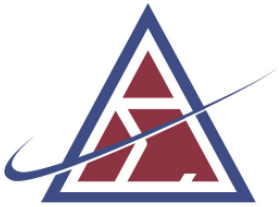

Institute of Actuaries of Australia

# Workers' compensation payment-type analysis for self-insurers

# A NSW case study

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## Abstract

Valuation of workers' compensation liabilities by payment-type for major insurers and for Scheme-wide work is long-established. However for self-insurers, the prevailing wisdom is that, except for the very largest exposures, either experience is too sparse to permit analysis that subdivides the liability into its payment-type components, or that the reliability of the resulting projections is not sufficiently improved to make the additional work worthwhile. This paper provides a critical appraisal of these assertions.

With focus on the jurisdiction of New South Wales, this paper documents a review of the characteristics of workers' compensation outstanding claims liabilities. This includes a discussion of the significant change to the entitlement benefit structure that was introduced with the 2001 Scheme Reform package. The emphasis of the discussion is on implications for actuarial assessments of the outstanding claims liability.

Once the contextual background is established, the paper considers the difficulties associated with valuing workers' compensation outstanding claims liabilities for self-insurers in frameworks that consider all of the constituent payment-types in aggregate. Those difficulties are substantial.

An approach is then presented that can be used to value outstanding claims liabilities within a framework that separately considers the main payment-type subgroups. The framework draws attention to the high predictive power of 'current age of claimant' for run-off projections for the most financially significant payment-types. This predictor is generally unused in aggregate frameworks. The presented approach also draws on observations taken from (what was at the time this paper was written) the most recent publicly available valuation performed for the Nominal Insurer by NSW WorkCover's actuarial advisor, and illustrates how it can be used as collateral information to assist with valuation of the less financially significant payment-types.

The relative likelihood of payment-type and aggregate valuation approaches generating reliable projections is discussed. The conclusion of this discussion is that payment-type approaches are worthy of consideration for a much wider range of self-insurers than is likely to have been subject to it in the past.

Finally, there is a discussion about the ancillary benefits of payment-type valuations, over and above their superior predictive power.

*Keywords: workers' compensation, self-insurance, outstanding claims assessment; payment-type, liability valuation*.

# 1. Introduction

## *1.1 Aggregate and Payment-Type Analyses*

For self-insurers, outstanding claims liability estimates are usually based on investigations that consider all payment types, such as weekly income replacement, medical benefits, investigation expenses and so forth, in aggregate. Throughout this paper such investigations are referred to as "*aggregate techniques*" or "*aggregate analyses*." Standard triangulation approaches are the most common form of analysis. If the analysis of claims experience is segregated, the breakdown is generally based on claim size in preference to payment-type.

The prevailing wisdom is that self insurers' experience is too sparse to permit analysis that incorporates any explicit subdivision into its payment-type constituents. Alternatively, it is sometimes claimed that any increase in the reliability of the projections that might arise out of separate analysis of different payment types is not sufficient to justify the required additional work. In this paper, analyses that include any explicit subdivision into payment-type constituents are referred to as "*payment-type techniques*" or "*payment-type analyses*."

This paper considers issues pertinent to the valuation of NSW workers' compensation liabilities. In particular, it draws attention to conditions that are in existence which mean that "*aggregate analyses*" can fail to produce realistic results.

Aggregate techniques can fail to produce realistic results under conditions that fall into two broad categories:

- where the claims history has been significantly impacted by statutory benefit changes or changes to benefit utilisation patterns. Under these conditions, projection assumptions based on recent past averages of aggregate payment and case reserve development can be at significant risk of generating results that ought not be regarded as applicable to the run-off, and

- where, by chance, the characteristics of the outstanding claims at a particular point in time include financially significant features that are different to those of outstanding claims at earlier balance dates. Depending on the nature of the differences, they might not be properly dealt with by an aggregate approach.

A well-constructed payment-type analysis is much more likely to deal appropriately with each of these circumstances than an aggregate one.

General reasoning suggests that, due to the impact of the 2001 Scheme Reforms, the first of the listed conditions is likely to be in existence for NSW self-insurers at the current time. The small size of self-insurers increases the risk that, by chance, the second of the listed conditions could be in existence. A conclusion of this paper is that the risk of aggregate analyses producing inappropriate results is high enough that payment-type techniques are worthy of consideration for a wider group of self-insurers than have been subject to such analysis historically.

The focus of the paper is NSW Workers' compensation liabilities, but many of the general principles are likely to be applicable to the assessment of liability in other jurisdictions.

### *1.2 Structure of this Paper*

This paper discusses the following topics:

- *The nature of workers' compensation liabilities in NSW*

  A description of the benefits available to injured workers is provided, with the aim of clarifying what the component parts of the outstanding claims liability are.

- *2001 Reforms and other factors influencing benefit utilisation patterns*

  The 2001 reform package and its impact on benefit utilisation and claim development patterns are discussed. Particular focus is given to implications for uncertainty and the choice of valuation approach.

  The discussion explores the impact of the reforms on aggregate claims experience triangles, and the difficulties likely to be encountered when trying to use this experience to project the run-off. These difficulties are explored in greater depth in section 5.

  The impact of the reforms is such that aggregate valuation approaches have to deal with substantial confounders. It is not easy to accept that one should have confidence in a valuation result drawn from such analysis.

  Because it is the most recent significant external factor affecting claims experience, the 2001 reform package is the focus of this section, but attention is also drawn to other causes that have changed utilsation patterns over time.

- *Notes on Case Reserves*

  A *Claims Estimation Manual* has been issued by NSW that most self-insurance claims areas seem to try to follow when setting case reserves.

  This section describes the instructions set out in the Claims Estimation Manual. The instructions need to be appreciated before determining how (and if) case reserves should be used as predictors of claims cost outcomes.

  For accident periods at reasonably advanced stages of development, the case estimate development (CED) model is often applied in outstanding claims liability assessments; especially in aggregate frameworks. Indeed, it is not uncommon for actuaries to defer to the case reserves when estimating the outstanding claims liability at the most advanced stages of development.

  In NSW, it should be recognized that the key purpose of case reserves is for input to the premium formula. It is not to assist actuaries conducting investigations of the outstanding claims liability. A case estimation framework that serves the premium formula well will not necessarily serve outstanding claims estimation exercises well.

- *Key points taken from Payment Type Valuations*

  Material discussed in this section draws from observations and analysis set out in the Scheme report, and investigation of other NSW workers' compensation portfolios that incorporate payment-type analysis. The Scheme Report is a valuable resource that is freely available on NSW WorkCover's website.

A key point for self-insurer advisors is how attractive age of claimant appears to be as a predictor of the outstanding claims liability for weekly income replacement and medical benefits; especially where the number of outstanding claims is small, and the age-mix of claimants can vary significantly from one accident year to the next. Other important observations include the long length of the payment tail projection, and the dominance of weekly and medical expenses in liability estimates.

There is substantial merit for self-insurance advisors, in appreciating trends, forecasts and key areas of uncertainty associated with the wider Scheme. The trends and forecasts can only be meaningfully discussed with reference to individual payment-types.

- *Additional Factors that Impact Self-Insurers*

  The relatively small number of claims dealt with in self-insurers' assessments presents both difficulties and opportunities. In some respects it serves to restrict the form the analysis can take, however it also makes techniques that might not be feasible in larger datasets both more tractable, and more worthwhile.

  For example, unlike the wider Scheme, for a self-insurer it is not usually reasonable to assume that at a given development year, active claimants will have a similar mix of ages. The reason for this is that the number of active claims is usually small, so differences that arise by chance can be significant. The small number of claims increases both the need for and tractability of, factoring claimants' ages into the analysis.

  In this section attention is also drawn to a substantial confounder that often impacts self-insurer valuations; batch processing. In this context, batch processing refers to a business process whereby, processing of payments is clumped. This section sets out some examples of situations in which batch processing manifests and describes its potential impact on claims development patterns and the actuarial control cycle.

- *An Assessment of Aggregate Valuation Approaches applied to the NSW Scheme*

  Drawing on earlier sections, this part of the paper considers the difficulties faced by actuaries who apply standard aggregate valuation approaches to NSW workers' compensation liability analyses. There is particular emphasis on two common valuation approaches, payments per claim incurred ('PPCI') and projected case estimates ('PCE'). The challenges associated with trying to apply these techniques currently appear to be formidable. Indeed, one might argue they are insurmountable.

  Though the emphasis is on PPCI and PCE analyses, it seems obvious that similar challenges will beset any aggregate valuation approach. For NSW workers compensation assessments at the current time, the prospect of any valuation approach having good predictive capability do not seem high.

- *One Payment-type approach*

  A payment-type approach is described that appears tractable and which has been applied in practice. It breaks the analysis of liability down into the following main sub-groups:

  - Weekly Benefits.
  - Medical Benefits
  - Section 66 & 67 Benefits
  - Work Injury Damages
  - Legal and Investigation Expenses

A valuation basis that one can have reasonable confidence in seems more attainable by applying a payment-type approach than if an aggregate approach is adopted. However, one should recognise that a payment-type valuation framework is not a panacea to valuation challenges that present themselves to self-insurance actuaries. Uncertainty is an innate feature of the outstanding claims liability estimate that can be minimised by adopting an appropriate valuation framework, but by no means eliminated or even reduced to low levels.

- *Comparisons of Results on changeover from Aggregate to Payment-Type Analysis*

  For examples where an aggregate valuation approach has been replaced with a payment-type analysis, this section of the paper describes the nature of the differences that have arisen.

  In a particular example shown, the payment-type analysis concluded that, due to understatement of the likely tail liability, a more appropriate liability estimate would be approximately 15% higher than the pre-existing aggregate analysis. Though this might indicate the order of magnitude of any difference that could arise, a comparison of results under an aggregate and payment-type framework for any particular self-insurer will be dependant on circumstances specific to that self-insurer, and it would be wrong to infer that all self-insurers are likely to conclude that they are under-reserved, or under-reserved by any particular amount.

  A common difference is recognition that the payment tail is likely to be much longer than was concluded as the result of the earlier aggregate analysis.

  Generally, three main factors seem to generate valuation difficulties in an aggregate framework that are more readily dealt with in a payment-type framework.

  - Lump sum payments. The most significant include common law settlements (now much rarer than they once were, but they can still occur), large Section 66 & 67 payments, or back-payments of income replacement or medical benefits.
  - Claimant age mixes that vary across accident years.
  - An absence of deep-tail claims experience to guide tail projections.

  '*More readily dealt with*' may not mean that appropriate projections are always obvious (though sometimes they can be). It can also mean that sources of uncertainty can be categorised and well expressed in operational terms. This can help guide explanations to self-insurer clients in terms that are meaningful to them. Conversely the ability to communicate with clients in such terms can make it much easier to elucidate helpful information from self-insurers that can be directly incorporated into the valuation.

- *Benefits of payment-type approaches*

  A payment-type approach has advantages over an aggregate one beyond improved predictive capability and better isolation of sources of uncertainty. This section of the paper discusses these advantages.

  Some of the advantages include:

  - Communication between the actuary and the self-insurer can occur in operationally meaningful terms.
  - It facilitates the direct testing and application of qualitative operational advice received from self-insurers.
  - A more meaningful control cycle scrutiny of valuation assumptions an occur.
  - Facilitation of the introduction of additional liability predictors, most notably the claimant's age.
  - Operationally meaningful monitoring programs can be constructed as an extension to the valuation process (though if administration practice includes batch processing to a significant extent, this can render frequent monitoring meaningless)
  - Collateral information (generally from the Scheme valuation) can be referenced to assist construction of the valuation basis where client specific data is scant.
  - The ability to better identify those components of the liability that are the most significant sources of uncertainty.
  - Alternative workers' compensation arrangements can be more readily costed. .

## 2. The Nature of NSW Workers' Compensation Liabilities

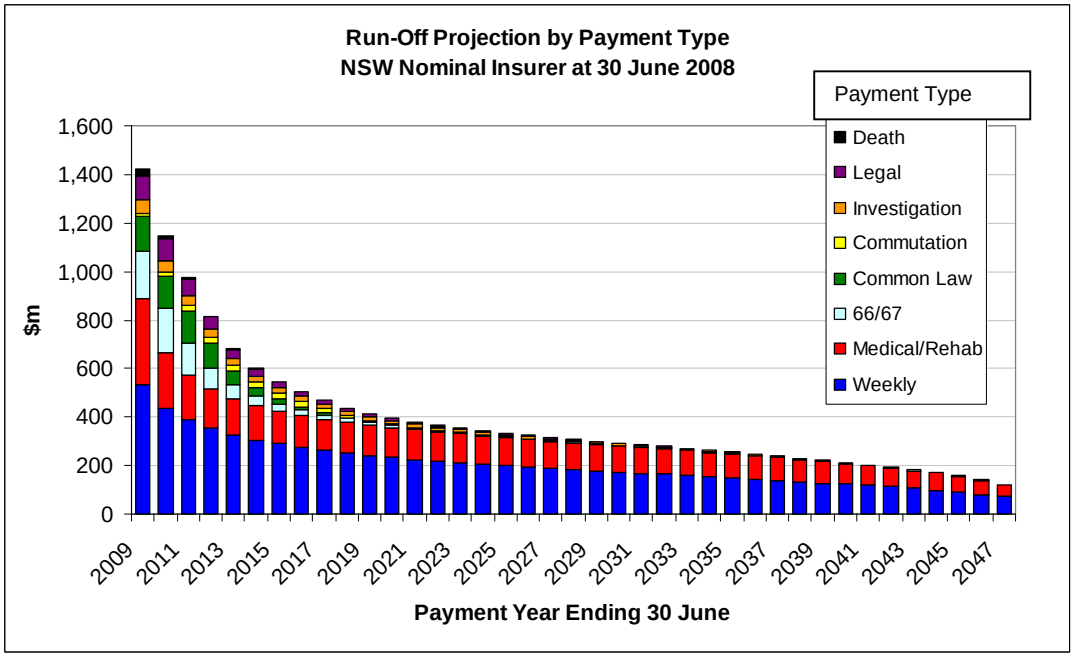
### *2.1 General Points Drawn from the Scheme Valuation*

Workers' compensation liabilities in all jurisdictions are long-term in nature. Payments for accidents that occur now could stretch many years into the future. Similarly (with the exception of new self-insurers) payments made in a financial year will be in respect of claims with accident dates over many past years

For NSW workers' compensation, the run-off tail is particularly long. Reforms introduced in 2001 placed significant restrictions on the circumstances in which it is possible to settle a claim for a long-term injury with a lump sum. Further, other changes reduced incentives for claimants to pursue lump sum settlements.[1] By and large, the reforms reverted the Scheme from one in which most large claims were paid as a lump sum, to one where periodic income replacement (often termed '*weekly benefits*') became the dominant form of benefit delivery. The payment tail is substantially longer now than it was prior to the 2001 reforms.

Advisors to self-insurers have ready access to the claims development patterns observed in the valuation conducted for the Nominal Insurer[2], along with how it has been interpreted and translated to run-off projections. An understanding of the drivers of the Scheme experience, together with an appreciation of how that has been translated to run-off projections, can be used to inform assessments and client discussions for self-insurers of all sizes.

The next graph summarises the projected run-off for the Nominal Insurer as it was estimated at the Scheme valuation at 30 June 2008. The projection is for 1987 Act claims. The presentation is gross of recoveries and excludes amounts for dust-disease claims.




[1] For example, the legislation governing workers' compensation entitlements in NSW restricts recovery of common law damages to damages for past economic loss due to loss of earnings and damages for future economic loss due to the deprivation of impairment or earning capacity. Once common law damages are received, then entitlement to any further workers' compensation benefits cease, and any weekly payments that have been made to the injured worker will be deducted from the common law payments.

[2] The Nominal Insurer is established under Section 154A of the Workers Compensation Act 1987. It manages the Workers' Compensation Insurance Fund and operates as a licensed workers' compensation insurer. The Nominal Insurer trades as the NSW WorkCover Scheme, and the NSW WorkCover Authority arranges for its outstanding claims liability to be actuarially assessed regularly. The report documenting the most recent actuarial outstanding claims liability assessment is publicly available on the NSW WorkCover website. In this paper, that assessment is referred to as the "*Scheme Valuation*" and the associated report is referred to as the "*Scheme Report*." The terms Scheme and Nominal Insurer are used interchangeably.

A notable feature is the length of the payment tail. The undiscounted mean term is 13.7 years (the discounted mean term is 7.7 years). The Scheme's full run-off projection currently extends well over 50 years.

This pattern is quite different to the results of many self-insurer assessments. They often have a much shorter or thinner tail. There is no obvious reason to anticipate that self-insurers and the Scheme should have expected run-off patterns that are very different from each other. Substantive differences in projected patterns should be scrutinised before being accepted.

A comparison with Scheme run-off projections can be considered a reasonableness check on the self-insurer's valuation result. Any comparison between a self-insurer's run-off projection and that of the Scheme will provide the most instructive feedback if the projection for the self-insurer can be expressed with a payment-type breakdown.

At 30 June 2008, the proportion of the outstanding claims liability estimate attributable to each of the different payment-types in the Scheme valuation was:

- Weekly Benefits 48%
- Medical and other costs (including rehabilitation) 25%
- Section 66/67 8%
- Common law damages 7%
- Commutation benefits 2%
- Investigation & legal expenses 8%
- Death & Other Benefits 2%

The list indicates that the weekly benefits category is the most financially significant liability component. The previous graph suggests this benefit category is very long tailed. Later in this paper, the case will be made that features of this component are such that, in current-value terms, it is more straightforward to value than the medical benefits category. The dominant uncertainty for this payment-type is the range of possible inflation outcomes. A further source of uncertainty is the cut-off date, because is linked to the date at which age pension entitlement commences. Changes to this age have been foreshadowed, and it is possible that over time further changes could occur.

The list indicates that the medical benefits category is also very significant. It is even longer tailed than weekly benefits (entitlement to medical benefits does not cease until death). This component is subject to a very high degree of uncertainty. Some of the reasons for this are:

- the absence of regular patterns in the claims history (this would make selecting assumptions problematic even if the other factors generating uncertainty that are listed here were not present)
- the range of possible inflation outcomes over a very long term
- possible changes in treatment needs of the claimant pool over a very-long period
- possible changes to the types of treatments that may be available
- possible changes in mortality rates (affecting the cut-off date and the pattern of utilisation)
- uncertainty about systemic factors that could influence benefit utilisation patterns, for example patterns that will apply when the claimant pool includes greater numbers of the very elderly.[3]

[3] For the very elderly, it seems reasonable to speculate that there could be a 'cost bulge' that is not yet evident in the experience. In some jurisdictions in the United States a phenomenon has been observed whereby for the very elderly, in the period leading up to their death, there is a spike in the utilisation of medical treatment. If the need for the treatment can be linked to an old workplace injury, it becomes part of the far tail of the workers' compensation liability. Even for the Scheme, there would currently be scant data to assess whether an elderly medical cost bulge, but there is good reason to anticipate that utilisation could increase.

Liability associated with other payment types is modest in comparison to weekly and medical benefits. It also has a much shorter tail (albeit still 10 to 12 years in length). Assessment of liability in these other payment-type categories is complicated by substantial changes in benefit utilisation patterns over the past twelve to fifteen years. However, assessment is not intractable. For some of the other payment-types, if self-insurer specific data is scant, it may be feasible to develop projection assumptions based on the Scheme valuation.

### *2.2 Liabilities under the 1926 Act*

This paper's focus is the liability incurred under the Workers' Compensation Act 1987, and its subsequent amending Acts (in this paper these are referred to collectively as '*the 1987 Act'*). For long-established self-insurers, it is possible for there to be a residual liability relating to the 1926 Act. .

Though the focus of this paper is 1987 Act liabilities, actuaries who advise self-insurers should be aware of features of the 1926 Act that mean the outstanding claims liability may be financially significant, even though amounts paid from one year to the next may be small. One of the largest contributors to this is that entitlement to income replacement benefits for pre 1 July 1985 injuries can continue for life.

### *2.3 Summary of Liability Components*

The WorkCover publication "*Workers' Compensation Benefits Guide*" and the 1987 Act set out a detailed description of the benefits available to injured workers' and their dependants. This section provides a brief summary of those benefits, and other expenses that may contribute to the liability of a self-insurer. They are described under the following category headings:

- Weekly benefits
- Medical and other costs (including rehabilitation):
- Permanent impairment benefits, including compensation for pain and suffering.
- Common law damages
- Commutation benefits
- Investigation expenses
- Death benefits and funeral expenses

*Weekly Benefits:*

Injured workers who suffer a total or partial incapacity for work are entitled to weekly compensation by way of income support. Separate parts of the Act deal with those who are:

- totally unfit for work (section 36 & 37)
- returned to work on partial duties (section 40)
- able to make a partial return to work, but no suitable duties are available. Such claimants are sometimes referred to as '*partial deemed total*' (Section 38).

If a worker returns to work on partial duties, and earns less than before the injury, then an additional amount called make-up pay may be paid. Generally, the make-up pay makes up the difference, but there are caps applied to the benefit.

The applicable compensation rates are specified in the Act and in the Workers' Compensation benefits guide. Salient points include:

- Generally, there is a step-down in benefits after 26 weeks of incapacity has elapsed.
- The rate at which weekly entitlements are paid is subject to various caps. Benefit amounts can be contingent on whether the injured worker is employed under an Award and/or has a dependant spouse and/or children.
- The definition of 26 weeks of incapacity is such that any intermediating periods during which return to work has occurred do not count toward the 26 week step-down period.
- A worker may be subject to a maximum of 52 weeks of section 38 payments.
- Benefits are subject to indexation.

For injuries suffered prior to the retiring age, entitlement to weekly payments ceases on the first anniversary of attaining retiring age. (Throughout the remainder of this paper the term *statutory retirement age* is used to refer to the date at which entitlement to weekly benefits ceases) For this purpose, retiring age means the age at which the person would (subject to any other qualifying requirements, be eligible to receive an age pension under the *Social Security Act*. Currently therefore, entitlement to weekly benefits usually ceases when the injured worker reaches age 66. Increases to the age at which age pension eligibility commences have been foreshadowed by the federal government. As the Act stands, this will automatically extend the weekly benefit liability tail.

*Medical Benefits*

Under Divisions 3 and 5 of Part 3 of the Act, depending on the type, nature and severity of the injury, an injured worker may be eligible for some or all of the following benefits:

- Medical and related treatment
- Hospital treatment
- Ambulance treatment
- Occupational rehabilitation
- Damage to artificial aids
- Damage to clothing
- Travel expenses to medical and other treatment

Entitlement to medical benefits can extend beyond the statutory retirement age, until death. In the extreme, a scenario can be painted whereby a person injured in their teens may remain entitled to medical benefits more than 80 years after their injury.

The Act specifies caps for which an employer can be liable for sub-components of medical expenses in respect of each injury. For example, for medical and related treatment in respect of the same injury, the cap is $50,000 and is unindexed. However, this amount can be increased on a case-by-case basis by application to the Workers' Compensation Commission. In the datasets that I have encountered, claims with medical treatment expenses well in excess of $50,000 have not been difficult to find. It seems that for injuries that generate expenses in excess of the statutory limits, such direction (or anticipation that such direction would be given in the event of a dispute) is not rare.

*Permanent Impairment Benefits (also known as statutory non-economic loss; or Section 66 & 67 benefits)*

If a worker suffers what is assessed to be a permanent impairment as a result of a workplace injury or illness, they may be entitled to receive a payment under Section 66 and possibly Section 67 of the Act.

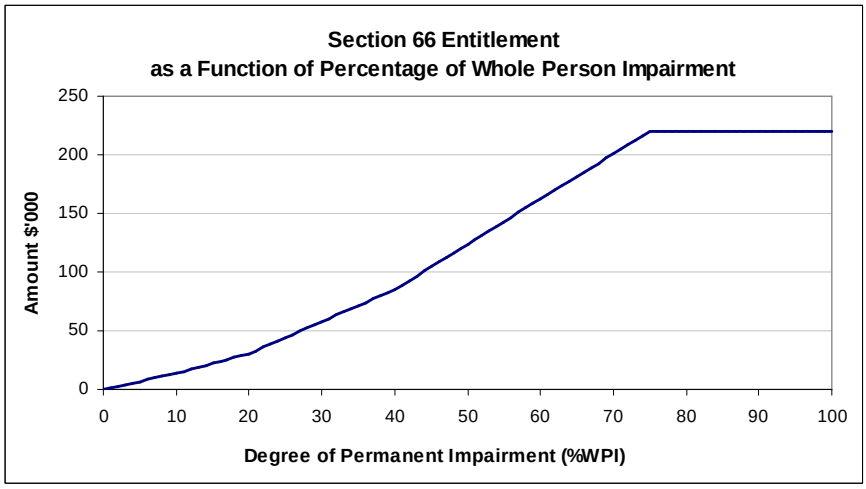
Benefits available under Section 66 (permanent impairment) and Section 67 (pain and suffering) are lump sum amounts that do not finalise the claim. Currently, the Section 66 entitlement is based on a formula that determines the compensation amount as a function of the injured workers' assessed percentage of Whole Person Impairment (WPI).

Workers' whose assessment exceeds 10% (15% in the case of psychiatric injury) are also entitled to compensation for pain and suffering under Section 67. The maximum amount currently payable for pain and suffering is $50,000.

The lump sum amounts have not been subject to indexation since 1995, but the lump sum amounts have varied over the years.

For 2002 injuries and later, the degree of impairment is assessed using the *WorkCover Guides for the Evaluation of Permanent Impairment* by medical specialists trained in its use. The maximum lump sum payment for permanent impairment for injuries from 2002 to 2006 inclusive was $200,000.[4] For injuries from 2007, the maximum has been $220,000.[5]

For post 31 December 2006, non-spinal injuries, Section 66 entitlement as a function of the degree of permanent impairment is as shown in the next chart. The chart is piecewise linear, with slope changes at 10%, 20%, 40% and 75%.




For injuries prior to 2002, any permanent impairment is assessed according to a Table of Disabilities (formerly known as the Table of Maims). For injuries received from 1 February 1992 to 31 December 2001,[6] the maximum amount payable under Section 66 for an individual loss or impairment is $100,000. The maximum is increased to $121,000 where there are multiple impairments.

[4] From the start of 2006 an extra 5% was added to the maximum for permanent impairment of the spine.
[5] $231,000 for spinal injuries.
[6] Strictly speaking, where the claim is lodged on or after 12 January 1997.

The table specifies disabilities/body part losses, together with a maximum amount payable for the individual impairment or loss (eg loss of the power of speech has a maximum entitlement of 60%, or $60,000). The maximum amount is payable where the loss is total. Where there is partial loss, a proportionate amount of the maximum is paid.

*Common Law Damages*

Common law entitlements now relate to economic loss only. Other heads of damage such as pain and suffering, and the cost of future medical care, that could form part of common law settlements prior to the 2001 reforms, cannot be incorporated. Section 66 & 67 benefits are the only route through which damages for non-economic loss can now be pursued.

*Commutation Benefits*

Commutations are an exchange of a lump sum settlement in place of entitlement to weekly and other ongoing benefits. The 2001 Scheme changes placed substantial restrictions on the circumstances in which a commutation benefit may be paid. Commutations are now rare. Across the exposures covered by the Nominal insurer, the number of such settlements has generally been 5 or less per month since the start of 2003.

*Legal expenses*

This includes the cost to the self-insurer of obtaining its own legal advice, and in certain circumstances the cost of reimbursing an injured worker for their legal expenses. Such expenses are often concentrated around lump sum payments of various kinds. For analysis purposes, it can sometimes be helpful to think of them as subdivided into expenses associated with:

- Lump sum settlements
- Section 66 & 67 Awards
- General disputes/surveillance.

*Investigation expenses*

These include the costs associated with assessing the degree of severity of injury and the entitlement to ongoing benefits, including surveillance costs. Similarly to legal expenses, they are often concentrated around lump sum payments of various kinds. It can be useful to think of these as having the same sub-components that are suggested for legal expenses.

*Death and Funeral Expenses*

The benefits that can be payable when a worker dies as the result of a workplace injury (which can occur many years after the accident date) are:

- A lump sum (currently $425,000)
- Reasonable funeral expenses
- Weekly payments for dependants.

*Indirect Claims Handling Expenses*

Indirect claims handling expenses are those that are not directly attributable to individual claims. Costs that may fall into this include:

- Salaries and related costs of claims staff
- Any outsourced claims handling functions
- General expenses associated with running a claims management and statutory reporting function (eg notional rent of office space, IT expense, printing and telecommunication cost).
- WorkCover contributions
- Cost of actuarial reviews

Discussion related to the indirect claims handling expense allowance falls outside of the main scope of this paper, but in a sense it can be regarded as a payment-type.

Conversion of the Scheme away from one where significant claims tend to settle by a lump sum to one where they become long-term income replacement and medical benefit recipients has implications for the relationship between the indirect expenses of handling claims and projected payment levels. Intuitively, as a proportion of projected payments, one would expect greater administrative costs in the current environment than when lump sums dominated.

At the 30 June 2008 Scheme valuation, the indirect claims handling expense rate allowed for was 9.8% of projected gross payments. By comparison, it is not unusual to see self-insurer assessments apply the minimum rate specified by NSW WorkCover of 6%, albeit often without analytic support.

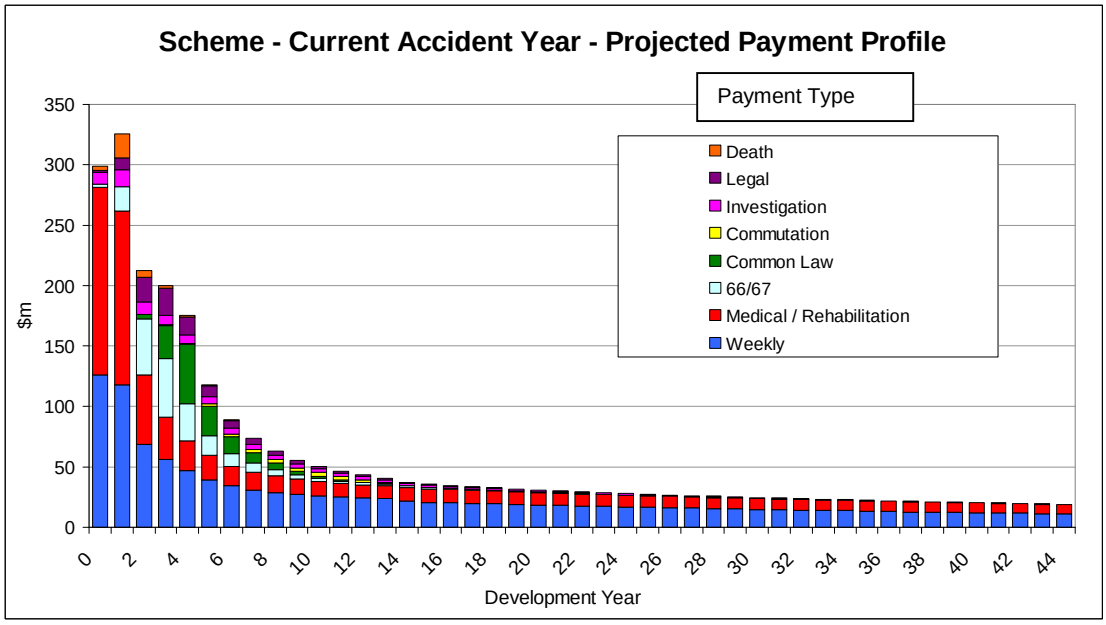
### *2.4 Run-Off Profile According to the Scheme Valuation – most recent accident year*

The next chart shows the undiscounted projected payment pattern for injuries that occurred over the period from 1 July 2007 to 30 June 2008 as assessed by PricewaterhouseCoopers ('PwC').[7] at the 30 June 2008 Scheme valuation. The projection illustrated is gross of any recoveries, and excludes payments that relate to dust-disease claims.

Development year zero payments are those made in the period 1 July 2007 to 30 June 2008, development year one payments are those made in the period 1 July 2008 to 30 June 2009, and so on.

The projection provides for 50% of all payments to be made by the end of development year 3, 75% by the end of year 11, and 90% by the end of year 25. The total projected run-off extends beyond 50 years. Workers' compensation liabilities in NSW are well worthy of the description '*long-tailed*.'

[7] *WorkCover Authority of NSW Actuarial valuation of outstanding claims liability for the NSW Workers' Compensation Nominal Insurer as at 30 June 2008*, dated 8 October 2008, signed by Michael Playford FIAA and David Wright, AIAA.




The undiscounted mean term of the payment profile for 2007/08 accidents is 12.1 years.

The Scheme projection suggests that, for accurate estimation of the overall outstanding claims liability, weekly and medical benefits are the most important to assess as accurately as possible.

Section 66 & 67 benefits and common law benefits are also significant for the first seven or eight development years. While these liability components exist there is also a reasonable volume of legal and investigation expenses. Payments in legal, investigation, common law and Section 66 & 67 categories fall away to fairly trivial levels after about 10 years.

# 3. Scheme Reforms and Other Factors Influencing Benefit Utilisation Patterns

## *3.1 2001 Scheme Reforms*

The most significant benefit changes that have occurred that impact the work of actuaries assessing liabilities in NSW have been the 2001 reforms. Even though the reforms took effect several years ago, they are taking time to emerge as observable changes in experience.

The reforms received assent as two sets of legislative amendments. On the 17th July 2001, the Workers' Compensation Legislation Amendment Act received assent, and in November 2001, the Workers' Compensation Further Amendment Act 2001 was passed. They gave effect to a wide range of Scheme reforms. A summary of some of the major changes that impact the estimation of the outstanding claims liability is set out below:

*Acceptance of Provisional Liability*

With effect from 1 January 2002, this provision required employers to begin weekly compensation payments and injury management within seven days of initial injury notification, except where there is a "reasonable excuse" for this not to occur (for instance there is insufficient medical evidence, or there is evidence that the injury is not work-related). Commencement of payments does not admit liability. These provisional payments are designed to reduce the impact of injury and illness, but do not mean an admission of liability.

Even if a claim is made, provisional payments can continue up to a maximum of 12 weeks. There is also a provision for the payment of medical expenses up to $5,000.

The impact is that a higher number of claims should be expected from 1 January 2002, that result in payments, but the general mix of claims may alter to include a higher proportion that are 'small'.

*Limitation of Access to Commutations*

The primary form of benefit payable under the 1987 Act is a weekly payment during the period that an injured worker is incapacitated for work. Injured workers and their employers have, in the past, been able to agree to settle a compensation claim for weekly payments on a once and for all basis, by the payment of a lump sum. This lump sum (commutation) terminates the employer's liability to the injured worker.

In response to evidence that in the wider scheme, commutations had been offered in too broad a category of cases, and that this was contributing to the increasing cost of the NSW Scheme, the legislative reform package places restrictions on the criteria that must be satisfied before commutations are permitted.

Commutations can now only be utilised where WorkCover is satisfied that the following conditions are met:

- The injury has resulted in a degree of permanent impairment of 15% or greater
- Lump sum compensation for permanent impairment and pain and suffering has already been paid.
- Two years has elapsed since the workers' first claim for weekly payments.
- All opportunities for injury management and return to work have been exhausted.
- The worker has an existing and continuing entitlement to weekly payments.
- The worker has received weekly payments regularly and periodically for the previous six months.
- The worker has not had weekly payments of compensation discontinued or reduced.

The practical impact of the legislative change is that commutations have been virtually eliminated. Hence, compared to the position before the reforms, there should be a significant reduction in lump sum payments, but an offsetting increase in the average duration of claims for weekly benefits. This means that the 'tail' of claims run-off is likely to have lengthened. The impact on the cost of claims is less certain.

Even prior to the reforms, utilisation of commutations has been subject to significant change with time. Generally, there were very few commutation settlements prior to 1995. Their use increased substantially after the introduction of the 1998 Act, reaching a peak between 1999 and 2002, before the restrictions imposed by the 2001 reforms took effect.

Commutation settlements are now very uncommon, but the significant changes in the extent of their utilisation over time have important implications for the assessment of claims experience and the projection of the outstanding claims run-off.

*Common Law and Section 66 & 67 benefits*

Changes were implemented in the NSW Scheme that aimed to reduce common law costs. The changes affect all claims where common law intimation was not made prior to December 2001, regardless of the date of injury.

Originally, the 1987 Act did not include common law access, but it was introduced with retrospective effect in 1989. Initially, it was subject to a 33% threshold, but this was reduced to 25% in 1992. It didn't change significantly again until 2001, but between 1997 and 2001 there was a substantial increase in common law utilisation.

The main changes from the end of 2001 were:

- The threshold for access to common law benefits was established at 15% of 'whole person impairment', compared to the threshold of 25% under the previous table.[8]
- Common law damages are only payable for economic loss (both past losses, and damages for future economic loss due to the deprivation of earning capacity). Damages for non-economic loss (such as pain and suffering) are abolished. Such damages are still recoverable via the statutory compensation system.
- Calculation of future economic loss is now limited to damages up to age 65.
- New pre-litigation procedures and processes for common law work injury claims were implemented that aimed to reduce legal costs.
- The requirement to make an irrevocable election between common law and statutory damages was removed (injured workers who fail in their bid for common law damages can now pursue statutory lump sum payments).

At the same time, the Further Amendment Act 2001 increases benefits payable under Sections 66 and 67 of the 1987 Act. These changes aim to provide some compensation for restricted common law damages payments, and to make the statutory benefits relatively more attractive when compared to potential common law benefits than was previously the case. This provision aimed to reduce the proportion of Scheme costs relating to legal expenses. The increased statutory benefits apply only in respect of injuries that occur from 2002.

These changes should mean, that compared to pre-reform experience, common law claims will be less frequent, and there should be a consequential reduction in legal expenses. There will be some offset to the savings through increased payments under Section 66 and 67.

[8] The 2001 Act changed the way in which permanent impairment was assessed – from using a Table of Injuries contained in part 3 Division 4 of the 1987 Act to using WorkCover Impairment Guidelines evaluated as a Whole of Person Impairment (WPI) %. Generally WPI assesses a reduced impairment percentage compared to the previous table, with different injuries having different relative reductions. The average size of a WPI% impairment is around 60% of the previous Table, though individual relativities couldt be quite different to this.

*Other Changes to the NSW Scheme*

Some of the other changes to the NSW Workers' Compensation Scheme arising from the 2001 legislative amendments were:

- Introduction of the right to claim damages for primary psychological/psychiatric impairments under Section 66 and 67, subject to an impairment threshold.
- Definition of a regulatory fixed scale of applicable fees for legal advice, limits on fees recoverable, and mechanisms for the assessment of costs.
- Introduction of a new entitlement for domestic assistance in the statutory Scheme.
- Restructuring of the dispute prevention and resolution system.

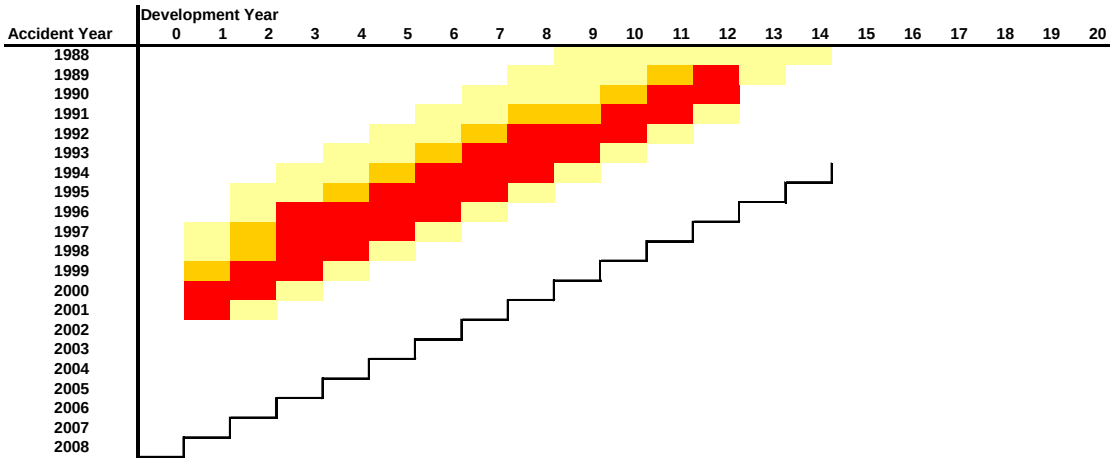
## *3.2 Scheme Reform Impact on Claims Experience*

The usual framework in which actuarial valuations are performed is premised on an assertion that claim development patterns experienced in older accident periods is predictive of patterns that are likely to be experienced for more recent ones.

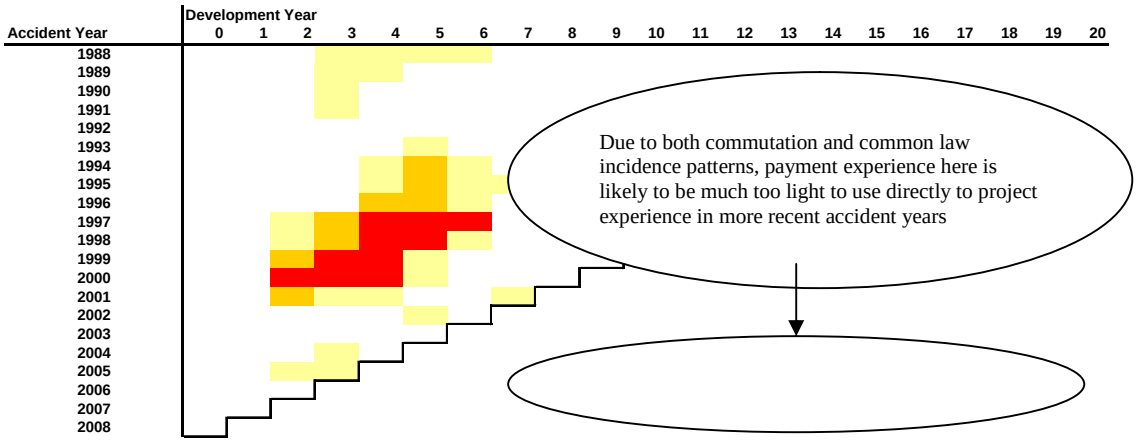
For NSW workers' compensation liabilities this premise is violated. We know that in years gone by, a high proportion of significant claims that did not settle in the first year or so after injury, were eventually settled with a lump sum. A similar lump sum settlement is much less likely in the current statutory environment. Serious injuries will generate weekly benefits payable over many years.

The 'hot-spots' in claims development triangles for common law and commutation settlements are indicated in the next two diagrams (red indicating the points at which such settlements were most prevalent, through to yellow indicating where they have occurred, but rather less prominently.

**Intensity of commutation Settlements**



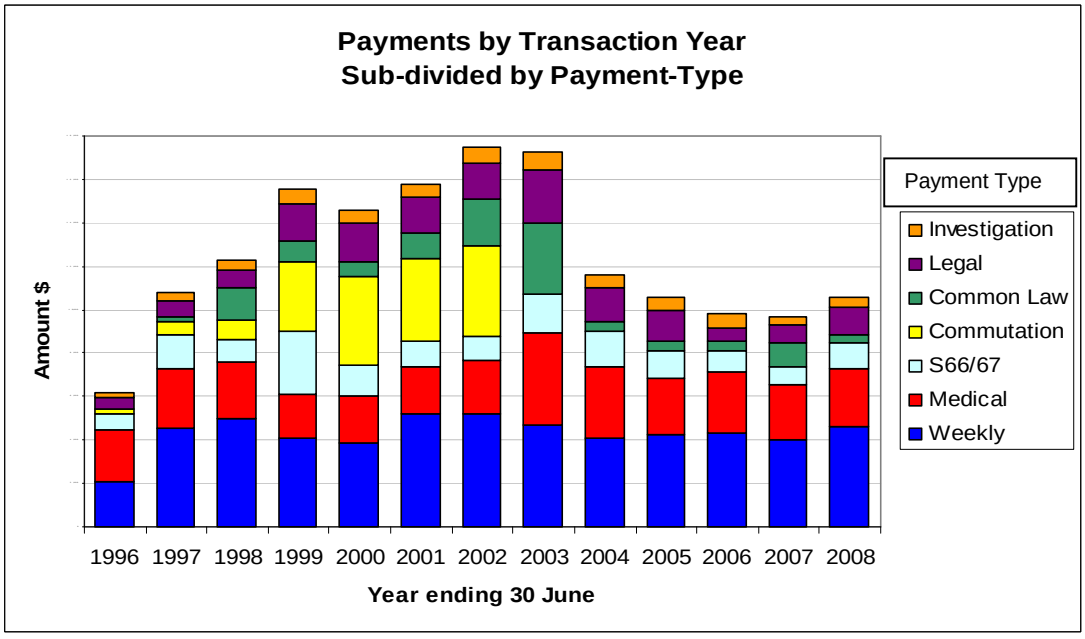
## Intensity of common Law Settlements




If the current benefits environment had been in existence during the periods where commutations and common law 'hot spots' occurred, a portion of the claims that settled with those lump sums, would instead have been recipients of ongoing income replacement and medical benefits. It follows there is a risk that the active annuitants and medical benefit claimants that remain from the accident years impacted by the lump sum hotspots could be too low to be used as a predictor of liability run-off patterns for more recent accident periods.

### *Payment-Type Heterogeneity*

For a particular self-insurer, the next chart shows payments in each year subdivided by payment-type. The general pattern is typical of NSW workers' compensation exposures.




The main observation is that after about 2002 and 2003, lump sum commutation and common law settlements became rare. The impact of the 2001 Scheme reforms is clear. The removal of the majority of settlements by this route has significant implications for how claims history can be used to reasonably project current run-off patterns.

## 4. Notes on Case Reserves

Where aggregate techniques are applied, for accident periods at the more advanced stages of development, case estimate based approaches are most commonly applied. Further, it is usual for the actuary to select some development stage at which the case reserve established by the claims manager is taken as the estimate of the liability, possibly in current-value terms.

This being the case, it is important that the nature of case reserves is appreciated. The majority of self-insurers aim to adhere to the WorkCover NSW Claims Estimation Manual ('the Manual'). The most recent version of the Manual is dated February 2002.

An important point to recognise about case reserves is that in the wider Scheme, a (perhaps the) chief application of case reserves is their use as an input to the premium formula. For this:

- Only the case reserves for claims from the most recent three accident years are used
- Reported incurred claims cost is capped
- Certain claim-types are excluded.

At best for self-insurance actuaries, the case reserve guidelines are constructed with the aim of generating suitable input to valuation work as a secondary consideration. There can be no guarantee that they are suitable for that purpose. It is noteworthy that in the wider Scheme they do not appear to be applied for valuing the outstanding claims liability (where they are sometimes used, it is most often as a flag to count claims of different types)

Where case reserves are taken up in valuations is for older accident years; typically several years after the injury date. Hence the most relevant parts of the guidelines for actuarial valuations are those that relate to older injuries. The Manual sets out an approach to setting case reserves for each payment-type. Graphs presented earlier in this paper make it clear that those parts of the Manual most relevant for older accident years will be those related to weekly and medical entitlements.

Separate Sections of the Manual deal with Temporary Total Incapacity (Section 36 & 37), Temporary and Permanent Partial Incapacity (Section 40) and Temporary Partial Incapacity (Section 38)

Because of the way in which case reserves are used in actuarial valuations (ie in well developed accident years), in this paper discussion is restricted to the subset of guidelines that relate to the most well-developed subset it specifies. That subset is injuries that occurred more than 104 weeks prior to the estimate being made.

- **Permanent Total Incapacity**

  For workers who are either:

  - Unlikely to be re-employed or vocationally retrained; or
  - Require ongoing hospitalisation, nursing home residence or home care; or
  - In receipt of a court award allowing for continuing weekly compensation benefits for total incapacity.

  *Weekly Benefits*

  The Manual states that estimate should include the total amount of weekly compensation payments that will be paid to the worker until one year after they reach retirement age.

*Medical Benefits*

For medical and hospital expenses, the Manual states that the estimate should include:

- For workers who are permanently hospitalised, at least $150,000 pa
- For workers in nursing homes, at least $75,000 pa for the workers life expectancy
- For workers needing home care, at least $35,000 pa for the workers life expectancy.

If any information exists that shows that any of the amounts is too low, then the Manual states that the estimate should be increased to allow for that. The Manual stipulates that the caps that apply to medical benefit entitlements should be taken into account.

The general rules for estimating medical, hospital and rehabilitation expenses (discussed below) also apply.

- **Temporary Total Incapacity**

*Weekly Benefits*

At the 104 week and later reviews, if the worker remains totally incapacitated and has not returned to work, then the Manual states that the estimate should be increased so that the total amount of weekly compensation benefit including amounts already paid and expected to be paid covers a period being the lesser of:

- At least 8 years of incapacity; or
- 80% of the period of incapacity from the date of injury to retiring age plus one additional year.

*Medical Benefits*

For medical, hospital and rehabilitation expenses, the Manual specifies the estimate should make allowances according to the following table. The same table applies at all reviews more than 26 weeks after injury,

| **Description** | **Worker back at work** | **Worker not back at work** |
|---|---|---|
| Medical & treatment | $1,500 | $3,000 per year of estimated incapacity |
| Hospital | Usually nil<br>If required allow $5,000 | Usually nil<br>If required allow $5,000 |
| Rehabilitation | Usually nil<br>If required allow $2,000 | $2,000 |

If medical or other investigations may be required, at least $2,000 for each claim must be allowed for – the allowance should be reviewed as more information is received.

When medical, hospital and rehabilitation expenses are estimated, the Manual specifies that the table here should be used unless the claims manager has sound evidence that another amount is more appropriate. Claims managers are instructed to take account of the maximum amounts in Sections 61, 62, 63, 63A(3), 76 and 77 of the Act.

- **Temporary and Permanent Partial Incapacity**

  *Weekly Benefits*

  At 104 week and later reviews, the Manual states that the estimate should be an amount equal to the lesser of:
  - Another 6 years at the benefit rate; or
  - 80% of the period of incapacity from the date of injury to retiring age plus one additional year.

  *Medical Benefits*

  Under the Manual, for medical, hospital and rehabilitation expenses, allowances according to the following table should be applied.

| **Description** | **Worker back at work** |
|---|---|
| Medical & treatment | $1,500 plus $1,500 for each year of estimated incapacity |
| Hospital | Usually nil<br>If required allow $5,000 |
| Rehabilitation | Usually nil<br>If required allow $2,000 |

  If medical or other investigations may be required, at least $2,000 for each claim must be allowed for – the allowance should be reviewed as more information is received.

  When medical, hospital and rehabilitation expenses are estimated, the Manual states that the table here should be used unless the claims manager has sound evidence that another amount is more appropriate. Claims managers are instructed to take account of the maximum amounts in Sections 61, 62, 63, 63A(3), 76 and 77 of the Act.

***General Points from the Manual:***

The following instructions taken from the manual are some of those that should be appreciated by actuaries who are assessing how (or whether) to use case reserves as liability predictors:

- The estimates are to ignore the possible effects of inflation (ie they are in current-values).
- For a disputed claim, the estimate should be calculated the same way as would be done for a claim that is not disputed. That is, all amounts claimed should be included, even if the expectation is that there may not be a liability to pay for them.
- The estimate must be based on sound evidence - rather than possibilities and vague understandings.

## 5. An Appraisal of Aggregate Valuation Approaches

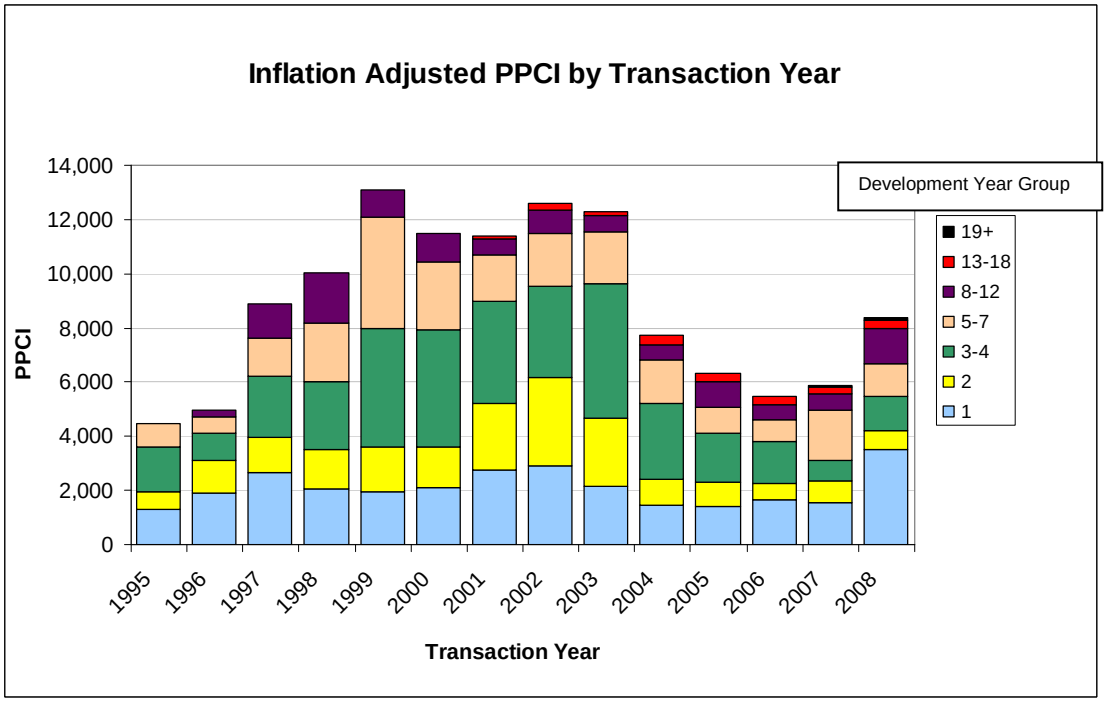
Armed with knowledge of the current benefit structure, the main ways that it has changed through the Scheme's history, and some of the main ways that benefit utilisation has altered with time, it is now possible to appraise how standard aggregate valuation approaches are likely to perform as liability predictors.

Actuarial valuations are usually predicated on the assertion that experience in older accident years should be predictive of run-off patterns for more recent years (perhaps with some adjustment where benefits or claims management policies have altered with time). In ways that are not insignificant, and which are very difficult to deal with in an aggregate framework, the assertions that underlie this paradigm are violated for NSW workers' compensation. When one considers the nature of the benefit structure that applies currently, and how benefits have varied over time, it seems self-evident that the challenges associated with aggregate valuation approaches are formidable. The risk of arriving at an inappropriate projection under such a structure seems to be high.

The two most commonly applied aggregate valuation approaches are Payments per Claim Incurred ('PPCI') and Projected Case Estimate ('PCE') models. Therefore, there is some emphasis on commentary on these methods. However, the general nature of the issues discussed will impact all aggregate approaches.

### *5.1 Comments on PPCI Reliability*

An illustration of the difficulties associated with application of a PPCI model is shown in the next chart. It illustrates PPCI experience over several years for a particular self-insurer. Each column corresponds to PPCI experience in a transaction year. Different development year sub-groups are shown as different colours in the chart.[9]




[9] For example, this self insurer is quite large, and the estimated number of incurred claims for accident dates in 2002/03 is 1,728. For accidents in 2001/02 it is 1,481. In inflation-adjusted terms, in 2005/06 payments in respect of 2002/03 injuries was $1.620m, and for 2001/02 injuries, it was $0.887m. The green component of the 2006 column in the graph is $1.620m/1,728 + $0.887m/1,481 = $938 + $589 = $1,537.

The graph has a number of interesting features.

The fact that tail experience is only just beginning to emerge is apparent. Because the oldest 1987 Act accident year is 1987/88, 1995/96 was the first transaction year that payments in development year 8 commenced. 2000/01 was the first year payments in development year 13 started. In 2007/08, the most advanced development year was 20.

The extensive use of commutation and common law lump sum settlements is clear from the increased height of the columns from 1998 to 2003. Payments have fallen away since as those lump sum settlements have become rare (though occasional common law awards still occur).

Because they relate to accident years for which settlement by lump sum was possible for a number of years, the ongoing payments at advanced development stages are now quite small. Since the end of 2001, lump sums have been much rarer. Claims that may have settled with a lump sum in the pre-reform environment are likely to be ongoing recipients of income replacement and medical benefits. Consequently, when claimants from 2001/02 and later accidents reach advanced development periods, their contribution to PPCIs is likely to be substantially greater than is the case for earlier accident years at the same development stage today. However, the PPCI analysis framework provides no basis for quantifying this effect.

*Objection 1 – the PPCI claims history triangle is too volatile to be translated into a valuation basis that should be considered predictive*

The history is volatile. We know that, at least in part, the variability can be explained by changes to statutory benefits and the time those changes have taken to emerge in the experience.

It is worthwhile to question to what degree the volatility, and the prima facie difficulty in arriving at projection assumptions reflects the inherent uncertainty in the liability value. An alternative explanation could be that the liability is amenable to more accurate estimation, but only by applying a different analysis framework. If the alternative explanation is the right one, there could be substantial merit in developing alternative valuation structures.

PPCI patterns in the examples shown are chaotic. It is not obvious how either history could be translated into a projection basis with any confidence. It is reasonable to suggest that, as experience viewed in this framework is so volatile and unpredictable, the PPCI should be abandoned as a valuation approach.

*Objection 2 – Such a small proportion of incurred claims is active after two or three years that the total number of incurred claims is an intuitively unappealing predictor*

At a given development year, it seems reasonable to suggest that claim payments stand a better chance of being proportional to the number of claims generating the payments (ie the number of active claims) than the number of incurred claims. For example, if two accident years had the same number of incurred claims, but at (say) development year five, twice as many claims from one accident year were generating payments than the other, there seems more appeal in the suggestion that through the rest of the run-off the first year should be expected to generate twice the claim payments of the second than the notion that they should be the same.

In effect, under a PPCI approach, the total number of incurred claims arising from each accident period is being used as an exposure measure. That is, for a given development year, payments are assumed to be proportional to the number of incurred claims.

Provided the number of active claims at a given development stage is approximately proportional to the number of incurred claims, there will not be much difference between assuming payments are proportional to incurred claims or active claims.

However, beyond three years or so after the date of injury, the proportion of incurred claims that generate payments each year is small and at a given development stage, the degree of variation in this proportion between accident years is large.

Illustrating this, for a relatively large self-insurer, the next triangle displays the number of claims that generate a payment each year. The number is displayed as a proportion of the total number of incurred claims from each accident year. Over the last 5 years, the proportion generating a payment in development year 3 has varied between 4.4% and 7.5%; the proportion of incurred claims generating a payment in development year 4 has varied between 2.5% and 4.7% and so on.

The rows under the triangle show over the previous five transaction years, what the highest and lowest values for the proportion of incurred claims that generate a payment have been. The final row divides the highest value over the last five years by the lowest value.

| Accident Year | Development Year 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | 0.4% |
| | | | | | | | | | | | | | 1.0% | 1.0% |
| | | | | | | | | | | | | 0.7% | 0.8% | 0.6% |
| | | | | | | | | | | | 1.0% | 0.9% | 1.0% | 0.9% |
| 1995 | 74.8% | 41.9% | 13.7% | 7.5% | 4.8% | 3.5% | 2.7% | 2.0% | 1.5% | 1.2% | 0.9% | 1.0% | 1.0% | 1.2% |
| 1996 | 76.3% | 43.3% | 13.6% | 8.5% | 6.0% | 4.8% | 3.2% | 2.4% | 1.8% | 1.4% | 1.3% | 1.3% | 1.3% | |
| 1997 | 74.3% | 38.8% | 11.7% | 7.6% | 5.6% | 3.3% | 2.5% | 2.0% | 1.5% | 1.2% | 1.1% | 1.1% | | |
| 1998 | 72.6% | 39.1% | 12.5% | 6.9% | 4.1% | 2.9% | 1.8% | 1.6% | 1.6% | 1.3% | 1.3% | | | |
| 1999 | 73.8% | 39.6% | 11.9% | 8.1% | 4.7% | 2.8% | 2.6% | 1.8% | 1.6% | 0.9% | | | | |
| 2000 | 72.3% | 40.1% | 13.6% | 7.3% | 4.7% | 3.0% | 2.2% | 2.0% | 1.8% | | | | | |
| 2001 | 76.4% | 43.9% | 12.6% | 7.5% | 4.5% | 3.0% | 2.8% | 2.3% | | | | | | |
| 2002 | 71.4% | 36.1% | 9.7% | 6.7% | 4.5% | 3.9% | 3.2% | | | | | | | |
| 2003 | 62.1% | 26.9% | 7.9% | 5.0% | 3.2% | 2.9% | | | | | | | | |
| 2004 | 66.1% | 28.5% | 7.8% | 4.5% | 2.5% | | | | | | | | | |
| 2005 | 70.3% | 28.1% | 7.8% | 4.4% | | | | | | | | | | |
| 2006 | 73.7% | 29.2% | 8.8% | | | | | | | | | | | |
| 2007 | 76.2% | 33.6% | | | | | | | | | | | | |
| 2008 | 75.8% | | | | | | | | | | | | | |
| Minimum | 66.1% | 26.9% | 7.8% | 4.4% | 2.5% | 2.8% | 1.8% | 1.6% | 1.5% | 0.9% | 0.9% | 0.7% | 0.8% | 0.4% |
| Maximum | 76.2% | 33.6% | 9.7% | 7.5% | 4.7% | 3.9% | 3.2% | 2.3% | 1.8% | 1.4% | 1.3% | 1.3% | 1.3% | 1.2% |
| Ratio | 1.15 | 1.25 | 1.24 | 1.69 | 1.87 | 1.38 | 1.85 | 1.42 | 1.22 | 1.52 | 1.51 | 1.73 | 1.54 | 2.64 |

The high degree of variability in the proportion of incurred claims that generate payments at any given development year means that as a choice for a predictor, incurred claim numbers is unattractive (provided one accepts that the number of active claims would be better). It is particularly unappealing if the number of active claims is reasonably amenable to estimation.

*Objection 3 – PPCI experience is unlikely to be consistent across different accident periods*

The mechanics of the PPCI model assumes that the central estimate of payments per claim incurred at each development year. However, this seems unlikely to reflect reality. One reason for this is that, due to the utilisation patterns for commutation and common law settlements, the proportion of the potential 'far tail' claims that have been removed by lump sum settlement will vary across accident years.

Another contributor to different expectations across accident years is that, by chance, the age-mix of claimants is likely to vary. The differences in age mix means that the likelihood that each claims will continue to be active at various future development points will be different across accident years. The nature of that difference is amenable to analysis if age or date of birth is explicitly incorporated into the model.

*Objection 4 – The approach provides no objective basis on which far-tail payment projections can be made.*

In earlier discussion, the point has been made that the length of the payment tail for NSW workers' compensation liabilities may extend well in excess of 50 years. By comparison, at the time this paper was written, available experience covers only 22 years. Beyond this point, the PPCI provides no objective framework around which projected run-off patterns can be based. At earlier development stages there is also an additional problem. For reasons set out in the discussion about the 2001 Scheme reforms (relating to past use of commutations and common law routes to claim settlement) recent payment experience at advanced development periods is likely to be too light to be used directly as a predictor of claim outcomes for more recent accident years.

*Objection 5 – The approach provides very little useful operational information*

Strictly speaking, when performing a statutory liability valuation, the actuary's responsibility extends no further than the narrow one of determining an appropriate balance sheet provision. In practice however, self-insurers often expect that the valuation can be used as a basis to provide useful operational feedback.

However, particularly if the actuary recommends a significant prior year strengthening or release, an explanation in terms that can be couched in terms that are operational is both well appreciated by the self-insurer, and a substantial boost to the actuary's credibility and perceived worth. Such an explanation also opens up the possibility of the valuation work providing actionable feedback that can help self-insurers to contain costs.

All aggregate valuations, including PPCI, suffer from the weakness that, in operational terms, explanation of changes in liability estimates will be vague. An increase might be explained as being due to say, sustained increased payment levels at advanced development stages. This is less helpful to those responsible for claims management than explanations that can distinguish persistency effects from average payment amounts per active claim, or whether it is weekly, medical or some other payment type that is at the source. Such information would also be useful to the Actuary to help determine whether or not the effect should be considered likely to persist.

*Objection 6 – Limited facilitation for costing alternative benefit structures (eg Comcare)*

Related to the previous point, should an occasion arise whereby the self-insurer seeks advice about how costs might differ under an alternative benefit structure, any aggregate valuation approach is unlikely to provide a useful starting point for the necessary analysis. A payment-type result is likely to form a much more useful starting point. This point is topical as larger companies weigh the relative merit of joining the Comcare Scheme as a self-insurer. It would add weight to the worth of considering alternative approaches if any benefit changes were to be mooted for the NSW WorkCover Scheme.

*Objection 7 – There are more appealing alternative structures*

If an alternative, more appealing valuation structure could not be identified then the case might be made that, notwithstanding its flaws, a PPCI approach should be accepted. In Section 7, an alternative structure is presented that seems to follow the underlying claims process and which directly analyses operational cost drivers to a much greater degree. That alternative appears to deal much better with the issues raised here as being problematic in a PPCI framework.

*Conclusion*

The nature of NSW workers' compensation liabilities is such that the application of naïve averages, drawn from recent PPCI experience has a high chance of generating inappropriate results. Further, it seems unlikely that incorporating some form of adjustment to naïve averages in this framework will produce an appropriate run-off projection.

### *5.2 Comments on PCE reliability*

Across a very wide range of liability classes this valuation method is one that actuaries often default to for well-developed accident periods. NSW Workers' compensation is no exception.

A PCE approach can be a fair choice when predictors other than case reserves don't seem to exist. *Usually* in general insurance the case reserves are set using all of the available information and they are set with the aim of incorporating this information into a realistic (albeit scenario-based) estimate of cost outcomes.

A distinction between NSW workers' compensation case estimates and most other risk classes is that a set of rules exists to guide how case reserves should be set. A further distinction is that in many circumstances where one might be tempted to default to case reserves, alternative reasonable predictors of outcomes can often be found.

Two conditions need to be present before PCE projections are likely to be reliable:

1. At a given development point, there should be a reasonably consistent relationship between case reserves and likely cost outcomes.

2. At a given development point, there should be a reasonably consistent expectation for the proportion of remaining cost captured in the case reserve that will crystalise as payments over the next development period (called the 'payment-to-outstanding' or PO factor).

Subjecting the two conditions listed above to scrutiny reveals there is good reason to anticipate that they are unlikely to hold for NSW workers' compensation liabilities.

*Consistent relationship between case reserves and likely cost outcomes.*

The PCE approach doesn't require accurate case reserves. It is more precise to say that it requires a reasonably consistent relationship between case reserves and likely claims outcomes. However, in practice, a case estimate development (CED) factor of 1.000 is usually applied by actuaries from some development point, so it is also worthwhile considering whether the prospects of the case estimates being accurate are good.

Case reserves are usually set with reference to NSW case estimation manual. A risk point for PCE models is that case reserves set with reference to the Manual are not constructed with the prime aim of assisting actuarial valuations. First and foremost, the focus is as input to the premium formula.

The discussion in the section 4 of this paper raised a number of red flags that ought to be recognised before deciding to use case reserves as liability predictors were discussed. In particular:

- For the purpose of input to the premium formula, incurred claim cost (case estimates plus amounts paid) are capped (currently at $150,000). Consequently, if case reserves for the largest claims are set in a way that don't reflect likely outcomes, no particular

issue arises with respect to their primary use (provided the estimate is in excess of the cap)

- The Manual applies the same rules for case reserve setting in respect of weekly benefits for claimants who have been in receipt of such benefits for two years, as they apply after (say) six years has elapsed. However, general reasoning would suggest that return to work prospects for a typical claimant at the two and six year time points would be rather different.

- Except for being used as a 'flag' to identify counts of claims in different categories, the Scheme valuation makes scant use of case reserve values (the investigating actuaries determining that better predictors of cost outcomes can be found).

- The premium formula utilises claims cost estimates in the first three years after injury. Hence it should not be surprising that any attempt to guide toward 'accuracy' should be focused on the setting of case reserves in the first three years after injury.

Case reserves are not totally devoid of merit for consideration as predictors of claims outcomes, but it is not hard to reach the conclusion that they should be treated warily.

*Payment-to-outstanding factors.*

Insofar as providing a sound basis for projection of payment patterns, general reasoning suggests that the PCE method will perform poorly. This is because a PCE framework assumes that, at a given development stage, PO factors should have the same expected value for all accident years. However, self insurer exposures are generally too small for it to be reasonable to expect the active claimants' age mix at a given development stage to be similar across different accident years. In reality, the expected PO factor for an accident year where active claimants are on average in (say) their 40s will be quite different to a year where active claimants are in their 60s.

The conditions required for the PCE approach to be reasonably predictive of outcomes don't appear to be present for NSW workers' compensation portfolios. It seems sensible to consider alternative structures.

### *5.3 Other Structures*

This paper has focused on the PPCI and PCE aggregate valuation approaches because they are the two that seem to be most widely applied in practice. However, other valuation approaches are sometimes encountered.

Though not specifically examined in this paper, other aggregate approaches also struggle to deal with factors that affect NSW workers' compensation portfolios at the current time. Arguably, none should be expected to fare any better than PPCI or PCE. The particular factors that aren't well dealt with are:

- Significant changes to the benefit structure that occurred in 2001 that has altered the mix of benefit types making up the payment experience and which will affect the run-off. The impact of those changes is still emerging in the experience.
- The variation from one accident year to the next of characteristics of the claimant pool that are not captured in such models, but which are likely to impact the liability run-off.

## 6. Factors Affecting Self Insurers

Estimating outstanding claims liabilities for self-insurers usually presents heightened challenges compared to the position when valuations are conducted on a larger-scale, such as those conducted for workers' compensation authorities and major insurers. Those challenges include:

- More variable experience (due to the relatively small exposure and small claims datasets)
- Data distortions caused by batch claims processing.
- Less readily available qualitative information regarding claims experience and exposures
- More limited contact between the Actuary and Principal between valuations
- A low level of resourcing for the valuation.

These challenges are not peculiar to NSW workers' compensation. They apply across most self-insurer assessments. However as some of them have direct implication for the way in which the outstanding claims liability assessment should be approached, they are discussed here briefly.

### *6.1 Batch Processing*

Batch processing refers to a business process whereby, processing of payments or case reserve changes is clumped. There are a range of situations in which this manifests. Some common ones are:

- Income replacement benefits might initially be processed and paid by a payroll department. They in turn notify the workers' compensation claims team when payments have been made. The claims team then processes the transactions to the claims administration system. Sometimes, rather than this resulting in processing close to the actual payment date, it occurs later and in batches.
- Medical, legal and other expense invoices might not be paid immediately upon being received by the self-insurer. It is possible that they may be accumulated for a time, after which many such invoices are paid in quick succession.

Batch processing can cause difficulty interpreting payment data (higher or lower than anticipated payment levels reflecting whether more or less batch processing has occurred more so than whether 'real' payment experience has been heavy or light). It can also compound difficulties associated with 'grossing-up' data when it is taken in advance of the valuation date. It is not uncommon for there to be a business process that includes making sure processing is up to date prior to the year-end, but this might not help the Actuary if payment extracts are taken some time prior to the balance date in order to make financial reporting deadlines.

### *6.2 Age Mix Varies by Accident Period*

In very large exposures, one can reasonably assume that the age mix of claimants is unlikely to move significantly between accident periods. However, for self-insurer sized exposures, by chance alone, it can.

The age mix of claimants is one of the best available predictors of likely run-off patterns. It follows that there should be substantial advantage to the reliability of the liability estimate if it can be built into the valuation model.

### *6.3 Low level of Resourcing*

It does not seem uncommon for self-insurers to see limited value in extending resources to the actuarial review beyond a rudimentary minimum.

It isn't hard to imagine that this can be part of a vicious circle, with the low level of resourcing supporting only a minimalist valuation effort, which in turn increases the likelihood of results with doubtful reliability, and a valuation that contains little or no output that is either actionable or genuinely informative to the self-insurer. If the valuation has these characteristics then the issue is that it is not seen as a valuable exercise. Rather, perhaps it is seen as a statutory exercise, devoid of innate merit. Keeping the resources to the minimum required to meet statutory obligations becomes rational, and so the cycle continues.

To a degree, the issue is one of salesmanship. Actuaries are better equipped to recognise that outstanding claims reserving is not a commodity than self-insurers. In the extreme, it would take little time or effort to accept claims data without interrogation, triangularise it, apply routine, mechanical models, and generate results on naïve application of past averages. Such an approach while possible, and cheap would typically be very unreliable and would most likely defeat the purpose of workers' compensation authorities mandating professional actuarial involvement in self-insurance outstanding claims reviews. However, the value in doing more must be evident to self-insurers in order for there to be support for greater effort.

A self-insurer's direct workers' compensation costs may be several million dollars per annum. When lost productivity from workplace injuries is added the full cost will be higher. It is clearly in a self-insurer's interest to have as accurate an estimate of that cost as can reasonably be achieved. An accurate estimate is necessary to facilitate comparison of costs with those that would be likely under alternative arrangements, such as a return to insurance or, for some self-insurers, Comcare. The cost of the actuarial review, while not insignificant, is small compared to the economic interest a self-insurer has in making the best decisions about its arrangements, and controlling overall costs.

Reliable lead indicators of deteriorating or improving claims outcomes, that can be expressed in operational terms, are also items that should be highly prized by self-insurers, particularly if corrective action may be possible.

If the case can genuinely be made that the actuarial valuation can provide such information, the business case for providing resources to the actuarial review to allow it ought to be reasonably strong.

# 7. One Payment-Type Approach

In this section, an outline of a framework for a payment-type investigation is presented that seems suitable for NSW workers' compensation assessments *at the current time*. This section also presents features of the claims experience by payment-type that seem typical.

The approach includes reference to the Scheme valuation work. Naturally, it is incumbent on the investigating actuary to do whatever they feel is required to be convinced that such collateral information is appropriate to apply to their self-insurer's situation before using it.

I emphasise that though the presented approach seems appropriate at the time this paper was written (2009), it may not be suitable in future years. A benefit of payment-type analysis is the discipline it requires to keep abreast of ongoing developments and changes to the Scheme in order that the analysis framework remains sound. This is true of changes to the Scheme, and also changes to collateral information, such as that which may be gleaned from the Scheme valuation.

A payment-type approach seems to stand a better chance of dealing appropriately with the difficulties that confront outstanding claims liability estimation in NSW workers' compensation at the current time.

This is not to say that a payment-type analysis is a panacea that is guaranteed to lead the actuary to a valuation basis that has a very high degree of predictive power. The nature of workers' compensation liabilities in NSW seems to be such that there are significant innate sources of uncertainty that cannot be reduced to low levels by the '*right*' model. However, a payment-type analysis can put the actuary in a position whereby the principal sources of uncertainty can be expressed in operational terms. This in turn places an actuary in good stead:

- to elicit operational details from the self-insurer to apply directly to the valuation, and
- to express the principal residual sources of uncertainty in terms that are operationally meaningful to the self-insurer.
- to draw on and directly apply collateral information such as qualitative client advice, or valuations for large exposures such as the Scheme.

An examination by payment-type can separate between:

- Apparent valuation uncertainty which, in reality, can be attributed to trying to apply a valuation framework that does not facilitate identification of good predictors of run-off outcomes. A payment-type valuation can reduce this.
- Real valuation uncertainty that relates to innate characteristics of the liability and for which good predictors either do not exist or are elusive.

Distilling out the second uncertainty category puts the Actuary in a good position to elicit and directly apply qualitative operational information from the self-insurer.

Other approaches and breakdowns to the one presented would be possible. The example described here makes heavy use of claimants' ages for the major payment-types from about five or six years after the injury date. The advantages of organising the valuation to directly take age-mix into account include:

- Age appears to be a much better candidate to predict run-off patterns than accident year.
- Collation of data into age-groups, combined with a knowledge of the characteristics of the benefit entitlements helps the actuary to mitigate the difficulties associated with having fairly sparse data to analyse. The sparse-data obstacle is often put forward as the feature which thwarts any attempt to analyse experience by payment-type.

The approach presented here breaks the analysis down into the following categories:

- Weekly benefits.
- Medical benefits (including rehabilitation)
- Section 66/67 benefits
- Common law
- Legal & Investigation expenses
- Death benefits
- Recoveries

The previous discussion indicates that weekly and medical benefit entitlements are the most significant contributors to the liability and hence are worthy of the greatest focus. Section 66 & 67 benefits and common law entitlements contribute significantly to projected payments for the first eight to ten years after injury, but are much less important in the far tail. Legal, investigation and other liability components are generally much less significant.

## *7.1 Weekly Benefits*

Weekly benefits are usually the most financially significant payment type. At the 30 June 2008 Scheme assessment, approximately 48% of the outstanding claims liability estimate was attributable to this payment-type. This category is worthy of detailed review.

As will be seen, the approach presented here also captures a portion of commutation and common law liability in addition to weekly benefits. On this basis, this component of the analysis would be expected to account for more than half of the outstanding claims liability

In the approach presented here, the analysis is broken down into:

- accident years at advanced development stages (say more than 5 or 6 years after the date of injury)
- more recent accident years

### *Accident years at advanced development stages*

This is further subdivided into:

- Regular annuitants
- Assessment to determine whether adjustment is required to allow for:
  - Non-retirement decrements
  - *IBNR* annuitants
  - Improved/Deteriorating partial return to work
- Sporadic income replacement

*For more recent accident years*

- A payments per active claim (PPAC) analysis, informed by both:
  - Experience reviewed in a PPAC framework
  - Projected experience arising from the annuity analysis for older accident years.

A more detailed description of the approach follows:

*Accident Years at advanced development stages (say, beyond about development year 5 or 6)*

Examination of weekly benefit payments on a claim by claim basis will usually reveal a number of claimants who are in receipt of quite regular payments over many years. I refer to these as regular annuitants. A segment of a typical table for such an examination is displayed below.

| | | Payment Year | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Claim No.** | **Accident Year** | **Date of Birth** | **2002** | **2003** | **2004** | **2005** | **2006** | **2007** | **2008** | **Status** | **Deemed Rate 31.12.2008** |
| 000419 | **2000** | 1952 12 08 | 4,492 | - | - | - | - | - | - | | |
| 000642 | **2000** | 1952 11 23 | 16,337 | 14,867 | 16,232 | 17,578 | 14,485 | - | - | | |
| 000744 | **2000** | 1951 02 13 | 10,520 | 12,461 | 12,924 | 22,412 | 29,308 | 19,228 | 19,275 | y | 19,601 |
| 001431 | **2001** | 1950 09 21 | 3,902 | - | - | - | - | - | - | | |
| 001444 | **2001** | 1953 02 06 | 9,433 | - | - | - | - | - | - | | |
| 001681 | **2001** | 1950 02 01 | 6,436 | - | - | - | - | - | - | | |
| 001767 | **2001** | 1952 01 09 | 518 | - | - | - | - | - | - | | |
| 010104 | **2001** | 1953 08 24 | 30,515 | 16,804 | 17,257 | 15,356 | 16,695 | 18,729 | 19,488 | y | 19,817 |
| 010111 | **2001** | 1952 11 30 | 259 | - | - | - | - | - | - | | |
| 010193 | **2001** | 1954 05 25 | 27,346 | 1,670 | - | 45,680 | 17,262 | 18,588 | 20,840 | y | 21,192 |
| 010244 | **2001** | 1953 11 11 | - | 1,449 | - | - | - | - | - | | |
| 010255 | **2001** | 1951 02 02 | - | - | 3,034 | 246 | - | - | - | | |
| 010332 | **2001** | 1952 01 25 | 553 | - | - | - | - | - | - | | |
| 010451 | **2001** | 1953 09 26 | - | 1,665 | - | - | - | - | - | | |
| 010480 | **2001** | 1951 11 26 | 1,341 | - | - | - | - | - | - | | |
| 010483 | **2001** | 1951 03 06 | 1,444 | - | - | - | - | - | - | | |
| 970069 | **1997** | 1952 02 06 | - | - | 50,190 | 6,960 | 7,200 | 7,920 | 7,800 | y | 7,932 |

Once about five or six years after injury has passed, and regular annuitants' payment streams have subsequently ceased, it seems it is almost always due to the claimant either reaching the statutory retirement age, or receiving a commutation or common law settlement. Evidence for significant return to work deeper in the tail than about development year six seems thin, making an annuity approach (that can build in benefit cessation at the statutory retirement age) highly attractive.

It is usually straightforward to identify the regular annuitants. In the table portion shown, there are four. It is also usually straightforward to identify the annuity rate at the balance date. Where batch processing obscures the annuity rate, it can usually be supplied by the self-insurer.

A standard annuity approach can be applied to estimate the outstanding weekly benefit liability for the regular annuitants, applying a benefit cut-off at age 66. Mortality is one decrement that should always be allowed for. It is also possible that a return to work decrement might also be justified though this would need to be supported by experience.

If, when reviewing the claims history for evidence of non-retirement/non-mortality decrements, decrements associated with cessations that have occurred due to common law or commutation settlements are ignored, the annuity projection should have a convenient implicit property. The liability associated with future common law settlements (and also the rather more unlikely commutation settlements) is likely to be captured in the weekly benefit valuation. This is because it is highly likely that if future common law settlements occur (which can only include compensation for economic loss), they are likely to arise out of the pool of regular annuitants. When a common law settlement occurs, liability for future income replacement entitlements is extinguished, and replaced by a lump sum. To the extent that the lump sum is below or above the value assigned by the annuity valuation for weekly benefits, there will be a release or strain.

There are various degrees to which the annuity approach can be embellished. Adjustment to allow for the following features of the weekly income can be considered, but once about five or six years since the injury has passed, their net impact seems small in comparison to the total weekly benefit liability:

- late-commencing annuitants
- non-retirement decrements
- sporadic income replacement benefits
- partial return to work (both improvements and deterioration)

The aim of this section of the paper is to provide a broad description of a payment-type valuation framework that seems tractable, so a prescriptive, detailed description of how this might be done has not been presented.

For late commencing annuitants and non-retirement decrements, a possible approach involves treating them as a unit. :

- Claims that have either commenced or ceased receiving regular income replacement benefits over (say) a five-year period can be identified (for reasons described earlier, cessations due to receipt of common law or commutation entitlements are not treated as cessations).
- An estimate can be made of the payment rate associated with the ceasing or commencing stream. A positive sign can be applied to this value in the case of a commencement, and a negative one in the case of a cessation.
- Across broad age and development-year bands, the sum of these payment streams can be collated and expressed as a proportion of the aggregate amounts of income replacement payment streams for the regular annuitants.
- Based on a review of this, a loading/discount factor can then be selected.

In each case I have examined, the required loading (positive or negative) has been very small. That is, the two effects substantially offset one another. Any net effect is small in comparison to the liability associated with regular annuitants.

It should be recognised that when late-commencing annuitants eventuate, they often start with a substantial back-payment (as can be seen for the last claim in the sub-list presented earlier). The segment of the previous table shows one late commencing annuitant (with the first year, inclusive of substantial back-payments shaded green). Several possible explanations exist for late-commencing annuitants, including:

- claims denied by the self-insurer but which ultimately get an award at the Commission.
- recurrence of symptoms
- gradual deterioration which eventually turns the claim into one with lost time

Allowance for back-payments can be considered together with allowance for sporadic income replacement payments (amounts delayed until some years after injury, and which are paid over too short a period for the claimant to be considered as a regular annuitant). General reasoning would suggest that, in terms of number of years since injury, there is likely to come a point at which further sporadic amounts will become increasingly unlikely. This should be taken into account in determining any loading applied to allow for this component of the weekly benefits liability.

The annuity approach produces a projection in respect of each active claimant. If a breakdown of the liability by accident year is required, this can be done by referencing the accident-year associated with each claimant, and aggregating the results by injury period.

Though the tail for this payment-type is very long, in current-value terms, weekly benefits have characteristics that mean they are more straightforward to estimate than some other payment types. However, uncertainty about future rates of benefit indexation (caused by uncertainty in inflation outcomes) is a highly important systemic feature.

*More Recent Accident Periods*

For more recent accident periods, considering the nature of the benefits, a PPAC approach has appeal. This valuation method requires a projection of the number of claims that will be 'active' in relation to weekly benefits for each future transaction period. Because of the relatively small size of self-insurer portfolios, it is usually convenient to use quite long development period cohorts in the definition of whether a claim should be regarded as 'active.' Generally, a definition that a claim is 'active' if it receives a weekly benefit payment at some time over the year seems to be quite workable.

For each accident year, the number of active claims at each development year can be modelled as a factor (usually less than 100%) multiplied by the number active in the previous year. The factor is termed the continuance rate. A corollary of earlier discussion is that at advanced development years, continuance rates will most likely reflect the proportion of annuitants in one year who do not reach the statutory retirement age at the next.

The projected active claims are multiplied by an assumed PPAC to project the run-off.

For late development periods, there is little experience on which to base continuance rate or PPAC estimates. At very advanced development periods (beyond development year 22 at the time of writing) there is no 1987 Act experience to guide the projections at all. However, it is possible to inform the PPAC model based on the annuity projections for earlier accident years.

It is now several years since the 2001 reforms, and for the first seven or eight development years, post-reform experience can be used directly as the basis for developing projection assumptions. However, for accident years prior to 2001, there is a risk that the mix, by both age and injury severity, of the remaining income replacement claimants (ie those that remain from the accident years where settlement by lump sum was once prevalent), might be different to that which would have existed had lump sum settlements been subject to the restrictions that apply now. Consequently, it is possible that continuance rates in recent transaction years for accident years prior to 2001 will not be predictive of continuance rates that will be experienced when recent accident years reach the same stage of development. I have no suggestion for action that can be taken to mitigate this issue, but it should be recognised as a contributor to the uncertainty that exists regarding the extent to which outcomes may depart from the liability estimate.

## *7.2 Medical Benefits (including rehabilitation)*

For self-insurer assessments it seems reasonable to collapse medical and rehabilitation liability assessment into a single category (in effect, treating rehabilitation costs as a special type of medical benefit).

An important characteristic of medical treatment benefits has been highlighted in earlier discussion. Entitlement to their reimbursement has no statutory, age-based cut-off. Medical benefits could continue to be paid until the claimant's death, so in the extreme, benefits may continue until claimants are in their 90s.

Analysis of experience, and general reasoning, suggest that the liability estimate for this payment-type is subject to the greatest uncertainty, eclipsing that associated with weekly benefits.

Some sources of uncertainty include:

- Future medical cost inflation
- Uncertainty about the future treatment needs of the pool of claimants
- The possibility that claimants in their elderly years may increase their utilisation of medical services. (see Sherman & Diss, 2005 for a USA-based discussion of this)
- Any future structural changes to the general mechanisms of health-care delivery that might have the effect of cost-shifting to or from workers' compensation.
- Potential future mortality improvement

Examination of the history on a claim by claim basis often indicates that at advanced development periods medical benefit payments have some annuity-like characteristics, but they are not as strong as for weekly benefits.

Individuals to whom a medical benefit is paid in a year are likely to have received medical benefit payments in preceding years. They are also likely to receive medical benefits in subsequent years. However, compared to income replacement, medical payments are much more variable. There is also a higher likelihood that the experience could be punctuated by years when no medical payments are received. Regular payment patterns at the individual claim level do not exist.

The next table shows an excerpt of medical benefits payment experience for a random selection of 1997 accident year claims for one self-insurer. It illustrates the much more erratic nature of the fine detail of individual experience in comparison to that for weekly benefits.

| Claim Number | Claimant Age | Payment Year | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 30.6.08 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
| **970373** | 49 | 0 | 1,783 | 430 | 0 | 0 | 0 | 9,021 |
| **970489** | 52 | 155 | 0 | 0 | 0 | 0 | 0 | 0 |
| **970531** | 62 | 1,432 | 155 | 170 | 1,270 | 444 | 116 | 597 |
| **970611** | 37 | 0 | 0 | 870 | 0 | 0 | 0 | 0 |
| **970735** | 47 | 0 | 2,011 | 193 | 0 | 0 | 0 | 0 |
| **970838** | 54 | 450 | 500 | 0 | 54 | 945 | 0 | 0 |
| **970855** | 39 | 0 | 0 | 288 | 0 | 0 | 0 | 0 |
| **970869** | 47 | 0 | 0 | 0 | 0 | 0 | 1,365 | 922 |
| **970873** | 53 | 315 | 2,321 | 0 | 0 | 0 | 0 | 0 |
| **970938** | 46 | 740 | 32 | 256 | 181 | 459 | 16,790 | 24,278 |
| **970944** | 59 | 1,813 | 3,540 | 4,987 | 4,142 | 4,687 | 450 | 0 |
| **970977** | 46 | 0 | 0 | 1,631 | 87 | 0 | 0 | 82 |
| **970983** | 46 | 0 | 0 | 0 | 700 | 0 | 0 | 0 |
| **971000** | 71 | 197 | 196 | 324 | 52 | 164 | 114 | 0 |
| **971003** | 57 | 0 | 700 | 16,290 | 0 | 0 | 0 | 0 |

Because of the variability, the uncertainty associated with possible payment levels at advanced development years is greater than that associated with income replacement benefits. This is especially true of future payments for the most developed accident years, since no experience at such advanced development stages exists yet.

Features of the payment experience that made claim-by-claim assessment attractive for weekly benefits in old accident years do not exist for medical benefit payments. An appropriate valuation basis that one can be confident about does not seem possible to identify in the same way that can be done for weekly benefits.

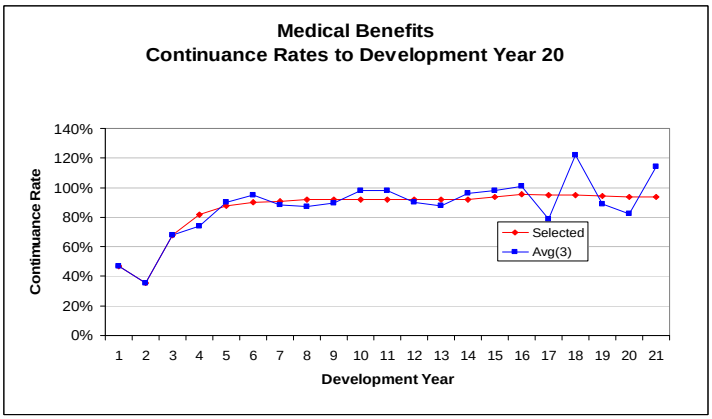
Given the general nature of this liability component, a PPAC or annuity-style assessment approach seems to have merit, but the most appropriate structure seems less clear cut than for weekly benefits. Further, selection of model parameters will often be problematic. This seems to reflect the unpredictable nature of this liability component.

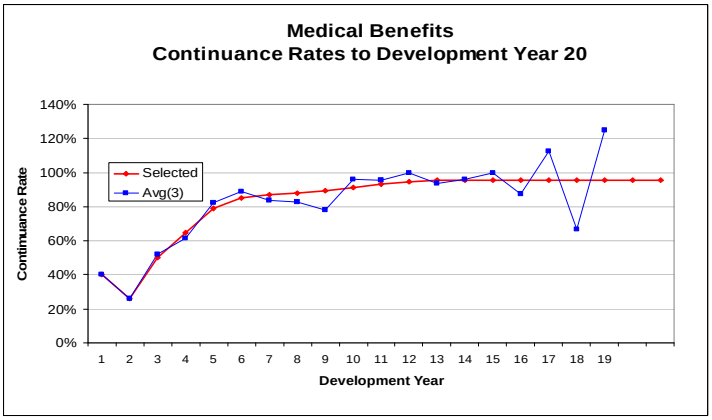
On balance, I have come to the view that a PPAC framework is the most appropriate to apply, with active claims defined in a similar way to that suggested for weekly benefits (ie in a given year, a claim is deemed an active medical claimant if, during the year the claimant receives a medical payment). The reasons for favouring a PPAC approach are:

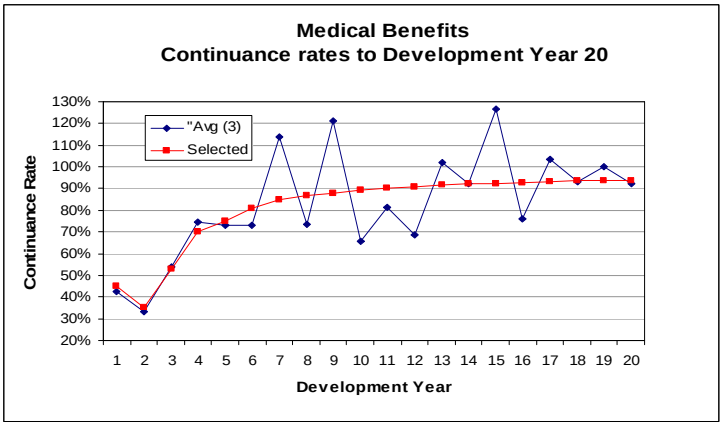
- averaged across groups of active claims, PPACs seem 'reasonably' stable.
- active claim numbers can be projected by extrapolating continuance rates observed historically (which, though subject to variability, do seem to follow a logical pattern). For projections beyond development years for which an experience history exists, the continuance rates can be overlain with a mortality allowance.
- an obvious, superior alternative does not seem to exist.

*Short-Term Continuance Rates*

Typical short-term continuance rate patterns are illustrated in the next few charts for self-insurers of different sizes (largest at the top).



There is a generally repeating pattern across the different self-insurers, though it becomes more difficult to discern as the size of the self-insurer's exposure reduces.

The process by which assumptions may be set can take a variety of forms. Continuance rate assumptions can be set by hand fitting, informed by the self-insurer's longer-term arithmetic or geometric averages experience. Alternatively, a more formal statistical curve-fitting process can be applied. The main point to which attention is drawn in this paper is that setting a sensible valuation basis seems feasible, albeit subject to greater uncertainty than for some other payment-types.

At the most advanced development years for which data is available, a long-term continuance rate can be determined in line with the discussion in the previous sub-section. In datasets that I have dealt with, long-term rates of between approximately 93% and 97% have seemed to be reasonably consistent with emerging experience.

Where a range of long-term continuance rates seem reasonable, it can be worthwhile determining results with values at either end of what appears to be a reasonable range and including commentary about the spread of results in a discussion about uncertainty. The results can be quite sensitive to even small changes in this assumption. This seems to reflect genuine and innate uncertainty about medical cost outcomes.

### *Long-Term Continuance Rates*

One can reason that mortality is unlikely to have had a significant impact on the observed continuance rates, but in the advanced tail, it will gradually become a more influential factor.

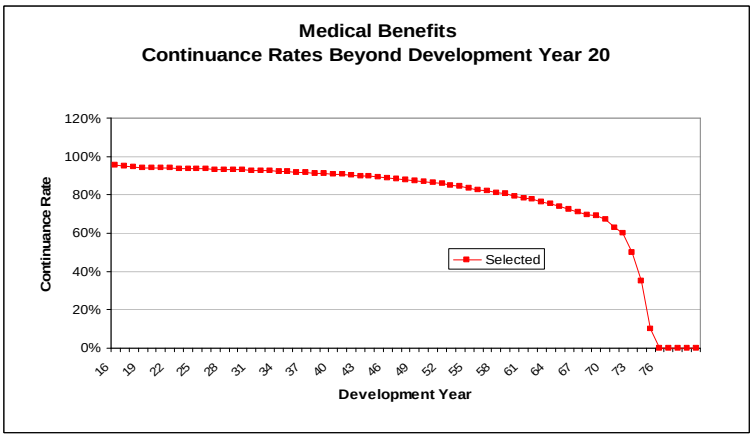
A hybrid approach is possible that, for accident-years that are at advanced development stages, uses the age of active claimants and mortality as inputs to help project the future number of active medical claimants. However, mortality is not the only decrement that requires consideration. Over development years for which experience exists (now 22, albeit heterogeneous), continuance rates are significantly lower than one would expect from mortality alone.

The precise mechanism for incorporating mortality into continuance rate assumptions at late development periods could take a number of forms. A workable example involves picking a development stage by which continuance rates can be assumed to have flattened off. For each active medical claimant at that development point in the history, the likelihood that they will be active at future development periods can be determined by assuming both the flat long-term continuance rate and a reduction based on mortality decrements from standard life tables.

As a further illustration of medical benefit liability uncertainty, there is some risk that non-mortality discontinuance rates could alter in the very far tail. An allowance for this could be made, but it would be speculative. Similarly, it is possible that population mortality may not be an appropriate assumption for the pool of claimants that survive to the far tail.

This suggested approach implicitly assumes that, by the time more recent accident years develop to the same point as that where mortality effects are examined, the age-mix of the active medical claimant group will be similar to the mix for the group reviewed. The process by which the basis is set could be altered if there was any reason to expect this assumption would be unreasonable.

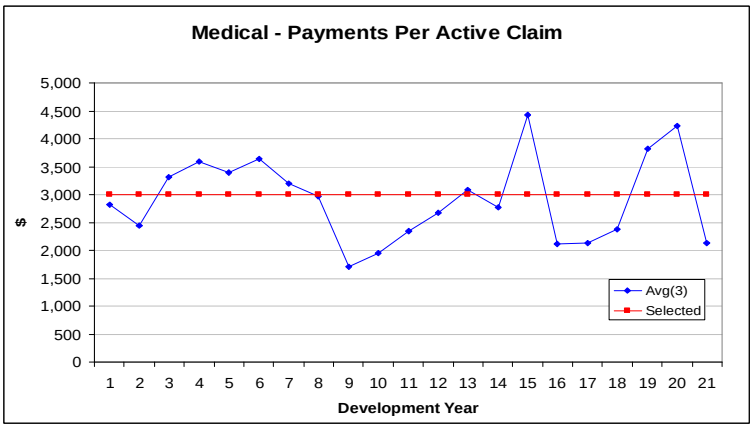
The general shape for the continuance rate curve that emerges from the form of analysis described is shown in the next chart.

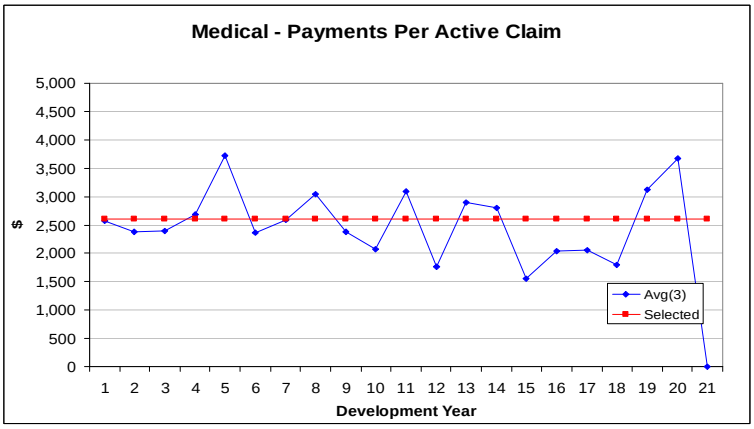



The process of arriving at the continuance rate assumptions could be adjusted if it was thought that, at more advanced development years, non-mortality decrements would become increasingly unlikely.

*Payments Per Active Claim*

A typical, inflation adjusted, PPAC experience summary for a self insurer is set out below in graphical form. With the blue line, the graph shows the PPAC experience at each development year, averaged over the last three payment years. The red line is drawn at what appears to be a reasonable estimate of the smooth trend around which the blue line varies. A second chart shows similar information for a smaller self-insurer.



It is difficult to see obvious structure in the PPAC experience for each of the self-insurers presented. Assuming a constant PPAC across all development years seems reasonable in view of the claims history. In other cases a structural changes by development year may be evident. As applies to all aspects of the valuation, it is important to consider the particular circumstances of the self-insurer under consideration before determining what form the projection assumption should take.

The smaller the self-insurer, the more likely it is that random variation will obscure any underlying pattern. For smaller self-insurers, it can be worthwhile working with larger accident and development year groupings than a single year to improve the chances of underlying patterns being identified.

As one moves from larger to smaller self-insurer sizes, medical benefit liability estimation is the payment-type that usually becomes troubling first. This is due to the combination of:

- volatility in experience obscuring underlying 'mean' patterns.
- the difficulty in translating collateral information such as that which might be distilled from the Scheme valuation. The translation is difficult, because there are breakdowns applied in the Scheme valuation that would not be feasible to reproduce for a self-insurer.
- The financial significance of the payment-type.

Establishing a medical benefits projection basis involves determining projection assumptions based on what may be volatile data, no matter how it is summarised. However, it does not follow that a payment-type framework should necessarily be abandoned. At the size level where selecting a medical benefits basis seems problematic, it is likely that experience reviewed in an aggregate framework will be volatile as well. It may very well be that an appropriate valuation basis is no more easy to settle on in an aggregate framework.

## *7.3 Section 66 & 67*

Compared to the weekly and medical benefits liability, the Section 66/67 liability is far less financially significant.

For self-insurer valuations, the similar characteristics of benefits payable under these Sections mean that they can reasonably be considered together.

An approach that seems workable involves projecting the number of future Section 66/67 payments first, and then estimating an average payment size (which may vary by development period) to multiply by the number of projected awards. If the development of assumptions based on a self-insurer's own experience seems difficult due to sparse data, it may be reasonable to develop assumptions drawn on observations from the Scheme valuation.

*Frequency and Incidence Pattern*

Analysis of Section 66 & 67 benefits is complicated by the history of their application. For instance, before 2001, non-economic loss payments would sometimes be wrapped up together with other entitlements in a commutation settlement. It can sometimes be worthwhile discussing with the self-insurer how these entitlements have been coded historically, so as to understand how the history should be interpreted.

Currently, the Scheme valuation separates assessment of the Section 66 liability investigation into deafness and non deafness subcategories. Such a split is unlikely to be feasible for a self-insurer, but it can be worthwhile to recognise that Section 66 deafness payments are typically small and late developing. Further their incidence has been subject to significant shifts over time.

The proportion of claimants that the Scheme valuation anticipates will ultimately receive a Section 66 payment can be estimated from information presented in the Scheme Report; though it requires drawing together information from the deafness and non-deafness sections. For non-deafness claims, the Scheme actuarial assessment indicates that since the 2001 reforms, approximately 10-12% of all incurred claims receive a section 66 payment. This is approximately 5,000 claims per annum. The Scheme projection allows for approximately 1,500 deafness Section 66 claims per annum, so in aggregate the proportion of all claims across the Scheme that are projected to ultimately receive a section 66 payment is approximately 15%. In earlier periods, the proportion was somewhat lower, and from 1990 to 1995, the mix of claimants was much more heavily weighted towards deafness.

Scheme-wide, since the 2001 reforms approximately 25-30% of claimants who receive a section 66 payment also receive a section 67 payment (pre-reform it was much higher), although the section 67 payment may be more delayed as it is more open to dispute.

To estimate the number of Section 66/67 settlements in the run-off for a self-insurer a Bornheutter Ferguson approach can be applied with a long-run average proportion of total claims likely to receive a section 66/67 benefit taking the place of the initial loss ratio. If the self-insurer's experience is deep enough, the basis can be developed with reference to the self-insurer's own experience. Failing that, Scheme-based assumptions for incidence patterns and the proportion of total claims likely to receive such benefits can be regarded as a reasonable default.

*Size*

The size of Section 66 and 67 payments in respect of different injuries has varied over time. The history of entitlements has been summarised in Section 2 of this paper. Initially the task facing an actuary trying to use a history subject to the degree of external influence that has beset Section 66 & 67 entitlements may seem daunting.

A case can be made that size allowance should vary by accident period, but in practice the majority of the Section 66/67 outstanding claims liability will now be related to the post-reform environment. For the most part, an average size assumption can be drawn from post 2001 experience in a straightforward manner, with the only required adjustment being that needed to take account of the 10% increase in Section 66 payments from 2007. However, if pre reform experience is used to inform any of the projected run-off for post reform accident periods, care should be taken to ensure that payments are converted to what they would have been in the post-reform environment first.

## *7.4 Common Law*

In the discussion about the assessment of the weekly benefit liability, the case was made that the suggested approach should implicitly allow for common law settlements for accident years advanced enough for the annuity approach to be applied

At more recent accident periods, it is arguable whether there is an implicit allowance or not (the regular annuitants from which common law claimants are typically drawn will still be establishing themselves).

In this paper, the term 'new' common law is applied to claims assessed against the post-reform access criteria. Any assessed under the previous access criteria are referred to as 'old' common law.

Under old common law arrangements, claimants were required to elect to continue to receive statutory benefits, or to pursue a common law entitlement. Consequently, the common law case reserve contained the amount expected to be paid in damages and common law legal expenses. Generally, under the new arrangements, statutory benefit case estimate fields (weekly, medical, section 66& 67) can continue to hold non-zero amounts, with the common law case estimate carrying any residual amount. While this is usually true, case reserving practice should be discussed with the particular self-insurer before any use is made of the case estimate field for valuation purposes.

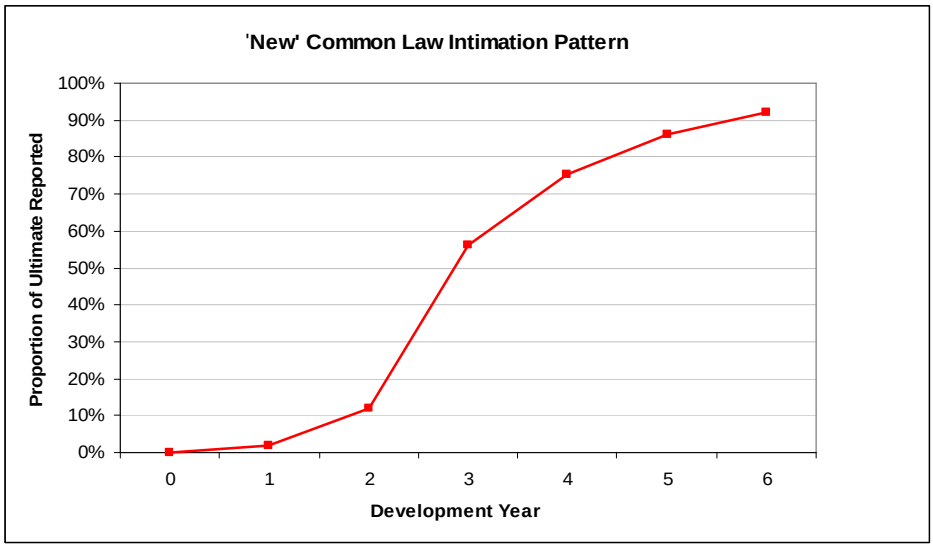
To determine an explicit allowance, a similar process to that suggested for Section 66 & 67 entitlements can be applied.

The number of common law claims for a self-insurer is likely to be too small to reliably distill an appropriate common law frequency assumption or assumed intimation pattern from the self-insurer's own experience.

*Frequency and Incidence Pattern*

To estimate the number of common law settlements in the run-off for a self-insurer a Bornheutter Ferguson approach can be applied with a long-run average proportion of total claims likely to receive a common law benefit taking the place of the initial loss ratio. If the self-insurer's experience is deep enough, the basis can be developed with reference to the self-insurer's own experience. Failing that, Scheme-based assumptions for incidence patterns and the proportion of total claims likely to receive such benefits can be regarded as a reasonable default.

At the 30 June 2008 Scheme valuation the ultimate number of 'new' common law intimations was estimated to be approximately 0.5% of all claims. An intimation pattern that seems reasonable, based on my interpretation of the Scheme valuation is set out in the next chart.




With these inputs, it should be straightforward to establish a Bornheutter Ferguson valuation basis to estimate the number of unreported common law intimations.

*Size*

For IBNR claims, if the self-insurer's experience is too sparse o allow development of an entity specific average claim size assumption, in my opinion it is reasonable to default to the assumptions applied for the Scheme valuation.

At 30 June 2008, in current-value terms, the Scheme valuation allowed for:

- 5% of intimations to settle at no cost
- 5% of intimations to settle for a cost less than $20,000, at an average cost of approximately $9,500.
- 90% of intimations to settle for a cost greater than $20,000, at an average cost of approximately $283,000.

On this basis, at 30 June 2008, an average size assumption in current value terms would have been approximately $255,000.

*Liability Estimate*

In current-value terms, the common law liability estimate for accident years where the annuity method is not used to estimate the weekly benefit liability can be taken as the sum of an amount for claims already intimated, plus the product of the number of estimated unreported intimations and the assumed average common law claim size.

In respect of the amount for intimated claims, the allowance should be determined based on discussion with the self-insurer. Sometimes take-up of the case reserve will be appropriate. In other cases it may not be.

As an example to illustrate this, a self-insurer may have a common law case estimation process that involves:

- Establishing a 'flag' reserve of (say) $10,000 at the time an indication is received that a common law matter may proceed
- Changing this to the amount indicated in the Statement of claim when that is received.
- Changing this to an amount in line with their own opinion of the likely settlement amount once evidence allowing them to form a view has been gathered.

Self-evidently, for this hypothetical example, whether or not the case reserve should be taken up or modified will depend on how it has been set.

Of secondary importance in terms of liability estimation, but necessary to determine a projected liability cashflow is an estimate of the payment pattern. Usually a self-insurer can provide estimated payment times for reported claims. For the allowance for unreported claims, in the absence of a firmer basis to make a payment timing estimate, it may be reasonable to assume payment at some fixed period after the projected intimation. It ought to be possible to review the self-insurers own experience of lags between intimation and payment to develop this assumption.

## *7.5 Legal and Investigation Expenses*

A number of factors associated with the 2001 reform package have had the effect of reducing the level of disputes, and hence the need for legal and investigation expenses to be incurred.

A detailed review of the claims history on a claim-by-claim basis typically reveals that legal and investigation expenditure has been concentrated around payment of lump sums. On an ongoing basis, it seems likely that costs in this category will form a much lower proportion of the liability than was the case a few years ago.

Historically, a high proportion of these costs have been associated with common law and commutation lump sum settlements, which are now much rarer. A more relevant claims history to examine for projection purposes than a complete one, is one that excludes those that can be deemed to be associated with common law and commutation lump sum settlements.

*Approach 1:*

One approach subdivides legal & investigation expenses into four broad groups being those associated with:

- Section 66/67 payments
- Common law settlements.
- Commutations.
- None of the above payment-types.

To implement this, criteria need to be established to make the subdivision. A suitable criteria may be:

- If a legal/investigation payment is made within six months of a section 66/67 payment it is regarded as being associated with a section 66/67 benefit; else
- If it is made within six months of a common law payment it is regarded as being associated with a common law payment.
- If it is made within six months of a commutation it is regarded as being associated with a commutation; else.
- It is regarded as associated with a general dispute.

For those associated with section 66/67 payments, an average payment amount per section 66/67 payment can be determined. This average can be applied to the projected number of section 66/67 awards to arrive at an estimate of the investigation & legal expense liability associated with future Section 66/67 awards.

An analogous approach can be taken for those payments associated with common law settlements.

Pragmatically, the likelihood of a future commutation can be treated as remote enough to ignore.

This leaves those associated with general disputes. Following the Scheme valuation, this history can be reviewed in a PPCI framework to estimate the legal & investigation outstanding claims liability relating to general disputes.

This approach directly takes into account the likely reduced legal and investigation expense levels that are likely given the reduced frequency of commutation and common law settlements.

*Approach 2:*

An increasingly justifiable approach is to construct a simple PPCI basis that considers all legal and investigation expenses together. Such an approach is much simpler and, recognising that most legal and investigation expenses are borne during the first eight to ten years after injury, can be justified on the grounds that sufficient time has elapsed since the reforms to allow projections based on the post-reform experience to be adopted. This simplified approach follows the processes generating the expenses less closely than approach 1 and is arguably prone to giving inappropriate results as the mix of common law, section 66 and other claims changes over time. However, in view of the (lack of) materiality attaching to these payment types, that risk may be acceptable.

## *7.6 Death Benefits*

Fatal injuries are typically reported very quickly, and any liability in respect of such claims is best estimated based on a discussion of the individual circumstances of the case in question. Entitlements include lump sum elements which are usually paid promptly and annuity benefits to dependants.

## *7.7 Recoveries*

For self-insurers, recoveries are typically (though not always) minor from a financial significance perspective. Incorporation of any allowance for recoveries needs to be cognisant of the requirements of the accounting standards. At the time this paper was written, the relevant accounting standard was AASB137. That standard requires that recoveries should be 'reasonably certain' before they can be taken into account. Self-insurers and the auditors often seem to interpret this as requiring explicit identification of which claims will generate recoveries, and from where they will be made.

If that position prevails, it probably follows that allowance for recoveries should only be incorporated where there is sufficient evidence for the self-insurer to have established a case reserve for them.

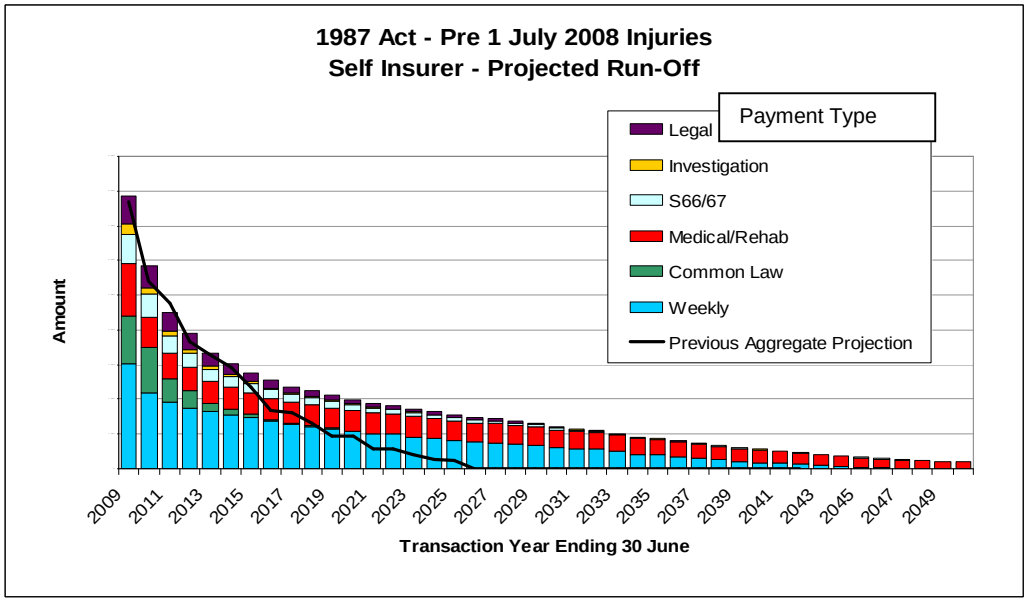
In larger portfolios, a PPCI approach can also be applied, but it is probably always worth cross-checking the result against case reserves for reasonableness.

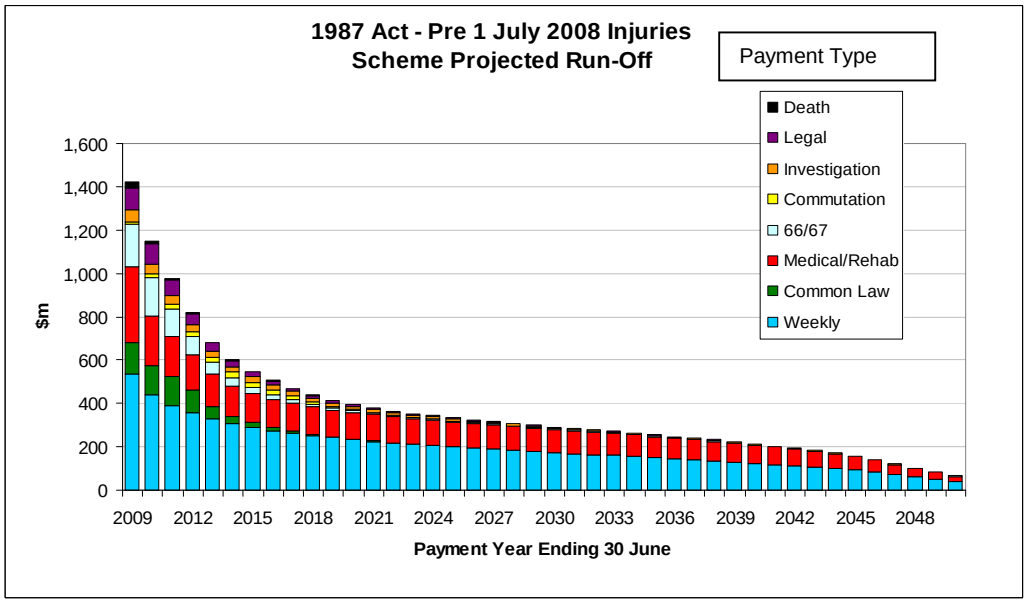
## 8. Comparison of Results on Transfer from an Aggregate to a Payment-Type Approach

This Section describes characteristics of opinion changes regarding the value of the liability and its profile that I have encountered when an aggregate approach to an outstanding claims assessment has been replaced by a payment-type analysis. Inevitably, this is a small sample, which is at risk of being heavily influenced by my personal bias.

Generally (though not universally) the liability estimate arising out of the payment-type analysis has been higher than that concluded based on the aggregate analysis. Whether this is in fact correct won't be known with certainty for several years, but I have found it much easier to rationalise the run-off projection arising from the payment-type analysis than the aggregate one.

An example is shown in the next chart. The payment-type valuation result is shown as a column graph. The thick line is the equivalent projection that had been performed under an aggregate framework. The Scheme run-off profile is shown in a second chart for comparison.



Payments are shown in the chart in inflated undiscounted terms, so the difference in discounted liability estimate between the payment-type and aggregate analysis is not as stark as the chart would indicate. However, it is still significant. In this particular case, the payment-type analysis indicated the appropriate liability estimate was approximately 15% higher than the previous aggregate analysis had indicated. Obviously the result of this comparison would vary from case to case. It is not immediately obvious whether the difference encountered here would be higher or lower than differences that would be encountered more widely.

The payment-type result looks much more reasonable when compared to the Scheme valuation than the aggregate valuation result does. In this particular case differences between the Scheme run-off and the particular self-insurer could be readily rationalised. In particular:

- The thinner weekly benefit tail (which though thinner than the Scheme valuation, was much thicker than the result flowing from the aggregate valuation) was a function of the age of the self-insurer's claimant pool. A tail as thick as the Scheme result for weekly benefits could not be plausibly projected
- The longer tail of Section 66 & 67 benefit payments reflected the large number of deafness claims for the particular self-insurer (which tend to be paid later)
- The longer tail for legal payments is a consequence of the length of the Section 66 & 67 payment tail.

With hindsight, it was straightforward to point to individual relatively young claimants, whose return to work prospects were poor and for whom payments were clearly likely to extend beyond the end of the run-off period projected under the aggregate approach.

A unifying feature on transition to a payment-type approach has been an increase in the degree of confidence that one can have in the adopted valuation basis. The reasons for this are typically a combination of:

- Comfort drawn from the fact that the outstanding claims model follows real claims drivers
- The fact that lump sum settlements are more appropriately dealt with.
- The valuation has been able to take account of qualitative information elicited from clients
- The valuation has been able to take into account collateral information from the Scheme Report.

# 9. General Points on the Merit of Payment Type Approaches

This paper makes the case that in NSW at the current time, payment-type valuations seem likely to be sufficiently more reliable than aggregate valuation approaches to warrant their consideration in a wider variety of circumstances than they have been applied historically.

In addition to this advantage, other benefits can flow from a payment-type approach. In particular:

- Client discussions and communication of the valuation result take place in terms that are operationally meaningful to the self-insurer. This can have the effect of improving the actuary's credibility as the advice is more readily accepted as being business-relevant. It is much more difficult to convey the results of an aggregate valuation analysis in a way that is meaningful or operationally actionable to those responsible for injury and claims management and prevention.
- Better two - way information flows are more likely than if the actuary's communication is in terms of a more abstract model.
- The valuation process mirrors the liability generating processes more closely.
- There is improved scope to access and apply collateral information, particularly from the Scheme valuation.
- There is increased incentive to keep up to date with Scheme developments.
- Actuarial control cycle discipline is enhanced, as the components reviewed follow the drivers of the claims process more closely.
- It is possible to adapt the valuation result to generate monitoring systems to provide the self-insurer with information about claims experience between valuations (though one needs to be mindful of the potential for batch processing to diminish the worth of such an exercise).
- There is scope to include predictors in addition to the usual ones (eg accident date, development period, past payments and case reserves) that can further enhance the reliability of the projections. Particular attention in this paper has been drawn to age as being worthy for inclusion.
- The structure provides a more helpful starting point from which to consider potential future benefit changes.

While there is an initial set-up cost associated with putting a payment-type structure in place, once established, it does not seem onerous to maintain.

## *Size and the Merit of Payment-Type Approaches*

For the very smallest self-insurers, the actuarial review is likely to include client discussions regarding the outlook for individual significant claimants. Where this occurs the valuation can, in effect, be characterised as being performed by payment-type.

For the largest self-insurers with several hundred claims per annum, data volumes seem clearly sufficient to allow analysis under the framework presented in Section 7.

The question arises as to whether there is a middle group for which explicit payment-type assessments are not feasible. Even if one concludes that such a middle group exists, and the valuation structure applied does not *explicitly* separate payment types, a review of experience by payment-type is still likely to be a worthwhile component of the investigation. At least then, aggregate techniques can be applied in an informed manner.

I have implemented payment-type valuations for portfolios with an estimated outstanding claims liability before claims handling expenses of just under $15m and approximately 250 claims per annum. I have not tested the presented approach on smaller portfolios, but I would expect that if there is a threshold at which explicit payment-type valuations are not feasible that threshold will be an outstanding claims liability well under $15m. Arguably, if the point is reached where setting a valuation under a payment-type framework seems infeasible, it is likely there would also be difficulty in establishing a reliable aggregate valuation basis.

## References

Playford M & Wright D, 2008 "*WorkCover Authority of NSW Actuarial valuation of outstanding claims liability for the NSW Workers' Compensation Nominal Insurer as at 30 June 2008"*

Schmidt A, 2009, *The Workers' Compensation Tail Revisited*, The National Council on Compensation Insurance Inc.

Sherman R & Diss G, 2005, *Estimating the Workers' Compensation Tail*, in CAS 2005 Proceedings pp579-678.