

www.pwc.com

2012 Casualty Loss Reserve Seminar

LOB-7 Estimating the Workers' Compensation Tail

A Mortality-Based Approach

Presented by: **Brian A. Jones, FCAS, MAAA**
Principal
brian.a.jones@us.pwc.com
(215) 217-5407

Date: **September 5-7, 2012**

pwc

CAS Antitrust Notice

The Casualty Actuarial Society is committed to adhering strictly to the letter and spirit of the antitrust laws. Seminars conducted under the auspices of the CAS are designed solely to provide a forum for the expression of various points of view on topics described in the programs or agendas for such meetings.

Under no circumstances shall CAS seminars be used as a means for competing companies or firms to reach any understanding – expressed or implied – that restricts competition or in any way impairs the ability of members to exercise independent business judgment regarding matters affecting competition.

It is the responsibility of all seminar participants to be aware of antitrust regulations, to prevent any written or verbal discussions that appear to violate these laws, and to adhere in every respect to the CAS antitrust compliance policy.

PwC 2

Industry Schedule P – workers' compensation One year development on "prior" year loss & ALAE reserves

(in billions)

Year	Development (in billions)
2003	\$0.33
2004	\$0.78
2005	\$1.29
2006	\$0.91
2007	\$1.68
2008	\$0.47
2009	\$0.92
2010	\$1.42
2011	\$0.51

PwC 3

Certain case reserving practices contribute to tail development

- Not accounting for future medical inflation / trend
- Making lump sum medical case reserve estimates based on "experience" rather than using life contingencies concepts for lifetime pension cases
- Using older or static life tables that don't reflect future improvements in life expectancy
- Failure to consider intermittent medical costs, such as prosthetic replacements or future surgeries, or high end-of-life care costs
- Lack of robust case reserving above primary / self-insured retentions
- Not establishing a case reserve for expenses

As do some actuarial assumptions

- Lack of sufficient historical loss development or dismissal of old patterns
- Underestimating future medical costs on lifetime WC cases and impact of inflation

PwC

4

How can a mortality-based model help with tail estimation

- Can help "calibrate" the tail
- Applicable to lifetime pension cases that comprise the majority of reserves for older years
- Can explicitly account for inflation/trends, mortality, and discount (if applicable)
- Facilitates sensitivity/scenario testing, e.g., impact of claims inflation
- Estimates various future annual claim cash flows (e.g., indemnity, medical, expense)

PwC

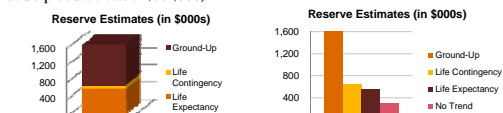
5

Sample mortality-based reserve calculation

Male - Age 50
 Life expectancy of 30 years
 Estimated annual benefit payments of \$10,000
 Assumed benefit inflation of 4% per year

	2011	2012	2013	...	2041	2051	2061	Total
(1) Trended annual payments	10,000	10,400	10,816	...	32,434	48,010	71,067	\$1.6M
(2) Probability that claimant survives through year	99.9%	99.7%	99.4%	...	56.0%	16.4%	0.7%	
(3) Expected future payments (1)x(2)	9,989	10,365	10,752	...	18,176	7,886	527	650,028

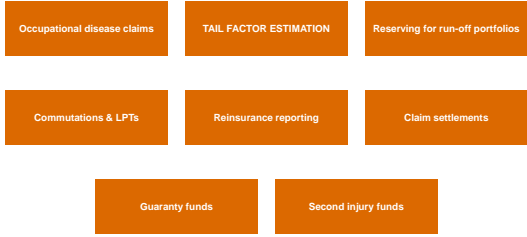
(A life expectancy approach assuming trended annual payments over the next 30 years would produce a cost of \$561,000)



PwC

6

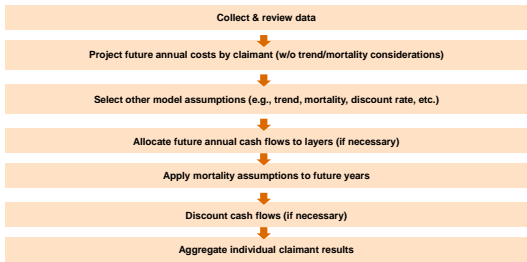
Applications of a mortality-based approach



PwC

7

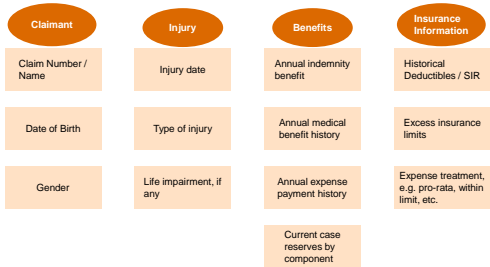
What are the steps in building a mortality-based model



PwC

8

Typical data elements



PwC

9

Major model assumptions

The four fundamental assumptions needed for a mortality-based estimation are:

Annual Future Costs

- Indemnity
- Medical
- Expense

Inflation / Trend

Life Contingencies / Mortality *

Discounting*

* If deductibles or excess layers are applicable, distribute losses by layer before applying mortality and discounting.

PwC

10

Future annual costs

Indemnity

- Benefits are statutorily-defined on a state / federal basis
- Permanent total disability awards are usually unlimited; permanent partial awards have time limits in certain states; there may also be offsets for Social Security and/or pension plans upon retirement.
- May be level or indexed by cost of living adjustments (COLAs)

Medical

- Medical payments are unlimited under workers' compensation coverage
- Substantial medical costs can occur early in the claim due to hospitalization/surgeries, but then level off after several years as maximum medical improvement is reached
- Future cost spikes are still possible, e.g., intermittent surgeries, equipment replacement, custodial end-of-life care
- Annual costs can be based on review of historical annual payments and/or claims adjusters projections (uninflated)
- Can further segment medical costs into major components (e.g., hospital, physicians, pharmaceuticals, attendant/nursing care, etc.) to address mix/trend differences

Expenses

- Annual costs can be based on historical annual payments and/or claim adjuster projections
- A "short-cut" approach might be to use a percentage loading on projected losses

PwC

11

Inflation / Trends

Cost of living adjustments

- May be required for indemnity benefits

Trends in medical payments

- Are more complicated to select, and
- Can have a big impact on the modeled reserve

PwC

12

Sample claim with various medical inflation assumptions

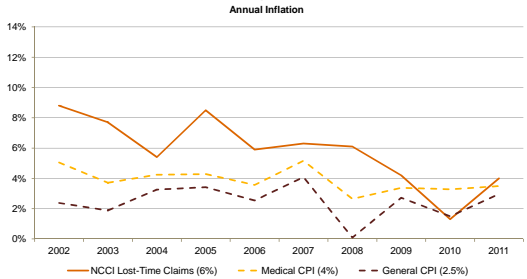
For our 50 year old male with initial annual payments of \$10,000, mortality-based estimates of total projected medical payments are:

Annual Medical Inflation	Total Projected Payments
4%	\$650,000
6%	\$1,005,000
8%	\$1,615,000

PwC

13

Medical inflation (CPI) has historically been higher than general inflation, and WC medical trends have been even higher



PwC

14

Workers' compensation medical "inflators" and "deflators"

Inflators

- Medical and technological advances
- Increasing utilization (e.g., number of doctor visits per claim)
- Use of more expensive, patented drugs (e.g., drugs/opioids for pain management)
- Mix of services toward more expensive care alternatives
- More expensive medical devices (e.g., prosthetics, motorized wheelchairs)
- Potential cost shifting from healthcare related to reforms / Medicare (MSAs)

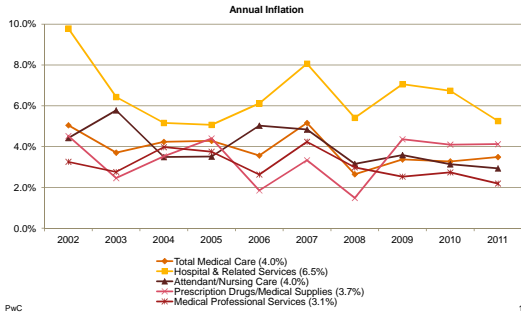
Deflators

- Recent medical supply and equipment abatement with hospital consolidation, physician employment with hospitals, and insurer pressure
- Recent pharmaceutical "patent cliff" fostering the use of cost-saving generics
- Potential cost shifting related to healthcare reform

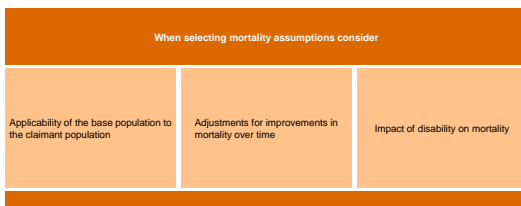
PwC

15

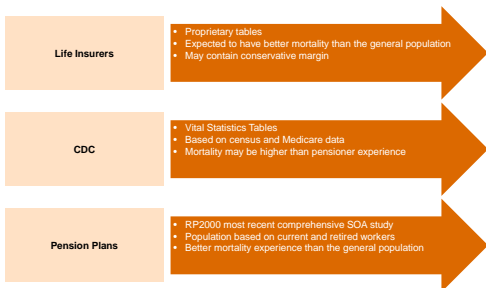
Inflation assumptions can vary for the different components of future medical payments



Selecting mortality assumptions



Mortality tables are created for different purposes



RP 2000 tables

- The RP 2000 mortality table is the most recent comprehensive mortality study performed by the SOA with sub-populations for:
 - Male vs. Female
 - Healthy vs. Disabled
 - Blue Collar vs. White Collar
- Commonly used in private pension plan valuation.
- Date used in study
 - More than 100 uninsured pension plans
 - 11 million life years of experience between 1990 and 1994
 - With improvements projected to 2000
- Pensioner life expectancy may be favorable compared to the general population.
- Can be scaled forward for improvements in life expectancy (Scale AA).

Mortality improves over time

- During the last century, general population mortality has improved significantly due to medical advancements, improved work conditions, public health initiatives, etc.
- Most experts expect continued improvements in life expectancy.
- A claimant aged 40 today will have a lower probability of death in his 60th year than a claimant aged 60 today.
- Adjustments for improvements in mortality over time can be incorporated through
 - Scale adjustments.
 - Generational tables constructed from a series of static tables which have been adjusted for improving mortality.

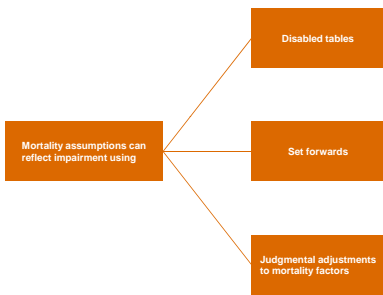
Different tables and the impact of mortality improvement

Age	GAM-83	UP-94	CDC 2007	RP-2000	RP-2000 Scaled to 2011	RP-2000 Generational
Male Life Expectancy						
30	46.5	48.5	47.1	49.5	50.6	54.4
40	36.9	38.5	37.8	39.8	40.9	43.9
50	27.7	29.5	29.0	30.3	31.4	33.4
60	19.3	20.7	20.9	21.2	22.2	23.4
70	11.9	13.3	13.7	13.4	14.1	14.7
Female Life Expectancy						
30	52.8	53.1	51.5	52.5	53.1	55.4
40	43.1	43.3	41.9	42.7	43.3	45.1
50	33.5	33.7	32.7	33.1	33.7	34.9
60	24.3	24.5	23.9	23.9	24.4	25.2
70	15.9	16.3	16.0	15.7	16.2	16.6

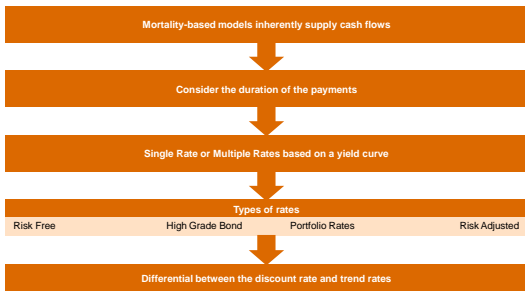
**SOA Exposure Draft
Mortality Improvement Scale BB**

- New retirement plan mortality tables and mortality improvement rates in 2013/14.
- Already observed mortality improvement experience in the US since 2000 has differed from that anticipated by Scale AA.
- Published interim improvement Scale BB which can be used for projection of base mortality rates beyond calendar year 2000 (instead of Scale AA).
- Underpinning Scale BB is a 1.0% long-term rate of mortality improvement.
- Switching from Scale AA to Scale BB may increase projections.

Some workers' compensation claimants are expected to have impaired life expectancy



Discounting



Strengths and weaknesses of a mortality-based approach

Benefits

- Intuitively appealing
- Not dependent on development history, but can help "calibrate" tail estimation
- Easily lends itself to sensitivity testing
- Good for small populations of claims where traditional methods may be too "crude"
- Inherently produces cash flows useful for layering and discounting

Challenges

- Can't apply to all claims
- Claims need to reach a lifetime "maintenance" mode
- Requires detailed data on open claims
- Requires technical skills / specialized software
- Requires considerable judgments
- There could still be a disconnect with traditional reserving due to claim settlements
