Basic Track I

2012 CLRS

September 5-7, 2012

Denver, Colorado

Introduction to Loss Reserving

- CAS Statement of Principles
  - Definitions
  - Principles
  - Considerations
- Basic Reserving Techniques
  - Paid Loss Development Method (PLDM)
  - Incurred Loss Development Method (ILDM)

Definitions

- What is a Loss Reserve?

    Amount necessary to settle unpaid claims

- Why are Loss Reserves Important?
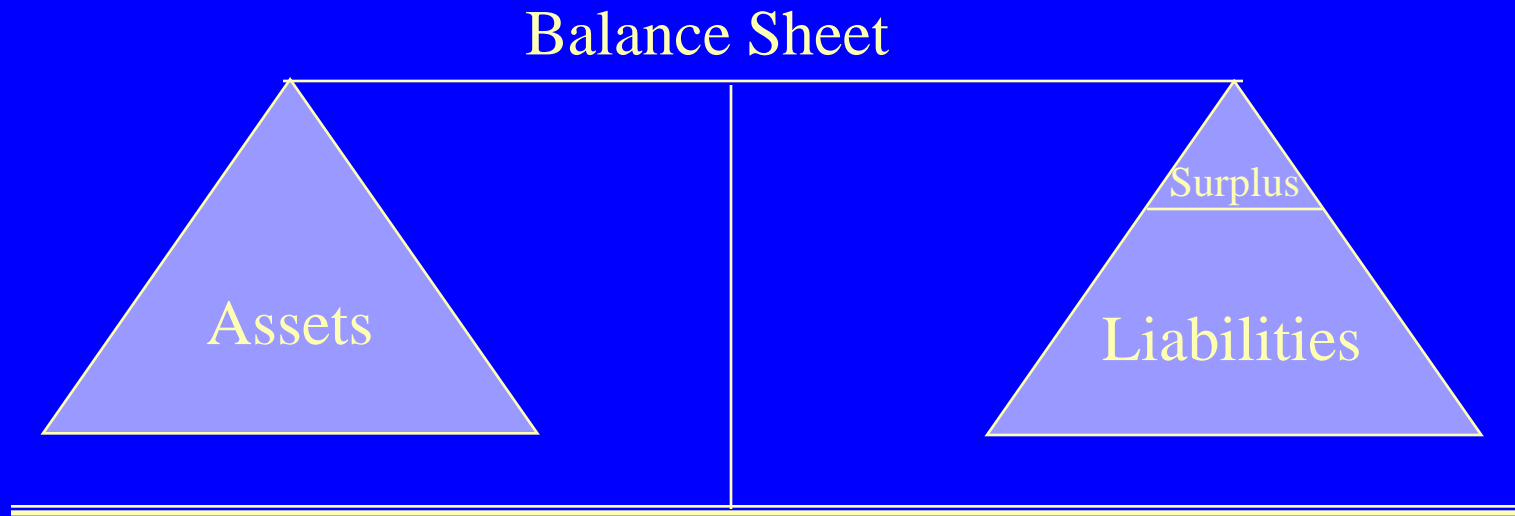 Accurate evaluation of financial condition & underwriting income

Definitions

- Accounting Aspects of Loss Reserves

Balance Sheet

Assets

Liabilities

Surplus

Definitions

- Accounting Aspects of Loss Reserves

Balance Sheet

Assets

Surplus
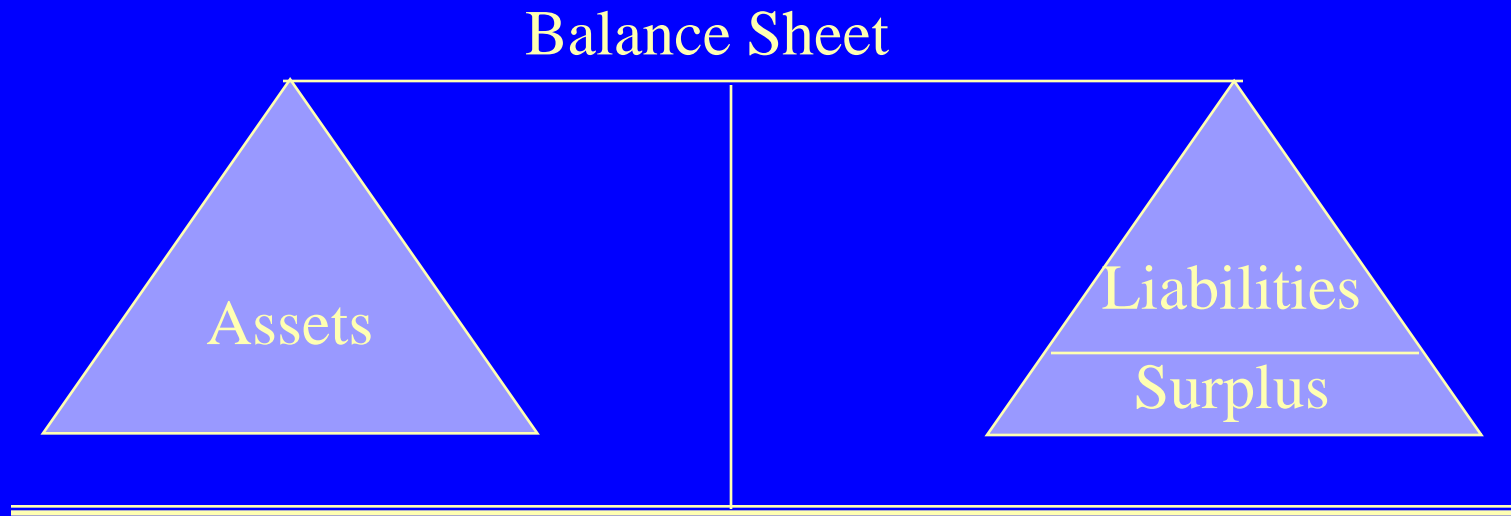
Liabilities

Definitions

- ## Carried Loss Reserve

  The amount shown in a published statement or an internal statement of financial condition.

- ## Indicated Loss Reserve

  The amount that results from the application of a particular loss reserving method.

- ## Reserve Margin/Deficit

  The difference between an indicated loss reserve and a carried loss reserve.

Definitions

- Elements of a Loss Reserve
  - Formula Reserve/Case Reserve
  - Development on Known Claims
  - Reopened Claims Reserve
  - Incurred But Not Reported (IBNR)
  - Claims in Transit

Life Cycle of a Claim Reserve

7/8/11 Accident occurs

Pure IBNR

7/11/11 Accident reported

Claims in Transit

8/1/11 Accident entered into records as $1,000 Formula Reserve

10/5/11 Individual reserve established

$10,000 Case Reserve

1/1/12 Estimate revised

$25,000 Case Reserve

8/18/12 Settlement agreed

$30,000 Case Reserve

8/25/12 Payment sent

$30,000 Case Reserve

9/2/12 Claim draft clears

Claim Closed

$ 0 Case Reserve

Definitions

- ## Case Reserves
  - Claim reported but not yet paid
  - Assigned a value by a claims adjuster or by formula

- ## Bulk + IBNR reserves include:
  - Reserves for claims not yet reported (pure IBNR)
  - Claims in transit
  - Development on known claims
  - Reserves for reopened claims

Definitions

- Loss Adjustment Expenses (LAE) are sum of:

  - Defense & Cost Containment (DCC) Expense

  - Adjusting and Other (AO)

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.

Definitions

- Loss Adjustment Expenses (LAE) are sum of:
  - Adjusting & Other (AO) Expense
    - Includes all claims adjusting expenses, whether internal or external to a company.
    - In general, includes costs associated with recording and adjusting cases.

Definitions

- Reserves = Outstanding

  = Liabilities = Unpaid

  = Case Reserves + IBNR

- Incurred losses may have various meanings!

  - Ultimate Losses (incl. IBNR)

  - Reported Losses (excl. IBNR)

Principles

- Actuarially sound reserves
  - – based on *estimates*
  - – derived from reasonable *assumptions*
  - – using appropriate *methods*

- Inherent Uncertainty
  - – a range can be actuarially sound
  - – true value known only after all claims settled

Principles

- Most appropriate reserve depends on:
  - relative likelihood of estimates in range
  - financial reporting context

Considerations: Data Organization

- Accident Date
  - The date on which the loss occurred.

- Report Date
  - The date on which the loss is first reported to the insurer.

- Recorded Date
  - The date on which the loss is first entered into the statistical records of the insurer.
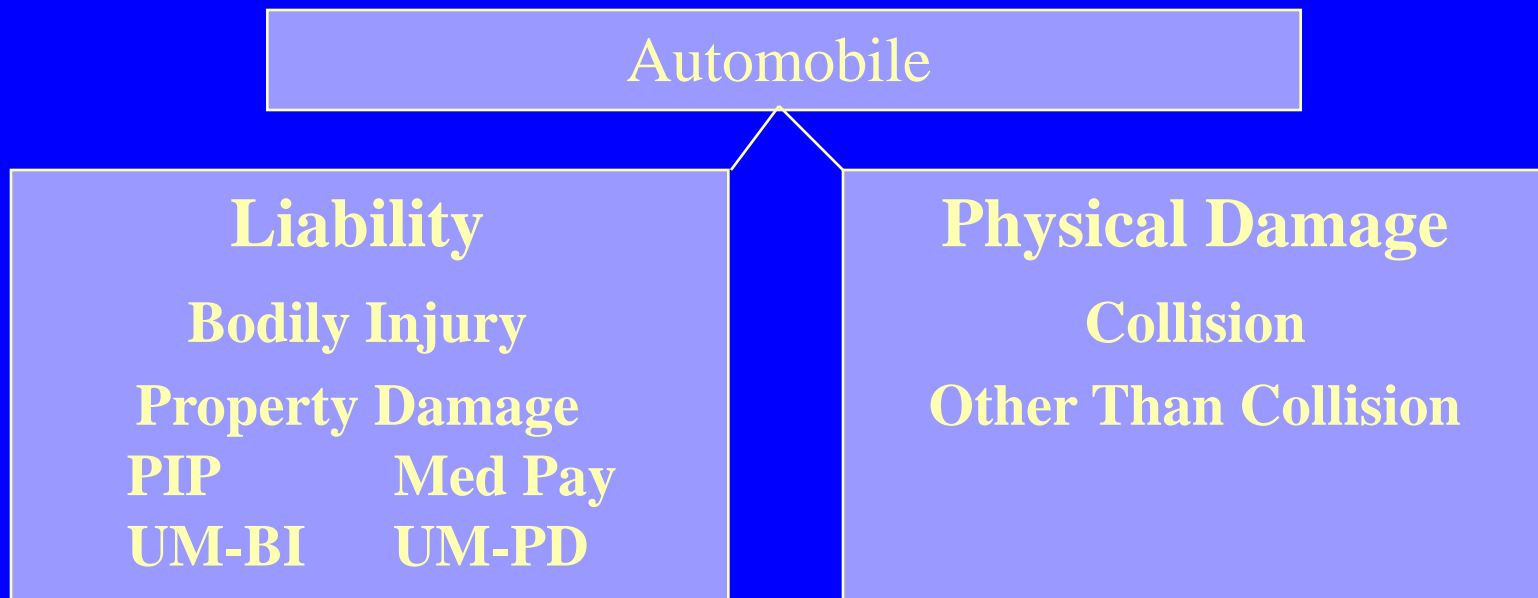
Considerations: Data Organization

- Accounting Date
  - Defines a group of claims for which liability may exist.
  - All claims incurred on or before the accounting date.

- Valuation Date
  - Defines the time period for which transactions are included when evaluating the existing liability.
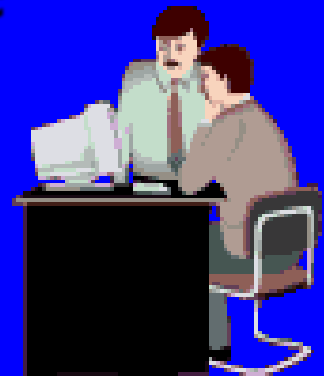
Considerations: Homogeneity

Accuracy is often improved by subdividing experience into groups exhibiting similar characteristics.

Automobile	
Liability	**Physical Damage**
Bodily Injury	**Collision**
Property Damage	**Other Than Collision**
PIP **Med Pay**	
UM-BI **UM-PD**	

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.
  - May be a point at which partitioning will divide the data into groups too small to provide credible development patterns.

- Use of supplementary data sources
  - Examples include industry data, countrywide data.

Basic Reserving Techniques: Definitions

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

- ## Triangles
  Compiled to measure the changes in cumulative claim activity over time in order to estimate patterns of future activity.

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

Basic Reserving Techniques:
Compilation of Paid Loss Triangle

- The losses are sorted by the year in which the accident occurred.

- The payments from inception are summed at the end of each year.

- Losses paid to date are shown on the most recent diagonal.

- The data is organized in this way to highlight historical patterns.

Basic Reserving Techniques:
Compilation of Paid Loss Triangle
Accounting Configuration

Goal: Calculate the total paid-to-date

Accident Year	Cumulative Paid Losses ($000 Omitted) Cumulative Accident Year Paid as of Year End					
	2006	2007	2008	2009	2010	2011
2006	3,780	6,671	8,156	9,205	9,990	10,508
2007		4,212	7,541	9,351	10,639	11,536
2008			4,901	8,864	10,987	12,458
2009				5,708	10,268	12,699
2010					6,093	11,172
2011						6,962

Basic Reserving Techniques:
Compilation of Paid Loss Triangle
Actuarial Configuration
Goal: Estimate the total ultimately paid

Accident Year	Cumulative Paid Losses ($000 Omitted) Development Stage in Months						Final Total Cost
	12	24	36	48	60	72	
2006	3,780	6,671	8,156	9,205	9,990	10,508	???
2007	4,212	7,541	9,351	10,639	11,536		???
2008	4,901	8,864	10,987	12,458			???
2009	5,708	10,268	12,699				???
2010	6,093	11,172					???
2011	6,962						???

Basic Reserving Techniques:
Paid Loss Development Factors

Accident Year	Evaluation Interval in Months					
	12-24	24-36	36-48	48-60	60-72	72 to Ultimate
2006	1.765	1.223	1.129	1.085	1.052	???
2007	1.790	1.240	1.138	1.084		
2008	1.809	1.240	1.134			
2009	1.799	1.237				
2010	1.834					
2011						

Sample Calculation for Accident Year 2007:

12-to-24 Months   1.790   =   7,541 / 4,212

From the end of the accident year (at 12 months) to the end of the following year (at 24 months), paid losses for 2006 grew 79%. During the next year (from 24 to 36 months), paid losses experienced an additional 24% growth (or development) and so forth.

Basic Reserving Techniques:
Compilation of Paid Loss Triangle

Accident Year	Cumulative Paid Losses ($000 Omitted) Development Stage in Months		
	12	24	36
2006	3,780	6,671	8,156
2007	4,212	7,541	

Accident Year	Cumulative Paid Losses ($000 Omitted) Evaluation Interval In Months	
	12-24	24 - 36
2006	+6,671 / 3,780	+8,156 / 6,671
2007	+7,541 / 4,212	

Basic Reserving Techniques:
Compilation of Paid Loss Triangle

Accident Year	Cumulative Paid Losses ($000 Omitted) Evaluation Interval In Months		
	12-24	24 - 36	
2006	+6,671 / 3,780	+8,156 / 6,671	
2007	+7,541 / 4,212		

Accident Year	Evaluation Interval in Months		
	12-24	24-36	
2006	1.765	1.223	
2007	1.790		

Basic Reserving Techniques:
Paid Loss Development Factors

Loss Development Factors (LDFs) are also known as:

- Age-to-Age factors
- Link Ratios

Basic Reserving Techniques:
Paid Loss Development Factors

Accident Year	Evaluation Interval in Months					
	12-24	24-36	36-48	48-60	60-72	72 to Ultimate
2006	1.765	1.223	1.129	1.085	1.052	
2007	1.790	1.240	1.138	1.084		
2008	1.809	1.240	1.134			
2009	1.799	1.237				
2010	1.834					
2011						
Average - All Years	1.799	1.235	1.134	1.085	1.052	
Average - Latest 3 Years	1.814	1.239	1.134	XXX	XXX	
Average - Excl Hi & Lo	1.799	1.239	1.134	XXX	XXX	
Wt Average - All Years	1.803	1.235	1.134	1.085	1.052	
Selected LDF	1.800	1.235	1.134	1.085	1.052	1.070

Basic Reserving Techniques:
Application of Paid LDM

	Evaluation Interval in Months					
	12-24	24-36	36-48	48-60	60-72	72 to Ultimate
LDFs	1.800	1.235	1.134	1.085	1.052	1.070

	Cumulative Paid Losses ($000 Omitted) Development Stage in Months						Final Total Cost
Accident Year	12	24	36	48	60	72	
2006	3,780	6,671	8,156	9,205	9,990	10,508	11,244
2007	4,212	7,541	9,351	10,639	11,536	12,136	12,985
2008	4,901	8,864	10,987	12,458	13,517	14,220	15,215
2009	5,708	10,268	12,699	14,401	15,625	16,437	17,588
2010	6,093	11,172	13,797	15,646	16,976	17,859	19,109
2011	6,962	12,532	15,477	17,550	19,042	20,032	21,435

Sample Calculations for Accident Year 2011:

At 24 Months: 12,532 = 6,962 x 1.800

At 36 Months: 13,797 = 11,172 x 1.235
                 15,477 =   6,962 x 1.800 x 1.235

Basic Reserving Techniques:
Paid LDM Projections & Reserves

Loss Reserve Estimate @ 12/31/11 = $32.241 million

Accident Year	Actual Paid Losses 12/31/11	Selected LDFs	Cumulative Development Factors to Ultimate	Estimated Ultimate Losses [(2) x (4)]	Actual Paid Losses 12/31/11	Estimated Loss Reserves [(5) - (6)]
(1)	(2)	(3)	(4)	(5)	(6)	(7)
2006	10,508	1.070	1.070	11,244	10,508	736
2007	11,536	1.052	1.126	12,985	11,536	1,449
2008	12,458	1.085	1.221	15,215	12,458	2,757
2009	12,699	1.134	1.385	17,588	12,699	4,889
2010	11,172	1.235	1.710	19,109	11,172	7,937
2011	6,962	1.800	3.079	21,435	6,962	14,473
Total	65,335			97,576	65,335	32,241

Basic Reserving Techniques:
Issues to Consider for Paid LDM

Issues to Consider	Examples
Have there been any changes which might make the older years irrelevant?	There are more motorcycle losses in the oldest year; Typical P&C no longer insures motorcycles.
Are the more recent years better predictors of the future?	Typical P&C has begun writing more business in state X.
Are there outlier points that need to be ignored or adjusted?	In one year, there were bad ice storms at the end of December. Late reporting caused unusually high development in the next year.

Basic Reserving Techniques:
Incurred Loss Triangle

Accident	Case Reserves ($000 Omitted)					
Year	Development Stage in Months					
	12	24	36	48	60	72
2006	5,557	4,176	2,936	1,987	1,245	742
2007	6,328	4,664	3,200	2,051	1,189	
2008	6,974	4,968	3,251	1,955		
2009	7,635	5,274	3,367			
2010	8,376	5,604				
2011	9,599					

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Accident	Cumulative Paid Losses ($000 Omitted)					
Year	Development Stage in Months					
	12	24	36	48	60	72
2006	3,780	6,671	8,156	9,205	9,990	10,508
2007	4,212	7,541	9,351	10,639	11,536	
2008	4,901	8,864	10,987	12,458		
2009	5,708	10,268	12,699			
2010	6,093	11,172				
2011	6,962					

Basic Reserving Techniques:
Incurred Loss Triangle

Accident Year	Cumulative Case Reported Losses ($000 Omitted) Development Stage in Months						Final Total Cost
	12	24	36	48	60	72	
2006	9,337	10,847	11,092	11,192	11,235	11,250	???
2007	10,540	12,205	12,551	12,690	12,725		???
2008	11,875	13,832	14,238	14,413			???
2009	13,343	15,542	16,066				???
2010	14,469	16,776					???
2011	16,561						???

Basic Reserving Techniques:
Selected Incurred LDFs

| Accident Year	Evaluation Interval in Months					
	12-24	24-36	36-48	48-60	60-72	72 to Ultimate
2006	1.162	1.023	1.009	1.004	1.001	???
2007	1.158	1.028	1.011	1.003		
2008	1.165	1.029	1.012			
2009	1.165	1.034				
2010	1.159					
2011						
Average - All Years	1.162	1.029	1.011	1.004	1.001	
Average - Latest 3 Years	1.163	1.030	1.011	XXX	XXX	
Average - Excl Hi & Lo	1.162	1.029	1.011	XXX	XXX	
Wt Average - All Years	1.162	1.029	1.011	1.003	1.001	
Selected LDF	1.162	1.030	1.011	1.003	1.001	1.000
Cumulative LDF	1.215	1.045	1.015	1.004	1.001	1.000

Basic Reserving Techniques:
Incurred LDM Projections & Reserves

Accident Year	Actual Reported Losses 12/31/11	Development Factors to Ultimate	Estimated Ultimate Losses [(2) x (3)]	Actual Paid Losses 12/31/11	Estimated Loss Reserves {(4) - (5)}
(1)	(2)	(3)	(4)	(5)	(6)
2006	11,250	1.000	11,250	10,508	742
2007	12,725	1.001	12,738	11,536	1,202
2008	14,413	1.004	14,471	12,458	2,013
2009	16,066	1.015	16,308	12,699	3,609
2010	16,776	1.045	17,539	11,172	6,367
2011	16,561	1.215	20,119	6,962	13,157
Total	87,791		92,425	65,335	27,090

Comparison of LDM Projections

Accident Year	Estimated Ultimate Losses Based on:		
	Paid LDM	Incurred LDM	Average = Selected
	Paid Method	Incurred Method	Average
2006	11,244	11,250	11,247
2007	12,985	12,738	12,862
2008	15,215	14,471	14,843
2009	17,588	16,308	16,948
2010	19,109	17,539	18,324
2011	21,435	20,119	20,777
Total	97,576	92,425	95,001

Ultimate Loss Projections
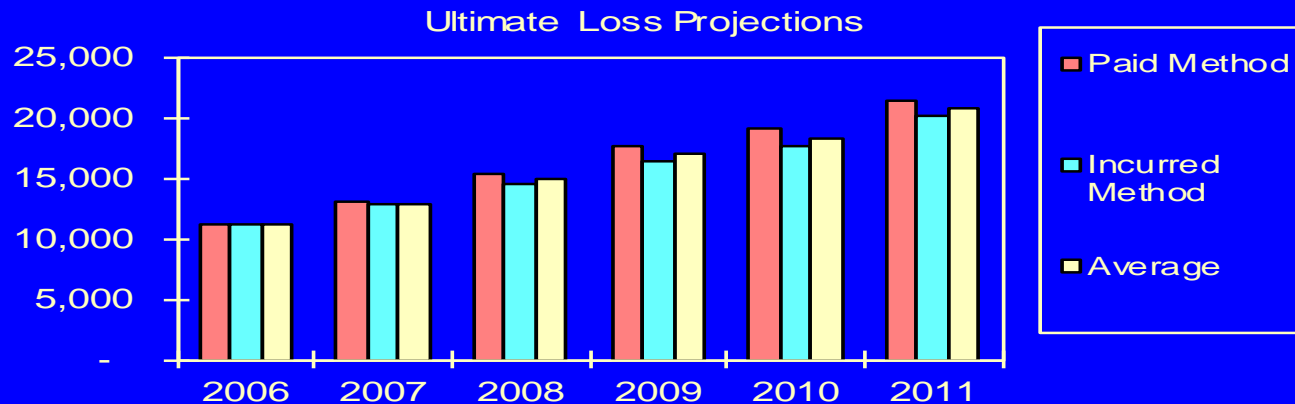
Comparison of Loss Development Methods

Underlying Assumptions

- **PLDM: No changes in the payment pattern**
- **ILDM: No changes in case reserve adequacy**

Pro	Con
PLDM: "Hard" data; no estimates involved ILDM: Uses all available information	PLDM: May generate large, volatile loss development factors & take longer to develop to ultimate ILDM: Uses case reserves, which are estimates, to develop estimates of ultimate losses

Key Assumptions & Potential Problems

Assumptions	Potential Problems
Claims settlement patterns unchanging	Increasing delays in claim closing rates
Case reserving practices & philosophies unchanging	Conscious effort to improve case reserve adequacy; Introduction of new case reserving procedures
No claim processing changes	Change in data processing; Revised claim payment recording procedures
Policy limits have no impact on loss development	Increasing frequency of full policy limits claims; Changing policy limits

Key Assumptions & Potential Problems

Assumptions	Potential Problems
Loss development unaffected by changing loss cost trends	Surges in inflation; Increased litigation; Diminished policy defenses
No change in mix of business	Changes in reinsurance coverages; Increased long-tail exposures; Introduction of new or revised coverages
No cyclical loss development	Underwriting cycles impact claims settlement or reserving practices

Key Assumptions & Potential Problems

| Assumptions	Potential Problems
No data anomalies	Catastrophic or unusual losses reflected in loss experience; Unusual claim settlement/reporting delays

Comparison of Estimated Reserves

Accident Year	Estimated Loss Reserves Based on:		
	Paid LDM	Incurred LDM	Average = Selected
	Paid Method	Incurred Method	Average
2006	736	742	739
2007	1,449	1,202	1,326
2008	2,757	2,013	2,385
2009	4,889	3,609	4,249
2010	7,937	6,367	7,152
2011	14,473	13,157	13,815
Total	32,241	27,090	29,666

Comparison of Estimated Reserves

Components of Selected Reserve at 12/31/11
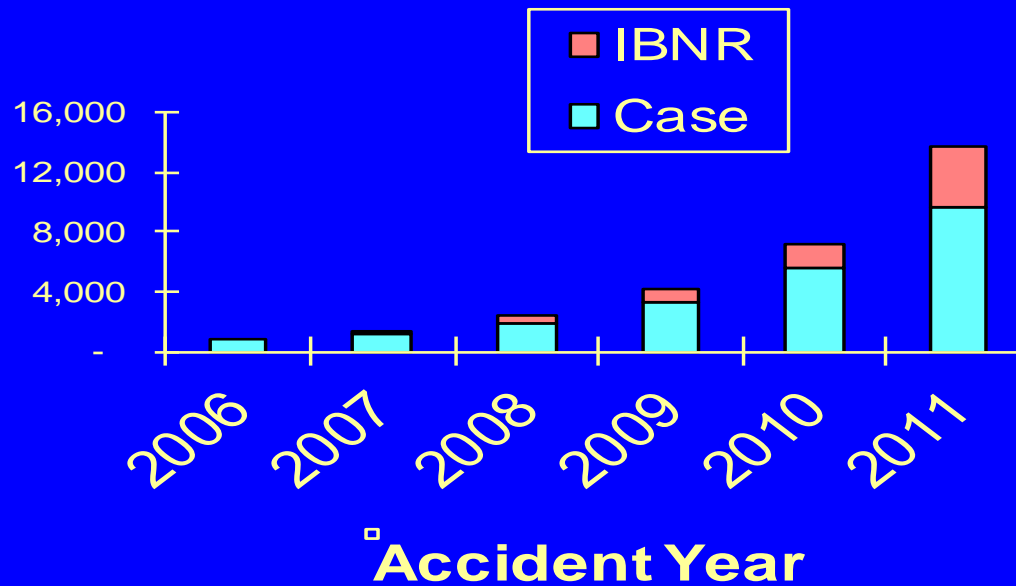
Comparison of Estimated Reserves

- Which estimate is right?

- Which estimate is best?

- How will you know?

- When will you know?

Session I Review

- **CAS Statement of Principles**
  - Definitions
  - Principles
  - Considerations

- **Basic Reserving Techniques**
  - Paid Loss Development Method (PLDM)
  - Incurred Loss Development Method (ILDM)

Looking Ahead

- Evaluating for Reasonability
- Factors influencing Sensitivity of Estimates
- More Basic Reserving Techniques
- Loss Adjustment Expenses
- Schedule P
- Examples - You set the reserve!

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