



Understanding the Actuarial Report on Reserves

2014 CLRS
September 17th, 2014
San Diego, CA



Welcome

- Introductions

- Instructors:

- Alex Alimi, Ellen Edmonds, Kurt Johnson, Sally Levy, Sara Hemmingson, Scott Lamb

- Teams

- Logistics

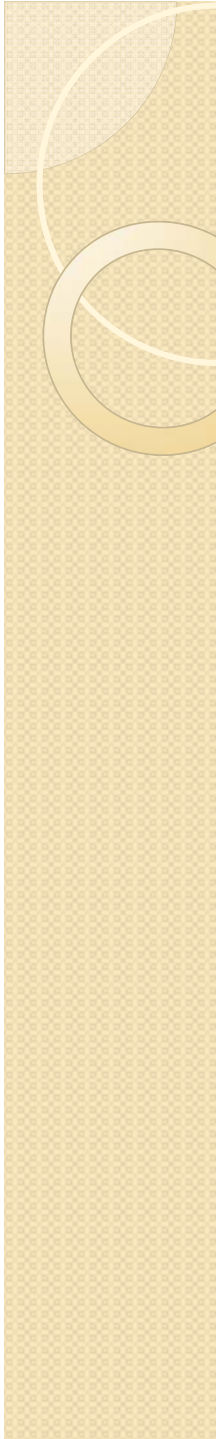
- Schedule

- Breaks at 9:30 and 2:00
- Lunch at 11:20



Overview

- Part 1 – Reserving Basics
- Part 2 – Basic Reserving Methods
- Part 3 – Comparison of Methods/Selections and Diagnostics
- Part 4 – Considerations for the Actuarial Report on Reserves



Part I

What is a reserve?

- An amount recorded in financial statements or accounting systems in order to reflect potential obligations.

Why is a reserve needed?

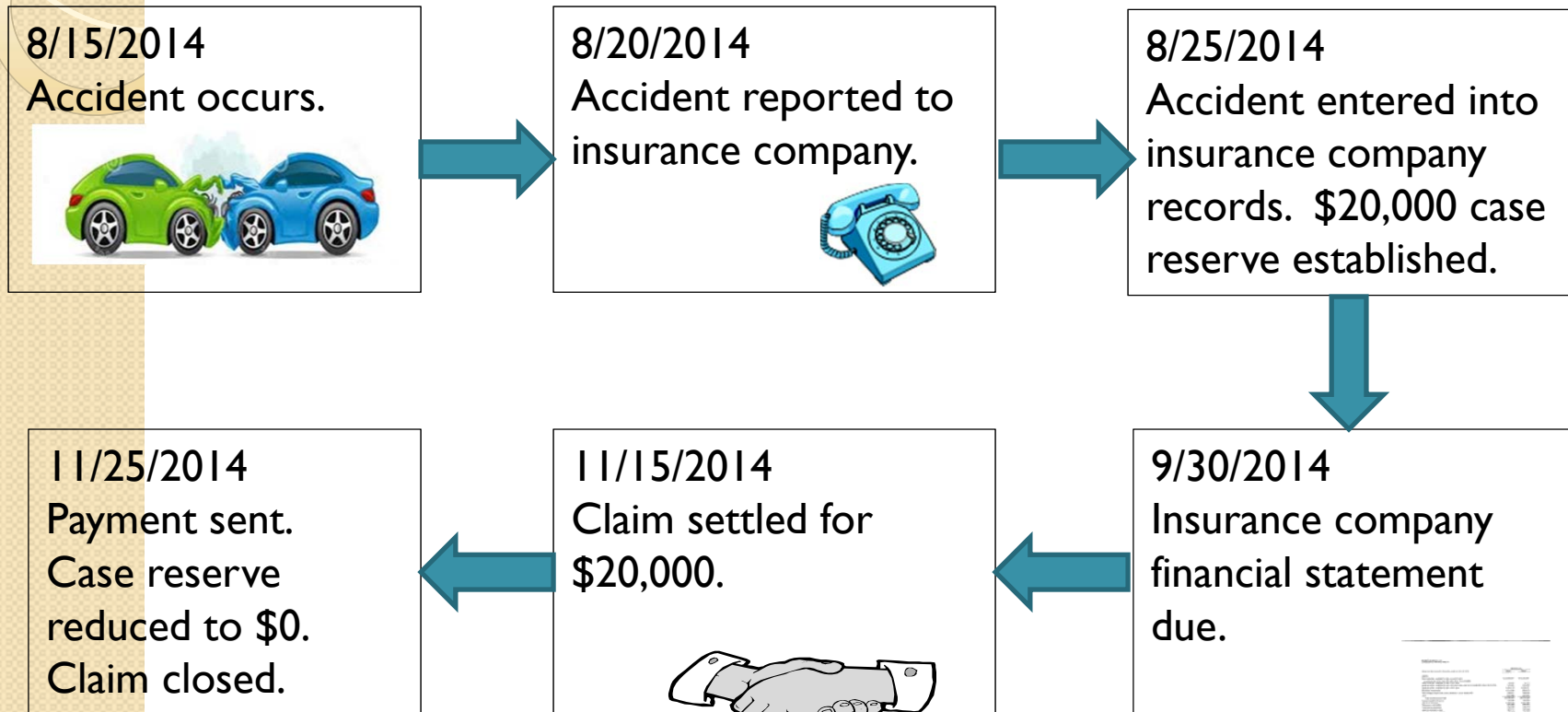
- There is a lag between the occurrence of an insured event and the final payment to the claimant.

Why is a reserve needed?



Insurer is now liable and financial statements need to reflect this.

Why is a reserve needed?



Who uses reserves and why?

- Company Management
- Enterprise Risk Management
- Regulators
- Rating Agencies
- Investors
- Analysts
- Mergers & Acquisitions



Actuarial Standards of Practice Related to Loss Reserving

ASOP 1 – Introductory Actuarial Standard of Practice

ASOP 23 – Data Quality

ASOP 36 – Statements of Actuarial Opinion Regarding
Property/Casualty Loss and Loss Adjustment Expense
Reserves

ASOP 41 – Actuarial Communications

ASOP 43 – Property/Casualty Unpaid Claim Estimates



Actuarial Statement of Principles Related to Loss Reserving

- Provides guidance to actuaries preparing loss reserve estimates
- Contains:
 - ❖ Definition
 - ❖ Principles
 - ❖ Considerations

Definitions

Carried Loss Reserve: The amount shown in a published statement or in an internal statement of financial condition.

Indicated Loss Reserve: The result of the application of a particular loss reserving evaluation procedure.

Reserve Margin/Deficit: The difference between a carried loss reserve and an indicated loss reserves.
○ Also referred to as Redundancy or Deficiency.



Elements of a Loss Reserve

- Case Reserve
- Provision for Future Development on Known Claims
- Reopened Claims Reserve
- Incurred But Not Reported
 - IBNER and IBNYR
- Claims in Transit (Incurred and Reported but not Recorded)



Elements of a Loss Reserve

- Case Reserve
 - Claim reported but not yet paid
 - Value assigned by claims adjuster or formula

- IBNR + Bulk Reserves
 - Reserves for claims not yet reported (“pure” IBNR)
 - Claims in transit
 - Development on known claims (IBNER)
 - Reserves for reopened claims

Formulas to Derive IBNR

Once an estimate of ultimate loss is obtained, the arithmetic of calculating IBNR is straightforward.

Ultimate Losses

Reported Losses

IBNR

Paid Losses

Case Reserves

IBNR

Paid Losses

Unpaid Losses

Exercise 1a

Ultimate Loss		
Reported Loss		IBNR
Paid Loss	Case Reserve	IBNR
Paid Loss	Unpaid Losses	

12,000.00	
10,000	
5,000	

Exercise 1b

Ultimate Loss		
Reported Loss		IBNR
Paid Loss	Case Reserve	IBNR
Paid Loss	Unpaid Losses	

[Yellow Box]		
[Yellow Box]		6,000
[Yellow Box]	4,000	[Yellow Box]
10,000	10,000	

Answers to Ia and Ib

12,000.00		
10,000	2,000	
5,000	5,000	2,000
5,000	7,000	

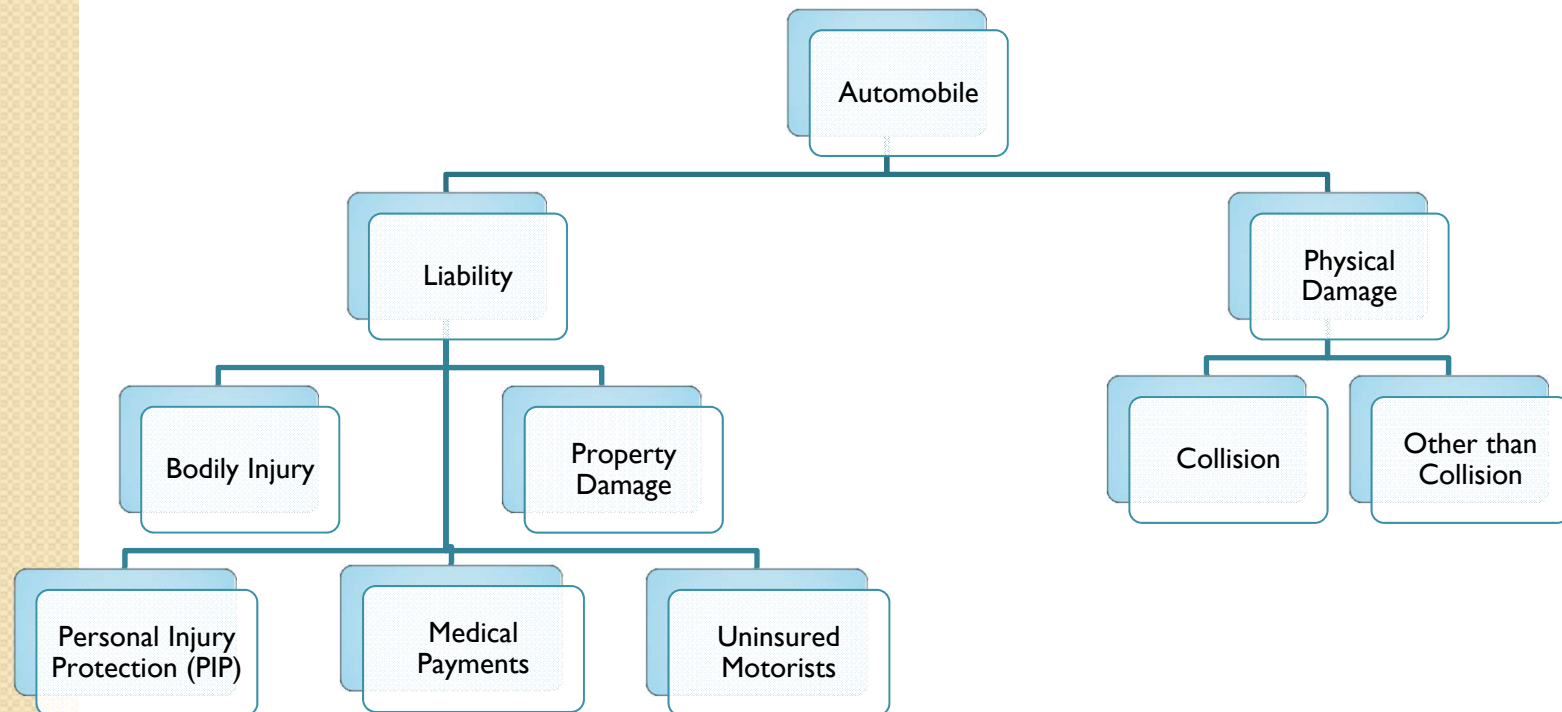
20,000.00		
14,000		6,000
10,000	4,000	6,000
10,000	10,000	

Principles

- Actuarially sound loss or loss adjustment expense reserves
 - based on *estimates*
 - derived from reasonable *assumptions*
 - using appropriate *methods*
- Inherent uncertainty
 - a range of reserves can be actuarially sound
 - true value known only when all claims settled
- Most appropriate reserve depends on
 - relative likelihood of estimates within the range
 - financial reporting context

Considerations: Homogeneity

Loss reserving accuracy is often improved by subdividing experience into groups exhibiting similar characteristics.



Considerations: Credibility

- A measure of the predictive value that is attached to a body of data.
- A group of claims should be large enough to be statistically reliable.
- Need to balance credibility and homogeneity.
 - May be a point at which partitioning divides the data into groups too small to provide credible development patterns.
- Use of external data sources
 - Examples include industry data, countrywide data

Considerations: Other

- Reinsurance
 - Is data net or gross of reinsurance?
- Policy limits and/or attachment points
- Type of data
 - Exposure
 - Losses
 - Loss adjustment expenses
 - Salvage and subrogation
- Specific to reinsurance data
 - Treaty vs. facultative
 - Pro rata vs. excess of loss

Definitions

- Loss Adjustment Expenses (LAE) are sum of:
 - Defense & Cost Containment (DCC) Expense
 - Includes all defense, litigation, and medical cost containment related expenses, whether internal or external to a company.
 - In general, includes costs associated with controlling the severity of cases.
 - Adjusting and Other (AO)
 - Includes all claims adjusting expenses, whether internal or external to a company.
 - In general, includes costs associated with recording and adjusting cases.

Data Organization

Loss Development – The financial activity on claims from the time they occur to the time they are settled and paid.

Loss Development Triangles – Compiled to measure the changes in cumulative claim activity over time in order to estimate patterns for future activity.

Loss Development Factor – The ratio of losses at successive evaluations for a defined group of claims (e.g. accident year).

Data Organization: Dates

- **Accident Date**
 - The date on which the loss occurred.
- **Report Date**
 - The date the loss is first reported to the insurer.
- **Recorded Date**
 - The date the loss is first entered into the statistical records of the insurer.
- **Accounting Date**
 - The cutoff date for separating amounts as paid or unpaid in a financial statement.
 - Sometimes referred to as the "as of date".
- **Valuation Date**
 - Date through which transactions are included in the data used to evaluate existing liability

Sources of Data

- Schedule P – Insurance company statutory financial statements contain a schedule showing 10 years of losses, LAE, S&S, and claim counts (primary only).
- Claim system reports (loss run)
 - Summary of loss runs – shows paid losses and expenses and number of claims by year as of a particular date
 - Detailed claim listing – claim by claim listing as of particular date
 - Can be very large but allows more detailed analysis

Schedule P – Part I

Years in Which Premiums Were Earned and Losses Were Incurred	Premiums Earned			Loss and Loss Expense Payments								12 Number of Claims Reported- Direct and Assumed
	1	2	3	Loss Payments		Defense and Cost Containment Payments		Adjusting and Other Payments		10	11	
	Direct and Assumed	Ceded	Net (Cols 1-2)	4	5	6	7	8	9	Salvage and Subrogation Received	Total Net Paid (Cols. 4-5+6 7+8-9)	
				Direct and Assumed	Ceded	Direct and Assumed	Ceded	Direct and Assumed	Ceded			
1. Prior	XXXX	XXXX	XXXX	(1)	(1)	-	-	-	-	-	-	XXXX
2. 2004	5,826	3,540	2,286	3,810	2,445	562	362	90	58	44	1,597	2,681
:	:	:	:	:	:	:	:	:	:	:	:	:
10. 2012	3,624	1,387	2,237	2,209	898	399	161	52	21	10	1,580	1,078
11. 2013	3,042	1,179	1,863	1,084	436	282	121	7	3	1	813	779
12. Totals	XXXX	XXXX	XXXX	7,102	3,778	1,243	644	149	82	55	3,990	XXXX

	Losses Unpaid				Defense and Cost Containment Unpaid				Adjusting and Other Unpaid		23 Salvage and Subrogation Anticipated	24 Total Net Losses and Expense Unpaid	25 Number of Claims Outstanding Direct and Assumed
	Case Basis		Bulk+IBNR		Case Basis		Bulk+IBNR		21 Direct and Assumed	22 Ceded			
	13 Direct and Assumed	14 Ceded	15 Direct and Assumed	16 Ceded	17 Direct and Assumed	18 Ceded	19 Direct and Assumed	20 Ceded					
1. Prior	-	-	-	-	-	-	-	-	-	-	-	-	-
2. 2004	10	6	-	-	-	-	1	-	1	1	-	5	1
:	:	:	:	:	:	:	:	:	:	:	:	:	:
10. 2012	341	136	79	32	-	-	31	2	18	7	3	292	39
11. 2013	1,023	413	133	58	-	-	215	19	11	5	4	887	252
12. Totals	1,374	555	212	90	-	-	247	21	30	13	7	1,184	292

Claim System Summary Exhibit

IRM General Liability (The MacDonald Company)										
Policy Period	Carrier	Valuation Date	Claim Count	Open Claims	Closed Claims	Indemnity Paid	Expense Paid	Indemnity Reserve	Expense Reserve	Total Incurred
6/30/06-12/30/07	MacDonald (SLO0001633)	04/13/12	84	2	82	\$154,575	\$861,409	\$7,500	\$4,794	\$1,030,063
12/30/07-12/30/08	MacDonald (SLO0001640)	04/13/12	0	0	0	\$0	\$0	\$0	\$0	\$0
12/30/07-12/30/08	MacDonald (SLO0001641)	04/13/12	66	8	58	\$103,284	\$919,091	\$8,500	\$30,114	\$1,060,989
12/30/08-12/31/09	MacDonald (SLO0001645)	04/13/12	71	8	63	\$113,773	\$535,995	\$44,001	\$36,685	\$731,229
12/31/09-12/31/10	MacDonald (SLO0001651)	04/13/12	42	9	33	\$58,457	\$333,532	\$69,500	\$44,578	\$512,017
12/31/09-12/31/10	MacDonald (SLO0001653)	04/13/12	0	0	0	\$0	\$0	\$0	\$0	\$0
12/31/10-1/1/2012	MacDonald (GLO211230)	04/13/12	52	19	33	\$100,450	\$159,442	\$126,250	\$46,748	\$432,891
1/1/12-1/1/13	MacDonald (GLO318501)	04/13/12	0	0	0	\$0	\$0	\$0	\$0	\$0
All Years			315	46	269	\$530,540	\$2,809,469	\$255,751	\$162,919	\$3,767,189

IRM General Liability (The MacDonald Company) Incident Only Claims										
Policy Period	Carrier	Valuation Date	Claim Count	Open Claims	Closed Claims	Indemnity Paid	Expense Paid	Indemnity Reserve	Expense Reserve	Total Incurred
6/30/06-12/30/07	MacDonald (SLO0001633)	04/13/12	147	0	147	\$0	\$139,028	\$0	\$0	\$139,028
12/30/07-12/30/08	MacDonald (SLO0001640)	04/13/12	0	0	0	\$0	\$0	\$0	\$0	\$0
12/30/07-12/30/08	MacDonald (SLO0001641)	04/13/12	106	0	106	\$0	\$105,394	\$0	\$0	\$105,394
12/30/08-12/31/09	MacDonald (SLO0001645)	04/13/12	141	0	141	\$0	\$149,934	\$0	\$0	\$149,934
12/31/09-12/31/10	MacDonald (SLO0001651)	04/13/12	109	1	108	\$0	\$202,165	\$0	\$3,032	\$205,197
12/31/09-12/31/10	MacDonald (SLO0001653)	04/13/12	0	0	0	\$0	\$0	\$0	\$0	\$0
12/31/10-12/31/11	MacDonald (GLO211230)	04/13/12	125	9	116	\$0	\$161,254	\$52,500	\$8,043	\$221,797
1/1/12-1/1/13	MacDonald (GLO318501)	04/13/12	0	0	0	\$0	\$0	\$0	\$0	\$0
All Years			628	10	618	\$0	\$757,776	\$52,500	\$11,075	\$821,351

Claim System Detail Claim Listing

Detail Loss Report

Losses From: 03/01/2008 To 03/02/2012

Claimant	Adj Off	FP	Claim Number	Accident Date	Notice Date	Close Date	O/C	Total	Claim	Medical	Expense	
Policy Number: 2843M700												
Policy Eff Date: 05/15/2010												
Accident State: NJ												
Accident Cause Text: PROP-OTHER FIRE												
Accident State: OK												
Accident Cause Text: PROP-ALL OTHER DAMAGES												
INTERSTATE REALTY MANAGE	877	FR	ELU7946	10/13/2010	10/13/2010	02/01/2011	C					
EARTHQUAKE CAUSED DAMAGE TO BUILDINGS, INCLUDING CRACKED WALLS.								Inc:	\$457,065.00	\$400,000.00	\$0.00	\$57,065.00
								Pd:	\$457,064.82	\$400,000.00	\$0.00	\$57,064.82
								O/S:	\$0.00	\$0.00	\$0.00	\$0.00
Accident Cause Text: PROP-HAIL												
MANAGEMENT INTERSTATE REA	877	FR	ELU8311	09/15/2010	10/18/2010		O					
APARTMENTS AT WILLOW ROCK, WILLOW CREEK, WILLOW GARDENS & WILLOW PARK SUSTAINED DAMAGE CAUSED BY HAIL.								Inc:	\$910,000.00	\$900,000.00	\$0.00	\$10,000.00
								Pd:	\$630,344.77	\$625,384.69	\$0.00	\$4,960.08
								O/S:	\$279,655.23	\$274,615.31	\$0.00	\$5,039.92
Accident Cause Text: UNKNOWN												
INTERSTATE REALTY MANAGE	039	FR	C6E7165	01/12/2011	01/14/2011	04/14/2011	C					
PIPE BREAK AT INSURED COMPLEX CAUSED DAMAGE TO 8 UNITS AND DISPLACED TENANTS.								Inc:	\$7,072.00	\$7,031.00	\$0.00	\$41.00
								Pd:	\$7,071.69	\$7,030.69	\$0.00	\$41.00
								O/S:	\$0.00	\$0.00	\$0.00	\$0.00
INTERSTATE REALTY MANAGE	039	FR	ENW1483	02/03/2011	03/14/2011	03/31/2011	C					
1STPP: OKLAHOMA LOCATIONS/PIPE BREAK AND WATER DAMAGE TO MULTIPLE LOCATIONS THROUGH OKLAHOMA. RELATED TO CAT FILE 36, FILE #EMY7755, AND FILE #EMY8065.								Inc:	\$0.00	\$0.00	\$0.00	\$0.00
								Pd:	\$0.00	\$0.00	\$0.00	\$0.00
								O/S:	\$0.00	\$0.00	\$0.00	\$0.00
Accident State: PA												
Accident Cause Text: PROP-OTHER FIRE												
BETHLEHEM TOWNHOUSES C/O	877	FR	EMQ5995	02/24/2011	03/09/2011		O					
FIRE IN TOWNHOME FROM UNKNOWN CAUSE.								Inc:	\$30,500.00	\$20,500.00	\$0.00	\$10,000.00
								Pd:	\$13,230.87	\$8,111.47	\$0.00	\$5,119.40
								O/S:	\$17,269.13	\$12,388.53	\$0.00	\$4,880.60
Accident Cause Text: PROP-OTHER NON-WEATHER WATER												
INTERSTATE REALTY MANA	145	FR	EMQ5783	03/01/2011	03/04/2011	02/08/2012	C					
WATER DAMAGE FROM SPRINKLER AFTER SELF-INDUCED FIRE IN TENANT'S UNIT.								Inc:	\$69,376.00	\$68,585.00	\$0.00	\$791.00
								Pd:	\$69,376.25	\$68,584.86	\$0.00	\$791.39
								O/S:	\$0.00	\$0.00	\$0.00	\$0.00

Compilation of a Triangle

- The data is sorted by year
 - Can be accident year, report year, policy year, underwriting year.
- The data is summed at the end of each valuation point (e.g. year, quarter, month).
- Current valuation is shown on the last diagonal.
- The data is organized in this way to highlight historical patterns.

Calculation of Loss Development Factors

Accident Year	Cumulative Paid Losses (\$000 Omitted)			
	Development Stage in Months			
	12	24	36	48
2004	689	1,143	1,297	1,375
2005	526	959	1,030	1,081

Accident Year	Evaluation Intervals in Months		
	12-24	24-36	36-48
	2004	1,143/689	1,297/1,143
2005	959/526	1,030/959	1,081/1,030

Calculation of Loss Development Factors

Accident Year	Evaluation Intervals in Months		
	12-24	24-36	36-48
	2004	1,143/689	1,297/1,143
2005	959/526	1,030/959	1,081/1,030

Accident Year	Evaluation Intervals in Months		
	12-24	24-36	36-48
	2004	1.659	1.135
2005	1.823	1.074	1.050



Loss Development Factors - Averages

- Simple Averages
 - All years
 - Recent years
 - Excluding high and low values (truncated)

- Weighted Averages
 - Weighted by data
 - All years
 - Recent years
 - Excluding high and low values (truncated)

Development Factors - Averages

Accident Year	Evaluation Intervals in Months								
	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-20
2004	1.659	1.135	1.060	1.015	1.001	1.000	1.000	1.000	1.001
2005	1.823	1.074	1.050	1.028	1.006	1.000	1.000	0.999	
2006	1.660	1.060	1.047	1.045	1.001	1.000	1.000		
2007	1.751	1.070	1.024	1.011	1.005	1.001			
2008	1.624	1.142	1.015	1.025	1.001				
2009	1.640	1.105	1.042	1.022					
2010	1.733	1.109	1.035						
2011	1.554	1.134							
2012	1.511								
Simple Averages									
All Years	1.662	1.104	1.039	1.024	1.003	1.000	1.000	1.000	
5 Years	1.612	1.112	1.033	1.026	1.003	1.000	1.000	1.000	
Weighted Averages									
All Years	1.647	1.108	1.038	1.023	1.003	1.000	1.000	1.000	
5 Years	1.606	1.115	1.031	1.025	1.003	1.000	1.000	1.000	

Development Factors - Averages

Accident Year	Evaluation Intervals in Months								
	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-20
2004	1.659	1.135	1.060	1.015	1.001	1.000	1.000	1.000	1.001
2005	1.823	1.074	1.050	1.028	1.006	1.000	1.000	0.999	
2006	1.660	1.060	1.047	1.045	1.001	1.000	1.000		
2007	1.751	1.070	1.024	1.011	1.005	1.001			
2008	1.624	1.142	1.015	1.025	1.001				
2009	1.640	1.105	1.042	1.022					
2010	1.733	1.109	1.035						
2011	1.554	1.134							
2012	1.511								
Simple Averages									
All Years	1.662	1.104	1.039	1.024	1.003	1.000	1.000	1.000	
5 Years	1.612	1.112	1.033	1.026	1.003	1.000	1.000	1.000	
Weighted Averages									
All Years	1.647	1.108	1.038	1.023	1.003	1.000	1.000	1.000	
5 Years	1.606	1.115	1.031	1.025	1.003	1.000	1.000	1.000	

Selected	1.600	1.110	1.038	1.025	1.003	1.000	1.000	1.000	
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What the LDF Represents

	Evaluation Intervals in Months								
	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-20
Selected	1.600	1.110	1.038	1.025	1.003	1.000	1.000	1.000	1.000

Accident Year	Cumulative Paid Losses (\$000 Omitted)									
	Development Stage in Months									
	12	24	36	48	60	72	84	96	108	120
2004	689	1,143	1,297	1,375	1,395	1,396	1,396	1,396	1,396	1,397
2005	526	959	1,030	1,081	1,111	1,118	1,118	1,118	1,117	1,117
2006	474	787	834	873	912	913	913	913	913	913
2007	590	1,033	1,105	1,131	1,144	1,150	1,151	1,151	1,151	1,151
2008	801	1,301	1,486	1,509	1,547	1,548	1,548	1,548	1,548	1,548
2009	636	1,043	1,152	1,200	1,226	1,230	1,230	1,230	1,230	1,230
2010	778	1,348	1,495	1,548	1,587	1,591	1,591	1,591	1,591	1,591
2011	1,003	1,559	1,768	1,835	1,881	1,887	1,887	1,887	1,887	1,887
2012	888	1,342	1,490	1,546	1,585	1,590	1,590	1,590	1,590	1,590
2013	653	1,045	1,160	1,204	1,234	1,238	1,238	1,238	1,238	1,238

What the LDF Represents

	Evaluation Intervals in Months								
	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-20
Selected	1.600	1.110	1.038	1.025	1.003	1.000	1.000	1.000	1.000

Accident Year	Cumulative Paid Losses (\$000 Omitted)									
	Development Stage in Months									
	12	24	36	48	60	72	84	96	108	120
2010	778	1,348	1,495	1,548	1,587	1,591	1,591	1,591	1,591	1,591
2011	1,003	1,559	1,768	1,835	1,881	1,887	1,887	1,887	1,887	1,887
2012	888	1,342	1,490	1,546	1,585	1,590	1,590	1,590	1,590	1,590
2013	653	1,045	1,160	1,204	1,234	1,238	1,238	1,238	1,238	1,238

Accident Year 2013

@ 24 months $1,045 = 653 * 1.600$

@ 36 months $1,160 = 1,045 * 1.100 = 653 * 1.600 * 1.110$

@ 120 months

$1,238 = 653 * 1.600 * 1.110 * 1.038 * 1.025 * 1.003 * 1.000 * 1.000 * 1.000 * 1.000$

Cumulative Development Factor (CDF)

	Evaluation Intervals in Months								
	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-20
Selected	1.600	1.110	1.038	1.025	1.003	1.000	1.000	1.000	1.000
CDF	1.895	1.185	1.067	1.028	1.003	1.000	1.000	1.000	1.000

Accident Year	Cumulative Paid Losses (\$000 Omitted)									
	Development Stage in Months									
	12	24	36	48	60	72	84	96	108	120
2010	778	1,348	1,495	1,548	1,587	1,591	1,591	1,591	1,591	1,591
2011	1,003	1,559	1,768	1,835	1,881	1,887	1,887	1,887	1,887	1,887
2012	888	1,342	1,490	1,546	1,585	1,590	1,590	1,590	1,590	1,590
2013	653	1,045	1,160	1,204	1,234	1,238	1,238	1,238	1,238	1,238

Accident Year 2013

@ 120 months

$$\begin{aligned}
 1,238 &= 653 * 1.600 * 1.110 * 1.038 * 1.025 * 1.003 * 1.000 * 1.000 * 1.000 * 1.000 \\
 &= 653 * 1.895
 \end{aligned}$$



Exercise 2:

Completing the triangle and making LDF selections



Part 2

Loss Development Methods

- Development Methods
 - Paid Losses
 - Incurred Losses
 - LAE
 - Counts
- Expected Loss Ratio Method
- Bornhuetter-Ferguson Method
- Cape Cod Method
- Paid to Paid Method



Development Methods

- Assumptions
- Reported claims indicate something about the unreported claims
- Reporting and payment of future claims will be similar to the patterns observed in the past.
- Issues
 - Changes in pattern, mix, reserve adequacy

Development Methods Paid

Accident Year	Actual Paid Losses @ 12/31/2013	Cumulative Development Factors to Ultimate	Estimated Ultimate Losses [(2) x (3)]	Estimated Loss Reserves [(6) - (4)]
(1)	(2)	(3)	(4)	(5)
2004	1,397	1.000	1,397	0
2005	1,109	1.007	1,117	8
2006	899	1.016	913	14
2007	1,109	1.038	1,151	42
2008	1,435	1.079	1,548	113
2009	1,090	1.128	1,230	140
2010	1,271	1.252	1,591	320
2011	1,214	1.555	1,887	673
2012	866	1.835	1,590	724
2013	482	2.570	1,238	756
Total	10,871		13,662	2,791

Development Methods Incurred

Accident Year	Actual Paid Losses @ 12/31/2013	Case Reserve Losses @ 12/31/2012	Actual Incurred Losses @ 12/31/2013 [(2) + (3)]	Cumulative Development Factors to Ultimate (5)	Estimated Ultimate Losses [(4) x (5)]	Estimated IBNR Reserves [(6) - (4)]	Estimated Loss Reserves [(7) + (3)]
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
2004	1,397	0	1,397	1.000	1,397	0	0
2005	1,109	8	1,117	1.000	1,117	0	8
2006	899	14	913	1.000	913	0	14
2007	1,109	42	1,151	1.000	1,151	0	42
2008	1,435	113	1,548	1.000	1,548	0	113
2009	1,090	136	1,226	1.003	1,230	4	140
2010	1,271	277	1,548	1.028	1,591	43	320
2011	1,214	555	1,769	1.067	1,887	118	673
2012	866	475	1,342	1.185	1,590	248	724
2013	482	172	653	1.895	1,238	585	756
Total	10,871	1,792	12,664		13,662	998	2,791

Exercise 3

Accident Year	Earned Premium	Actual Paid Losses @ 12/31/2013	Case Reserve Losses @ 12/31/2013	Actual Incurred Losses @ 12/31/2013 [(3) + (4)]	Cumulative Incurred LDF's to Ultimate	Estimated Ultimate Losses [(5) x (6)]	Estimated IBNR Reserves [(7) - (5)]	Estimated Loss Reserves [(8) + (4)]	Estimated Ultimate Loss Ratio [(7) ÷ (2)]
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(8)	(8)
2004	1,756	995	0	995	1.000				
2005	1,808	994	65	1,059	1.004				
2006	1,862	970	142	1,112	1.009				
2007	1,879	951	299	1,250		1,270	20	319	67.6%
2008	1,913	1,100	495			1,630	35	530	85.2%
2009	1,995	862	588	1,450	1.054	1,528	78	666	76.6%
2010	2,017	804			1.091	1,473	123	669	73.0%
2011	2,035	701				1,465	198	764	72.0%
2012	2,175			1,260	1.227	1,546	286	976	71.1%
2013	2,450	286	666	952		1,856			75.8%
Total	19,890	8,233	4,057	12,290		13,949	1,659	5,716	70.1%



Expected Loss Ratio Method

- Assumptions
 - The initial estimate of the expected loss amount is a better estimate ultimate losses than emerging experience



Expected Loss Ratio Method

- **Expected Loss Ratio**
 - The anticipated ratio of projected ultimate losses to earned premiums
- **Sources:**
 - Pricing Assumptions
 - Historical Data
 - Industry Data



Expected Loss Ratio Method Pricing Assumptions

	Percent of <u>Premium</u>
Commissions	20.0%
Taxes	4.0%
General Expenses	15.0%
Profit	-1.0%
Total	38.0%
Expected Loss Ratio (Available for Loss and LAE)	62.0%

Expected Loss Ratio Method Historical Data – Schedule P

	Loss and Loss Expense % (Incurred/Premiums Earned)		
	29 Direct and Assumed	30 Ceded	31 Net
1. Prior	XXXX	XXXX	XXXX
2. 2004	76.8	71.9	84.3
3. 2005	70.4	65.7	76.6
4. 2006	67.5	63.9	72.8
5. 2007	74.0	66.3	84.0
6. 2008	76.6	68.9	82.0
7. 2009	79.6	71.3	84.8
8. 2010	77.0	72.0	80.0
9. 2011	93.0	89.7	95.0
10. 2012	86.3	81.2	89.5
11. 2013	90.6	80.7	96.9
12. Totals	XXXX	XXXX	XXXX

Average of 3 years	90.0	83.9	93.8
Average of 5 years	85.3	79.0	89.2

Expected Loss Ratio Method

- Estimating Reserves Based on ELR
 - $\text{Earned Premium} \times \text{ELR} = \text{Expected Ultimate Losses}$
 - $\text{Ultimate Losses} - \text{Paid Losses} = \text{Total Reserves}$
 - $\text{Total Reserves} - \text{Case Reserves} = \text{IBNR Reserves}$

Expected Ratio Method

Estimating Reserves Based on ELR

Earned Premium	=	\$ 100,000
Expected Loss Ratio	=	65%
Paid Losses	=	\$ 10,000
Case Reserves	=	\$ 13,000

$$\begin{aligned} \text{Total Reserve} &= (\$100,000 \times 0.65) - \$10,000 \\ &= \$65,000 - \$10,000 \\ &= \$55,000 \end{aligned}$$

$$\begin{aligned} \text{IBNR Reserve} &= \$55,000 - \$13,000 \\ &= \$42,000 \end{aligned}$$



Expected Ratio Method

Estimating Reserves Based on ELR

Use when you have no history such as:

New product lines

Radical changes in product lines

Immature accident years for long tailed lines

Can generate negative reserves or negative IBNR if

Estimated Ultimate Losses < Paid Losses

Estimated Ultimate Losses < Incurred Losses

Exercise 4

Earned Premium	500,000
Paid Losses	165,000
Case Reserves	62,500

<u>Expense Components</u>	<u>% of Prem</u>
Commissions	15.0%
Taxes	6.5%
General Expenses	13.5%
Profit	3.0%

Expected Loss Ratio

Total Reserves

IBNR Reserves



Bornhuetter-Ferguson Method

- Assumptions
 - Unreported claims will develop based on expected claims
 - Unreported claims are estimated using expected loss ratio and earned premium
- Terminology
 - A Priori
 - Percent Unpaid / Unreported

Bornhuetter-Ferguson Method

Reserves Based on ELR and Actual Loss

$$(EP \times ELR) \times (IBNR \text{ Factor}) = (IBNR \text{ Reserves})$$

$$\text{Where IBNR Factor} = (1.000 - 1.000/CDF)$$

$$\text{Actual} + \text{IBNR Reserve} = \text{Ultimate Losses}$$

$$\text{Case Reserve} + \text{IBNR Reserve} = \text{Total Reserve}$$

The IBNR Factor is the percent of expected losses unreported.

Bornhuetter-Ferguson Method

Resulting Ultimate Loss Estimate is Actually a Weighting of the Expected Ratio Method and the Chain Ladder Method

Bornhuetter-Ferguson Ultimate =

Chain Ladder Ultimate \times (w) + Expected Loss Ultimate \times (1-w)

[Reported Loss] \times CDF \times (w) + [EP \times ELR] \times (1-w)

Set $w = 1.000/\text{CDF}$

[Reported Loss] \times CDF \times (1/CDF) + [EP \times ELR] \times (1-1.000/CDF)

[Reported Loss] + [(EP \times ELR) \times (1.000-1.000/CDF)] =

Bornhuetter-Ferguson Ultimate

Bornhuetter-Ferguson Method IBNR Factors

Accident Year	Evaluation Intervals in Months								
	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-120
2002	1.659	1.135	1.060	1.015	1.001	1.000	1.000	1.000	1.001
2003	1.823	1.074	1.050	1.028	1.006	1.000	1.000	0.999	
2004	1.660	1.060	1.047	1.045	1.001	1.000	1.000		
2005	1.751	1.070	1.024	1.011	1.005	1.001			
2006	1.624	1.142	1.015	1.025	1.001				
2007	1.640	1.105	1.042	1.022					
2008	1.733	1.109	1.035						
2009	1.554	1.134							
2010	1.511								
Average All Years	1.662	1.104	1.039	1.024	1.003	1.000	1.000	1.000	
Average 3 Years	1.599	1.116	1.031	1.019	1.002	1.000	1.000	1.000	
Average 5 Years	1.612	1.112	1.033	1.026	1.003	1.000	1.000	1.000	
Weighted Average	1.647	1.108	1.038	1.023	1.003	1.000	1.000	1.000	
Selected	1.600	1.110	1.038	1.025	1.003	1.000	1.000	1.000	1.000
CDF	1.895	1.185	1.067	1.028	1.003	1.000	1.000	1.000	1.000
$\text{IBNR Factor} = 1 - [1 \div \text{Cumulative Development Factor}]$									
$1 - [1 \div 1.895] = 0.472$									
IBNR Factor	0.472	0.156	0.063	0.027	0.003	-	-	-	-

Bornhuetter-Ferguson Method

Accident Year	Earned Premium	Assumed Expected Loss Ratio	Assumed Expected Losses	IBNR Factor	Estimated IBNR	Actual Paid Losses	Estimated Ultimate Losses
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			(2) x (3)		(4) x (5)		(6) + (7)
2002	2,284	62.0%	1,416	0.000	0	1397	1397
2003	2,092	62.0%	1,297	0.000	0	117	1117
2004	1,833	62.0%	1,136	0.000	0	913	913
2005	2,136	62.0%	1,324	0.000	0	1151	1151
2006	2,551	62.0%	1,582	0.000	0	1548	1548
2007	1,986	62.0%	1,231	0.003	4	1226	1230
2008	2,561	62.0%	1,588	0.027	43	1548	1591
2009	2,479	62.0%	1,537	0.063	97	1768	1865
2010	2,237	62.0%	1,387	0.156	216	1342	1558
2011	1,862	62.0%	1,154	0.472	545	653	1198
Total	22,021		13,653		905	11,663	13,568

Exercise 5

Accident Year	Earned Premium	Actual Paid Losses	Expected Loss Ratio	CDF	Expected Losses	IBNR Factor	Estimated IBNR	Estimated Ultimate Losses	Estimated Ultimate Loss Ratio
2007	2,105	981	66.0%	1.374					
2008	2,281	965	65.0%	1.652					
2009	2,365	815	64.0%	1.850					
2010	2,480	722	63.0%	2.097					
2011	2,500	660	62.5%	2.475					
Total	11,731	4,143			7,510		3,407	7,550	64.4%



Cape Cod Method

Assumptions

- Unreported claims will develop based on expected claims
- Expected Loss Ratio based on reported claim experience instead of judgmental selection

Cape Cod Method

Derive Claims Ratio

Accident	Earned	Reported		% Ultimate	Used Up	Estimated
Year	Premium	Claims	CDF	Reported	Premium	Claims Ratio
(1)	(2)	(3)	(4)	(5)	(6)	(7)
				$1.0 \div (4)$	$(2) \times (5)$	$(3) \div (6)$
2008	10,000	6,674	1.010	99.0%	9,901	67.4%
2009	10,500	7,041	1.020	98.0%	10,294	68.4%
2010	11,000	7,166	1.070	93.5%	10,280	69.7%
2011	11,500	6,662	1.160	86.2%	9,914	67.2%
2012	12,000	5,726	1.400	71.4%	8,571	66.8%
2013	12,500	4,507	1.900	52.6%	6,579	68.5%
Total	67,500	37,775			55,540	68.0%

Cape Cod Method

Estimate Ultimate Losses

Accident Year	Earned Premium	Expected Claims Ratio	Estimated Expected Claims	CDF	% Ultimate Unreported	Expected Unreported Claims	Reported Claims	Projected Ultimate Claims
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
			(2) x (3)		$1.0 - [1.0 \div (5)]$	(4) x (6)		(7) + (8)
2008	10,000	68.0%	6,801	1.010	1%	67	6,674	6,741
2009	10,500	68.0%	7,142	1.020	2%	140	7,041	7,181
2010	11,000	68.0%	7,482	1.070	7%	489	7,166	7,655
2011	11,500	68.0%	7,822	1.160	14%	1,079	6,662	7,741
2012	12,000	68.0%	8,162	1.400	29%	2,332	5,726	8,058
2013	12,500	68.0%	8,502	1.900	47%	4,027	4,507	8,534
Total	67,500		45,910			8,135	37,775	45,910

Exercise 6a

Accident Year	Earned Premium	Reported Claims	CDF	% Ultimate Reported	Used Up Premium	Estimated Claims Ratio
(1)	(2)	(3)	(4)	(5) $1.0 \div (4)$	(6) $(2) \times (5)$	(7) $(3) \div (6)$
2008	1,775	1,122	1.025			
2009	1,825	1,116	1.065			
2010	1,875	1,078	1.125			
2011	1,950	1,005	1.250			
2012	2,250	920	1.600			
2013	2,500	780	2.100			
Total	12,175	6,021				

Exercise 6b

Accident Year	Earned Premium	Expected Claims Ratio	Estimated Expected Claims (2) x (3)	CDF	% Ultimate Unreported $1.0 - [1.0 \div (5)]$	Expected Unreported Claims (4) x (6)	Reported Claims	Projected Ultimate Claims (7) + (8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
2008	1,775			1.025			1,122	
2009	1,825			1.065			1,116	
2010	1,875			1.125			1,078	
2011	1,950			1.250			1,005	
2012	2,250			1.600			920	
2013	2,500			2.100			780	
Total	12,175						6,021	



Paid to Paid Method

- Used for items that are related to paying losses
- Paid DCC to Paid Loss
- Recovered Salvage and Subrogation to Paid Loss

Paid to Paid Method

Accident Year	<u>Cumulative Paid DCC</u>						
	12	24	36	48	60	72	84
2007	71	166	286	416	527	611	677
2008	83	189	313	458	584	672	
2009	93	213	361	523	657		
2010	103	226	394	581			
2011	108	245	437				
2012	128	280					
2013	132						

Accident Year	<u>Cumulative Paid Losses</u>						
	12	24	36	48	60	72	84
2007	3,361	5,991	7,341	8,259	8,916	9,408	9,759
2008	3,780	6,671	8,156	9,205	9,990	10,508	
2009	4,212	7,541	9,351	10,639	11,536		
2010	4,901	8,864	10,987	12,458			
2011	5,708	10,268	12,699				
2012	6,093	11,172					
2013	6,962						

Paid to Paid Method

Accident Year	<u>Cumulative Paid DCC to Cumulative Paid Losses</u>						
	12	24	36	48	60	72	84
2007	0.021	0.028	0.039	0.050	0.059	0.065	0.069
2008	0.022	0.028	0.038	0.050	0.058	0.064	
2009	0.022	0.028	0.039	0.049	0.057		
2010	0.021	0.025	0.036	0.047			
2011	0.019	0.024	0.034				
2012	0.021	0.025					
2013	0.019						

Paid to Paid Method

Accident Year	<u>Paid to Paid Development Factor</u>						
	12-24	24-36	36-48	48-60	60-72	72-84	84-Ult
2007	1.312	1.406	1.293	1.173	1.099	1.068	
2008	1.290	1.355	1.297	1.175	1.094		
2009	1.279	1.367	1.273	1.159			
2010	1.213	1.406	1.301				
2011	1.261	1.442					
2012	1.193						
Average	1.258	1.395	1.291	1.169	1.096	1.068	
4 Pt Average	1.237	1.393	1.291				
Average X Hi/Lo	1.261	1.393	1.295	1.173			
SELECTED	1.237	1.393	1.291	1.169	1.096	1.068	1.068
CDF	3.252	2.629	1.887	1.462	1.251	1.141	1.068

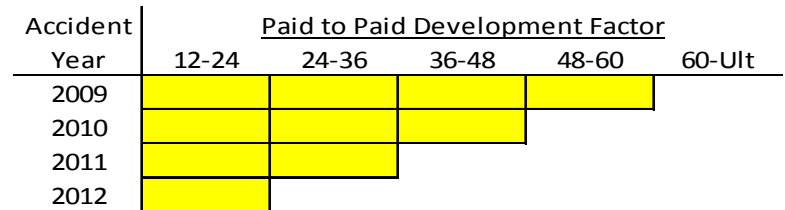
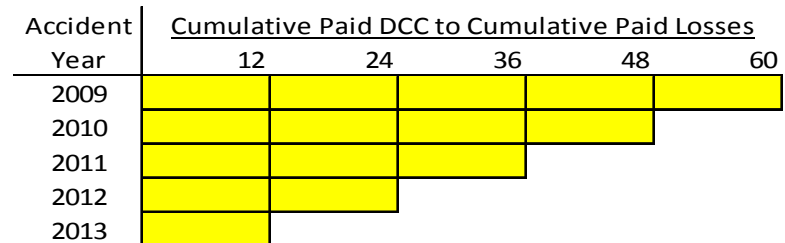
Paid to Paid Method

Accident Year	Ratio to Date	Devel. Factor	Developed Paid/Paid Ratio	Ultimate Losses	Ultimate DCC	Paid DCC to Date	Indicated DCC Reserves
(1)	(2)	(3)	(4) (2) x (3)	(5)	(6) (4) x (5)	(7)	(8) (6) - (7)
2007	0.069	1.068	0.074	10,292	762	677	85
2008	0.064	1.141	0.073	11,261	822	672	150
2009	0.057	1.251	0.071	12,751	905	657	248
2010	0.047	1.462	0.069	14,500	986	581	405
2011	0.034	1.887	0.064	16,326	1,061	437	624
2012	0.025	2.629	0.066	17,641	1,164	280	884
2013	0.019	3.252	0.062	20,716	1,284	132	1,152
Total				103,487	6,984	3,436	3,548

Exercise 7a

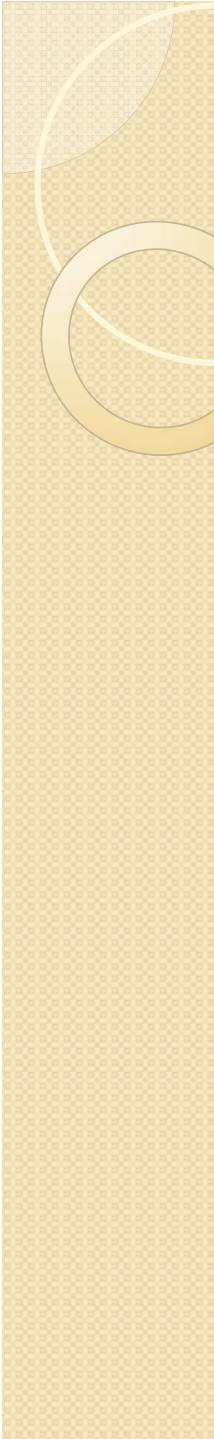
Accident Year	Cumulative Paid DCC				
	12	24	36	48	60
2009	45	188	351	538	702
2010	53	219	410	628	
2011	60	250	468		
2012	68	281			
2013	75				

Accident Year	Cumulative Paid Losses				
	12	24	36	48	60
2009	3,000	7,500	9,750	11,213	12,110
2010	3,500	8,750	11,375	13,081	
2011	4,000	10,000	13,000		
2012	4,500	11,250			
2013	5,000				



Exercise 7b

Accident Year	Ratio to Date	Devel. Factor	Developed Paid/Paid Ratio	Ultimate Losses	Ultimate DCC	Paid DCC to Date	Indicated DCC Reserves
(1)	(2)	(3)	(4) (2) x (3)	(5)	(6) (4) x (5)	(7)	(8) (6) - (7)
2009	0.000	0.000		15,137		702	
2010	0.000	0.000		17,660		628	
2011	0.000	0.000		20,183		468	
2012	0.000	0.000		22,705		281	
2013	0.000	0.000		25,228		75	
Total				100,913	0	2,155	0

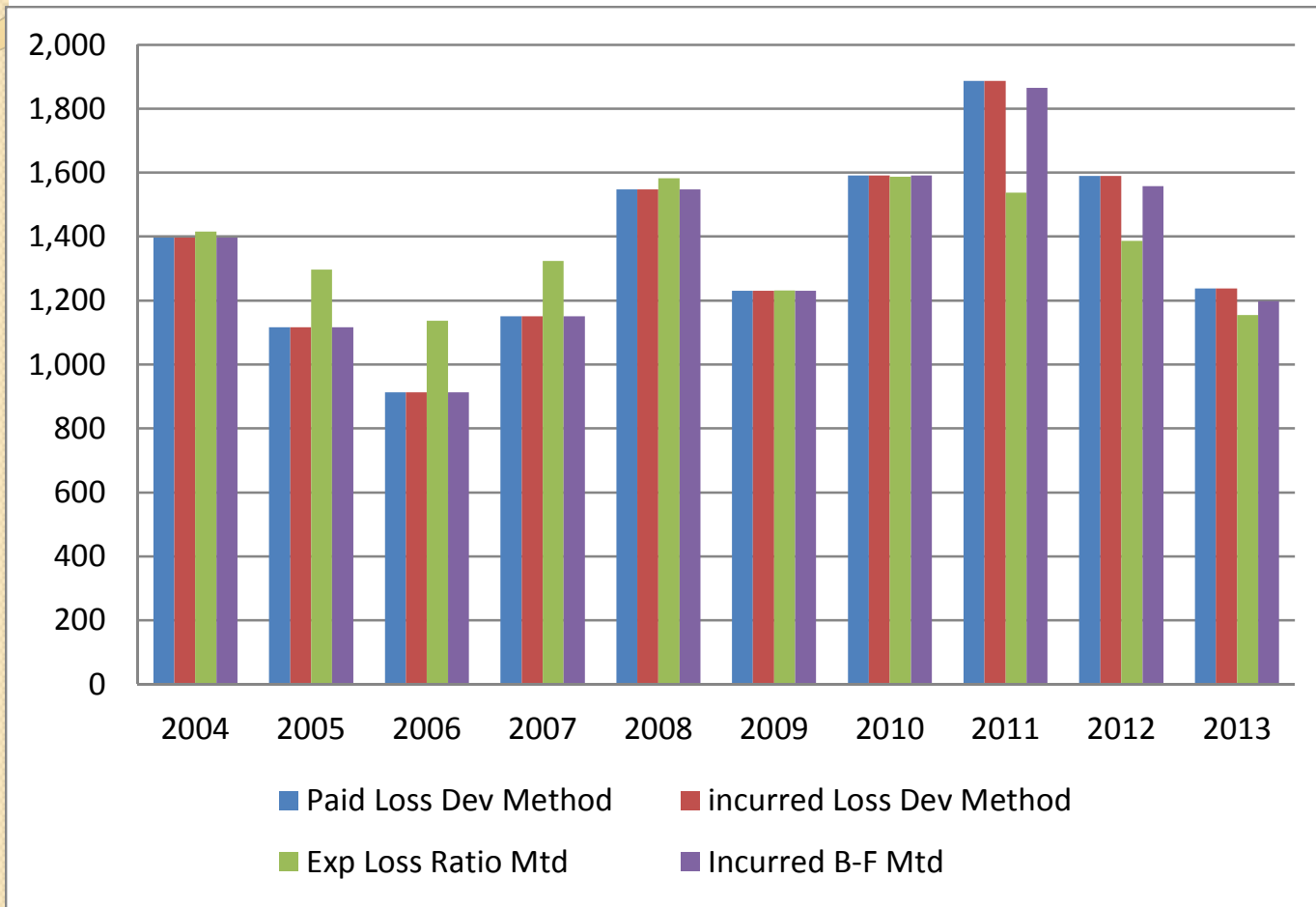


Part 3

Comparison of Methods

Calendar Year	Paid Loss Dev Method	incurred Loss Dev Method	Exp Loss Ratio Mtd	Incurred B-F Mtd
2004	1,397	1,397	1,416	1,397
2005	1,117	1,117	1,297	1,117
2006	913	913	1,136	913
2007	1,151	1,151	1,324	1,151
2008	1,548	1,548	1,582	1,548
2009	1,230	1,230	1,231	1,230
2010	1,591	1,591	1,588	1,591
2011	1,887	1,887	1,537	1,865
2012	1,590	1,590	1,387	1,558
2013	1,238	1,238	1,154	1,198

Comparison of Methods





Method Discussion

Paid Loss Development Method:

- Assumes claim payment/settlement patterns are consistent over time
- Assumes paid losses to date are predictive of future payments

Advantage:

- Not distorted by changes in reserving philosophy
- Responsive to potential changes in loss levels

Potential Pitfalls:

- Beware of potential distortions caused by unusually large settlements
- Changes in settlement patterns may reduce LDF predictive power



Method Discussion

Incurred Loss Development Method:

- Assumes claim reporting patterns are consistent over time
- Assumes claim reserve philosophy is consistent over time
- Assumes reported losses to date are predictive of future payments

Advantage:

- Utilizes the maximum available information (paid and case reserve)
- Responsive to potential changes in loss levels

Potential Pitfalls:

- Beware of potential distortions caused by changes in case reserve adequacy
- Changes in settlement patterns may reduce LDF predictive power



Method Discussion

Expected Loss Ratio Method:

- Assumes the loss ratio will ultimately reach an expected level

Advantage:

- No past development history required (ideal for new or changing risks)
- Can easily incorporate information from underwriting, claims, etc.

Potential Pitfalls:

- Can potential produce negative reserve indications
- Reliant on loss ratio assumptions that may be development outside of the control of the opening actuary



Method Discussion

Bornhuetter-Ferguson Methods:

- Assumes the unexposed development will follow an expected loss ratio pattern

Advantage:

- Reduce potential distortions in development methods
- Prevents negative reserves possible under ELR Method

Potential Pitfalls:

- Sensitive to the implied unreported percentage implicit from LDFs
- Reliant on loss ratio assumptions



Method Discussion

Paid to Paid Method:

- Assumes the relationship between two quantities (eg paid loss and paid ALAE) is stable over time

Advantage:

- Incorporates the relationship between loss payments and defense payments directly into the calculation

Potential Pitfalls:

- Won't work for the most litigious lines where defense costs are high and loss payments are low
- Sensitive to the estimate of ultimate losses



When To Rely on Each Method

Paid/Incurred Development Methods

- When settlement & case reserve practices have remained consistent
- Later stages of development when potential of distortions are reduced

Expect Loss Ratio Method

- Early stages of long tail lines
- New Business or drastically changing patterns

Bornhuetter-Ferguson Methods

- When development factors are expected to be reliable
- Early stages of development

Paid to Paid Method

- When there have been no changes in litigation strategy

Overview of Indications

Calendar

Year	Paid Losses	Incurred Losses	Min Estimate	Average Estimate	Max Estimate
2004	1,397	1,397	1,397	1,402	1,416
2005	1,109	1,117	1,117	1,162	1,297
2006	899	913	913	969	1,136
2007	1,109	1,151	1,151	1,194	1,324
2008	1,435	1,548	1,548	1,556	1,582
2009	1,090	1,226	1,230	1,230	1,231
2010	1,271	1,548	1,588	1,590	1,591
2011	1,214	1,769	1,537	1,794	1,887
2012	866	1,342	1,387	1,531	1,590
2013	482	653	1,154	1,207	1,238

Summary of Methods

EXERCISE 9a: Selecting the Ultimates

Calendar	Paid Loss Dev	incurred Loss	Exp Loss	Incurred	Selected
Year	Paid Losses	Incurred Losses	Ratio Mtd	B-F Mtd	Ultimate
2004	1,397	1,397	1,416	1,397	
2005	1,109	1,117	1,297	1,117	
2006	899	913	1,136	913	
2007	1,109	1,151	1,324	1,151	
2008	1,435	1,548	1,582	1,548	
2009	1,090	1,226	1,231	1,230	
2010	1,271	1,548	1,588	1,591	
2011	1,214	1,769	1,537	1,887	
2012	866	1,342	1,387	1,590	
2013	482	653	1,154	1,238	

Summary of Methods

EXERCISE 9b: Complete the Reserve Estimate Exhibit

Calendar Year	Selected Ultimate	Paid Losses	Incurred Losses	Case Reserve	IBNR	Total Reserve
2004		1,397	1,397			
2005		1,109	1,117			
2006		899	913			
2007		1,109	1,151			
2008		1,435	1,548			
2009		1,090	1,226			
2010		1,271	1,548			
2011		1,214	1,769			
2012		866	1,342			
2013		482	653			

Reasonableness Checks

Overview

- Check results from projection methods for reasonableness against relevant indicators:

Key Reasonable Checks

- Premium
 - Loss Ratios (LR)
- Claim Counts
 - Implied Severity

Other Checks:

- Exposures or Number of Policies
 - Frequency
 - Pure Premium (PP)

Implied Loss Ratios: Exercise 10a

Calendar Year	Earned Premium	Ultimate Losses		Exp Loss Ratio Mtd	Incurred B-F Mtd
		Paid Loss Dev Method	incurred Loss Dev Method		
2006	1,833	913	913	1,136	913
2007	2,136	1,151	1,151	1,324	1,151
2008	2,551	1,548	1,548	1,582	1,548
2009	1,986	1,230	1,230	1,231	1,230
2010	2,561	1,591	1,591	1,588	1,591
2011	2,479	1,887	1,887	1,537	1,865
2012	2,237	1,590	1,590	1,387	1,558
2013	1,862	1,238	1,238	1,154	1,198
Total	17,645	11,148	11,148	10,940	11,054

Calendar Year	Earned Premium	Paid Loss Dev Method		Exp Loss Ratio Mtd	Incurred B-F Mtd
		Dev Method	incurred Loss Dev Method		
2006	1,833	49.8%	49.8%	62.0%	49.8%
2007	2,136				
2008	2,551	60.7%	60.7%	62.0%	60.7%
2009	1,986	61.9%	61.9%	62.0%	61.9%
2010	2,561	62.1%	62.1%	62.0%	62.1%
2011	2,479				
2012	2,237	71.1%	71.1%	62.0%	69.6%
2013	1,862	66.5%	66.5%	62.0%	64.3%
Total	17,645	63.2%	63.2%	62.0%	62.6%

Implied Average Severity: Exercise 10b

Calendar Year	Ultimate Reported Claims	Paid Loss Dev Method	Incurred Loss Dev Method	Exp Loss Ratio Mtd	Incurred B-F Mtd
2006	133	913	913	1,136	913
2007	152	1,151	1,151	1,324	1,151
2008	180	1,548	1,548	1,582	1,548
2009	175	1,230	1,230	1,231	1,230
2010	177	1,591	1,591	1,588	1,591
2011	175	1,887	1,887	1,537	1,865
2012	166	1,590	1,590	1,387	1,558
2013	150	1,238	1,238	1,154	1,198
Total	1,308	11,148	11,148	10,940	11,054

Calendar Year	Ultimate Reported Claims	Paid Loss Dev Method	Incurred Loss Dev Method	Exp Loss Ratio Mtd	Incurred B-F Mtd
2006	133	6.86	6.86	8.54	6.86
2007	152	7.57	7.57	8.71	7.57
2008	180	8.60	8.60	8.79	8.60
2009	175				
2010	177	8.99	8.99	8.97	8.99
2011	175	10.78	10.78	8.78	10.66
2012	166				
2013	150	8.25	8.25	7.70	7.99
Total	1,308	8.52	8.52	8.36	8.45



Diagnostic Triangles

- Paid to Incurred Ratios
- Closed to Reported Claims
- Average Paid
- Average Outstanding
- Loss Ratios

Paid to Incurred Triangle

EXERCISE 11a: Complete the Paid to Incurred Triangle

Paid To Incurred										
Year	12	24	36	48	60	72	84	96	108	120
2004	0.7175	0.8232	0.8966	0.9484	0.9688	0.9698	0.9704	0.9899	1.0000	1.0000
2005	0.6929	0.8483		0.9077	0.9803	0.9905	0.9905	1.0000	1.0000	
2006	0.6696	0.7607	0.9285	0.9719		0.9819	0.9822	0.9911		
2007	0.5894	0.7405	0.9275	0.9589	0.9917	1.0000	1.0000			
2008		0.8694	0.9282	0.9681	0.9684	0.9755				
2009	0.6170	0.8886	0.9296	0.9490						
2010	0.6613	0.8538	0.9416	0.9643						
2011	0.6715	0.9196	0.9337							
2012	0.5696	0.8077								
2013	0.7312									

Closed to Reported Claims Triangle

EXERCISE 11b: Complete the Closed to Reported Triangle

Closed to Reported										
Year	12	24	36	48	60	72	84	96	108	120
2004	0.222	0.277	0.338	0.402	0.625	0.911	0.944	0.989	0.978	0.989
2005	0.160	0.306	0.436	0.488	0.576	0.815		0.978	1.000	
2006	0.362	0.250	0.421	0.625	0.753	0.904	0.954	1.000		
2007		0.263	0.427	0.512	0.800		0.971			
2008	0.500	0.431	0.518	0.544	0.732	0.932				
2009	0.410	0.414	0.519	0.659	0.777					
2010	0.286	0.438	0.475							
2011	0.323	0.437	0.500							
2012	0.441	0.423								
2013	0.357									

Average Paid Severity Triangle

EXERCISE 11c: Complete the Average Paid Severity Triangle

Average Paid Severity

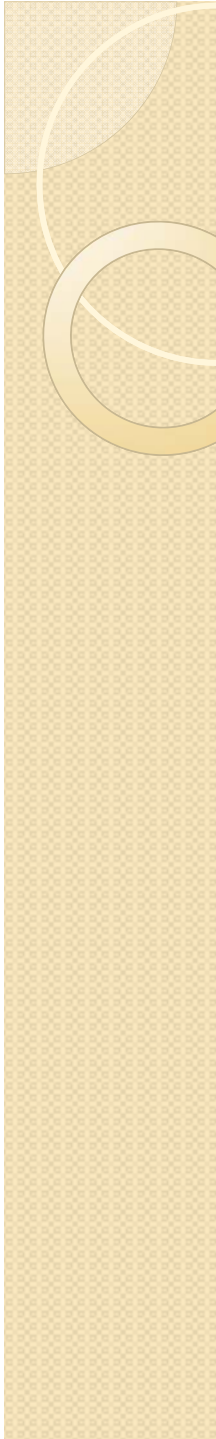
Year	12	24	36	48	60	72	84	96	108	120
2004	11.289	12.892	10.838	11.207	10.568		10.933	10.922	10.890	10.934
2005		11.653	11.885	11.430	10.837	11.283	11.215	11.301	11.387	
2006	12.936	12.853	12.816	12.988	13.185	13.108	12.701	12.636		
2007	11.745	13.145	13.268	13.558		12.500	12.136			
2008	20.575	18.486	17.120	16.878	15.784	15.485				
2009	11.885	17.100	16.309	15.352	15.426					
2010	12.397	16.000		15.169						
2011	12.108	16.113	15.083							
2012	11.676	16.154								
2013	13.600									

Average Case Reserve Triangle

EXERCISE 11d: Complete the Average Case Reserve Triangle

Average Case on Open Claims

Year	12	24	36	48	60	72	84	96	108	120
2004	5.714	3.830	1.887	1.020	0.909	3.750	6.000		-	-
2005	5.952	3.000	2.727	2.273	0.513	0.588	5.000	-	-	
2006		5.392	1.705	1.000	1.000	2.500	5.000	-		
2007	11.538	6.250		1.190	0.556	-	-			
2008	32.500	4.878	2.750	1.220	1.923	5.714				
2009	12.500	3.659	2.564	2.419	3.571					
2010	8.889	4.878	1.905	1.316						
2011		2.500	2.143							
2012	15.789	6.667								
2013	7.778									



Part 4



Part 4 Overview

- The Magnitude / Importance of Your Reserve Estimate
- Documenting Your Reserve Estimate
- Opining on a Booked Reserve Estimate
- How the Reserve Estimate is Used in the Financial Analysis of a Company



Part 4 Overview

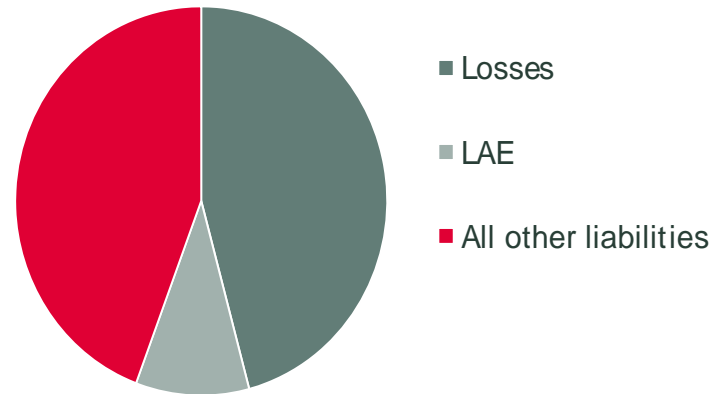
- **The Magnitude / Importance of Your Reserve Estimate**
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P&C INDUSTRY
LIABILITIES, SURPLUS AND OTHER FUNDS (000's)

		<u>% of Total Liabilities</u>
1. Losses	491,077,265	46%
:		
3. Loss adjustment expenses	105,632,471	10%
:		
:		
:		
:		
:		
:		
28. Total liabilities	1,071,264,943	
:		
:		
37. Surplus as regards policyholders	665,175,012	
38. TOTALS	1,736,439,954	

Source
SNL Financial

Contents
P&C Industry - Page 3 (Liabilities, Surplus)
Operating Status: Operating & Acq/Defunct
Reporting Level: Individual Cos
Total Number of Companies: 3810
Period: 2013Y





Who Relies on Reserve Estimates

- Company Management
- Enterprise Risk Management
- Regulators
- Rating Agencies
- Investors
- Analysts
- Parties Involved in Mergers & Acquisitions



Part 4 Overview

- The Magnitude / Importance of Your Reserve Estimate
- **Documenting Your Reserve Estimate**
- Opining on a Booked Reserve Estimate
- How The Reserve Estimate is Used in the Financial Analysis of a Company



Documenting Your Reserve Estimate

- Done through a document called an 'Actuarial Report'
- Definition: The Actuarial Report is the underlying analytical documentation which supports the Statement of Actuarial Opinion.



Actuarial Report – What is Covered?



Actuarial Report – General Outline

- Executive Summary
 - Unpaid Loss and LAE Reserve Estimate
 - Company Description / Background / Changes
 - Changes in Exposure (states, classes for example)
 - Major Risk Factors in the Reserve Estimate
- Company Background, History, Operations
 - Background
 - Domicile
 - History
 - Business Written
 - Plan of Operation



Actuarial Report – General Outline

- Purpose and Scope

- State what is covered in the analysis

Example:

- *Projections include both loss and assumed loss adjustment expense (LAE) for defense cost and cost containment*
- *There is no reserve provision for general administrative and internal expenses for the run-off of the Company's business.*



Actuarial Report – General Outline

- Conditions and Limitations

- Describe the data relied upon

Example:

- *In this analysis, we relied, without audit or verification, on the data and carried reserve estimates prepared from the Company's database and data from the affiliated companies.*
- *The Company's and its affiliate's inception-to-date data were balanced in total to the General Ledger.*



Actuarial Report – General Outline

- Conditions and Limitations Continued
 - Discuss Limitations of the Data

Example:

As the Company has insufficient history of its own to estimate loss development patterns on its workers compensation business without reference to an external benchmark, comparable development data provided by affiliated companies as well as available industry data were relied upon.



Actuarial Report – General Outline

- Conditions and Limitations Continued
 - Inherent Economic and Financial Uncertainty

Example:

- *The projections make no provision for the extraordinary future emergence of new classes of losses or types of losses not sufficiently represented in the Company's historical database.*
- *While these reserves represent a reasonable provision based on the appropriate application of actuarial techniques to the available data, there can be no guarantee that the actual future payments will not differ, perhaps significantly, from the estimates contained in this Report.*



Actuarial Report – General Outline

- Discussion of Analysis
 - Data Groupings / Segmentation
 - Description of Methods
 - Actuarial Assumptions

Exercise 12

Given the following information, come up with five points that you would include in the Discussion of Analysis portion of your report.

- You have been asked to complete a WC and AL reserve estimate for DogGrooming, Inc. an company that provides dog daycare, grooming and transportation for pampered pets.
- All claim data was received by DogGrooming's TPA, ClmRecorder and is as of 7/31/14.
- Payroll and auto counts were received from DogGrooming, Inc.
- Due to lack of full credibility, you have relied on industry data in your analysis to supplement LDF and ILF selections.



Part 4 Overview

- The Magnitude / Importance of Your Reserve Estimate
- Documenting Your Reserve Estimate
- **Opining on a Booked Reserve Estimate**
- How The Reserve Estimate is Used in the Financial Analysis of a Company



Actuarial Standards of Practice (ASOPs) Applicable to Statements of Actuarial Opinion

- ASOP 1: Introductory Actuarial Standards of Practice
- ASOP 23: Data Quality
- ASOP 36: Statements of Actuarial Opinion on Regarding Property & Casualty Loss and Loss Adjustment Expense Reserves
- ASOP 41: Actuarial Communications
- ASOP 43: Property/Casualty Unpaid Claim Estimates



ASOP No. 36

Statements of Actuarial Opinion Regarding Property/Casualty Loss and Loss Adjustment Expense Reserves

- Binding on all actuaries opining on P&C loss reserves
- COPLFR encourages the actuary to be familiar with the disclosure requirements of Sections 4.1 and 4.2 of ASOP No. 36, which include, but are not limited to, disclosing the following:
 - The intended users of the Statement of Actuarial Opinion
 - The intended purpose of the Statement of Actuarial Opinion
 - The stated basis of reserve presentation
 - Whether any material assumption or method was prescribed by law
 - Whether the actuary disclaims responsibility for any material assumption or method that originated from another source



Statement of Actuarial Opinion (SAO)

The Statement of Actuarial Opinion must consist of the following four Sections which must be clearly designated

- an IDENTIFICATION paragraph identifying the Appointed Actuary
- a SCOPE paragraph identifying the subjects on which an opinion is to be expressed and describing the scope of the actuary's work
- an OPINION paragraph expressing his or her opinion with respect to such subjects; and one or more
- additional RELEVANT COMMENTS paragraphs

SAO – IDENTIFICATION

Paragraph

IDENTIFICATION paragraph should specifically indicate

- the Appointed Actuary's relationship to the company
- qualifications for acting as appointed actuary
 - A member in good standing of the Casualty Actuarial Society, or
 - A member in good standing of the American Academy of Actuaries who has been approved as qualified for signing casualty loss reserve opinions by the Casualty Practice Council of the American Academy of Actuaries.
- date of appointment
- that the appointment was made by the Board of Directors, or its equivalent, or by a committee of the Board.

SAO – SCOPE Paragraph

SCOPE paragraph should contain statements such as

- “I have examined the actuarial assumptions and methods used in determining reserves listed in **Exhibit A**, as shown in the Annual Statement of the Company as prepared for filing with state regulatory officials, as of December 31, 20__, and reviewed information provided to me through XXX date.”
- “In forming my opinion on the loss and loss adjustment expense reserves, I relied upon data prepared by _____ (name, affiliation and relation to Company). I evaluated that data for reasonableness and consistency. I also reconciled that data to Schedule P – Part I of the company’s current Annual Statement. In other respects, my examination included such review of the actuarial assumptions and methods used and such tests of the calculations as I considered necessary.”

Property and Casualty Practice Note
2013

Exhibit A: SCOPE

DATA TO BE FILED IN BOTH PRINT AND DATA CAPTURE FORMATS

Loss Reserves:

Amount

1. Reserve for Unpaid Losses (Liabilities, Surplus and Other Funds page, Col 1, Line 1) \$_____
2. Reserve for Unpaid Loss Adjustment Expenses
(Liabilities, Surplus and Other Funds page, Col 1, Line 3) \$_____
3. Reserve for Unpaid Losses – Direct and Assumed
(Should equal Schedule P, Part 1, Totals from Cols. 13 and 15, Line 12 * 1000) \$_____
4. Reserve for Unpaid Loss Adjustment Expenses – Direct and Assumed
(Should equal Schedule P, Part 1, Totals from Cols. 17, 19 and 21, Line 12 * 1000) \$_____
5. The Page 3 write-in item reserve, "Retroactive Reinsurance Reserve Assumed" \$_____
6. Other Loss Reserve items on which the Appointed Actuary is expressing an Opinion (list separately) \$_____

Premium Reserves:

7. Reserve for Direct and Assumed Unearned Premiums for Long Duration Contracts \$_____
8. Reserve for Net Unearned Premiums for Long Duration Contracts \$_____
9. Other Premium Reserve items on which the Appointed Actuary is expressing an Opinion (list separately) \$_____

SAO – OPINION Paragraph

OPINION paragraph should include a sentence that directly addresses each of these points:

- “In my opinion, the amounts carried in Exhibit A on account of the items identified:
 - A. Meet the requirements of the insurance laws of (state of domicile).
 - B. Are computed in accordance with accepted actuarial standards and principles.
 - C. Make a reasonable provision for all unpaid loss and loss expense obligations of the Company under the terms of its contracts and agreements.”

SAO – OPINION Paragraph

OPINION paragraph should include a sentence that at least covers these points:

- “In my opinion, the amounts carried in Exhibit A on account of the items identified:
 - A. Meet the requirements of the insurance laws of (state of domicile).
 - **B. Are computed in accordance with accepted actuarial standards and principles.**
 - C. Make a reasonable provision for all unpaid loss and loss expense obligations of the Company under the terms of its contracts and agreements.”

SAO – OPINION Paragraph

OPINION paragraph should include a sentence that at least covers these points:

- “In my opinion, the amounts carried in Exhibit A on account of the items identified:
 - A. Meet the requirements of the insurance laws of (state of domicile).
 - B. Are computed in accordance with accepted actuarial standards and principles.
 - **C. Make a reasonable provision for all unpaid loss and loss expense obligations of the Company under the terms of its contracts and agreements.”**

SAO – OPINION Paragraph

C. Make a reasonable provision for all unpaid loss and loss expense obligations of the Company under the terms of its contracts and agreements.”

- Determination of Reasonable Provision: When the stated reserve amount is within the actuary’s range of reasonable reserve estimates
- Determination of Deficient or Inadequate Provision: When the stated reserve amount is less than the minimum amount that the actuary believes is reasonable
- Determination of Redundant or Excessive Provision: When the stated reserve amount is greater than the maximum amount that the actuary believes is reasonable



SAO – OPINION Paragraph

C. Make a reasonable provision for all unpaid loss and loss expense obligations of the Company under the terms of its contracts and agreements.”

- Qualified Opinion: When, in the actuary’s opinion, the reserves for a certain item or items are in question because they cannot be reasonably estimated or the actuary is unable to render an opinion on those items
- No Opinion: If the actuary cannot reach a conclusion due to deficiencies or limitations in the data, analyses, assumptions, or related information, then the actuary may issue a statement of no opinion.



SAO – ADDITIONAL RELEVANT COMMENTS Paragraphs

- Risk of Material Adverse Deviation (RMADs)
- Other Disclosures in Exhibit B
 - Discounting
 - Salvage / Subrogation
 - Pool and Associations
 - Mass Tort Exposure
 - Etc.
- Reinsurance
- IRIS Ratios
- Methods and Assumptions

Exhibit B: DISCLOSURES
DATA TO BE FILED IN BOTH PRINT AND DATA CAPTURE FORMATS

Note: Exhibit B should be completed for Net dollar amounts included in the SCOPE. If an answer would be different for Direct and Assumed amounts, identify and discuss the difference within RELEVANT COMMENTS.

1. Name of the Appointed Actuary

Last ____ First ____ Mid ____

2. The Appointed Actuary's Relationship to the Company:

Enter E or C based upon the following:

E if an Employee of the Company or Group; C if a Consultant

3. The Appointed Actuary has the following designation (indicated by letter code).

F if a Fellow of the Casualty Actuarial Society (FCAS)

A if an Associate of the Casualty Actuarial Society (ACAS)

M if not a member of the Casualty Actuarial Society, but a Member of the American Academy of Actuaries (MAAA) approved by the Casualty Practice Council, as documented with the attached approval letter

O for Other

4. Type of Opinion, as identified in the OPINION paragraph

Enter R, I, E, Q, or N based on the following:

R if Reasonable

I if Inadequate or Deficient Provision

E if Excessive or Redundant Provision

Q if Qualified. Use Q when part of the OPINION is Qualified

N if No Opinion _____

5. Materiality Standard expressed in US dollars (Used to Answer Question #6)

\$ _____

Exhibit B: DISCLOSURES
DATA TO BE FILED IN BOTH PRINT AND DATA CAPTURE FORMATS

6. Are there significant risks that could result in Material Adverse Deviation? Yes [] No [] Not Applicable []
7. Statutory Surplus (Liabilities, Col 1, Line 37) \$ _____
8. Anticipated net salvage and subrogation included as a reduction to loss reserves as reported in Schedule P (should equal Part 1 Summary, Col 23, Line 12 * 1000) \$ _____
9. Discount included as a reduction to loss reserves and loss expense reserves as reported in Schedule P
- 9.1 Nontabular Discount [Notes, Line 32B23, (Amounts 1,2,3,& 4), Electronic Filing Cols 1,2,3,&4] \$ _____
- 9.2 Tabular Discount [Notes, Line 32A23 (Amounts 1&2), Electronic Filing Cols 1&2] \$ _____
10. The net reserves for losses and expenses for the company's share of voluntary and involuntary underwriting pools' and associations' unpaid losses and expenses that are included in reserves shown on the Liabilities, Surplus and Other Funds page, Losses and Loss Adjustment Expenses lines. \$ _____
11. The net reserves for losses and loss adjustment expenses that the company carries for the following liabilities included on the Liabilities, Surplus and Other Funds page, Losses and Loss Adjustment Expenses lines.
- 11.1 Asbestos, as disclosed in the Notes to Financial Statements (Notes, Line 33A03D, ending net asbestos reserves for current year) Electronic Filing Col 5 \$ _____
- 11.2 Environmental, as disclosed in the Notes to Financial Statements (Notes, Line 33D03D, ending net environmental reserves for current year), Electronic Filing Col 5 \$ _____
12. The total claims made extended loss and expense reserve (Greater than or equal to Schedule P Interrogatories).
- 12.1 Amount reported as loss reserves \$ _____
- 12.2 Amount reported as unearned premium reserves \$ _____
13. Other items on which the Appointed Actuary is providing Relevant Comment (list separately) \$ _____



Part 4 Overview

- The Magnitude / Importance of Your Reserve Estimate
- Documenting Your Reserve Estimate
- Opining on a Booked Reserve Estimate
- **How The Reserve Estimate is Used in the Financial Analysis of a Company**



How The Reserve Estimate is Used in the Financial Analysis of a Company

- Reserves and Risk Based Capital (RBC)
- Best's Capital Adequacy Ratio (BCAR)
- Enterprise Risk Management (ERM)
- Spotting a Reserve Deficiency and other red flags



How The Reserve Estimate is Used in the Financial Analysis of a Company

- **Reserves and Risk Based Capital (RBC)**
- Best's Capital Adequacy Ratio (BCAR)
- Enterprise Risk Management (ERM)
- Spotting a Reserve Deficiency and other red flags



Reserves in RBC Calculations

- RBC = Risk Based Capital
 - Measures the minimum amount of capital appropriate for an entity to support its business operations in consideration of its size and risk profile
 - Essentially, this is the amount of risk a company can take (higher risk = higher capital required)
 - It is designed to be the minimum regulatory capital standard, not necessarily the full amount the insurer should actually carry
- It is used by regulators to help determine the health of an insurance company and if they should take any legal authority to gain control
 - It is not meant to be used as a stand alone tool, but is part of a group of tools a regulator would use
- Risk Factors focus on 3 major areas:
 - Asset Risk, Underwriting Risk and Other Risk



Reserves in RBC Calculations

Reserving Risk Charge

- For most companies, the reserving risk charge is the dominant part of the risk-based capital requirements
- The reserving risk charge in the risk-based capital formula measures the susceptibility of loss reserves to adverse developments.
- The charge is quantified separately by line of business, using Schedule P data for the past ten years.
- The reserving risk charge does not attempt to measure the adequacy of reported reserves. Measurement of a company's loss reserve adequacy is handled by state financial examinations and by analysis of Schedule P, not by the risk-based capital formula.

Source: NAIC PROPERTY/CASUALTY INSURANCE COMPANY
RISK-BASED CAPITAL REQUIREMENTS by Sholom Feldblum



Reserves in RBC Calculations

- Risk Based Capital Ratio:
The relationship between the “adjusted surplus” held by the company and the “risk-based capital surplus.”
- Four levels of action that a company can trigger under the formula:
 1. Company action
 2. Regulatory action
 3. Authorized control
 4. Mandatory control
- Each RBC level requires some particular action on the part of the regulator, the company, or both



How The Reserve Estimate is Used in the Financial Analysis of a Company

- Reserves and Risk Based Capital (RBC)
- **Best's Capital Adequacy Ratio (BCAR)**
- Enterprise Risk Management (ERM)
- Spotting a Reserve Deficiency and other red flags

Reserves in BCAR

- BCAR = Best's Capital Adequacy Relativity
 - Measures a company's relative capital strength compared to its industry peer composite
 - It shapes the appropriateness of a company's rating
 - Uses the Capital Adequacy ratio, which allows for an integrated review of a company's Underwriting, Financial, and Asset leverage
- $BCAR = \text{Adjusted Surplus} / \text{Net Required Capital}$



Reserves in BCAR

- Risk Factors focus on 3 major areas:
 - Investment Risk, Credit Risk and Underwriting risk
- Underwriting Risk Capital consists of loss reserve risk and net written premium risk
- Typically, Underwriting Risk generates $\frac{1}{2}$ to $\frac{3}{4}$ of a company's total gross required capital



Reserves in BCAR

- **Balance Sheet Strength**
 - The most important area to evaluate
 - It is the foundation for policyholder security
 - Measures the exposure of a company's surplus to its operating and financial practices
 - A company's BCAR result is extremely useful in evaluating a company's balance-sheet strength, but it is only one component of that analysis

Reserves in BCAR

Overall Financial Strength Rating Components

- Balance Sheet Strength
- Operating Performance
- Business Profile

BCAR Guidelines

Implied Balance Sheet Strength

BCAR

Secure:

175	A++
160	A+
145	A
130	A-
115	B++
100	B++

Vulnerable:

90	B
80	B-
70	C++
60	C+
50	C
40	C-
<40	D



How The Reserve Estimate is Used in the Financial Analysis of a Company

- Reserves and Risk Based Capital (RBC)
- Best's Capital Adequacy Ratio (BCAR)
- **Enterprise Risk Management (ERM)**
- Spotting a Reserve Deficiency and other red flags



Reserves and ERM

- ERM looks at these risks:
 - Underwriting Risk
 - Interest Rate Risk
 - Credit Risk
 - Operational Risk
- Underwriting Risk is where reserves fit in
 - For Insurance companies, reserve risk is a large part of their ERM
 - For non-insurance companies, reserve risk is typically relatively small compared to other risks analyzed



How The Reserve Estimate is Used in the Financial Analysis of a Company

- Reserves and Risk Based Capital (RBC)
- Best's Capital Adequacy Ratio (BCAR)
- Enterprise Risk Management (ERM)
- **Spotting a Reserve Deficiency and other red flags**

Spotting a Reserve Deficiency

Reserve Estimates Over Time

P&C Industry

Schedule P - Part 2 - All Lines

NAIC Book Layout

Dollars in Thousands

Years in Which Losses Were Incurred	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
	INCURRED NET LOSSES AND DEFENSE AND COST CONTAINMENT EXPENSES REPORTED AT YEAR END										DEVELOPMENT		% Change		
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	One Year	Two Year	One Year	Two Year	
	11	11	11	11	11	11	11	11	11	11	11	11	11	11	
1	Prior	319,062,282	333,837,757	341,921,781	350,179,196	353,519,610	359,650,215	364,771,422	366,880,259	368,750,762	371,197,420	2,446,653	4,317,165	1%	1%
2	2004	265,136,725	251,929,595	246,686,872	242,827,659	240,150,223	238,055,035	237,109,408	236,601,445	236,023,583	235,730,568	-293,031	-870,887	0%	0%
3	2005		281,672,755	271,815,202	266,614,615	262,872,880	259,368,460	257,473,988	256,265,761	255,546,992	255,129,537	-417,438	-1,136,219	0%	0%
4	2006			265,546,672	259,374,061	260,790,985	250,931,778	246,743,891	244,806,126	243,652,483	242,811,473	-841,020	-1,994,699	0%	-1%
5	2007				285,671,395	286,639,328	276,550,240	274,710,676	272,416,755	271,082,221	268,272,121	-2,810,100	-4,144,635	-1%	-2%
6	2008					326,113,749	322,701,465	319,297,827	315,052,410	310,381,004	307,654,974	-2,726,011	-7,397,444	-1%	-2%
7	2009						292,740,105	289,027,090	285,337,136	284,818,020	283,400,705	-1,417,338	-1,936,454	0%	-1%
8	2010							290,726,627	289,385,652	288,452,377	287,431,722	-1,020,680	-1,953,966	0%	-1%
9	2011								323,874,251	319,541,062	318,215,046	-1,326,031	-5,659,207	0%	-2%
10	2012									312,650,551	306,604,222	-6,046,315			-2%
11	2013										298,943,958				
12	Totals											-14,451,297	-20,776,328		

Spotting a Reserve Deficiency

Reserve Estimates Over Time

P&C Industry
 Schedule P - Part 2 - All Lines
 NAIC Book Layout

Dollars in Thousands

Years in Which Losses Were		8	9	10	11	12	13	14	15
		c			DEVELOPMENT		% Change		
		2011	2012	2013	One Year	Two Year	One Year	Two Year	Since Inception
		I1	I1	I1	I1	I1	I1	I1	I1
1	Prior	366,880,259	368,750,762	371,197,420	2,446,653	4,317,165	1%	1%	16%
2	2004	236,601,445	236,023,583	235,730,568	-293,031	-870,887	0%	0%	-11%
3	2005	256,265,761	255,546,992	255,129,537	-417,438	-1,136,219	0%	0%	-9%
4	2006	244,806,126	243,652,483	242,811,473	-841,020	-1,994,699	0%	-1%	-9%
5	2007	272,416,755	271,082,221	268,272,121	-2,810,100	-4,144,635	-1%	-2%	-6%
6	2008	315,052,410	310,381,004	307,654,974	-2,726,011	-7,397,444	-1%	-2%	-6%
7	2009	285,337,136	284,818,020	283,400,705	-1,417,338	-1,936,454	0%	-1%	-3%
8	2010	289,385,652	288,452,377	287,431,722	-1,020,680	-1,953,966	0%	-1%	-1%
9	2011	323,874,251	319,541,062	318,215,046	-1,326,031	-5,659,207	0%	-2%	-2%
10	2012		312,650,551	306,604,222	-6,046,315		-2%		-2%
11	2013			298,943,958					
12	Totals				-14,451,297	-20,776,328			



Spotting a Reserve Deficit

IRIS Ratios

- There are 12 IRIS Ratios
- They are grouped into four areas
 - Overall ratios
 - Profitability ratios
 - Liquidity ratios
 - Reserve ratios

Spotting a Reserve Deficit

IRIS Ratios – Industry

- One Year Reserve Development to Surplus

One Year Development	-14,451,297
Surplus of Prior Year End	594,818,948
IRIS Ratio 10	-2%

- Two Year Reserve Development to Surplus

Two Year Development	-20,776,328
Surplus of Second Prior Year End	560,322,549
IRIS Ratio 11	-4%

- In each case, a ratio $\geq 20\%$ is 'unusual'

Spotting a Reserve Deficiency

Reserve Estimates Over Time

Now Defunct Insurance Company
Schedule P - Part 2 - All Lines IN THOUSANDS

NAIC Book Layout

Dollars in Thousands

Years in Which Losses Were Incurred		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		INCURRED NET LOSSES AND DEFENSE AND COST CONTAINMENT EXPENSES REPORTED AT YEAR END										DEVELOPMENT		% Change		
		2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	One Year	Two Year	One Year	Two Year	Since Inception
		I1	I1	I1	I1	I1	I1	I1	I1	I1	I1	I1	I1	I1	I1	I1
1	Prior	0	0	0	0	0	0	0	0	0	0	0	0			
2	2004	0	0	0	0	0	0	0	0	0	0	0	0			
3	2005	0	0	0	0	0	0	0	0	0	0	0	0			
4	2006			668	416	387	895	2,126	2,432	3,473	3,766	293	1,334	8%	55%	464%
5	2007				2,916	2,422	2,373	2,713	3,777	6,988	9,484	2,496	5,707	36%	151%	225%
6	2008					4,682	4,094	4,234	8,877	9,115	9,560	445	683	5%	8%	104%
7	2009						3,273	2,958	2,924	3,267	5,808	2,541	2,884	78%	99%	77%
8	2010							2,129	2,351	3,295	4,684	1,389	2,333	42%	99%	120%
9	2011								2,089	1,848	3,178	1,330	1,089	72%	52%	52%
10	2012									1,262	2,564	1,302		103%		103%
11	2013										4,086					
12	Totals											9,796	14,030			

Spotting a Reserve Deficiency

IRIS Ratios – Now Defunct Company

- One Year Reserve Development to Surplus

One Year Development	9,796
Surplus of Prior Year End	2,195
IRIS Ratio 10	446%

- Two Year Reserve Development to Surplus

Two Year Development	14,030
Surplus of Second Prior Year End	10,554
IRIS Ratio 11	133%

- In each case, a ratio $\geq 20\%$ is 'unusual'



Sensitivity Analysis

- Improvements in Results may stem from:
 - Higher rates
 - Lower claim frequency
 - Lower claim severity
- Better results would *appear* to be present if:
 - Claims were being processed or paid more slowly
 - Case reserves were less adequate
 - Mix of business is different

Exercise 13

Company ABC and XYZ both have the same exposures, selected ultimates and implied loss ratios. Each company appears to see improvements in their loss ratios over time.

- For each company, you have access to:
 - Ultimates as of 12/31/13
 - Implied Loss ratios
 - Closed Claim triangle
 - Reported Claim triangle
 - Case reserve triangle

Your assignment is to determine if the results are truly improving over time, or if there are indications that the results simply appear to be improving.



Thank You