

# *Intermediate Track II*

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## *Investigating and Detecting Change*

2012 CLRS

September 5-7, 2012

Denver, CO

# *Introduction*

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## *The Ideal Situation*

Loss reserve data should contain a long, stable history of homogeneous claim experience, where no significant operations changes materially affect either the mix of business or the handling of claims, and there should be a sufficient number of claims to produce credible loss patterns.

# *Introduction*

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## *The Reality*

Virtually all elements of “The Ideal” are periodically violated:

1. The Mix Changes
2. Claim Handling Changes
3. Case Reserves are Strengthened/Weakened
4. Other Factors
  - ◆ Changes in Deductibles, Limits, SIRs
  - ◆ Changes in Reinsurance
  - ◆ Tort Reform, other law changes
  - ◆ New Sources of Loss
  - ◆ Changes in the Economy

# *Introduction*

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## *This Session Will Discuss*

- ◆ The potential impact of mix changes
- ◆ Changes in claim closing patterns
- ◆ Changes in case reserve adequacy
- ◆ What Else?

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*CHANGE  
IN  
MIX*

# Change in Mix

## Cumulative Paid Losses (Combined)

Accident <u>Year</u>	<u>Months of Development</u>			
	<u>12</u>	<u>24</u>	<u>36+</u>	<u>Ultimate</u>
2008	\$2,000	\$4,000	\$5,100	\$5,100
2009	2,000	4,000	5,100	5,100
2010	2,000	4,000		5,100
2011	2,000			5,100

# Change in Mix

## Cumulative Paid Losses (Category A)

Accident Year	<u>Months of Development</u>			
	<u>12</u>	<u>24</u>	<u>36+</u>	<u>Ultimate</u>
2008	\$1,500	\$1,800	\$2,100	\$2,100
2009	1,500	1,800	2,100	2,100
2010	1,500	1,800		2,100
2011	500			700

Develops quickly

Most of \$ paid within 12 months

# Change in Mix

## Cumulative Paid Losses (Category B)

Accident Year	<u>Months of Development</u>			
	<u>12</u>	<u>24</u>	<u>36+</u>	<u>Ultimate</u>
2008	\$500	\$2,200	\$3,000	\$3,000
2009	500	2,200	3,000	3,000
2010	500	2,200		3,000
2011	1,500			9,000

Develops slower than Category A

Most of \$ paid between 12-24 months



# *Change in Mix*

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## *Paid Loss Ultimate Comparison*

Accident Year 2011 ultimate loss if change in mix is ignored: \$5,100 (*i.e. unchanged from 2010*)

Accident Year 2011 ultimate if data is separately analyzed: \$9,700 (*i.e. sum of two category ultimates*)

# *Change in Mix*

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## *Key Principle*

Always search for subdivisions of data related to possible causes of variable loss development

# *Change in Mix*

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## *Suggested Subdivisions of Data Include*

### Primary:

1. Geographic
2. New Products vs. Old
3. Subline or Coverage
4. Deductibles or Policy Limits
5. Type of Loss Payment (e.g., Medical vs. Indemnity)

### Reinsurance:

1. Attachment Point
2. Production Source
3. Line or Subline

# *Change in Mix*

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## *How Do You Decide?*

### Ask:

1. Underwriters
2. Claims Department
3. Agents
4. Actuaries

### The Key:

Learn as much as possible about the book of business you are evaluating.

- ◆ What it has been historically
- ◆ What it is becoming

# Change in Mix

## *What Should be Done if Mix Change Includes New Business for Which You Have Insufficient Data?*

### Seek Alternative Sources of Data

Perhaps general liability book formerly was comprised solely of “OL&T” exposures, but in recent years began adding “M&C” risks.

Possible Solution: Relate ISO development patterns for M&C to OL&T and modify development factors for your analysis.

### Discuss Potential Impacts with Claims, Underwriting, Other Actuaries

- ◆ Length of Tail
- ◆ Frequency
- ◆ Severity
- ◆ Loss Ratios

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# *CLAIM CLOSING PATTERNS*

# Claim Closing Patterns

*What is driving the divergence?*

## *Unadjusted Paid Loss Development Method*

Accident	<u>Months of Development</u>			
<u>Year</u>	<u>12</u>	<u>24</u>	<u>36+</u>	<u>Ultimate</u>
2009	\$1,000	\$4,000	\$6,000	\$6,000
2010	1,000	3,500		5,250
2011	750			4,219

## *Incurred Loss Development Method*

Accident	<u>Months of Development</u>			
<u>Year</u>	<u>12</u>	<u>24</u>	<u>36+</u>	<u>Ultimate</u>
2009	\$2,000	\$5,000	\$6,000	\$6,000
2010	1,967	4,917		5,900
2011	1,867			5,600

# *Claim Closing Patterns*

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- 1) Review Closing Rates to Determine Whether There Has Been a Change
- 2) Seek Independent Confirmation That a Change Has Occurred
- 3) Restate Historical Closed Claims Using Current Closing Rates
- 4) Restate Historical Paid Losses Using Restated Closed Claims
- 5) Apply Standard Loss Development Method To Restated Paid Losses



# *Claim Closing Patterns*

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## *Data Needed*

- ◆ Paid Loss Development Triangle (slide 15)
- ◆ Reported Claims Development Triangle (slide 19)
- ◆ Projected Ultimate Claims (slide 19)
- ◆ Closed Claims Development Triangle (slide 19)
  
- ◆ Calendar period data offers alternative perspective and added insight (slide 22)

# *Claim Closing Patterns*

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*Step 1: Review Closing Rates to Determine  
Whether There Has Been a Change*

# Claim Closing Patterns

Accident Year	Reported Claims			
	<u>Months of Development</u>			
	<u>12</u>	<u>24</u>	<u>36</u>	<u>Ultimate</u>
2009	500	900	1,000	1,000
2010	480	880		980
2011	450			900

Accident Year	Closed Claims		
	<u>Months of Development</u>		
	<u>12</u>	<u>24</u>	<u>36+</u>
2009	250	810	1,000
2010	240	704	
2011	180		

# Claim Closing Patterns

## *Closed / Reported*

Accident Year	<u>Months of Development</u>		
	<u>12</u>	<u>24</u>	<u>36</u>
2009	50.0%	90.0%	100.0%
2010	50.0%	80.0%	
2011	40.0%		

## *Closed / Ultimate*

Accident Year	<u>Months of Development</u>		
	<u>12</u>	<u>24</u>	<u>36</u>
2009	25.0%	81.0%	100.0%
2010	24.5%	71.8%	
2011	20.0%		

# *Claim Closing Patterns*

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Calendar period data from the Claim Department may also offer a useful tool for monitoring change.

- ◆ New Reported Claims

- ◆ Open Claims

- ◆ Closed Claims

# Claim Closing Patterns

<u>Calendar Year-end</u>	(1) New Reported Claims	(2) Open Claims @ year-end	(3) In-Force Claims = (1) + prior year (2)	(4) Closed Claims	(5) Closure Rate = (4) / (3)
2007	1,000	340	1,340	1,000	74.6%
2008	1,000	340	1,340	1,000	74.6%
2009	1,000	340	1,340	1,000	74.6%
2010	980	330	1,320	990	75.0%
2011	950	446	1,280	834	65.2%

1,280 = 950 + 330

Columns (1), (2) and (4) derived from slide 19

# *Claim Closing Patterns*

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Note that the slowdown in claims closing produces LOWER estimated reserves with the paid development method (will you look a gift horse in the mouth?)

Applies to incurred losses as well

# *Claim Closing Patterns*

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## *Step 2: Seek Independent Confirmation that a Change Has Occurred*

- ◆ Ask the Claims Department About Changes in:
  - ❖ Opening and Closing Practices
  - ❖ The Claims Handling Environment
  - ❖ Levels of Staffing, Reorganizations
  - ❖ Definition of a Claim (e.g., Multiple Claimants)



# *Claim Closing Patterns*

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*Step 3: Restate Historical Closed Claims Using  
Current Closing Rates*

# Claim Closing Patterns

*Adjusted Closing Percent (see slide 20)*

Accident Year	<u>Months of Development</u>		
	<u>12</u>	<u>24</u>	<u>36</u>
2009	20.0%	71.8%	100.0%
2010	20.0%	71.8%	
2011	20.0%		

*Adjusted Closed Claims*

Accident Year	<u>Months of Development</u>		
	<u>12</u>	<u>24</u>	<u>36+</u>
2009	200	718	1,000
2010	196	704	
2011	180		

Ultimate Claims (slide 19) \* Adjusted Closing %

$$200 = 1,000 * 20.0\%$$

$$718 = 1,000 * 71.8\%$$

$$196 = 980 * 20.0\%$$

# *Claim Closing Patterns*

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*Step 4: Restate Historical Paid Losses Using  
Restated Closed Claims*

# Claim Closing Patterns

## Linear Interpolation of Adjusted Paid Losses

<b>Accident Year 2009 @ 12 Months</b>	<u>Age 0</u>	<u>Age 12</u>
Actual Closed Claims (slide 19)	0	250
Actual Paid Loss (slide 15)	0	1,000
Therefore, 200 Claims would expect to have \$800 paid loss		
AY 2009 @ 12 Months	$\frac{200 - 0}{250 - 0}$	$\times (1,000 - 0) + 0 = 800$

<b>Accident Year 2009 @ 24 Months</b>	<u>Age 12</u>	<u>Age 24</u>
Actual Closed Claims (slide 19)	250	810
Actual Paid Loss (slide 15)	1,000	4,000
Therefore, 718 Claims would expect to have \$3,507 paid loss		
AY 2009 @ 24 Months	$\frac{718 - 250}{810 - 250}$	$\times (4,000 - 1,000) + 1,000 = 3,507$

<b>Accident Year 2010 @ 12 Months</b>	<u>Age 0</u>	<u>Age 12</u>
Actual Closed Claims (slide 19)	0	240
Actual Paid Loss (slide 15)	0	1,000
Therefore, 196 Claims would expect to have \$817 paid loss		
AY 2010 @ 12 Months	$\frac{196 - 0}{240 - 0}$	$\times (1,000 - 0) + 0 = 817$

# *Claim Closing Patterns*

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*Step 5: Apply Standard Loss Development Method  
to Restated Paid Losses*

# Claim Closing Patterns

## Adjusted Paid Loss Development Method

Accident Year	<u>Months of Development</u>		
	<u>12</u>	<u>24</u>	<u>36+</u>
2009	\$800	\$3,507	\$6,000
2010	817	3,500	
2011	750		

From slide 28

Accident Year	<u>Months of Development</u>		
	<u>12-24</u>	<u>24-36</u>	<u>36-Ult</u>
2009	4.38	1.71	
2010	4.28		
Selected	4.33	1.71	1.00
CDF	7.41	1.71	1.00
<b>Ultimate</b>	<b>5,561</b>	<b>5,988</b>	<b>6,000</b>

# Claim Closing Patterns

## Impact of Adjustment

<u>Acc Yr</u>	<u>Revised Forecast</u>	<u>Original Forecast</u>	<u>Difference</u>
	Slide 30	Slide 15	
2009	\$6,000	\$6,000	\$0
2010	5,988	5,250	738
2011	<u>5,561</u>	<u>4,219</u>	<u>1,342</u>
Total	\$17,549	\$15,469	\$2,080

The slowdown in claims closing produces LOWER estimates!

AND the revised forecast is IN LINE with the incurred method estimate of \$17,500 (slide 15).

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*CASE  
RESERVE  
ADEQUACY*



# Case Reserve Adequacy

*What is driving the divergence?*

Accident <u>Year</u>	<i>Incurring Losses (\$000)</i>			Projected <u>Ultimate</u>
	<u>Months of Development</u> <u>12</u>	<u>24</u>	<u>36+</u>	
2009	10,000	40,000	50,000	50,000
2010	10,000	45,000		56,250
2011	10,417			55,340

Accident <u>Year</u>	<i>Paid Losses (\$000)</i>			Projected <u>Ultimate</u>
	<u>Months of Development</u> <u>12</u>	<u>24</u>	<u>36+</u>	
2009	2,000	24,000	50,000	50,000
2010	2,500	30,000		62,500
2011	3,125			78,125

# Case Reserve Adequacy

*What if claim closing patterns are not changing?*

Accident <u>Year</u>	<i>Reported Claims</i>			
	<u>Months of Development</u>			
	<u>12</u>	<u>24</u>	<u>36</u>	<u>Ultimate</u>
2009	5,000	8,000	10,000	10,000
2010	5,000	8,000		10,000
2011	5,000			10,000

Accident <u>Year</u>	<i>Closed Claims</i>		
	<u>Months of Development</u>		
	<u>12</u>	<u>24</u>	<u>36+</u>
2009	1,000	6,000	10,000
2010	1,000	6,000	
2011	1,000		

# *Case Reserve Adequacy*

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- 1) Review Paid-To-Incurred Triangles
- 2) Review Trends in Average Paid Claims Versus Trends in Average Case Reserves
- 3) Review Potential Reasons for Observed Trends
- 4) Adjust Historical Case Reserves to Current Adequacy Levels
- 5) Calculate Adjusted Incurred Losses
- 6) Project Ultimate Losses Using Adjusted Incurred Losses and Standard Loss Development

# *Case Reserve Adequacy*

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*Step 1: Review Paid - To - Incurred Triangles*

# Case Reserve Adequacy

Accident Year	<u>Months of Development</u>		
	<u>12</u>	<u>24</u>	<u>36</u>
2009	20%	60%	100%
2010	25%	67%	
2011	30%		

[paid loss / incurred loss from slide 33]

Ratios are increasing. Since settlement rates appear consistent, may be due to a decrease in case reserve adequacy.

# *Case Reserve Adequacy*

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*Step 2: Review Trends in Average Paid Claims  
Versus Trends in Average Case Reserves*

# Case Reserve Adequacy

Accident Year	<u>Average Paid Loss</u>		<u>Average Case Reserves</u>	
	<u>12</u>	<u>24</u>	<u>12</u>	<u>24</u>
2009	2,000	4,000	2,000	8,000
2010	2,500	5,000	1,875	7,500
2011	3,125		1,823	
Trend	25%	25%	-4.5%	-6.3%

Avg Paid \$ = Paid \$ Triangle (Slide 33) / Closed Claim Triangle (Slide 34) \*  
1,000

Avg Case Reserves = (Incurred \$ Triangle - Paid \$ Triangle (Slide 33)) /  
(Reported Claim Triangle - Closed Claim Triangle (Slide 34)) \*  
1,000 **OBSERVATION: CASE RESERVE WEAKENING**

# *Case Reserve Adequacy*

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## *Step 3: Review Potential Reasons for Observed Trends*

- ◆ Is the book shifting to a lower severity mix?
- ◆ Have policy limits and/or reinsurance retentions kept pace with claims inflation?
- ◆ Has anything material changed in the handling of claims?
  - ❖ Turnover in claim department staff
  - ❖ Changes in philosophy

If you conclude there has been case reserve weakening (or strengthening), adjust the data. Here's one approach.



# *Case Reserve Adequacy*

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*Step 4: Adjust Historical Case Reserves to  
Current Adequacy Levels*

# Case Reserve Adequacy

*Assumption:*


*25% is the Actual Rate of Claim Inflation (slide 39)*

Accident <u>Year</u>	<u>Adjusted Average Case Reserves</u>		
	<u>12</u>	<u>24</u>	<u>36</u>
2009	1,167	6,000	0
2010	1,458	7,500	
2011	1,823		

$1,167 = 1,823 / (1.25^2)$

$1,458 = 1,823 / 1.25$

$6,000 = 7,500 / 1.25$



*Note: Use paid data for inflation assessment.*

# *Case Reserve Adequacy*

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*Step 5: Calculate Adjusted Incurred Losses*

# Case Reserve Adequacy

	Paid to Date Losses (slide 33)	+	# of Open Claims (slide 34)	x	Adjusted Average Case Reserves (slide 42)/1000	=	Adjusted Incurred Losses
AY 2009 @ 12 Months	2,000	+	4,000	x	1.167	=	6,667
AY 2009 @ 24 Months	24,000	+	2,000	x	6.000	=	36,000
AY 2010 @ 12 Months	2,500	+	4,000	x	1.458	=	8,334

# *Case Reserve Adequacy*

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*Step 6: Project Ultimate Losses Using Adjusted  
Incurred Losses and Standard Loss  
Development*

# Case Reserve Adequacy

## Adjusted Incurred Losses

Accident Year	<u>Months of Development</u>		
	<u>12</u>	<u>24</u>	<u>36+</u>
2009	\$6,667	\$36,000	\$50,000
2010	8,334	45,000	
2011	10,417		

from slide 44

Accident Year	<u>Months of Development</u>		
	<u>12-24</u>	<u>24-36</u>	<u>36-Ult</u>
2009	5.40	1.39	
2010	5.40		
Selected	5.40	1.39	1.00
CDF	7.50	1.39	1.00
Ultimate	78,125	62,500	50,000

# Case Reserve Adequacy

## Impact of Adjustment

Accident <u>Year</u>	Original Incurred Estimate (Slide 33)	Original Paid Estimate (Slide 33)	Revised Incurred Estimate (Slide 46)
2009	\$50,000	\$50,000	\$50,000
2010	56,250	62,500	62,500
2011	<u>55,340</u>	<u>78,125</u>	<u>78,125</u>
Total	\$161,590	\$190,625	\$190,625

# *What Else?*

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- ◆ Deductibles/Limits/SIRs change
- ◆ Reinsurance Arrangements Change
- ◆ Tort Reform
- ◆ New Sources of Loss
- ◆ Changes in the Economy



# Deductibles/Limits/SIRs change

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- ◆ Deductibles may change the number of claims
- ◆ May change loss \$ as well
- ◆ Need to review profile of deductibles and limits – inherent assumption is no change
- ◆ Treat like change in mix

# Reinsurance Arrangements

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## Change

- ◆ Effect on total net liability
- ◆ Might also affect claims handling  
e.g., if retention is limited to \$100,000 by reinsurance, is there an incentive to settle a \$500,000 case more quickly than if you were on the hook for the whole thing?

# Tort Reform

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- ◆ Change in benefits which would affect severity and payout (e.g. cost containment)
- ◆ Change in statute of limitations (frequency change, less “tail” development)
- ◆ New patterns – e.g., ability to do lump-sum settlements of permanent workers’ comp claims

# New Sources of Loss

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- ◆ Mold
- ◆ Terrorism
- ◆ Asbestos – just keeps on running
- ◆ Stacking of auto limits

# Conclusion

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- ◆ Know what's going on in the company
- ◆ Know what actuarial methods can and can't do
- ◆ Pick the right tool for the job
- ◆ BE AWARE!

# Summary

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*Assumption of long, stable history is often violated.*

- ◆ The mix of business can change
- ◆ Claim closing patterns can change
- ◆ Changes in case reserve adequacy can change

# *Looking Ahead*

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Session 3 presents two case studies.

» Think about what's going on.

» Decide how to evaluate the impact.