Assessing & Monitoring Insurance Liability Uncertainty

Elaine Collins and Felix Tang

Overview

- Financial reporting
- Beyond reporting
- Control cycle
- Findings

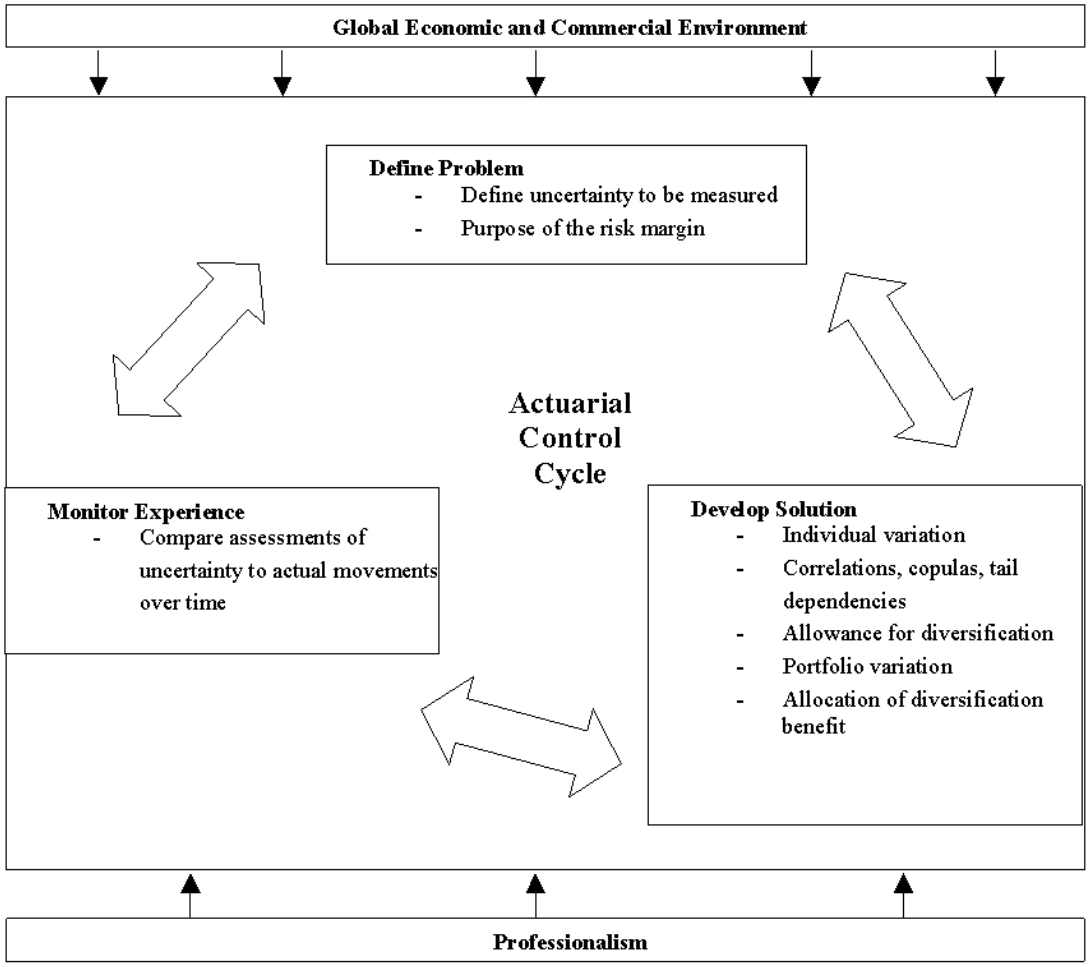
Financial reporting

- Financial reporting under APRA
- AIFRS reporting of GI liabilities
- Regulatory capital requirements
- IASB recent international conclusions
- IAIS prudential supervision & solvency principles

Beyond reporting

- Risk management
- Capital allocation
- Product pricing

Control Cycle



Interpretation of uncertainty

- Timeframe
- Skewness
- Gross or net
- Past vs future variability
- Unexpired risks
- Type of claim data
- Length of unit data period

Types of claim data

Mack method results

	Mack technique measure of variability based on:		
Portfolio	Payments	Reported Incurred	Reported numbers
Short tail	30.4%	-41.3%	17.8%
Long tail	13.6%	32.4%	17.7%
	Implied mean as % of that for Short Tail (Payments):		
	Payments	Reported Incurred	
Short tail	100%	-67%	
Long tail	421%	222%	

Mack results re-expressed

	Adjusted Mack technique measure of variability based on:	
Portfolio	Payments	Reported Incurred
Short tail	30.4%	46.0%
Long tail	13.6%	13.2%
	Implied mean as % of that for Short Tail (Payments):	
Portfolio	Payments	Reported Incurred
Short tail	100%	60%
Long tail	421%	545%

Types of claim data
Immediate observations

- **Mack's variability expressed as proportion of the excess above the base variable**
- **Percentage variability influenced by implied mean of variability analysis**
- **Dollar variability can yield differing views from different data sets (even if implied mean similar)**
- **Important to consider different types of data when determining variability**

Interpretation
Assessment
Monitoring

Length of unit data period (Scenario 1)

Scenario 1 - incremental payments in time unit 1

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A	100	100	100	100	100	100	50	50	50	50	50	10	10	10	10	10
B	100	100	100	100	100	100	50	50	50	50	50	10	10	10	10	
C	100	100	100	100	100	100	50	50	50	50	50	10	10	10		
D	100	100	100	100	100	100	50	50	50	50	50	10	10			
E	100	100	100	100	100	100	50	50	50	50	50	10				
F	100	100	100	100	100	100	50	50	50	50	50					
G	50	150	50	150	50	150	25	75	25	75						
H	100	100	100	100	100	100	50	50	50							
I	100	100			100	100	50	50								
J	100	100	100			100	50									
K	100	1														
L	100	1														
M	100	1														
N	100	1														
O	100	1														
P	100															

F	100	100	100	100	100	100	50	50	50	50	50
G	50	150	50	150	50	150	25	75	25	75	
H	100	100	100	100	100	100	50	50	50		

Scenario 1 - incremental payments in time unit 2

	0'	1'	2'	3'	4'	5'	6'	7'
A'	300	400	400	250	200	160	40	40
B'	300	400	400	250	200	160	40	
C'	300	400	400	250	200	160		
D'	300	400	400	250	200			
E'	300	400	400					
F'	300	400	400					
G'	300	400						
H'	300							

C'	300	400	400	250	200
D'	300	400	400	250	200
E'	300	400	400	250	

Interpretation
Assessment
Monitoring

Length of unit data period (Scenario 2)

Scenario 2 - incremental payments in time unit 1

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A	100	100	100	100	100	100	50	50	50	50	50	10	10	10	10	10
B	100	100	100	100	100	100	50	50	50	50	50	10	10	10	10	
C	100	100	100	100	100	100	50	50	50	50	50	10	10	10		
D	100	100	100	100	100	100	50	50	50	50	50	10	10			
E	100	100	100	100	100	100	50	50	50	50	50	10				
F	100	100	100	100	100	100	50	50	50	50	50					
G	50	50	150	150	50	50	75	75	25	25						
H	100	100	100	100	100	100	50	50	50							
I	100	100	100	100	100	100	50	50								
J	100	100	100	100	100	100	50									
K	100	100	100	100	100	100										
L	100	100	100	100	100											
M	100	100	100	100												
N	100	100	100													
O	100	100														
P	100															

F	100	100	100	100	100	100	50	50	50	50	50
G	50	50	150	150	50	50	75	75	25	25	
H	100	100	100	100	100	100	50	50	50		

Scenario 2 - incremental payments in time unit 2

	0'	1'	2'	3'	4'	5'	6'	7'
A'	300	400	400	250	200	160	40	40
B'	300	400	400	250	200	160	40	
C'	300	400	400	250	200	160		
D'	200	500	300	300	150			
E'	300	400	400					
F'	300	400	400					
G'	300	400						
H'	300							

C'	300	400	400	250	200
D'	200	500	300	300	150
E'	300	400	400	250	

Length of unit data period
Mack results (real data)

	Mack technique measure of payment variability:		
Portfolio	Quarterly	Half-yearly	Yearly
Short tail	32.1%	40.1%	30.4%
Long tail	12.4%	12.9%	13.6%
	Implied mean as % of that for Short Tail (Payments):		
Portfolio	Quarterly	Half-yearly	Yearly
Short tail	100%	104%	100%
Long tail	426%	419%	419%

- **For the short tail data, yearly data may represent an over-summarisation**
- **For long tail data, results may relate to the degrees of freedom reducing**
- **The selected time unit may not present a complete picture of underlying volatility**

Assessment of risk margins

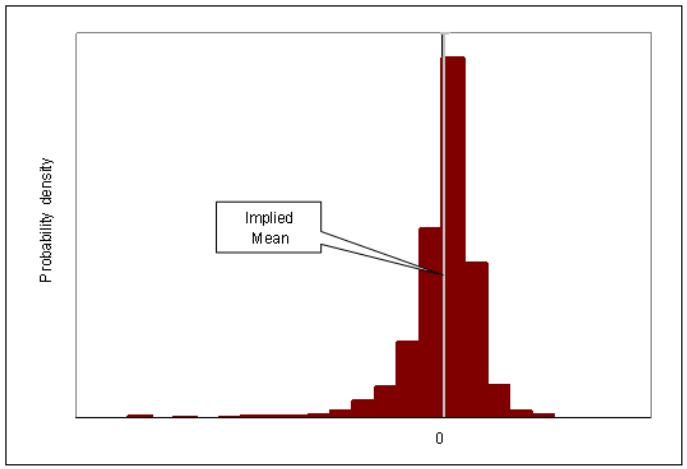
- Probability distributions
- Non-additive nature
- Negative risk margins
- Highly subjective correlations
- Tail dependence at high PoA
- Allocation of diversification benefits

Probability distributions

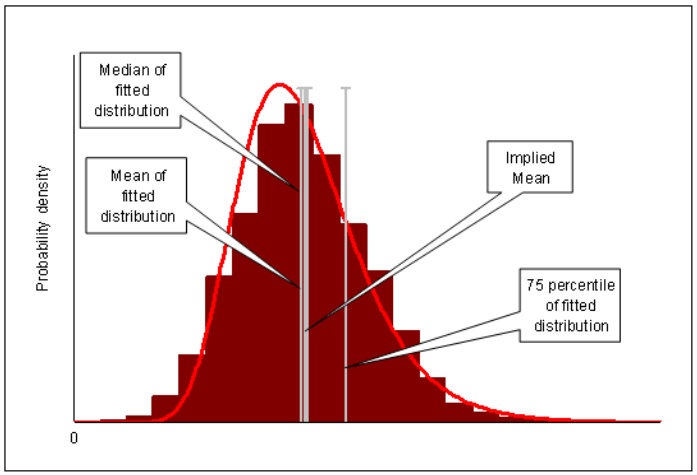
- **Using real data (Insurers A & B)**
- **Bootstrap on paid chain ladder**
  - **Long tail (LT)**
  - **Short tail (ST)**
- **Fitted distributions using @Risk**
- **Implied mean from sims compared to fitted mean, median, 75% percentile**

Probability distributions

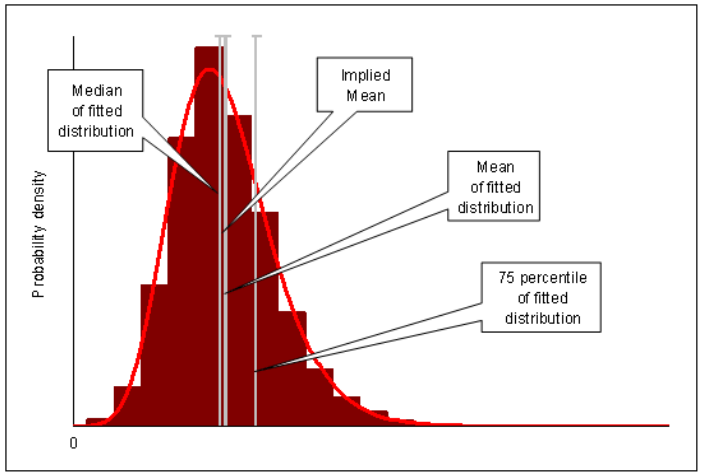
Short tail - Insurer A



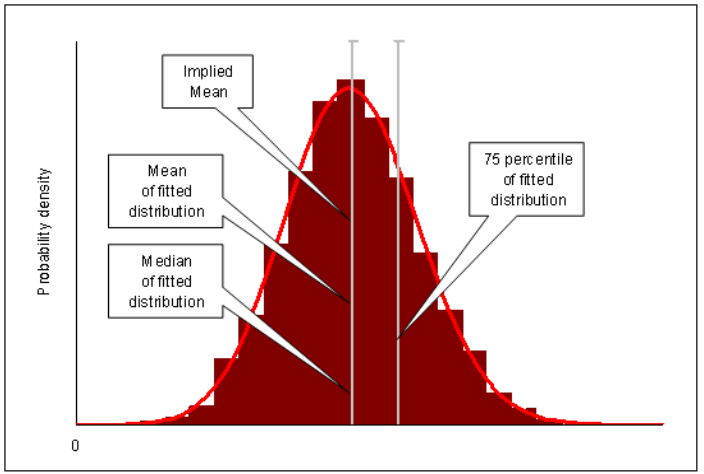
Short tail - Insurer B



Long tail - Insurer A



Long tail - Insurer B

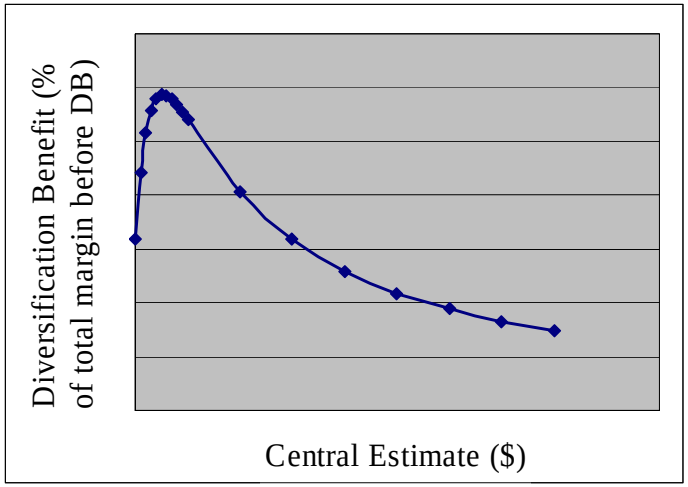


Correlations & diversification benefit

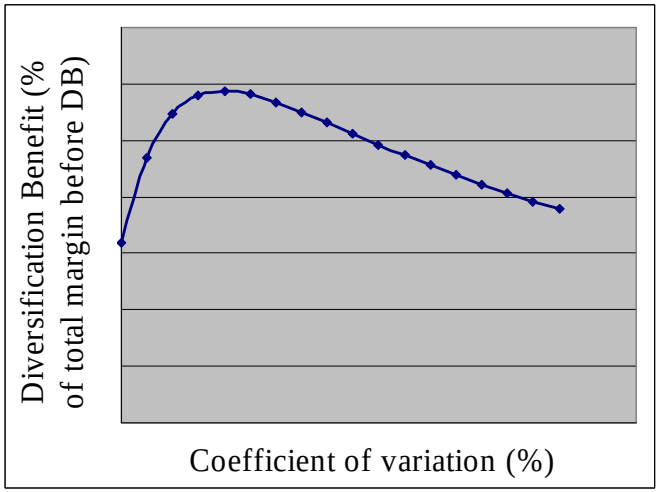
- **Overall portfolio variability**
- **Correlation coefficient not always a full descriptor**
- **Recent decrease in diversification benefits**
- **Problem with examining portfolio data in aggregate (adding triangles)**

Allocation of diversification benefit

As size of class A increases

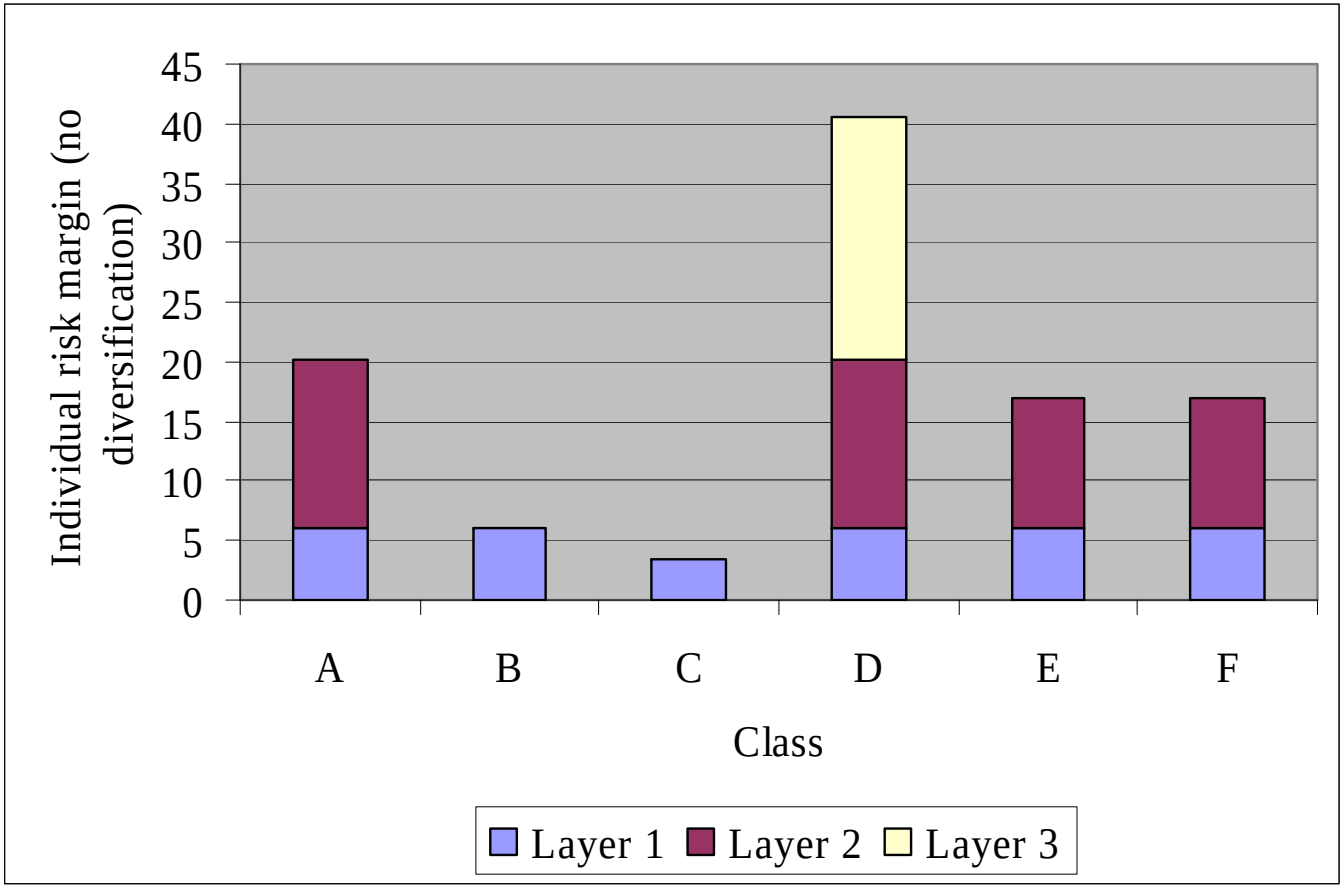


As uncertainty of class A increases



- **Pro rata approach (the most widespread approach)**
- **Uniformly reducing the probability of adequacy for each class**
- **Impact of exclusion**
- **Stratified approach**

Allocation of diversification benefit
Stratified approach

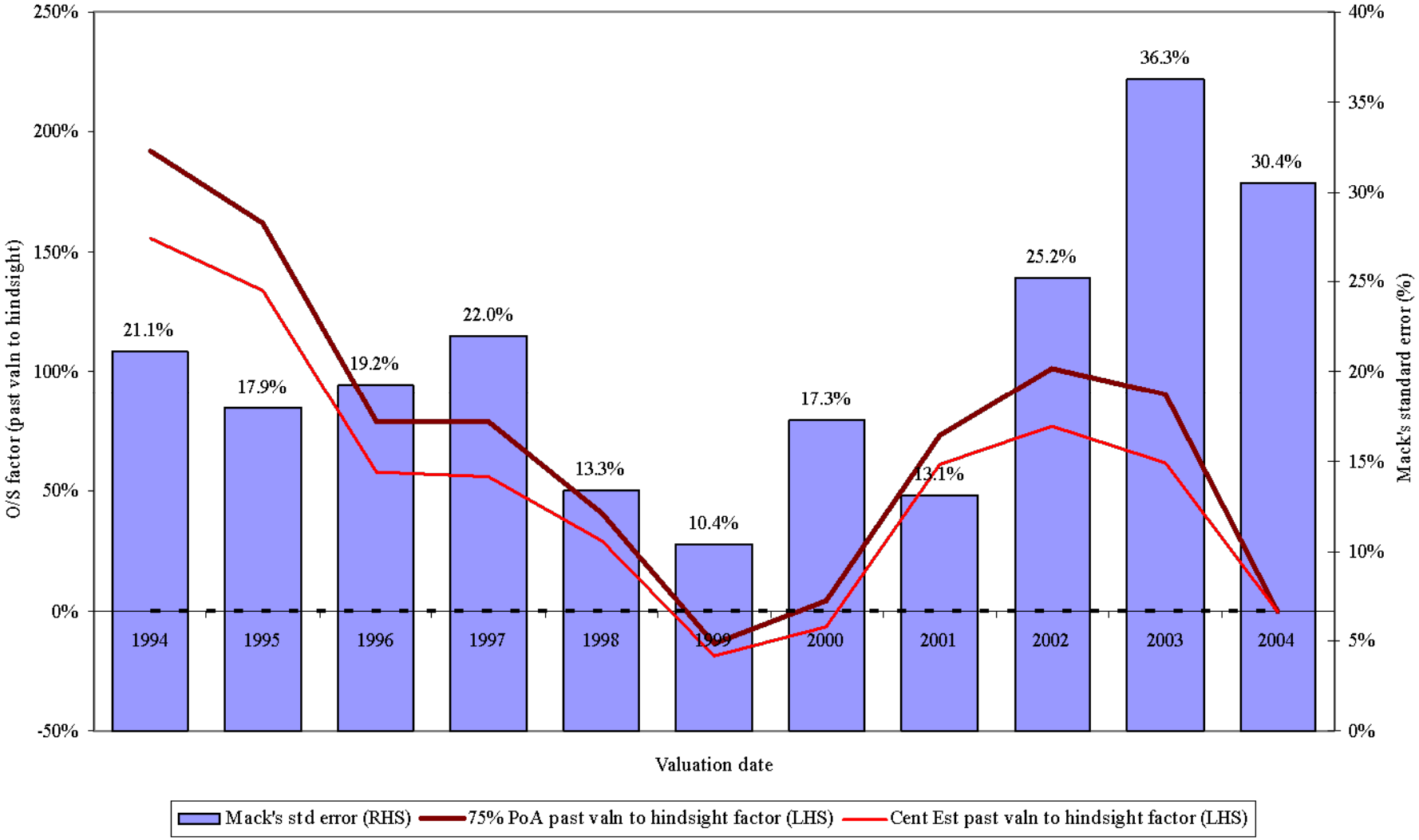


Monitoring risk margins

- **Tracking uncertainty**
- **Hindsight estimates**

Hindsight estimates

Interpretation
Assessment
Monitoring



Findings

- Estimating insurance liability uncertainty and variability
- Liability variability & correlation outputs
- Diversification benefit key drivers
- Monitoring relatively underdeveloped

Thank you

Elaine Collins
eccollins@kpmg.com.au
(02) 9335 8942

Felix Tang
felixtang@kpmg.com.au
(02) 9335 7690