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Basic Reserving: Estimating the Liability for Unpaid Claims

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Loss Reserve

- What is a loss reserve?
 - Amount necessary to settle unpaid claims
- Why are loss reserves important?
 - Accurate evaluation of financial condition and underwriting income

Components of a Reserve

- Case reserves
- Incurred but not reported (“IBNR”) reserves
 - Claims incurred but not yet reported
 - Claims reported but not yet recorded
 - Future increases in case reserves
 - Closed claims that reopen in the future

Case Reserve Basics

- Estimated by a claim adjuster
- Based on the details of the claim
- Various reserving philosophies
 - Most likely settlement value (mode)
 - Expected value of settlement (mean)
 - Maximum settlement value
 - Etc.

Case Reserve Issues

- Loss adjustment expenses
- Impact of inflation
- Recoveries from salvage and subrogation
- Recoveries from reinsurance

Hypothetical Claim Background

- Auto liability insurance
- Policy period: April 1, 2012 to March 30, 2013
- Accident date: December 4, 2012
- Date of claim report: January 15, 2013

Hypothetical Claim Transactions – Part 1

Date	Transaction	Reported Claim Value	Cumulative Paid to Date
Jan. 15, 2013	Case reserve of \$10,000 established	\$10,000	\$0
Mar. 22, 2013	\$2,500 payment for medical costs; Case reserve reduced to \$7,500	\$10,000	\$2,500
Apr. 18, 2013	\$500 payment to independent adjuster; No change to case reserve	\$10,500	\$3,000
Oct. 14, 2014	Case reserve increased from \$7,500 to \$50,000	\$53,000	\$3,000
Dec. 18, 2014	Claim settled with \$25,000 payment for lost wages and additional medical costs; Case reserve decreased to \$0	\$28,000	\$28,000

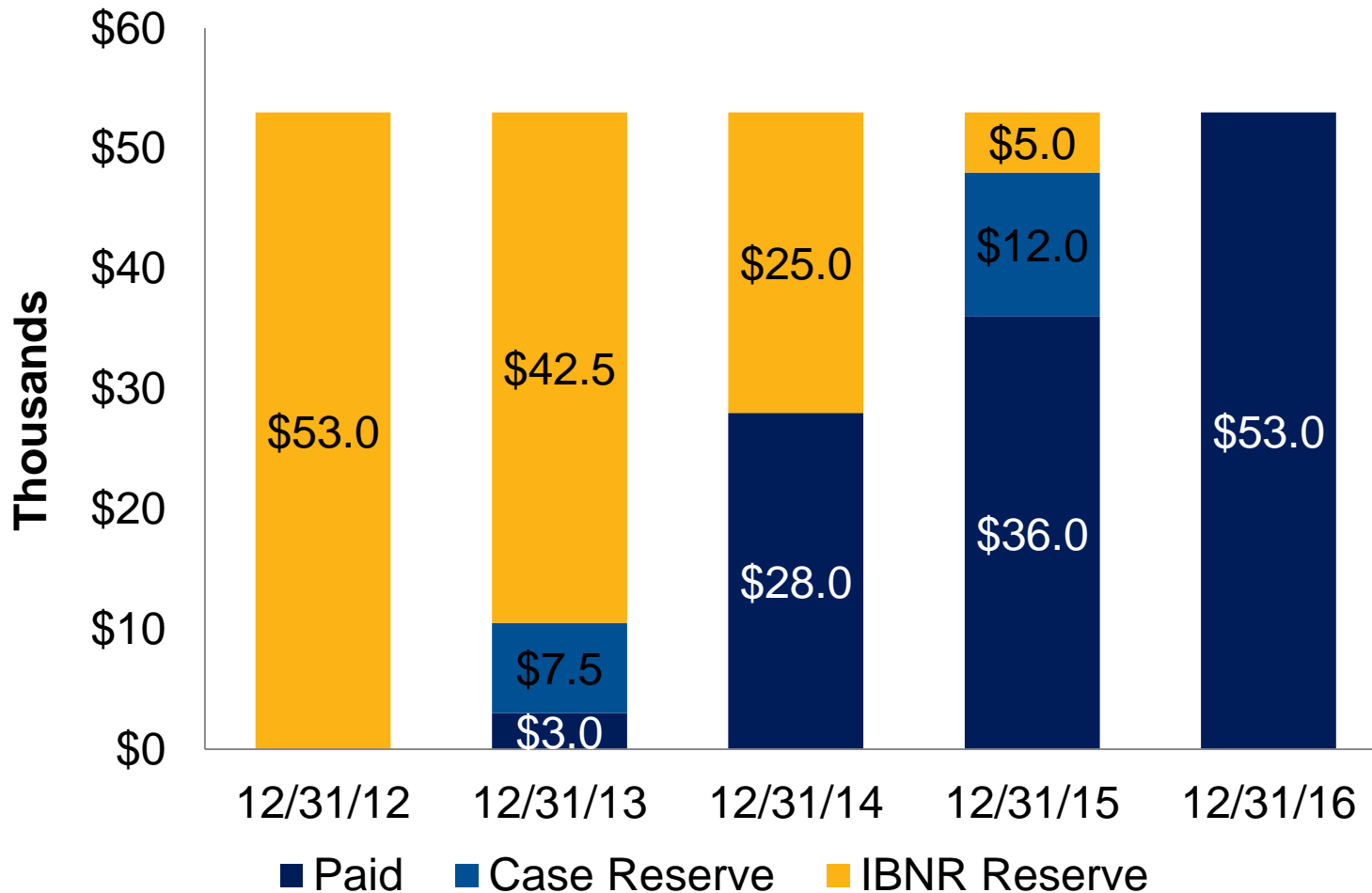
Hypothetical Claim Transactions – Part 2

Date	Transaction	Reported Claim Value	Cumulative Paid to Date
Sep. 3, 2015	Claim reopened with case reserve of \$15,000 for legal defense costs and \$5,000 for future payments to claimant	\$48,000	\$28,000
Dec. 8, 2015	Payment of \$8,000 for legal costs; Case reserve for defense costs reduced to \$7,000	\$48,000	\$36,000
Aug. 30, 2016	Final payment to claimant of an additional \$9,000; Case reserve for payment to claimant reduced to \$0	\$52,000	\$45,000
Sep. 15, 2016	Final payment for defense costs of an additional \$8,000; Case reserve reduced to \$0	\$53,000	\$53,000

The Problem

- Policy was sold in early 2012
- Claim isn't fully paid until late 2016
- How does the company know if its business is profitable?

Hypothetical Claim Year-End Losses



Interested Parties

- **Company management**
 - Which business segments are the most/least profitable?
- **Investors**
 - How profitable is the company?
- **Regulators**
 - Does the company have sufficient funds available to meet its obligations to policyholders?

Basic Methods

Expected Loss Ratio

Single Accident Year

- Premium Earned During 2012 = \$5 million
- Expected loss ratio = 80%
- Expected losses = \$5 million x 80%
= \$4 million
- Total payments as of 12/31/2012
= \$1.5 million
- Total reserves as of 12/31/2012
= \$4 million - \$1.5 million
= \$2.5 million

Expected Loss Ratio Multiple Years

(1) Accident Year	(2) Earned Premium	(3) Expected Loss Ratio	(4) = (2) x (3) Expected Ultimate Loss	(5) Paid Loss as of 12/31/12	(6) = (4) – (5) Estimated Loss Reserve
2005	14,784	75%	11,088	10,852	236
2006	17,468	75%	13,101	15,045	(1,944)
2007	19,550	75%	14,663	15,878	(1,215)
2008	21,243	75%	15,932	14,967	965
2009	24,003	75%	18,002	15,425	2,577
2010	24,866	75%	18,649	11,836	6,813
2011	25,843	75%	19,382	5,609	13,773
2012	27,487	75%	20,615	1,406	19,209
Total	175,244		131,433	91,018	40,415

Expected Loss Ratio

Pros and Cons

- Strengths
 - Simple calculation, easy to explain
 - Minimal data requirements
 - Not sensitive to data fluctuations
- Weaknesses
 - Not responsive to data fluctuations
 - Not responsive to changes in risk environment
 - No accounting for inherent uncertainty in the expected loss ratio – the key parameter

Paid Loss Development Data Accounting Configuration

Accident Year	Accident Year Paid Losses (in \$000s) Cumulative Totals as of 12/31/XX							
	2005	2006	2007	2008	2009	2010	2011	2012
2005	696	2,785	5,262	8,178	9,522	10,604	10,803	10,852
2006		776	3,907	8,383	12,748	14,161	14,805	15,045
2007			1,058	4,344	8,501	11,912	15,148	15,878
2008				1,106	4,589	7,929	12,618	14,967
2009					1,230	4,829	10,355	15,425
2010						1,281	5,696	11,836
2011							1,217	5,609
2012								1,406

Paid Loss Development Data

Actuarial Configuration

Accident Year	Accident Year Paid Losses (in \$000s)							
	Cumulative Totals by Development Age in Months							
	12	24	36	48	60	72	84	96
2005	696	2,785	5,262	8,178	9,522	10,604	10,803	10,852
2006	776	3,907	8,383	12,748	14,161	14,805	15,045	
2007	1,058	4,344	8,501	11,912	15,148	15,878		
2008	1,106	4,589	7,929	12,618	14,967			
2009	1,230	4,829	10,355	15,425				
2010	1,281	5,696	11,836					
2011	1,217	5,609						
2012	1,406							

Loss Development Factor From 12 Months to 24 Months

Accident Year	Cumulative Paid at 12 Months	Cumulative Paid at 24 Months	Loss Development Factor
2005	696	2,785	$4.002 = 2,785 / 696$
2006	776	3,907	$5.032 = 3,907 / 776$
2007	1,058	4,344	$4.107 = 4,344 / 1,058$
2008	1,106	4,589	$4.151 = 4,589 / 1,106$
2009	1,230	4,829	$3.926 = 4,829 / 1,230$
2010	1,281	5,696	$4.445 = 5,696 / 1,281$
2011	1,217	5,609	$4.611 = 5,609 / 1,217$
Total	7,364	31,759	$4.313 = 31,759 / 7,364$
2012	1,406	???	???

Loss Development Factor From 12 Months to 24 Months

Accident Year	Cumulative Paid at 12 Months	Cumulative Paid at 24 Months	Loss Development Factor
2005	696	2,785	4.002 = 2,785 / 696
2006	776	3,907	5.032 = 3,907 / 776
2007	1,058	4,344	4.107 = 4,344 / 1,058
2008	1,106	4,589	4.151 = 4,589 / 1,106
2009	1,230	4,829	3.926 = 4,829 / 1,230
2010	1,281	5,696	4.445 = 5,696 / 1,281
2011	1,217	5,609	4.611 = 5,609 / 1,217
Total	7,364	31,759	4.313 = 31,759 / 7,364
2012	1,406	1,406 x 4.300 = 6,046	4.300

Paid Loss Development Data

Actuarial Configuration

Accident Year Paid Losses (in \$000s)								
Cumulative Totals by Development Age in Months								
Accident Year	12	24	36	48	60	72	84	96
2005	696	2,785	5,262	8,178	9,522	10,604	10,803	10,852
2006	776	3,907	8,383	12,748	14,161	14,805	15,045	
2007	1,058	4,344	8,501	11,912	15,148	15,878		
2008	1,106	4,589	7,929	12,618	14,967			
2009	1,230	4,829	10,355	15,425				
2010	1,281	5,696	11,836					
2011	1,217	5,609						
2012	1,406	6,046						

Paid Loss Development Data

Loss Development Factor Selection

Accident Year	12-24	24-36	36-48	58-60	60-72	72-84	84-96	96-Ult
2005	4.002	1.889	1.554	1.164	1.114	1.019	1.005	
2006	5.032	2.146	1.521	1.111	1.045	1.016		
2007	4.107	1.957	1.401	1.272	1.048			
2008	4.151	1.728	1.591	1.186				
2009	3.926	2.144	1.490					
2010	4.445	2.078						
2011	4.611							
2012								
Wtd Avg	4.313	1.999	1.506	1.184	1.063	1.017	1.005	
Selected	4.300	2.000	1.500	1.185	1.065	1.017	1.005	???

Paid Loss Development Data

Loss Development Factor Projection

Accident Year	12-24	24-36	36-48	58-60	60-72	72-84	84-96	96-Ult
2005	4.002	1.889	1.554	1.164	1.114	1.019	1.005	???
2006	5.032	2.146	1.521	1.111	1.045	1.016	1.005	???
2007	4.107	1.957	1.401	1.272	1.048	1.017	1.005	???
2008	4.151	1.728	1.591	1.186	1.065	1.017	1.005	???
2009	3.926	2.144	1.490	1.185	1.065	1.017	1.005	???
2010	4.445	2.078	1.500	1.185	1.065	1.017	1.005	???
2011	4.611	2.000	1.500	1.185	1.065	1.017	1.005	???
2012	4.300	2.000	1.500	1.185	1.065	1.017	1.005	???
Selected	4.300	2.000	1.500	1.185	1.065	1.017	1.005	???

Paid Loss Development Data

“Squaring the Triangle”

Accident Year Paid Losses (in \$000s)
Cumulative Totals by Development Age in Months

Accident Year	12	24	36	48	60	72	84	96
2005	696	2,785	5,262	8,178	9,522	10,604	10,803	10,852
2006	776	3,907	8,383	12,748	14,161	14,805	15,045	15,121
2007	1,058	4,344	8,501	11,912	15,148	15,878	16,148	16,229
2008	1,106	4,589	7,929	12,618	14,967	15,940	16,211	16,292
2009	1,230	4,829	10,355	15,425	18,278	19,466	19,797	19,896
2010	1,281	5,696	11,836	17,754	21,038	22,405	22,786	22,900
2011	1,217	5,609	11,218	16,827	19,940	21,236	21,597	21,705
2012	1,406	6,046	12,090	18,135	21,490	22,887	23,276	23,392