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2013 CAS Annual Meeting

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

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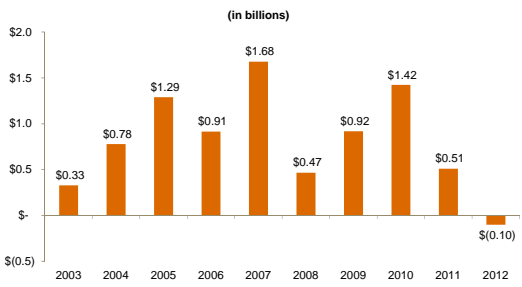
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Background

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

(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
2012	\$(0.10)

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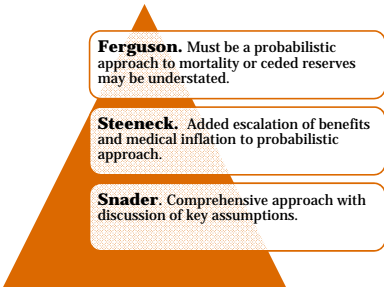
Challenges to estimating reserves on lifetime workers' compensation claims

- 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 - Use of outdated or static life tables

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

Prior research lays the foundation for mortality-based techniques

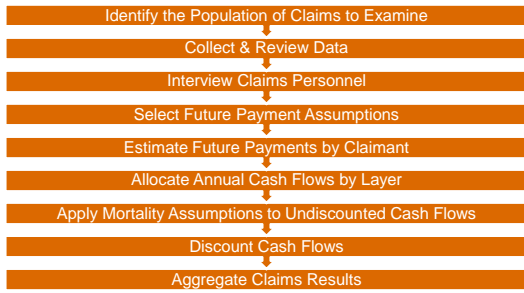


Our objective

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

What are the steps in 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

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:

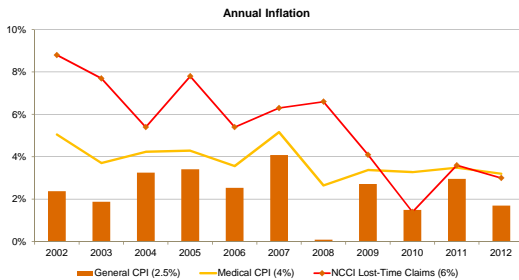
Medical Inflation	Total Projected Payments
4%	\$632,000
6%	\$971,000
8%	\$1,548,000

Medical “inflation” and “deflators”

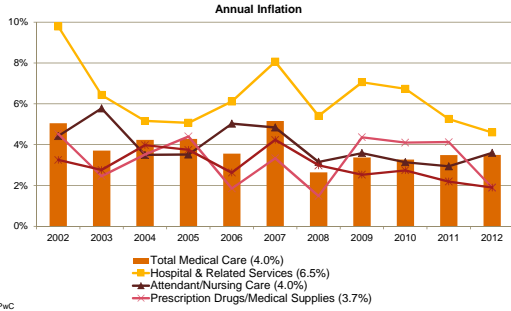
	Medical CPI	Health Insurance	Workers' Comp
Inflation			
Aging population		x	x
Consolidation of healthcare providers	x	x	x
Cost of services	x	x	x
Mandated benefits/healthcare reform		x	
Mix of claims/diagnosis		x	o
Utilization - more expensive drugs, devices, procedures		x	x
Utilization - more procedures 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.

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



Inflation assumptions may vary between components of future medical payments



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 <ul style="list-style-type: none">• Set forwards• Impairment factors• Disabled tables• Blended tables
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Mortality tables are created for different purposes

Life Insurers	<ul style="list-style-type: none">• Proprietary tables• Expected to have better mortality than the general population• May contain conservative margin
CDC	<ul style="list-style-type: none">• Vital Statistics Tables• Based on census and Medicare data• Mortality may be higher than pensioner experience
Pension Plans	<ul style="list-style-type: none">• RP2000 most recent comprehensive SOA study• Population based on current and retired workers• Better mortality experience than the general population

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

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	30.5
	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

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



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Thank You

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

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