

APPENDIX 4: METHODOLOGY, ASSUMPTIONS AND UNCERTAINTY

LIABILITIES AS AT 30 JUNE 2011

A.4.1 Table 9 below summarises the estimated accrued Scheme liabilities as at 30 June 2011. The Scheme liabilities are divided into those attributable to claims notified as at 30 June 2011 and those attributable to IBNR claims as at 30 June 2011. For simplicity, the liability for outstanding compliance costs is not included.

Table 9: Run-Off Cover Scheme liabilities related to medical incidents prior to 30 June 2011 (\$'m)

Liabilities in relation to claims notified as at 30 June 2011	13.8 ^(a)
Liabilities in relation to IBNR claims as at 30 June 2011	47.5 ^(b)
Total Run-Off Cover Scheme liabilities.	61.4

(a) Including \$0.9 million CHE.

(b) Including \$3.0 million CHE.

A.4.2 Table 10 below compares the 'actual' estimated Scheme liabilities in relation to prior medical incidents as at 30 June 2011 to the 'expected' amounts, which are based upon information to 30 June 2010.

Table 10: Actual versus expected liability estimates as at 30 June 2011 (\$'m)

	Actual	Expected	Actual minus expected
Notified (but not yet recovered)	12.9 ^(a)	14.0	-1.1
IBNR	44.5	39.8	4.7
Total	57.4	53.8	3.6

(a) Including \$2.79m paid by MIs but not yet recovered from Medicare.

A.4.3 After allowing for \$2.78m in paid but not recovered, the 'actual' estimated notified liability is about \$3.8m less than the 'expected' liability, based on last year's review. This relates to downwards revisions in the liability estimates prepared by industry actuaries for incidents which were already notified as at 30 June 2010.

A.4.4 The 'actual' estimated IBNR liability is higher than expected, with the difference being attributable to three sources. In last year's report, the estimated liability relating to 2010-11 incidents was generated through our internal model. As 2010-11 incidents are now historical incidents, we have used the industry actuaries' liability estimates for those incidents. Generally, industry estimates are lower than those produced by our model, contributing to a lower 'actual' IBNR than expected. Additionally, we have applied a lower margin to IBNR which further reduces 'actual' IBNR. On the other hand, since the last report, the industry actuaries have revised up their liability

estimates on all historical incidents which are yet to be reported. This more than offsets the downwards pressure on 'actual' IBNR.

A.4.5 After considering the differences between the estimates produced by our internal model and the estimates being prepared by industry actuaries, along with the data issues surrounding the industry's estimates, we have reduced the margin on IBNR from 25 per cent to 20 per cent. As was the case in last report, our model is still producing a higher estimate of accrual than we would expect to be produced by the industry actuaries.

DESCRIPTION OF THE MODEL USED TO PROJECT THE ACCRUAL OF NEW RUN-OFF COVER SCHEME LIABILITIES AFTER 30 JUNE 2011

A.4.6 The approach involved projecting the expected future ROC indemnity payments for each doctor who was practising as at 30 June 2011. Projection of indemnity payments entailed the projection of:

- incidents which will result in a claim;
- the delay involved in notification of claims;
- the cost of claims after allowing for the HCCS;
- the likelihood of eligibility for the Scheme at the time a claim is notified; and
- the delay involved in the payment of notified claims.

RUN-OFF COVER CLAIMS

Components of claim cost

A.4.7 For the purposes of the model, a ROC claim includes any eligible claim notified and finalised at direct cost to the MII. Claim costs include all costs which are directly attributable to the claim. Indirect claims handling expenses (CHE) are dealt with separately.

A.4.8 Directly attributable claim costs include damages, plaintiff legal costs to the extent that they are awarded, and defence costs to the extent that they are directly attributable to the claim.

A.4.9 The Scheme pays 5 per cent of the direct cost of each eligible claim to cover CHE. Where an eligible claim is partly covered by the HCCS, the allowance for CHE

paid under the Scheme is 5 per cent of the total claim cost, including the portion covered by the HCCS.

Assumptions

A.4.10 Claim experience has continued to be lighter than expected, based on the assumptions in our previous report. A short period of emerging experience should not necessarily be relied on as a guarantee that underlying assumptions are inappropriate for such a long-tail and uncertain line of insurance as medical indemnity. This is especially true in relation to the Scheme, due, for example, to the following factors:

- ROC claims are very long-tail and model projections are particularly sensitive to assumptions;
- the Scheme is relatively immature;
- systems to facilitate timely and accurate data transfer are still being developed; and
- the Scheme commenced immediately after tort reforms were implemented, with the tort reforms being preceded by a period of abnormally high claim rates 'claim spike'.

A.4.11 We have not altered any of the claim, demographic or financial assumptions in this review.

Claim frequency assumptions

A.4.12 Claim frequency and claim size assumptions were made in light of information provided by the actuaries of the MIIIs.

A.4.13 Practitioners with total medical indemnity payments (including both medical indemnity premiums and MDO membership fees) of less than \$1,700 were excluded from the analysis in order to ensure that only genuine 'at-risk' doctors were the focus of the investigation. Note that we have changed the definition of 'at-risk' doctors this year. In previous years, the definition was medical indemnity premium (excluding membership fees) of more than \$1,500. We made the change because for some practitioners membership fees appear to be a significant proportion of their total payments. The excluded group contained interns, trainees and hospital indemnified doctors in some of the data provided by the MIIIs. About 71,470 practising doctors have some medical indemnity premium. After excluding those doctors with total medical indemnity payments of less than \$1,700 we were left with 38,638 'at-risk' doctors and we have set our claim frequency assumption at 5 per cent to be consistent with this.

A.4.14 The overall claim frequency was assumed to be 5 per cent. That is, on average each 'at-risk' doctor was assumed to have a 5 per cent chance of being involved in a medical incident in the next year which will result in a future medical indemnity claim. This is unchanged from our previous review. Individual claim frequencies were adjusted based on premium as discussed below.

Adjustment to individual claim frequencies based on premium

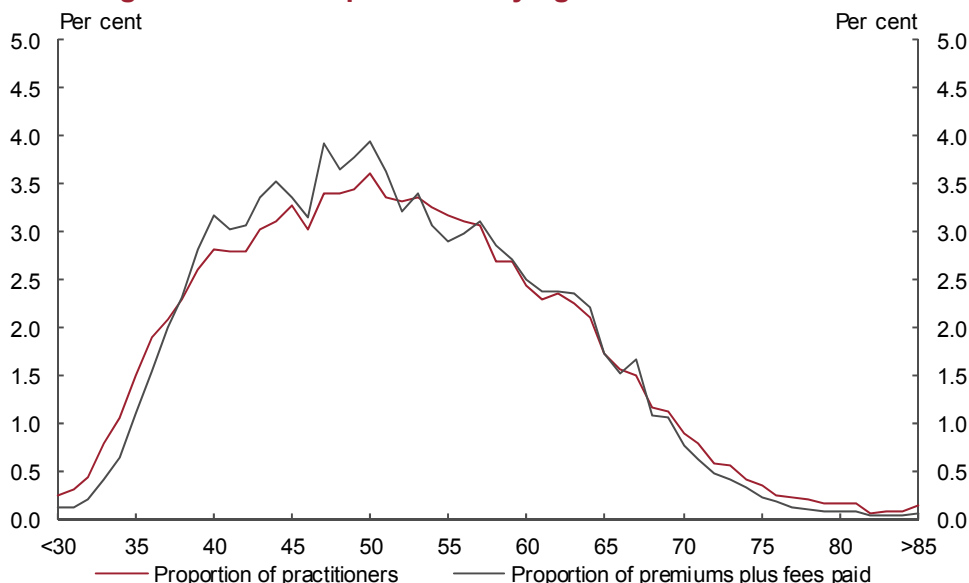
A.4.15 The likelihood of future notifications of ROC claims was projected according to the assumed 'riskiness' of each individual practitioner. The risk of medical indemnity claims posed by each practitioner was determined based on risk categorisation. Practitioners were categorised according to specialisation, age, gender and MII.

A.4.16 The average premium for each risk group was used as a proxy for the risk of medical indemnity claims. The claim frequency for each group was multiplied by the ratio of the premium for the group to the premium of the entire cohort of 'at-risk' doctors.

A.4.17 Although insurance premiums are broadly determined in line with claim risk, the premium of a group is at best an imprecise proxy for risk. For example, market and financial considerations affect premiums charged. However, given the data available, relative premiums have been assumed to be a reasonable means of categorising practitioners according to their risk of medical indemnity claims for the purposes of this model.

A.4.18 Insurance premiums tend to diminish for practitioners towards retirement age. This supports the suggestion that doctors tend to wind down their practice hours and possibly perform fewer risky medical procedures (for example, surgery) as they approach retirement. The possible reduction in risk towards retirement is apparent from the pattern of relative premiums for 'at-risk' doctors shown in Figure 5 below. In the last report, membership fees were not included in this chart, however the difference is barely noticeable. Note that age and gender were not available for some doctors.

Figure 5: Relative premiums by age for 'at-risk' doctors



Note: The graph includes all practitioners with total payments (including membership fees) of at least \$1,700 from all MIIIs.

Adjustment to individual claim frequencies based on assumed wind-down of risky practice

A.4.19 The relative premiums of older doctors appear to indicate a reduction in risky practice as doctors approach retirement. Actuaries have also suggested that doctors wind-down their risky practice approaching retirement. However, relative premiums may not capture the full extent of the reduction, since premiums are calculated on a claims-made rather than claims-occurring basis.

A.4.20 Again, for this valuation, doctors are assumed to wind-down their risk exposure from age 60, at a rate above that reflected in the premiums. Premium relativities are augmented with a wind-down from age 60 according to the formula $0.933^{(\text{age}-59)}$, with a multiple of 100 per cent applied until age 60, 50 per cent at age 70 and 25 per cent at age 80.

A.4.21 This assumption is very subjective, and is not amenable to objective validation. Nonetheless, it does not appear unreasonable in light of observed claim experience and discussions with actuaries.

Claim size assumptions

A.4.22 Claim sizes were assumed to increase with the delay to notification, on the basis that claims which take longer to report tend to be bigger on average for example, cerebral palsy cases.

A.4.23 The assumed claim reporting pattern is shown in Table 11 below. Claim sizes presented in the table do not include allowance for inflation or superimposed inflation. Adjustment for inflation and superimposed inflation is discussed below.

A.4.24 The claim reporting pattern is based on the reporting patterns provided by the approved actuaries of two of the MIIs.

Table 11: Claim reporting and size pattern

Development year	Proportion of number of claims notified (per cent)	Gross average claim size (\$'000) ^(a)
1	19.8	70
2	20.3	80
3	13.4	80
4	18.8	100
5	9.0	150
6	5.4	150
7	2.9	150
8	2.4	150
9	1.7	150
10	1.8	150
11	1.4	150
12	1.1	150
13	0.8	150
14	0.4	400
15	0.2	400
16	0.1	400
17	0.1	400
18	0.1	400
19	0.1	400
20	0.2	400

(a) Gross average claim sizes presented in the table are intended to be in 2011 dollars and do not include allowance for inflation and superimposed inflation.

A.4.25 Claims cost net of high cost claim indemnities is calculated assuming that the HCCS threshold will change such that a constant proportion of the gross average claim size will be met by the HCCS. Thus, for simplicity, the HCCS threshold is assumed to increase in line with claims inflation over time. The model effectively assumes that 24 per cent of the total discounted claims cost (in relation to future medical incidents) will be met by the HCCS and 27 per cent of the ROC discounted claims cost will be met by the HCCS.

A.4.26 The projected ROC claims cost is very sensitive to the proportion of claims which are assumed to be reported late. The longer the delay between the incident and the claim, the greater the likelihood that a practitioner will be eligible for the Scheme at the time the claim is notified. Thus, the majority of Scheme cost relates to the small proportion of claims which are notified very late. Therefore, a minor change in the assumed proportion of late reported claims can have a significant impact on the estimated ROC claims cost.

Probability of a claim falling under the Run-Off Cover Scheme

A.4.27 The model involved projection of the proportion of the total accrual of liabilities which falls under the Scheme.

A.4.28 A practitioner can become eligible for the Scheme by reason of:

- retirement at 65 years and older;
- permanent disability;
- death;
- maternity;
- resignation; or
- satisfaction of other eligibility criteria specified in the regulations.

A.4.29 The probability of becoming eligible for the Scheme was estimated for each practitioner based on their age as at 30 June 2010 and their sex. Note that practitioners do not become eligible by means of resignation until three years have passed since cessation of practice.

A.4.30 The estimated likelihood of practitioners becoming eligible for the Scheme was overlaid on the projected claim notifications to give the projected ROC claim notifications for each practitioner. The expected notified claims cost was multiplied by the likelihood of eligibility in each future year, and summed across all practitioners to arrive at the expected cost of ROC claims notified in that year.

A.4.31 In other words, the total ROC claim notifications were calculated as the scalar product of the vector of claim notifications and the vector of probabilities of Scheme eligibility for each practising doctor in each future year.

A.4.32 It was assumed that on average practitioners who become eligible for the Scheme do so half-way through the financial year.

Demographic assumptions

A.4.33 The probabilities of death and disablement are assumed to be an increasing multiple of the probabilities of death in *Australian Life Tables 2005-07* (ALT 2005-07). The probabilities of death are assumed to be 35 per cent of ALT 2005-07 until age 64, 50 per cent from age 65 to 69, and 60 per cent of ALT 2005-07 thereafter. The probabilities of permanent disability are assumed to be 15 per cent of ALT 2005-07 up to age 24, an increasing multiple of ALT 2005-07 from 15 to 30 per cent from age 25 to 64, and 0 from 65 onwards.

A.4.34 The assumed probabilities of maternity leave are unchanged and were derived assuming that female practitioners each have an average of 1.5 children between ages 28 and 43 and that they take one year of maternity leave for each child.

A.4.35 The probabilities of resignation are assumed to be 0.3 per cent between ages 39 and 53, increasing linearly to 1 per cent at age 60, and increasing linearly to 2 per cent at age 64.

A.4.36 The probabilities of retirement are 12 per cent at age 65 and 5 per cent at age 66 increasing linearly to 11.9 per cent at age 89. The probabilities of retirement were assumed to be 100 per cent for ages 90 and above, given the negligible effect on the results.

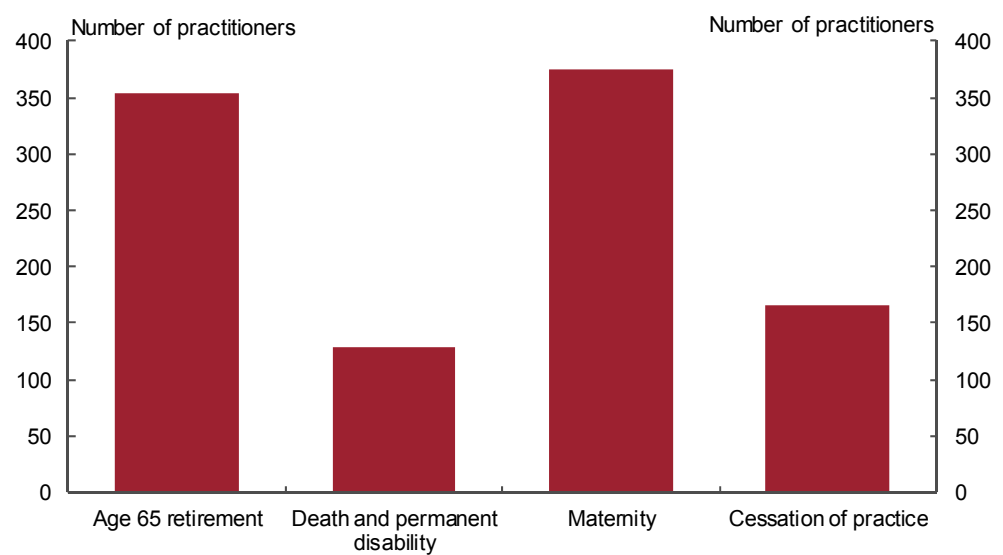
A.4.37 It is instructive to present the probabilities that a practising male doctor will be eligible for the Scheme in future years. The decrement assumptions are summarised in Table 12 in the form of assumed probabilities of being eligible for the Scheme at the end of each of the next 10 financial years for males. The assumed probabilities are very similar to those adopted in last year's review.

Table 12: Assumed probabilities of eligibility for the Run-Off Cover Scheme over the next 10 financial years for male doctors

Year ending 30-Jun	Age at 30 June 2011						
	20	30	40	50	60	70	80
2012	0.0004	0.0005	0.0008	0.0018	0.0046	0.0735	0.1266
2013	0.0007	0.0010	0.0017	0.0038	0.0097	0.1454	0.2432
2014	0.0011	0.0015	0.0026	0.0059	0.0153	0.2154	0.3499
2015	0.0015	0.0021	0.0066	0.0113	0.0314	0.2834	0.4467
2016	0.0019	0.0027	0.0107	0.0168	0.0503	0.3490	0.5338
2017	0.0024	0.0033	0.0148	0.0225	0.1842	0.4121	0.6114
2018	0.0028	0.0039	0.0190	0.0284	0.2447	0.4722	0.6798
2019	0.0032	0.0046	0.0233	0.0355	0.3053	0.5292	0.7395
2020	0.0037	0.0053	0.0278	0.0439	0.3498	0.5828	0.7909
2021	0.0042	0.0061	0.0323	0.0536	0.3939	0.6328	0.8344

A.4.38 Figure 6 below depicts the number of 'at-risk' practitioners projected to become eligible for the Scheme by various means during the 2011-12 financial year. Although doctors will become eligible for the Scheme during 2011-12 by way of cessation of practice (having ceased practice during 2008-09), the number below refers to doctors who will actually become eligible during 2014-15.

Figure 6: Projected entries of ‘at-risk’ practitioners to the Run-Off Cover Scheme based on decrement assumptions



A.4.39 As in the previous reports, the numbers of practitioners projected to enter the Scheme was higher than the number provided by the insurers for 2004-05 to 2010-11 financial years (see Table 1).

A.4.40 Where the date of birth or gender was not available for a practitioner, these were assigned randomly according to the age and gender distribution of ‘at-risk’ doctors.

Payment patterns, inflation and discounting

A.4.41 ROC indemnity payments in relation to medical incidents occurring after 30 June 2010 were projected assuming the payment pattern in Table 13 below.

A.4.42 This payment pattern has not changed from that adopted in last year’s report.

Table 13: Payment pattern assumed

Delay from notification to payment (years)	Proportion of claim costs paid (per cent)
1	3.15
2	15.41
3	20.10
4	19.53
5	10.07
6	8.73
7	6.78
8	5.45
9	4.02
10+	6.74

Economic assumptions

A.4.43 Medical indemnity claim costs tend to increase at a faster rate than general inflation. Claim payments were projected to increase in line with wage inflation plus superimposed claim cost inflation.

- Wage inflation was assumed to be 4 per cent per annum. This is not inconsistent with general expectations of wage growth.
- Superimposed inflation was assumed to be 2.5 per cent per annum. Superimposed inflation refers to the tendency for medical indemnity claim amounts to increase at rates faster than general inflation. Bursts of superimposed inflation have been observed in the past. Despite this, superimposed inflation is typically allowed for with a constant assumption. For this exercise, an allowance of between 2 per cent and 5 per cent per annum might be reasonable. We have adopted an assumption towards the lower end of this range, having regard to the potential impact of the various tort reforms that have taken place over the last few years.

A.4.44 Claim payments were discounted at a rate of 6 per cent per annum. This is the same rate as was assumed last year. The chosen rate provides consistency with the rate adopted in a number of similar contexts and therefore is suitable from a whole of government perspective.

DATA SUMMARISING THE COHORT OF 'AT-RISK' DOCTORS

A.4.45 Table 14 summarises the age distribution of the cohort of 'at-risk' practitioners, with the total premium representing a proxy for risk of medical indemnity claims for each age group. Note that age and gender were not available for some doctors.

Table 14: Cohort of 'at-risk' doctors

Age at 30 June 2011	Number 'at-risk'	Total premium (\$'000)	Proportion males (per cent)
<30	39	185	41
30-34	1,078	4,426	53
35-39	4,036	29,595	61
40-44	5,632	48,846	64
45-49	6,407	54,100	65
50-54	6,549	52,202	68
55-59	5,708	44,034	73
60-64	4,451	35,862	82
65-69	2,765	21,520	85
70-74	1,271	8,080	89
75-79	480	2,324	91
80-84	222	899	95
>85	57	195	93
Total	38,695	302,268^(a)	71

(c) Numbers may not add due to rounding. Total premium includes membership fees. If membership fees are excluded, total premium is approximately \$280m.

PROJECTION OF FUTURE RUN-OFF COVER SCHEME COSTS

A.4.46 Table 15 below summarises the next 10 years' ROC indemnity payments which were aggregated to derive the projected Scheme costs in future years. The payments projected during 2011-12 include \$2.79 million in amounts paid but not yet recovered by insurers as at 30 June 2011.

Table 15: Calculation of projected Run-Off Cover indemnity payments

Year ending 30 June 2011	Medical incidents pre 1 July 2011		Total (\$m)	Medical incidents post 1 July 2011	Grand Total (\$m)
	Notified as at 30 June 2011 (\$m)	IBNR as at 30 June 2011 (\$m)		Total (\$m)	
2012	4.2	0.2	4.4	0.0	4.4
2013	2.3	1.0	3.3	0.1	3.4
2014	2.2	2.2	4.4	0.3	4.7
2015	2.0	3.4	5.4	0.6	6.0
2016	1.3	4.1	5.4	1.2	6.6
2017	1.1	4.7	5.7	2.0	7.8
2018	0.8	5.0	5.8	3.2	9.0
2019	0.7	5.3	6.0	4.5	10.4
2020	0.5	5.5	6.0	5.8	11.8
2021	0.4	5.9	6.3	7.3	13.7

Note: The costs of notified and IBNR claims do not always sum to the total cost of medical incidents pre 1 July 2011 due to rounding.

UNCERTAINTY IN RELATION TO LIABILITY PROJECTIONS

A.4.47 The projected ROC indemnity payments summarised in Table 15 are subject to uncertainty which relates to:

- data in relation to the claiming behaviour of eligible practitioners;
- substantial random variation associated with medical incidents and the notification of claims from year to year;
- calibration of the model claim size and claim frequency assumptions to the underlying claim process (medical indemnity liabilities are characterised by few claims associated with large random variation such that a wide range of results can be obtained with equal statistical validity);
- the extent to which doctors approaching retirement might cut down on their practice hours and possibly engage in less 'risky' practice (for example, less surgery);
- sensitivity of the model to the proportion of late-reported claims;
- sensitivity of the model to the decrement assumptions;
- the possibility that not all Scheme eligible claims have been identified and that recoveries will be more diligently pursued later in the claim process; and
- recent tort reforms in a number of jurisdictions with the possible effect of 'bringing forward' claims and distorting recent claim experience.

A.4.48 The information provided by the actuaries of the MIIIs and MDOs relied on broadly similar valuation models. The range of assumptions adopted by industry actuaries reflects the substantial uncertainty involved in estimating liabilities of the Scheme.

A.4.49 It must be emphasised that different results can be obtained from different yet equally plausible models and assumptions. Again, this is a common issue with liabilities of this nature.

A.4.50 An estimate of the projected accrual of ROC liabilities during the 2011-12 financial year was provided by each of the actuaries of the MIIIs; these summed to \$9.02 million (including CHE). This can be compared to the estimate produced by our model (including CHE) of \$10.25 million.