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2013 CAS Annual Meeting

A Mortality-Based Approach to Reserving for Lifetime Workers' Compensation Claims

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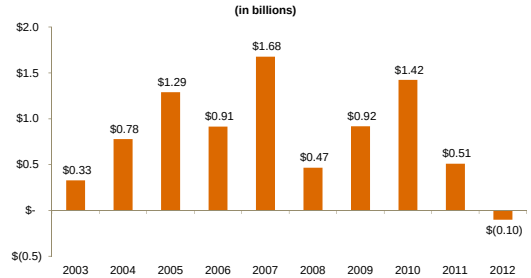
1-yr development on "prior" years Schedule P - workers' compensation



Background

Challenges to estimating reserves on lifetime workers' compensation claims

- Insufficient historical loss development data
- Impact of inflation and changes in medical utilization
- Industry case reserving practices
  - Implicit discounting
  - Reserving for fixed number of years
  - Not accounting for inflation
  - Using life expectancy (deterministic) rather than life contingency (probabilistic) approach
  - Use of outdated or static life tables

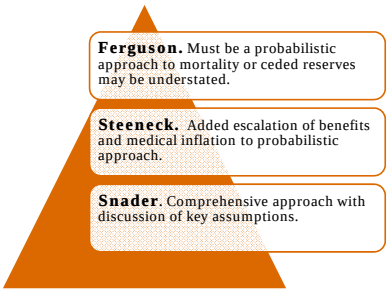
Background

What is a mortality-based model?

- Similar to pension calculations on individual lives
- Estimate of future annual cash flows for each claimant based on major cost components:
  - Indemnity benefits
  - Medical payments
  - Expenses
- Incorporates:
  - Mortality - using a probabilistic approach
  - Inflation – COLA's and medical trend
  - Discounting – if applicable

Background

Prior research lays the foundation for mortality-based techniques



Background

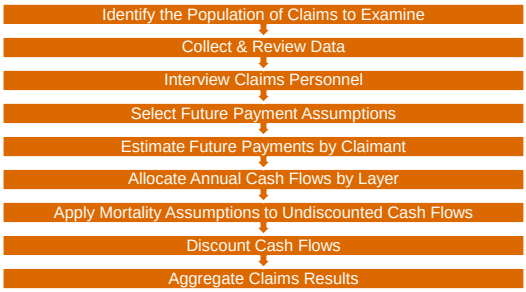
Our objective

Provide a practical framework for constructing a mortality-based model with updates on trends and resources.

- Synthesize major concepts from prior research
- Discuss updated medical trends
- Consider applicable mortality tables

Building a Mortality-Based Model

What are the steps in building a mortality-based model



Building a Mortality-Based Model

Sample mortality-based reserve calculation

Male - Age 50
Life expectancy of 30 years
$10,000 annual payments; 4% annual inflation
($000's)

2013	2014	2015	…	2042	2043	…	2060	…	Total
(1) Trended annual payments (through age 120)									
10.0	10.4	10.8	…	31.2	32.4	…	63.2	…	3,798.6
(2) Probability that claimant survives through year									
99.8%	99.5%	99.3%	…	57.9%	54.2%	…	2.0%	…	
(3) Expected future payments (1) x (2)									
10.0	10.4	10.7	…	18.1	17.6	…	1.2	…	**632.3**

Compare to Life Expectancy approach:

2013	2014	2015	…	2042	2043	…	2060	…	Total
Trended annual payments (through age 80)									
10.00	10.4	10.8	…	31.2					**560.8**

Order of calculations is important when looking at different layers

Continue previous example; introduce $500,000 deductible

	2013-22	2023-32	2033-42	2043-52	2053-62	2063+	Total
(1) Trended annual payments (through age 120)							
Ground Up	120.1	177.7	263.1	389.4	576.4	2,272.0	3,798.6
Deductible	120.1	177.7	202.2				500.0
Excess			60.8	389.4	576.4	2,272.0	3,298.6
(2) Expected future payments							
Deductible	117.9	161.1	149.7				**428.8**
Excess			36.3	134.7	31.3	1.2	**203.5**

Compare to incorrectly applying mortality before allocating to layers:

	2013-22	2023-32	2033-42	2043-52	2053-62	2063+	Total
Expected future payments							
Deductible	117.9	161.1	186.0	34.9			**500.0**
Excess				99.8	31.3	1.2	**132.3**

Same concept applies to discounting – must discount after allocating to layers.

Typical data elements

Claimant	Injury	Benefits	Insurance Information
Claim Number / Name	Injury date	Annual indemnity benefit	Historical Deductibles / SIR
Date of Birth	Type of injury	Annual medical benefit history	Excess / reinsurance limits
Gender	Life impairment, if any	Annual expense payment history	Expense treatment (e.g. pro-rata or within limit)
		Current case reserves by component	

Major model assumptions

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

Annual Future Costs	Inflation / Trend	Life Contingencies / Mortality *	Discount Rate*
Indemnity *Medical* *Expense*			

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

Key Assumptions

Inflation / trends

Cost of living adjustments
- May be required for indemnity benefits

Trends in medical payments
- Big impact on reserve
- Can be complicated – may include utilization component

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

Medical Inflation	Total Projected Payments
4%	$632,000
6%	$971,000
8%	$1,548,000

Key Assumptions: Medical Trend

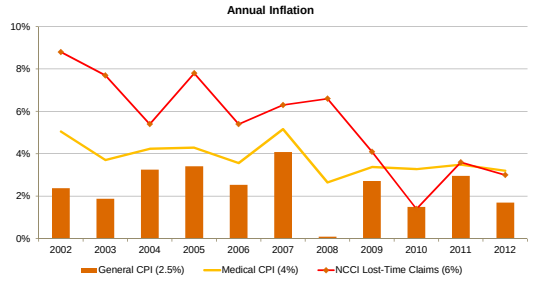
Medical "inflators" and "deflators"

	Medical CPI	Health Insurance	Workers' Comp
Inflators			
Aging population		x	x
Consolidation of healthcare providers	x	x	x
Cost of services	x	x	x
Mandated benefits/healthcare reform		x	
Mix of claims/diagnosis		x	o
Utilization - more expensive drugs, devices, procedures		x	x
Utilization - more procedures per claimant		x	x
Deflators			
Change in care method (retail clinics, virtual access)		x	
Greater price transparency and consumer price sharing	x	x	o
High performance health care networks	x	x	
Medical supply and equipment abatement	x	x	x
New hospital readmission penalties		x	x
Pharmaceutical "patent cliff"	x	x	x

O = may not have much impact on lifetime workers' compensation claims.

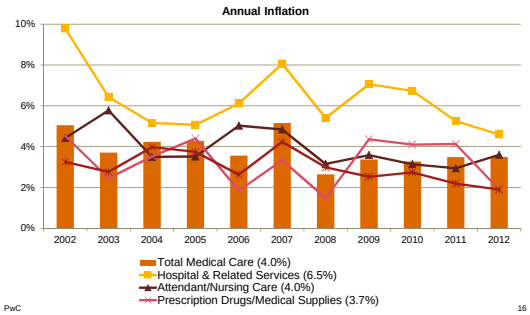
Key Assumptions: Medical Trend

Medical CPI historically higher than general CPI; WC medical trends even higher



Key Assumptions: Medical Trend

Inflation assumptions may vary between components of future medical payments



Key Assumptions: Mortality

Selecting mortality assumptions

When selecting mortality assumptions consider		
Applicability of the base population to the claimant population	Adjustments for improvements in mortality over time	Impact of disability on mortality • Set forwards • Impairment factors • Disabled tables • Blended tables

Key Assumptions: Mortality

Mortality tables are created for different purposes

Life Insurers	• Proprietary tables • Expected to have better mortality than the general population • May contain conservative margin
CDC	• Vital Statistics Tables • Based on census and Medicare data • Mortality may be higher than pensioner experience
Pension Plans	• RP2000 most recent comprehensive SOA study • Population based on current and retired workers • Better mortality experience than the general population

Key Assumptions: Mortality

RP 2000 tables

- RP 2000 is the most recent comprehensive study performed by the SOA. Includes:
  - Male vs. Female
  - Healthy vs. Disabled
  - Blue Collar vs. White Collar
- Commonly used in private pension plan valuation.
- Based on 11 million life-years (1990-94) with projection to 2000
- Can be scaled forward to future years for improvement in life expectancy

Key Assumptions: Mortality

Mortality improves over time

- General population mortality has improved significantly over past 100 years. Most experts expect continued improvements in life expectancy.
- 40 year old today will have a lower probability of death at 60 than a current 60 year old.
- Improvements in mortality over time can be incorporated through scale adjustments.
- Generational table constructed from a series of static tables which have been adjusted for improving mortality (a different table for each year, e.g. 2013, 2014, ...).

Life Expectancy Examples

	Age	GAM-83	UP-94	CDC 2007	RP-2000 Combined Healthy	RP-2000 Scaled to 2013	RP-2000 Generational	RP-2000 Disabled
Male	**30**	46.5	48.5	47.1	49.5	50.8	54.6	26.9
	50	27.7	29.5	29.0	30.3	31.6	33.6	17.7
	70	11.9	13.3	13.7	13.4	14.3	14.8	9.3
Female	**30**	52.8	53.1	51.5	52.5	53.2	55.6	39.5
	50	33.5	33.7	32.7	33.1	33.8	35.0	24.6
	70	15.9	16.3	16.0	15.7	16.3	16.7	12.4

Conclusion

Strengths and weaknesses of a mortality-based approach

Strengths

- Intuitively appealing
- Does not require development history
- 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

Weaknesses

- Claims need to reach maintenance mode
- Requires detailed data on open claims
- Requires technical skills / specialized software
- Requires several judgments
- No estimate for re-openings
- Does not contemplate settlements

Conclusion

Applications of a mortality-based approach

- Occupational disease claims
- Tail factor estimation
- Reserving for run-off portfolios
- Commutations & LPTs
- Reinsurance reporting
- Claim settlements
- Guaranty funds
- Second injury funds

Thank You

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A Mortality-Based Approach to Reserving for Lifetime Workers' Compensation Claims

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