social rehabilitation – serious injury and some supporting analysis;
- A confirmation by David Gifford of PwC that the explanation of PwC's quality assurance review and control procedure, supplied in respect of the previous report and summarised in section 7.6.1, is still valid.

We have received the full cooperation of all the parties named in this section and received all the information that we requested.

## 4 Valuation results and changes from the previous report

For the sake of completeness we reproduce the central estimates given in the PwC report below. We also show movements from the previous valuation:

**Table 4-1 Central estimates by payment type (all figures in \$M)**

Payment type	At 30 June 2007	Variance due to				Projected from previous review
		Past inflation	Future inflation and discount	Reallocation of payments	Experience and non- economic assumptions	
Non fatal weekly compensation	4,603	49	60	0	98	4,396
Fatal weekly compensation	404	3	3	0	15	383
Medical	1,016	7	17	-101	30	1,063
Social rehabilitation	5,126	32	108	18	333	4,635
Vocational rehabilitation	140	1	2	-21	-17	175
Hospital rehabilitation	791	5	14	0	30	742
Other rehabilitation	547	2	10	103	82	350
Independence allowance	606	3	14	0	48	541
Lump sums	256	1	2	0	32	221
Ambulance and bulk billed	20	0	0	0	-1	21
Claims handling expenses	949	8	16	0	19	906
<b>Total</b>	<b>14,458</b>	<b>111</b>	<b>246</b>	<b>-1</b>	<b>669</b>	<b>13,433</b>

**Table 4-2 Central estimates by account (all figures in \$M)**

Account	At 30 June 2007	Variance due to				Projected from previous review
		Past inflation	Future inflation and discount	Reallocation of payments	Experience and non- economic assumptions	
Earners'	2,572	20	38	0	64	2,450
Employers'	999	9	13	0	-105	1,082
Medical misadventure	926	6	22	0	48	850
Motor vehicle	4,154	31	78	0	326	3,719
Non earners'	2,505	16	51	0	245	2,193
Partnership program	83	0	1	0	-7	89
Residual non work	983	8	14	0	33	928
Residual work	1,983	17	26	0	116	1,824
Self employed	252	3	3	0	-53	299
<b>Total</b>	<b>14,457</b>	<b>110</b>	<b>246</b>	<b>0</b>	<b>667</b>	<b>13,434</b>

Note: Totals in the two tables differ due to rounding.

Obvious issues arising from the tables above are:

- The general deterioration in estimated liabilities due to experience and non-economic assumptions across most payment types and accounts (see section 5);
- The seemingly anomalous releases from the Employer and Self-employed accounts (see section 5.3.3); and
- The changes due to economic effects i.e. past inflation and assumptions for future inflation and discount rates (see section 6).

We explore these issues in the following sections.

## 5 Non-economic assumptions

### 5.1 Experience

#### 5.1.1 *Translating experience into valuation results*

Broadly speaking, the deviations in actual experience from that expected in the previous report will have three effects on the estimated liability given in the current report:

- The different number of active claims to that expected will result in a different estimated liability, even if the assumptions in the calculation remain unchanged. In broad terms, 2% more active weekly non-fatal claims than expected will result in a 2% higher estimated liability than projected in the previous review;
- The different number of active claims may also induce the actuary to reconsider the assumptions for future continuance rates. For instance more active weekly non-fatal claims than expected may indicate that the continuance rate assumptions should be increased, raising the number of projected future active claims and increasing the estimated liability; and
- More payments per active claim than expected may indicate that the payment per active claim assumptions should be increased, raising the future projected payment levels and increasing the estimated liability.

The distinction between these effects is that the first effect happens automatically as a consequence of the valuation models, whilst the second two arise as a consequence of deliberate decisions by the actuary based on an interpretation of the experience.

#### 5.1.2 *How to interpret experience*

For most payment types there are two crucial components of experience. The first is payments and second component (which we will call the “experience component”) depends on the model being used. For most payment types the model used is a Payment Per Active Claim (PPAC) model, thus the experience component is the number of active claims. However for lump sum models, it is the number of lump sum payments and for a payment decay models there is no experience component. We show in Table 5-1 below the experience since the last valuation, indicating the experience component as appropriate. For most payment types the period is the nine months to 31 December 2006 but for Weekly Non Fatal payments the date is 31 March 2007. For brevity, we show the experience aggregated for all accounts although PwC presents results for different groups of accounts. We also exclude the Partnership Plan since the net liability is small. To interpret the table, note that:

- A different number of active claims to that expected will have a flow through effect to payments. For instance, the number of active non-fatal weekly claims is 3% more than expected. The amount of payments is 4% more than expected. Of this 4%, 3% is accounted for by the greater number of active claims than expected and the remaining 1% by payments per claim being 1% more than expected;
- In the absence of an assumption change by the actuary, a different number of active claims to that expected in the quarter before the valuation date will also flow through automatically to the estimated liabilities;
- Projected demographic and economic changes are all taken into account in the expected experience. Therefore, if the actuary's assumptions were perfect, all the actual versus expected ratios would be 100%; and
- The Scheme experience is the result of a statistical process. Let's use the payment per active claim (PPAC) assumption as an example. The PPAC is a statistical variable with a mean and variability about the mean. The actuarial assumption for a PPAC is the mean but the actual outcome in any quarter may not be equal to the mean/actuarial assumption. Broadly speaking, the most likely outcome is the mean/actuarial assumption but there are probabilities of an outcome much larger or much smaller than this. We refer to this variation about the mean/actuarial assumption as random variation. In the context of Table 5-1, this means that we expect our actual versus expected ratios to vary around 100% but not too much. The larger the payment type, the closer to 100% we should expect.

### 5.1.3 ACC experience over the last nine months

**Table 5-1 Experience over last nine months**

<b>Payment type</b>	<b>Experience component</b>	<b>Actual experience component</b>	<b>Actual/Expected (%)</b>	<b>Actual payments (\$M)</b>	<b>Actual/Expected (%)</b>
<b>Non fatal weekly compensation</b>	Active claims	127,039	103%	582.7	104%
<b>Fatal weekly compensation</b>	Active claims	14,346	100%	50.3	100%
<b>Medical</b>	Active claims	2,423,403	101%	319.1	99%
<b>Social rehabilitation</b>					
serious injury	Active claims	3,136	101%	149.6	106%
non-serious injury capital	n/a		n/a	61.6	107%
non-serious injury non-capital	Active claims	46,180	86%	69.4	111%
<b>Vocational rehabilitation</b>	Active claims	16,261	113%	30.4	96%
<b>Hospital rehabilitation</b>	Active claims	30,772	101%	130.9	105%
<b>Other rehabilitation</b>	n/a		n/a	72.8	121%
<b>Independence allowance</b>	Active claims	48,938	103%	27.6	107%
<b>Lump sums</b>	n/a		n/a	37.5	172%

In the light of the discussion above, examination of Table 5-1 highlights the following issues:

- There have been more active claims than expected for non-fatal weekly compensation. Payments have also been higher but this is likely to have been mostly due to the number of active claims. The experience may lead to a change in continuance rates (see section 5.2.1);
- Serious injury social rehabilitation payments have been 6% greater than expected over nine months. Given that the expectation was for a 5% per annum increase over inflation this represents a superimposed inflation rate of around 13%. This is a significant deterioration in a payment type that already has an established level of high superimposed inflation and, unless it is brought quickly under control, it will have serious negative implications for the scheme. We explore this topic in more detail in section 5.2.2;
- The other social rehabilitation payments are also greater than expected. These payment types are less financially significant for the liabilities than the serious injury payments and do not have a previous history of superimposed inflation so this deterioration is less concerning than that for the serious injury payments (see sections 5.2.3 and 5.2.4);
- The low number of active claims for non-serious injury non-capital social rehabilitation looks anomalous but is due to travel costs being shifted to the 'other rehabilitation' payment type (see section 5.2.3);
- The greater number of vocational rehabilitation active claims is due to a surge in the number of Work Placement Assessment and Return to Work Program payments, coupled by decrease in the number of other payments. Since the Work Placement Assessment and Return to Work Program payments are generally lower per claim than the others, the total amount of payments is lower than expected. If this experience continues then a change in assumptions will be required although it is likely that there will be little effect on the total estimated liability;
- Hospital rehabilitation payments have been 5% greater than expected. There was an assumption of superimposed inflation of 5% per annum so this represents a significant increase from last year and has reportedly been caused by the removal of caps on the cost of various elective surgery procedures (see section 5.2.5);
- Other rehabilitation payments have been 21% higher than expected. This is due to increases in transport and dental costs (see section 5.2.6);
- The number of active claims for the independence allowance was 3% more than expected and this flowed through to the payments. The remaining 4% excess of actual over expected payments was mainly due to back-payments which are expected to reduce significantly in the near future;
- There have been many more lump sums than expected. This is a result of a court decision in late 2006 which has resulted in asbestos-related claims being entitled to a lump sum rather than an independence allowance (see section 5.2.7).

## 5.2 The assumptions

We now discuss in more detail, for the important payment types where the experience has not been in line with that expected:

- How recent experience has been incorporated in the actuarial assumptions;
- Our opinion of the resulting actuarial assumptions; and
- The risks of experience deviating from the assumptions.

We do not attempt to reproduce the PwC report but, rather, give our view of the issues as reported by PwC and their response to them. Readers of this report are advised to refer to the appropriate sections of the PwC report.

We begin each section with a summary of the amount of payments and estimated outstanding claims liability associated with the payment type under discussion. In general terms:

- Payment types which make up a larger proportion of the payments but a smaller proportion of the estimated liability are more financially significant for the cash flows in the BEFU forecasts than the estimated outstanding claims liabilities appearing in the balance sheet. An example of such a payment type is Hospital rehabilitation where the payments are 7% of total annual payments but which make up 5% of the central estimate of the outstanding claims liability; and
- Vice versa. An example of such a payment type is Social rehabilitation - serious injury where the payments are 8% of total annual payments but which make up 29% of the central estimate of the outstanding claims liability.

### 5.2.1 *Weekly non-fatal*

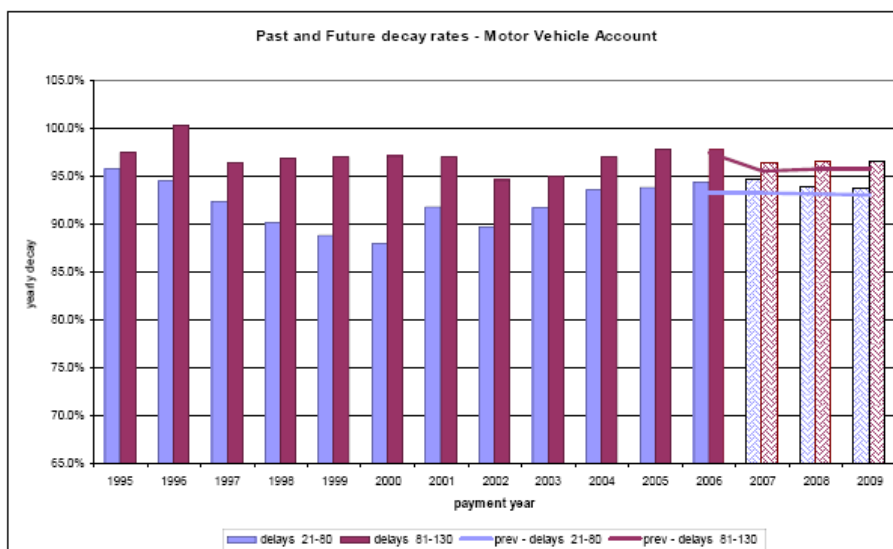
#### 5.2.1.1 *Financial significance*

Weekly non-fatal payments were \$805m per annum over the last nine months. This makes up 33% of the total scheme payments in any one year (excluding ambulance and bulk billed costs and claims handling expenses). PwC's central estimate of the liability is \$4,603m which is 32% of the total estimated liability.

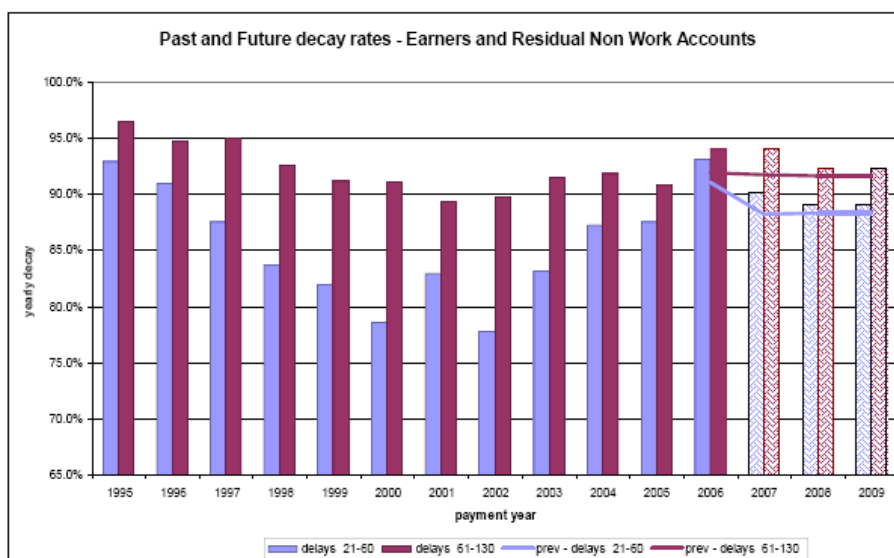
#### 5.2.1.2 *Continuance rates*

There were 3% more active claims than expected. This was primarily due to a deterioration in continuance rates for the Earners, Residual non-work and Motor accounts as shown in the graphs reproduced from the PwC report below:

**Figure 5-1 Continuance rates for the Motor account**



**Figure 5-2 Continuance rates for the Earners and residual non-work accounts**



Broadly speaking, the continuance rates for these (and the other accounts) reduced between 1995 and 2002 as part of an ACC drive to reduce the number of long term claimants. On completion of this exercise it was expected that the remaining claimants would be less likely to recover and that, accordingly, continuance rates would rise until the portfolio stabilised. This has indeed occurred and the important (and difficult) question is – when and where will the rates stabilise? It appeared as though this was taking place in 2004/05. However, the deterioration for these accounts in 2006 reopens the question. Is this deterioration a random fluctuation? If so then the experience can be expected to return to 2004/05 levels. If not then where will the continuance rates stabilise?

PwC have partially recognised the 2006 experience by setting rates between 2004/05 levels and the 2006 level. We agree that this is an appropriate response but highlight the financial implications if rates

continue to deteriorate (in this context we meant that if rates continue to increase since this means a deterioration in the estimated liability).

Although the differences apparent in the graphs above do not appear large, it is easy to imagine the rates increasing by, for instance, 1% per annum. We expect that this would increase the estimated weekly non-fatal liability by approximately \$500M. Accordingly we regard this as a key financial risk for the scheme.

### 5.2.1.3 *Payments per active claim (PPAC)*

The choice of two inflation indices for the PPACs creates some minor interpretation difficulties when assessing the assumptions. The issue is somewhat technical but, briefly, when assessing a graph of plotted PPACs, the values in the graph are in constant calendar values but not accident year values. This means that if a PPAC for a particular block of accident years is thought to be constant in development year terms, the graphs produced by PwC should show a slight decreasing trend. To choose a constant value (in terms of the graph) is equivalent to choosing an increasing PPAC in development year terms. PwC refer to this in section 4.4 of their report, in reference to development year 40 and beyond, where they have specifically built in a decreasing trend into the PPACs to compensate. However, the issue is just as valid for earlier development years so that, in cases where a constant PPAC is fitted, the end result is actually an increasing PPAC in development year terms. There are several accounts where constant PPACs are fitted well before development year 40.

It may be worth considering a change so that the values in the graphs are expressed in constant accident year terms before the assumptions are fitted. We do not anticipate this would have a significant impact on the results but may make fitting and interpretation easier.

## 5.2.2 *Social rehabilitation – serious injury*

### 5.2.2.1 *Financial significance*

Social rehabilitation – serious injury payments were \$200m per annum over the last nine months. This makes up 8% of the total scheme payments in any one year (excluding ambulance and bulk billed costs and claims handling expenses). PwC's central estimate of the liability is \$4,209m which is 29% of the total estimated liability.

### 5.2.2.2 *Superimposed inflation*

In general, actuarial models base their expectation of future increases in payments on some measure of inflation. For this payment type, PwC use inflation as measured by increases in the Labour Cost Index. A base (or unadjusted) actuarial model will use forecast inflation and changes in the portfolio of claims to project payments in each year. The extent to which payments increase by more than the levels projected by the base actuarial model is termed 'superimposed inflation'. After the examination of the history of past superimposed inflation, an allowance is built into the base actuarial model so that it will better project future payment levels. This is known as the superimposed inflation assumption.

### 5.2.2.3 History of superimposed inflation

The PwC report shows a history of superimposed inflation for the social rehabilitation – serious injury payment type and their base actuarial model. By sourcing information from previous PwC reports we are able to extend the table a little earlier than is shown in the 2007 PwC report. Super imposed inflation since 2000 has been:

**Table 5-2 Recent superimposed inflation**

<b>Payment year to 31 December</b>	<b>Superimposed inflation for the year</b>
2000	8%
2001	12%
2002	4%
2003	3%
2004	8%
2005	6%
2006	13%
<b>Average</b>	<b>8%</b>

We do not have the information to extend the history before 2000 but it seems safe to conclude that:

- Superimposed inflation is a well established feature of the serious injury portfolio;
- Superimposed inflation has averaged 8% since 2000 and may have been at significant levels before then.

### 5.2.2.4 Reported causes of superimposed inflation

We only have access to the 31 March 2004 and later reports. Those reports make reference to:

- The 2004 report
  - ✓ The introduction of lifetime care plans
  - ✓ The greater provision of attendant care by life coaches rather than attendant carers;
- The 2005 report
  - ✓ An increase in the number of hours of care provided (with aging of the claimants a significant contributing factor)
  - ✓ A shift of services from less expensive categories to more expensive categories;
- The 2006 report
  - ✓ Lifetime care plans. Around 600 plans had been completed out of the approximately 3000 claimants although it was reported that an analysis of past payment data had not shown any significant trends in payments before or after the introduction of the plan for each patient

- ✓ An increase in the number of hours of care provided and/or a shift of services from less expensive categories to more expensive categories. It was noted that there was no data available on hours of care to isolate these effects
  - ✓ The greater provision of attendant care by life coaches rather than attendant carers
  - ✓ An increase in the rates for contracted agencies providing home based rehabilitation services by 10% at 31 December 2004;
- The 2007 report
    - ✓ Lifetime care plans. Around 700 plans had been completed out of the approximately 3000 claimants, covering 40% of payments
    - ✓ The report gives a table showing payment increases in recent years by category. It is apparent that, although Home-based rehabilitation is indeed a major contributor to superimposed inflation in dollar terms, almost all payment types are experiencing significant increases. We reproduce the table below:

**Table 5-3**

Category	Payments in year to 31 December (\$m)			
	2003	2004	2005	2006
Assessment Services	3.8	4.2	5.3	6.5
Equipment	11.5	15.1	17.3	20.4
Home-based Rehabilitation	65.9	72.0	83.4	94.7
Housing Modifications	3.6	4.1	5.8	7.7
In-patient Rehabilitation	22.5	27.8	28.2	42.0
Other Social Rehabilitation	11.0	11.6	11.3	10.6
Vehicle modifications	2.7	4.2	4.4	6.6
<b>Total</b>	<b>121.1</b>	<b>138.9</b>	<b>155.6</b>	<b>188.5</b>

Category	Increase in year to 31 December (\$m)		
	2004	2005	2006
Assessment Services	0.4	1.1	1.2
Equipment	3.5	2.3	3.0
Home-based Rehabilitation	6.0	11.4	11.3
Housing Modifications	0.6	1.7	1.9
In-patient Rehabilitation	5.3	0.3	13.8
Other Social Rehabilitation	0.6	-0.3	-0.6
Vehicle modifications	1.4	0.2	2.2
<b>Total</b>	<b>17.9</b>	<b>16.7</b>	<b>32.9</b>

Category	Increase in year to 31 December (%)		
	2004	2005	2006
Assessment Services	10.4	26.0	23.5
Equipment	30.7	15.2	17.5
Home-based Rehabilitation	9.2	15.8	13.6
Housing Modifications	15.5	40.5	32.5
In-patient Rehabilitation	23.6	1.2	49.1
Other Social Rehabilitation	5.5	-2.7	-5.7
Vehicle modifications	52.7	5.1	50.1
<b>Total</b>	<b>14.8</b>	<b>12.0</b>	<b>21.1</b>

Note: the above table shows total payments rather than payments per claim.

#### 5.2.2.5 Current allowance for superimposed inflation and justification

PwC's current allowance for superimposed inflation is 5% per annum for the next 5 years (to 31 December 2011) followed by zero. This represents an increase of the expected period of 5% per annum by 1.5 years from the allowance used for the previous valuation. PwC list a number of justifications for an allowance which is less than that suggested by past history:

- A long term allowance at the levels experienced over the recent past would ultimately lead to projections that imply all seriously injured claimants would be receiving more than 24 hours of care per day;
- Part of the recent history was due to the Lifetime care planning process and can be expected to moderate once this process is complete. They expect this to be achieved within five years;
- ACC has recently embarked on a project to achieve
  - ✓ Greater understanding of the current levels of care
  - ✓ More consistency of levels of care
  - ✓ More control over future cost increases;
- The potential of ACC to exert control over costs is greater than the upward pressure due to the aging of the claimant pool.
- Other jurisdictions (notably the Transport Accident Commission (TAC) in Victoria) have shown the ability to stabilise attendant care costs after period of significant increases. Attendant care costs paid by ACC are broadly comparable to those paid by the TAC;

#### 5.2.2.6 TFCA's opinion

The setting of superimposed inflation assumption is not a precise science and there is scope for a wide variety of views, depending on the circumstances and the professional judgement of the actuary involved. However, professional and accounting standards require a "best estimate" or mean assumption to be set. In our view this means that sound reasons are needed before setting an assumption which differs markedly from a well established trend such as that shown in Table 5-2 above.

We believe that PwC have conducted such analysis as they are able, given the data available. However, we do not consider the reasons given in the PwC report to be sufficiently strong that they would have caused us, had we been the primary actuary, to have adopted an allowance that is as low as has been adopted. We comment specifically on PwC's justifications below:

- **A long term allowance at the levels experienced over the recent past would lead to projections that imply all seriously injured claimants would be receiving more than 24 hours of care per day.** It seems likely to us that, although a small proportion of claimants are currently receiving close to 24 hours per day of care, the bulk are receiving considerably less than this. Without comprehensive data on current care levels (which previous PwC reports state does not exist) it is not possible to be absolutely certain, however it seems unlikely to us that PwC's current allowance implies increased care levels at such a level that the 24 hour a day cap is in any way threatened for other than a small proportion of claimants. In addition, there are many possible (and actual) causes of superimposed inflation other than an increase in the number of hours of care. Superimposed inflation from these other causes is not limited by the supposed 24 hour cap. Accordingly we do not regard this factor as precluding a much larger superimposed inflation allowance;

- **Part of the recent history was due to the Lifetime care planning process and can be expected to moderate once this process is complete.** If Lifetime care planning was a major contributor then we would have expected lower levels of superimposed inflation before the exercise started and also that a reasonably simple analysis on claimants going through the process would show increases as a result of the process, followed by no increases. However, we note that

  - ✓ Superimposed inflation was high well before the Lifetime care planning process started
  - ✓ PwC state (in their 2006 report) that an analysis of Lifetime care participants was inconclusive in relation to superimposed inflation, and
  - ✓ According to PwC's figures, only 100 claimants completed the process in 2006 (this seems slow progress and at this rate it would take some considerable time to complete the whole pool);
- **ACC has recently embarked on a project to achieve greater understanding of the current levels of care, greater consistency of care and exert more control over cost increases.** It seems to us that the first two objectives imply that ACC are uncertain as to what extent the third objective can be achieved. In the absence of concrete, quantifiable cost control plans and some evidence that they are achievable, any projected consequent reduction in superimposed inflation is, at best, speculative. In effect, PwC's projections take credit for achievement of this control in advance of any tangible plan for how this can be achieved;
- **Other jurisdictions (notably the Transport Accident Commission (TAC) in Victoria) have shown the ability to stabilise attendant care costs after period of significant increases. Attendant care costs paid by ACC are broadly comparable to those paid by the TAC.** PwC make this comparison to demonstrate that similar costs can stabilise in other jurisdictions. We accept this but we are wary of comparisons between schemes, more still when they are in different countries. Although some aspects of claims management models are transferable between jurisdictions, many are not due to operational, legislative, cultural and other differences. It is not clear to us that ACC are at the same point as TAC were when they started to control costs or that the issues driving the increases are similar. The comparison of superimposed inflation allowances across jurisdictions is even more problematic but, given that the subject has been raised, we note that TAC do (on the latest information that we have available) retain a 1.5% per annum superimposed inflation allowance in respect of similar payments, even though they have reportedly already been successful in controlling costs. PwC have informed us that this is at least partly due to TAC not currently paying any compensation for family based care. This may be so but simply illustrates the dangers of cross jurisdiction comparisons.

It seems to us that the scenario adopted by PwC is a possible outcome, if everything goes reasonably well. However, we question whether it is a 'central estimate'.

For instance, after five years, one of the few likely causes of significant negative superimposed inflation that we can visualise is where the unit cost of care has previously been driven artificially high due to an excess of demand over supply and that this situation reverses. However, we can think of many plausible causes of positive superimposed inflation. For a central estimate of zero, there should be an approximately equal likelihood of positive and negative superimposed inflation. Given this, and the past history of the portfolio, is zero superimposed inflation after five years a reasonable central estimate of the range of possible outcomes?

#### 5.2.2.7 PwC and ACC response

We have given PwC an opportunity to respond to our views, as stated above.

On 9 July 2007, they supplied us with some approximate analysis arguing that, of the 13% superimposed inflation in the last year, 6% is explained by the following 'one-off' causes:

- Some problems in the medical fee payment system resulted in some payments being allocated to the March 2006 quarter rather than the December 2005 quarter;
- A change to the invoicing practice of the DHBs has accelerated inpatient rehabilitation payments;
- The large 'one-off' payments to certain claimants (subsequently allowed for in the modelling structure – see section 7.2.4).

We accept that, taken at face value, this partially offsets our concerns about the superimposed inflation over the last year but it does not change our view of the assumption adopted.

On 12 July 2007 we were also been provided with some additional material by Gavin Pearce, the Chief Actuary of ACC:

- An ACC response to questions asked by PwC over the course of formulating their assumption, concerning the recent levels of superimposed inflation and the plans for moderating them;
- A paper to the Executive Leadership Team, dated 12 July 2007, outlining a proposed project to exert more control over cost increases.

This latter document gives us some comfort that the issue is being taken seriously by ACC but it is far from clear what scope there is for cost containment and how effective the ACC will be in achieving it.

On 12 July 2007, we were sent a further document by PwC providing further support for their assumption. We are not sure that a point by point analysis of this recent material adds usefully to the discussion although we are happy to engage in this if required. It does not alter our recommendation. We do however, note several obvious points:

- Lifetime care planning, which has previously been used as both a justification for past increases and as a reason for eventual cost containment now appears to be being phased out in favour of the new project. We conclude that the success of such programs is not guaranteed;

- PwC agree that a decrease in care costs is unlikely, but argue that a decrease in capital and assessment costs is possible. They go on to suggest that an overall 10% decrease in costs is a plausible outcome. We note that capital and assessment costs make up around 20% of total costs. Therefore capital and assessment costs would need to reduce by 50% to achieve a 10% reduction in total costs. Although these costs have increased by 90% in the last three years, a 50% reduction seems unlikely to us;
- The unit costs of care are set by regulation. PwC state that their valuation does not consider possible future rate increases until they have received Cabinet approval. We have also noted similar comments elsewhere in this and previous reports in relation to various medical costs. We do not accept this as a valid argument. In our view, the actuary is required to make a best estimate of the likely future increases, taking into account issues such as cost pressures and/or a history of increases. To the extent that the actuary has been, or chooses to be, constrained then this should be made clear in the report as a limitation on the scope of the valuation.

In general, PwC have stated their position as being that, in the absence of more data, they do not believe the experience in 2006 is sufficient to increase the assumptions in their previous report by more than they have done. They believe that ACC will make significant progress over the next year in compiling the information needed to more properly assess an appropriate assumption.

#### 5.2.2.8 *TFCA recommendation*

We recommend that for future reports, either:

- The superimposed inflation assumption for social rehabilitation – serious injury is significantly strengthened; or
- Considerably more analysis is included in the report justifying the current assumption.

For avoidance of doubt, by future reports we mean the report covering the valuation as at 30 June 2007 and subsequent reports.

#### 5.2.2.9 *The financial significance of the assumption*

The reason we have given the issue of superimposed inflation for social rehabilitation - serious injury such prominence in our review is the financial significance of even a small change in the assumption. The single quantitative reference to this in the PwC report is in scenario 2 of the sensitivity analysis on page 155 of the report, which shows that replacing the assumption of zero after five years with 2% per annum would add \$1.22B to the central estimate of the outstanding claim liabilities.

Given this sensitivity and the uncertainty of the assumption we recommend that the financial significance of this issue be given considerably more prominence in future PwC reports.

### 5.2.3 *Social rehabilitation – non-serious injury non-capital*

#### 5.2.3.1 *Financial significance*

Social rehabilitation – non-serious injury non-capital payments were \$93m per annum over the last nine months. This makes up 4% of the total

scheme payments in any one year (excluding ambulance and bulk billed costs and claims handling expenses). PwC's central estimate of the liability is \$283m which is 2% of the total estimated liability.

The reported experience for this payment type has been distorted by the removal of travel costs (which have been reallocated to 'other rehabilitation').

#### 5.2.3.2 *Continuance rates*

The expected number of actives for the 2006 year has not been adjusted for the removal of travel costs, which mean that it is too high. PwC report that the 14% less actives than expected is largely due to this distortion. We note that, unless travel costs can be retrospectively removed from this payment type, it will be two or so years until enough experience is available to set continuance rates on a post-removal basis. In the meantime, PwC have ignored the last year in setting their continuance rates.

#### 5.2.3.3 *Payments per active claim*

The expected payments for the 2006 year have been adjusted for the removal of travel costs. Total payments of 11% in excess of those expected represent a significant deterioration. The PwC report attributes this mostly to increases in Non-acute inpatient rehabilitation payments. PwC have set projected rates at the level of the 2006 payments. Should 2006 represent part of an increasing trend then the assumptions will be understated but we agree with PwC that it is too soon to project any increasing trend.

### 5.2.4 *Social rehabilitation – non-serious injury capital*

#### 5.2.4.1 *Financial significance*

Social rehabilitation – non-serious injury non-capital payments were \$82m per annum over the last nine months. This makes up 3% of the total scheme payments in any one year (excluding ambulance and bulk billed costs and claims handling expenses). PwC's central estimate of the liability is \$634m which is 4% of the total estimated liability.

The bulk of this payment type is made up of hearing aid/audiology costs in the Residual Work account.

#### 5.2.4.2 *Experience and assumptions*

Experience has been adverse, with payments 6% higher than expected (after allowance for the transfer in of audiology costs). Given that there was a superimposed inflation allowance for the year of 15% in the work accounts and 7.5% in the non-work accounts, this represents a considerable overall increase of around 25%.

There are two important assumptions in the valuation of this payment type:

- The projected rate that payments for each development year will decay from one calendar year to the next; and
- The starting point from which to start the decay projections.

#### 5.2.4.3 *Decay rates*

PwC report that they have essentially ignored the 2006 deterioration in the decay rates by retaining their assumptions from the previous review.

Although not apparent from the graph in the PwC report, examination of the appendices shows the assumed long term decay rates for earlier development periods are significantly below experience over the last 4-8 years. PwC believe that this is due to an increase in the use of hearing aids. We are not in a position to comment on the accuracy of this but note that there is a considerable risk that the eventual long term decay rates will be greater than those assumed. In addition, there is a considerable risk that next year's decay rates, which incorporate an allowance for superimposed inflation (see section 5.2.4.5) will again be higher than projected and that the deterioration will need to be taken up in full in the projections. Should either of these situations eventuate, the estimated liabilities for this payment type would increase significantly.

#### *5.2.4.4 Starting point*

PwC have partially incorporated the deterioration in the starting point for the projections. If the 2006 payments are a genuine increase, rather than a short term fluctuation then, again, the estimated liabilities will increase once this becomes apparent.

#### *5.2.4.5 Superimposed inflation*

In addition, PwC have reduced their future superimposed inflation allowances from 15%, 10% and 5% for work accounts for 2007, 2008 and 2009 (and half these figures for non-work accounts) to 12%, 8% and 4% (for both work and non-work accounts). The intent of this adjustment was to move to a uniform assumption across the two groups of accounts. However, it also had the effect of lowering the overall allowance. We note this as a slightly inconsistent reaction to poor experience. We do not recommend the uncritical retention of the previous allowance but we do think that the current allowance looks a little low in the light of the experienced superimposed inflation over the last year

We note that the superimposed inflation allowance will be revisited for the next report, when PwC intend to explicitly allow for an expected agreement with hearing aid manufacturers and we suggest that it is also re-evaluated in the light of recent experience. In any case, we note that the financial significance of the release due to the lowering of the superimposed inflation allowance is small.

### *5.2.5 Hospital rehabilitation*

#### *5.2.5.1 Financial significance*

Hospital rehabilitation payments were \$180m per annum over the last nine months. This makes up 7% of the total scheme payments in any one year (excluding ambulance and bulk billed costs and claims handling expenses). PwC's central estimate of the liability is \$791 which is 5% of the total estimated liability.

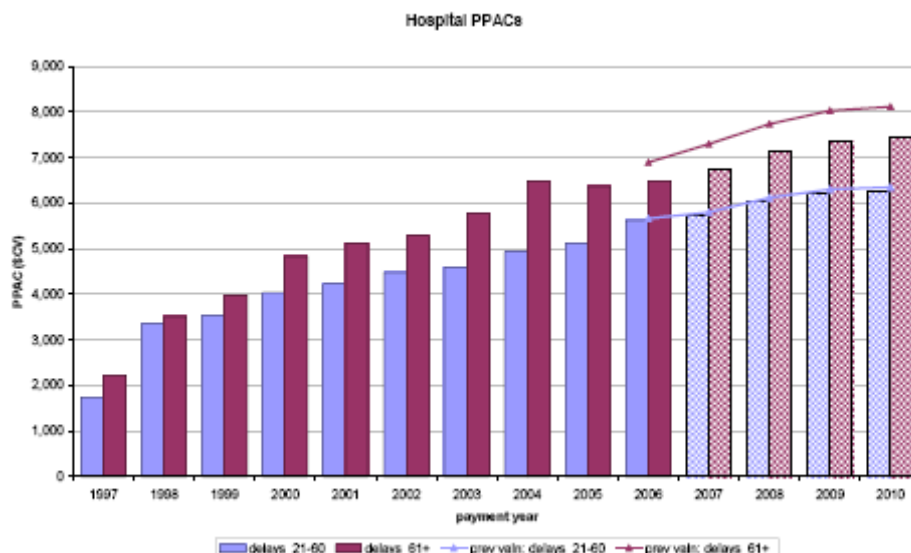
#### *5.2.5.2 Experience and assumptions*

Payments were 5% more than expected, even after allowing for the superimposed inflation assumption of 5%. PwC attribute this to the elimination of budget caps on certain elective procedures in April 2006.

The superimposed inflation allowance adopted by PwC is 6% for 2007 and 2008, 5% for 2009 and 1% per annum beyond that. In the context of rate

for the last year of 10% and the strong increase in PPACs demonstrated by the graph, reproduced from the PwC report below, there must be a risk that this allowance is insufficient.

**Figure 5-3 Hospital rehabilitation PPACs**



## 5.2.6 Other rehabilitation

### 5.2.6.1 Financial significance

Other rehabilitation payments were \$98m per annum over the last nine months. This makes up 4% of the total scheme payments in any one year (excluding ambulance and bulk billed costs and claims handling expenses). PwC's central estimate of the liability is \$547m which is 4% of the total estimated liability.

### 5.2.6.2 Experience and assumptions

After adjusting for the inclusion of provider travel in this payment type, payments have been 21% higher than expected over the year. Part of this relates to the inclusion, for the first time, of all backdated attendant care costs. PwC attribute most of the remainder to an increase in dental care costs.

The change in payments included makes the interpretation of past experience and the choice of assumptions problematic. PwC have reportedly used decay rates that are similar to recent averages but it is not clear to us that these decay rates are appropriate for the new payment mix, or how they incorporate the increasing trend in dental costs. We expect that this will become clearer over the next two years but, until then, this must be regarded as an area of risk for the scheme.

## 5.2.7 Lump sums

### 5.2.7.1 Financial significance

Lump sum payments were \$50m per annum over the last nine months. This makes up 2% of the total scheme payments in any one year (excluding

ambulance and bulk billed costs and claims handling expenses). PwC's central estimate of the liability is \$256m which is 2% of the total estimated liability.

#### 5.2.7.2 *Experience and assumptions*

The experience for this payment type has been dominated by the consequences of the recent court decision which determined that sufferers of asbestos related diseases are entitled to receive lump sum compensation rather than the independence allowance. 219 such claims were paid in the December 2006 quarter. The previous review did not allow for such claims.

The determination of the date of accident for asbestos related claims is a complex issue. In broad terms it is deemed to be the earlier of the date of first incapacity or first sought treatment. This means that most of the asbestos claims yet to emerge will fall to future accident years. PwC have assumed that there will be a total of approximately 2000 claims spread over the next ten years at an average cost of around \$80,000.

In the context of the current review (which includes claims with an accident date up to 31 March 2007) PwC have assumed that there are approximately 300 further asbestos claims to be reported, with an average size of \$80,000.

We have been supplied with analysis from DOL which suggests that the assumptions adopted for asbestos claims are conservative. We have not reviewed these in any detail and note that all these assumptions are subject to great uncertainty but, in the context of the total estimated liabilities, the effect is small. There seems ample time to monitor the experience and improve the assumptions as it emerges.

There have also been some assumption changes in respect of the other lump sum claims but these are of minor financial significance.

### 5.2.8 *Expenses*

#### 5.2.8.1 *General*

Claims management expenses are around \$250-\$300M per annum. This represents 10-12% of the total scheme payments in any one year. PwC's central estimate of the liability is \$950M which is 7% of the total estimated liability.

#### 5.2.8.2 *Methodology*

Previously, PwC relied on ACC to produce the estimated liability for claim management expenses and to allocate this between accounts. On the basis of the information provided, TFCA were unable to review the methodology in any detail. Although we were comfortable with the overall magnitude of the estimated expense liability we noted that it was not consistent with the remainder of the valuation.

PwC now produce the estimated expense liability themselves and have revised the methodology. The method used by PwC reportedly involves using an expense allocation provided by ACC to express expenses as a percentage of claim payments, where the percentage varies by payment type and development period. We are more comfortable with the revised

approach, as described, with the reservations set out in sections 5.2.8.3 to 5.2.8.5.

The change in methodology has resulted in a modest reallocation of expenses from the Employer and Earner accounts to the Motor, Non-earner and Residual work accounts.

#### 5.2.8.3 *Budgeted expenses versus actual expenses*

The expense allocation provided by ACC was reportedly based on budgeted expenses rather than actual expenses. PwC plan to update the analysis using actual expenses for the June 2007 review. Accordingly, the figures may change.

#### 5.2.8.4 *Disclosure*

Neither the report nor the appendices give any detail of the expense allocation supplied by ACC, or the derivation of the percentages applied to the future claim payments. PwC have supplied additional material which we have reviewed. So long as the expense attribution supplied by ACC is robust we are comfortable that the method is reasonable and has been correctly applied.

However, we recommend that future reports provide more detail.

#### 5.2.8.5 *Short term adjustment*

The expense allowances have been set by looking at past expenses and comparing them with past claim payments. When these allowances are projected forward, they produce a total estimated liability which PwC believe is too high. They have therefore reduced projected growth in expenses by 3% per annum for the first three years, justifying the reduction on the basis that:

- Expenses should increase with superimposed inflation; and
- The past expenses include a depreciation allowance for ACC's new claim management system which will not be carried forward at its current level.

Whilst we agree with these points in general, in our opinion, this reduction is somewhat arbitrary and PwC have not produced any supporting evidence for it. In our view, the projected expenses should be compared with ACC budgets and any necessary reduction made on this basis.

We recommend that future reports contain additional analysis justifying such a reduction.

## 5.3 Account specific issues

### 5.3.1 *Relationship of Account results and payment type assumption changes*

In general terms, the changes in the valuation by account follow from the experience and assumption changes made for each payment type, according to how much of the estimated liabilities for each account are made up by the various payment types. For instance, the Motor account has a high proportion of the serious claims. Therefore the strengthening in the Social rehabilitation – serious injury payment type affects this account more than it does the others. This is a slight approximation in that

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assumptions of reach payment type are set for various groups of accounts, as set out in section 7.2.2. To the extent that there are important account specific issues in the payment type assumptions we have noted these in the sections above discussing that payment type. Other account specific issues are noted in the remaining subsections of this section 5.3.

### 5.3.2 *Medical misadventure account*

The impact of the Injury Prevention Rehabilitation Compensation Act is still uncertain. There has been an increase in the number of active claims in early development periods, consistent with an expected bringing forward of claim acceptance. Therefore, the continuance rates for later development periods have been adjusted downwards to reflect the expectation that fewer claims will be accepted at later development periods. If, rather than a bringing forward of claim acceptance, the Act has resulted in more claims there will be a deterioration in the estimated liabilities of this account in future years.

### 5.3.3 *Claim transfers*

The decreases in estimated liabilities in Table 4-2 for the Employer and Self-employed accounts look anomalous, given the increases elsewhere. In fact they are due to a transfer of audiology and other gradual process liabilities from these accounts into the Residual work account.

## 6 Economic assumptions

### 6.1 Total change

**Table 6-1 Analysis of movement from economic effects (all figures in \$M)**

	<b>Central estimate</b>
<b>Current report but previous economic assumptions</b>	14,101
<b>plus change due to</b>	
Decrease in discount rate	194
Increase in future inflation	49
Past inflation higher than assumed	112
<b>Current report</b>	<b>14,456</b>

We consider the changes and the adopted assumptions in turn below.

### 6.2 Discount rate

PwC derive period specific risk free discount rates based on interpolating yields on available Government fixed interest bonds. For this report the yields are as at 31 March 2007. Details are shown in Appendix A2 of the PwC report. The use of risk free discount rates is in accordance with the relevant actuarial and accounting standards.

Although the discount rate used in this valuation is different for each future year, PwC report a single equivalent discount rate which can be thought of as the average of the future yearly rates.

The discount rate has decreased from 5.83% pa to 5.70% pa, resulting in an increase in the central estimate of \$194M. We have verified the assumption of 5.70% per annum.

Important points to note about changes in the central estimate due to changes in the discount rate are:

- If the discount rate is based on risk free rates at the valuation date then the resulting rate is determined wholly by market conditions. There is no subjective input from the actuary; and
- Changes in the central estimates are accompanied by offsetting changes in the value of Government securities. Therefore the effect of a discount rate change on the overall funding level of the ACC scheme will generally be significantly less than the impact on the central estimate of the liabilities. If the estimated liabilities were matched by Government securities of the same term there would be no impact on the overall funding level of the scheme as a result of discount rate changes. Therefore, volatility in the overall funding level arising from movements in the discount rate is due to

- ✓ The scheme not being fully funded, and
- ✓ The assets and liabilities not being fully matched (i.e. investment risk);

### 6.3 Future inflation

Projected Labour Cost Index and Average Weekly Earnings inflation have increased slightly as shown below.

**Table 6-2 Change in future inflation assumptions**

Index	From 31	Year to 31 March				
	December 2006 to 31 March 2007	2008	2009	2010	2011	2012 & later
Labour cost	0.74%	3.00%	2.60%	2.60%	2.58%	2.58%
Average weekly earnings	0.94%	3.80%	3.40%	3.40%	3.38%	3.38%
Consumer price index	0.72%	2.90%	2.30%	2.30%	2.30%	2.27%
<b>Change from previous report</b>						
Labour cost	0.12%	0.33%	-0.07%	-0.07%	0.01%	0.01%
Average weekly earnings	0.13%	0.33%	-0.07%	-0.07%	0.01%	0.01%
Consumer price index	0.02%	0.48%	0.04%	0.04%	0.04%	0.01%

We have reviewed these assumptions and compared them with:

- Historic experience;
- Consensus forecasts in the Aon Economists' Survey; and
- Consensus forecasts in the New Zealand Institute of Economic Research (NZIER) Survey.

We are comfortable with the assumptions adopted.

Note that we have classified the inflation assumptions for the quarter to 31 March 2007 as 'future' since at the time the valuation was being undertaken, figures had not yet been released. They have subsequently been released (on 18 April for the CPI and 7 May for the other indices). CPI and LCI were slightly below the forecasts. The AWE increase was 1.5%. The overall effect on the estimated liability is likely to be minimal.

### 6.4 Past inflation

#### 6.4.1 Purpose of past inflation adjustments

First, we make some introductory comments on the purpose of inflation adjustments for a valuation.

The setting of payment assumptions is much easier if past payments are adjusted for past inflation. Different payment types will be subject to different types of inflation. Theoretically, in a stable scheme and with an "exact" choice of inflation index, inflation-adjusted past payments per claim will be constant, irrespective of the time of payment. A lack of scheme stability and/or an inexact choice of inflation index will emerge as superimposed inflation in the payments per claim.

Projections of future inflation (including super-imposed inflation) are then applied to the model assumptions to give projected future payments.

The inflation indices used by PwC for each payment type are given in section 4.1 of the PwC report. In our opinion the choices of index for each payment type are reasonable.

#### 6.4.2 Inflation from 31 March 2006 to 31 December 2006

The previous valuation used actual inflation to 31 March 2006 and made assumptions about inflation for the nine months to 31 December 2006.

As set out in the PwC report, and reproduced in Table 6-3 below, the assumptions were not a good match to the actual experience.

**Table 6-3 Actual and expected inflation**

Index	Payment type(s)	Most recent index		Actual Inflation	Expected Inflation	A-E inflation
		at Previous Review	at current review			
AWE	weekly non fatal	832.75	855.68	2.8%	1.6%	1.1%
CPI step	independence allowance, lump sum	953	985	3.4%	2.8%	0.5%
LCI step	weekly fatal	1089	1124	3.2%	2.5%	0.7%
LCI	other	1124	1153	2.6%	1.9%	0.7%

Use of the actual inflation figures increases the estimated liability by \$112M.

We regard the \$112M as relatively large, given the forecasts available at the time of the previous valuation and the subsequent experience. In effect it resulted from an under-estimate of likely inflation in the previous PwC report. However, as we discuss in section 6.3, we are comfortable with the assumptions used in this valuation.

We now examine the valuation process and methodology.

## 7 Valuation process and methodology

### 7.1 Scope and data

#### 7.1.1 Scope

The purposes of the PwC report, as noted in section 1.1 of the report are to:

- Make preliminary recommendations to assist in quantifying the outstanding claims provisions for ACC's 30 June 2007 financial statements;
- Provide projected claim payments and outstanding claims estimates for the next five years to assist in the completion of the BEFU 2007;
- Provide information to assist in the setting of levy rates for the 2008/09 financial year.

This scope seems to us to be entirely appropriate and PwC do not note any subsequent limitations of scope in their report.

#### 7.1.2 Data

##### 7.1.2.1 Responsibility for data

Data for the valuation is supplied by ACC. ACC also undertake the data reconciliations. PwC have reviewed these reconciliations and concluded:

*"We have reviewed the detailed reconciliations performed by ACC, and believe that suitable procedures are in place to verify that the data used is reliable and sufficient for the purposes of our valuation. We also believe that the data is relevant and appropriate for the purposes of our valuation."*

##### 7.1.2.2 Data verification

PwC list the data reconciliations completed by ACC and they certainly seem comprehensive. However, we have not viewed these ourselves. We note that the scope of our review explicitly excludes an independent evaluation of the data.

##### 7.1.2.3 Data accuracy

There are three significant issues emerging from the data for this valuation:

- The transfer of various classes of payments between the payment types used for the valuation
  - ✓ Audiology payments have been transferred from 'medical – other' to 'social rehabilitation – non-serious capital'
  - ✓ Provider travel costs have been transferred from the payment type related to the services provided to 'other rehabilitation';
- The inclusion of all Backdated attendant care payments. Previously some of these payments were excluded from the valuation and a separate allowance made elsewhere in ACC's financial statements;

- The transfer of certain gradual process claims from the Employer and Self-employed accounts to the Residual work account, in accordance with the Injury Prevention, Rehabilitation and Compensation Act 2001.

The report explains these issues and details the adjustments made to account for them. We are satisfied that they have been treated appropriately.

## 7.2 Valuation methods

### 7.2.1 *Payment types*

PwC separate the payments into 15 different payment types in order to carry out their analysis and modelling. These are detailed in section 3.1 of the PwC report and we do not repeat them here. We consider that, although there may be changes to these in the future as new issues emerge, the current payment types are appropriate for this valuation.

### 7.2.2 *Grouping of accounts*

In principal, one would expect to make different sets of assumptions for each of the ACC accounts. However, in practice:

- There may not be sufficient data to set stable assumptions for each account, particularly for the small accounts;
- Experience may not differ across the accounts;
- The setting of different assumptions per account will only affect the total estimated liability if experience differs across the accounts and the mix of claims by account is changing over time; and so
- The setting of different assumptions for each account can result in much more work (and consequent chance of error) for little gain.

Broadly speaking, PwC have adopted several different sets of assumptions:

- One set for serious injuries;
- One set for the Employers', Residual Work, Self Employed and Partnership Plan accounts;
- One set for the Earners and Residual Non Work accounts;
- One set for the Motor Vehicle account;
- One set for the Medical Misadventure account; and
- One set for the Non Earners account.

This seems reasonable to us although we have not verified the grouping in any detail. We comment that there may be other characteristics rather than account which may be suitable for defining different sets of assumptions. For instance serious/non-serious is used but there could be others.

### 7.2.3 *Model choice*

PwC use different actuarial methods for each payment type, as detailed in section 3.1 of the PwC report. The different methods used are:

- Payment per active claim (PPAC) method. This is suitable for payments that are periodic in nature – that is most of the payment types in this valuation. PwC use this method wherever appropriate and we agree with this choice;
- Payment decay method. This is used for payment types where the number of “active” claims in a particular quarter is not a particularly good indicator of the expected number of active claims in the following quarter. PwC use this method for the Social rehabilitation capital payments for non-serious claims, Other rehabilitation payments and Ambulance payments. We agree in principal with this but have not conducted any analysis to determine whether or not the PPAC method may be suitable for some of these payment types. However, we do not see this as a significant issue.
- Individual claims projection for serious claims. We agree that this method is suitable for serious claims since the expected payments depend heavily on the injury profile of the claims. The method has been enhanced since the previous review and we comment on this in section 7.2.4;
- Projection using banding of expected claims by severity for the lump sum payment type. We agree with the use of this model for this payment type but comment that the experience since lump sums were introduced in 2002 is limited and the modelling is particularly uncertain.

### 7.2.4 *Social rehabilitation - serious injury*

#### 7.2.4.1 *General*

Several changes have been made to the valuation method for serious injury. Generally, we regard these either as improvements or as being neutral in terms of contributing to a better estimate of the overall liabilities. The changes are technical in nature so we do not describe them here but refer the interested reader to section 3.1.3 of the PwC report.

For completeness, we note two minor concerns with the new method.

#### 7.2.4.2 *Capping*

PwC have identified that, every so often certain claims receive high levels of non-capital payments for a limited period. PwC’s method bases future non-capital payments for each claim on the payment over the last year. This is likely to over-estimate payments for claims which are undergo the temporary high level of payments in the year before the valuation. Therefore PwC have capped the level of payments over the last year to \$100,000 and increased the estimated liability by 3% to take account of the capping. We agree with this.

However, PwC have also identified that the claims that do experience these temporary high levels of non-capital payments return to a payment level much above their previous level. This is not projected in PwC’s model and therefore emerges as a small level of superimposed inflation. We have not

tried to estimate the effect of this but believe it to be small, maybe 0.3% per annum.

#### 7.2.4.3 *Allocation of superimposed inflation*

PwC have observed that superimposed inflation is not experienced equally by all claims and that, in general, claims with low payments compared with their injury profile experience higher superimposed inflation than those with high payments. They have therefore devised a process for allocating their chosen total superimposed inflation in this way. This does not change the overall estimated liability but may have some minor effect on how it is allocated between accounts. However, the fact some claims with low payments in a particular year receive high increases does not mean that these claims will continue to receive high increases until they are above average and that the rate of increase for that claim will then moderate. One would need to conduct a longitudinal analysis to establish this and we do not believe that this has been done. Therefore we have yet to be convinced that the process will result in a better allocation of estimated liabilities on an individual claim or account level.

#### 7.2.5 *Partnership program*

PwC describe their method for allowing for the Partnership Program liability in section 3.1.10 of the PwC report. We do not describe it in detail here but note that, in our opinion, it is appropriate. However we make several points:

- Claims under the Stop Loss and High Cost Claims Cover have been estimated in accordance with the pricing basis for the levies. Potential claims should be monitored and an assessment of the sufficiency of the pricing basis should be made on an ongoing basis;
- The projected liabilities in future years include an allowance for the liabilities bought back by the Full Self Cover Plan employers at the end of the self insurance period. Therefore the income projections in the BEFU and DEFU should include an allowance for the buy back payments from these employers. ACC have confirmed to us that this is the case;
- The lack of good data from the Partnership Plan means that the liability is difficult to assess. An improved data reporting regime for Partnership Plan employers may be worthy of consideration.

### 7.3 **Economic and expense assumptions**

As stated in sections 6.2 (discount rate), 6.3 (inflation) and 5.2.8 (expenses) we have reviewed these assumptions and, with the exception with some minor issues with the expense assumption we believe that they are appropriate for the purposes of the valuation.

## 7.4 Non-economic assumptions

### 7.4.1 Checks

#### 7.4.1.1 General

We applied the following process to the significant payment types:

- We took the data shown in the appendices to the PwC report and inflated the payment data to 31 March 2006 with the appropriate index;
- We compared the assumptions given in the appendices with recent averages;
- We sourced from PwC quarterly tabulations of inflated payments for the significant payment types and the quarterly assumptions (since these are not given in the appendices). We compared the assumptions with recent averages;
- We evaluated the superimposed inflation assumptions, given the analysis documented in the PwC report and the trends in the data.

#### 7.4.1.2 Serious injury

We spot checked the calculations for various claims against the description of the method given in the PwC report.

We have not evaluated in detail the mortality assumptions in the serious injury model which have been revised since the last review. However, they appear reasonable.

#### 7.4.1.3 Exposure and future costs

Also, we reviewed the future exposure assumptions documented in Appendix A3 of the PwC report and the costs per unit of exposure given in Appendix Y of the PwC report.

### 7.4.2 TFCA opinion on assumptions

Our opinion of the financially significant assumptions is set out in detail in section 5. To the extent that we have not raised issues in that section, we are either satisfied that the assumptions adopted are a valid interpretation of the experience or that they are not financially significant. Issues arising which we believe are worthy of comment are set out below.

## 7.5 Application of assumptions

### 7.5.1 Checks

We have taken the data as shown in the appendices and applied the assumptions to it for each significant payment type. In theory this should reproduce the cash flows shown in the appendices and indeed it did so to an acceptable degree of precision. Also, we applied the discount rate and aggregated the discounted cash flows to give the total discounted estimated liabilities for each significant payment type. Again these agreed with those shown in the PwC report.

The payment types which we did not verify in this way are:

- Ambulance and bulk billed payments;
- Claim handling expenses.

## 7.6 Controls

### 7.6.1 PwC's process

For our review of PwC's report on the 31 March 2005 valuation, we asked PwC for an explanation of the controls and review processes carried out in this valuation. We have summarised their response below:

- The spreadsheet templates used for analysis are "clean" at each valuation (i.e. they don't take last time's spreadsheets and just update). In their view this minimises the risk of errors being carried forward. The templates do refer to the assumptions from the previous valuation so that they are able to select these if desired but this therefore needs to be a conscious decision rather than the default;
- The projections, inflation and discounting are carried out using generic SAS programs (i.e. the same programs are used for most benefit types);
- While they don't check the projection for every single account for every benefit type, they check a large proportion of them using independent spreadsheets. There is therefore a minimal chance of error in projections;
- They receive the data from ACC in triangles in accident quarter x development quarter triangles, which they read into SAS and then export to the spreadsheet models. They separately receive the data in spreadsheets from ACC and check the models against these spreadsheets provided by ACC;
- Any changes to SAS code are checked via the Excel projection models (the final results are based on the SAS projections);
- The Partnership Program net calculations (which are very complicated) are also carried out in both SAS and Excel;
- Each benefit involves at least 2 managers and above – with a review by a director. The results are discussed with Noeline Woof (partner) and further discussions held with Chris Latham (partner) as appropriate;
- This list is not exhaustive.

PwC have confirmed that this response remains appropriate.

### 7.6.2 TFCA observations

This process seems appropriate to us. We note that, whilst in the past we have found some minor presentation errors, we have found none this year so it seems likely that the control process is robust in terms of ensuring an accurate execution of the valuation process.

## 7.7 Risk margin

For the first time, PwC's report makes a recommendation on the level of risk margin. The recommended margin varies by account, averaging 12% across all accounts.

### 7.7.1 *Basis for calculating risk margin*

The risk margin recommended in the report is based on an intended probability of sufficiency of 75%, calculated separately for each account. We regard the need for the adoption of a risk margin as an accounting issue and the choice of the probability of sufficiency as a matter for the ACC board. Accordingly, we offer no opinion on these issues in this report. Likewise we offer no opinion on the decision to calculate a margin separately for each account although we note that a commercial insurer operating in the Australian market would likely hold a combined risk margin of less than that indicated by summing the risk margins for the individual accounts. The justification for this is that the risks for the separate accounts are unlikely to be fully correlated. The PwC report notes the advice of ACC's auditor that this is not permissible in ACC's case although the reasoning is not given.

### 7.7.2 *Calculation of the risk margin*

A detailed derivation of the risk margin is given in Appendix W of the PwC report. It should be noted that the calculation of risk margins is yet to be fully developed in the profession and there are a variety of different approaches used, all with technical weaknesses. Although there are some details which we would have approached differently, we agree that the end result of 12% is reasonable, with one proviso discussed below.

The uncertainty around the allowance for superimposed inflation for serious injuries creates a considerable degree of uncertainty for this valuation. There is a range of likely outcomes for superimposed inflation experience which have considerable implications for the estimated liabilities. For instance, a rate of superimposed inflation of 2% per annum after 5 five years adds 8% to the central estimate of the liability. It is not apparent that PwC have taken account of the uncertainty in the serious injury superimposed inflation assumption and the sensitivity of the estimated liability to it in their assessment of the risk margin.

We recommend that PwC includes a discussion of this issue and its implications for the risk margin in future reports. We anticipate that this may result in an increase to the recommended risk margin.

## 7.8 Disclosure

In general, we find the PwC report to be clear, with an adequate discussion of the important issues. Given that it is already 155 pages plus lengthy appendices, we hesitate to recommend significant additions. However there are some areas where we think extra material would be helpful, both to the casual reader and for us in our review role.

### 7.8.1 *Separate reconciliation of the effects experience and assumption changes*

In general, PwC's reconciliation of the valuation results to a projection of the results of the previous review are comprehensive although we prefer them collected in one place such as our presentation in tables Table 4-1 and Table 4-2.

However, they show combined figures for experience and the change in assumptions rather than showing these separately for each payment type and account. Separate figures assist the informed reader to understand which changes are simply due to emerging experience and which are the result of the interpretation by the actuary of that experience.

Usually we ask PwC for these figures and show them in our review but, this year, the calculation is complicated due the re-allocation of payments between payment types. Therefore PwC have not provided a complete set of figures. We also note that it has become apparent that PwC and TFCA have a different interpretation on the allocation between experience and the change in assumptions. For these reasons we have not included the table in our report this year. We look forward to further dialogue with PwC on this topic.

We note that the current draft of the updated professional standard of the Institute of Actuaries of Australia (PS300) requires a split of the effects of experience and assumption changes.

We recommend that PwC include a table in their report showing the changes in the estimated liability for each payment type and account due to non-economic effects split by experience and changes in assumptions.

### 7.8.2 *Early continuance and decay rates*

The report shows graphs of recent continuance or decay experience, compared with assumptions, for each payment type as appropriate. Typically these are for delay quarters 21 and beyond. However, for most payment types, experience in early development quarters is just as, if not more, important. Without using the appendices to create equivalent graphs for earlier delays, the reader is missing important information about the experience and PwC's interpretation of it. Although we acknowledge the difficulties in presentation (since the rates change rapidly for these early development periods) we recommend that some way is found to present this information.

### 7.8.3 *Projection diagonals*

One of the important assumptions of most of the models used by PwC is what is known as the 'last diagonal'. In the current context, this consists of the active claims as at 31 December 2006 for a PPAC model and payments over the December 2006 calendar quarter for a payment decay model.

The models use these 'last diagonals' and project all future payments from them. This means that the models are sensitive to different choices of last diagonal. If, for instance, a last diagonal were 2% lower then the projected cash flows and estimated liabilities would be 2% lower.

Unfortunately, operational delays and other issues mean that, especially for early development periods, the last diagonal can be quite unstable. It is therefore common practice to take a smoothed last diagonal rather than that coming directly from the data.

PwC use smoothed diagonals in almost all cases. They show the diagonal used but give very little detail on how they derive it. Different methods can give quite different results. For our review we compared PwC's diagonals with a simple method of our own. The two methods normally agreed to within 2% but there were instances of larger differences.

We recommend that future reports give more details on the process used to derive the smoothed diagonals. If they have not done so, PwC should evaluate their method against just using the raw diagonals of unsmoothed data and other methods of smoothing.

#### **7.8.4 Sensitivity**

As mentioned in section 5.2.2.8, we recommend that the report more prominently explore the sensitivity of the estimated liabilities to the superimposed inflation allowance for serious injury.

### **7.9 Compliance**

#### **7.9.1 Professional Standard No 4 of the New Zealand Society of Actuaries**

In our opinion, the PwC report complies with the professional standard.

#### **7.9.2 Financial Reporting Standard No 35 of the Institute of Chartered Accountants of New Zealand**

In our opinion, the estimated outstanding claim liabilities given in the PwC report comply with the requirements of FRS 35.

## 8 Comparison of DEFU 2006 and BEFU 2007

### 8.1 General

In this section we track usually track the changes in the actuarial elements of the financial projections, as reported in:

- The previous PwC report;
- The DEFU 2006;
- The current PwC report; and
- The BEFU 2007.

However, we have been informed that there were no figures submitted for the DEFU 2006 and that the figures for the BEFU 2007 are identical to those in the PwC report. Therefore we simply reconcile the projected claim estimated liabilities appearing in this and the previous PwC reports.

### 8.2 Potential sources of changes

Any changes in the estimated claims liabilities can potentially be caused by changes in:

- The assumptions for the outstanding claims valuation, including
  - ✓ Economic assumptions
  - ✓ Claims assumptions such as the run-off of active claims and payments per claim; and
- The assumptions for the number of claims in future years of exposure, including
  - ✓ The level of future exposure, for instance the number of motor cars, and
  - ✓ The number of claims per unit of exposure.

### 8.3 Comparison of the previous and current PwC reports

There have been a considerable number of changes in the assumptions for the outstanding claims valuation but there have been no changes in the level of future exposure. Changes in the projected future claim liabilities are shown in the following table:

**Table 8-1 Projected claim liabilities**

	<b>As at 30 June (\$M)</b>				
	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>
<b>Previous PwC report</b>	13,433	14,167	14,911	15,672	n/a
<b>Current PwC report</b>	14,457	15,272	16,096	17,007	17,966
<b>Increase (%)</b>	7.6%	7.8%	7.9%	8.5%	n/a

Note that we have approximated some of the figures in the above table so as to include projected expense allowances.

The 7.6% increase for 2007 is made up of various factors as shown in Table 4-1. The gradually increasing percentage over future years is consistent with the changes to the non-economic assumptions, which result in higher costs, gradually emerging in future years of exposure.