THE RESERVING CYCLE BEHIND THE UNDERWRITING CYCLE

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insured.™

AGENDA

- The Underwriting Cycle
- The Reserving Cycle
- Reserve Releases in Reinsurance
- Interdependency between both cycles
- Conclusion

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The Underwriting Cycle

The Underwriting Cycle

US P&C profitability over years:

* 2007 is actual first half ROAS of 13.1%. 2008 P/C insurer ROE is 1.1.1 estimate.
Source: Insurance Information Institute; Fortune

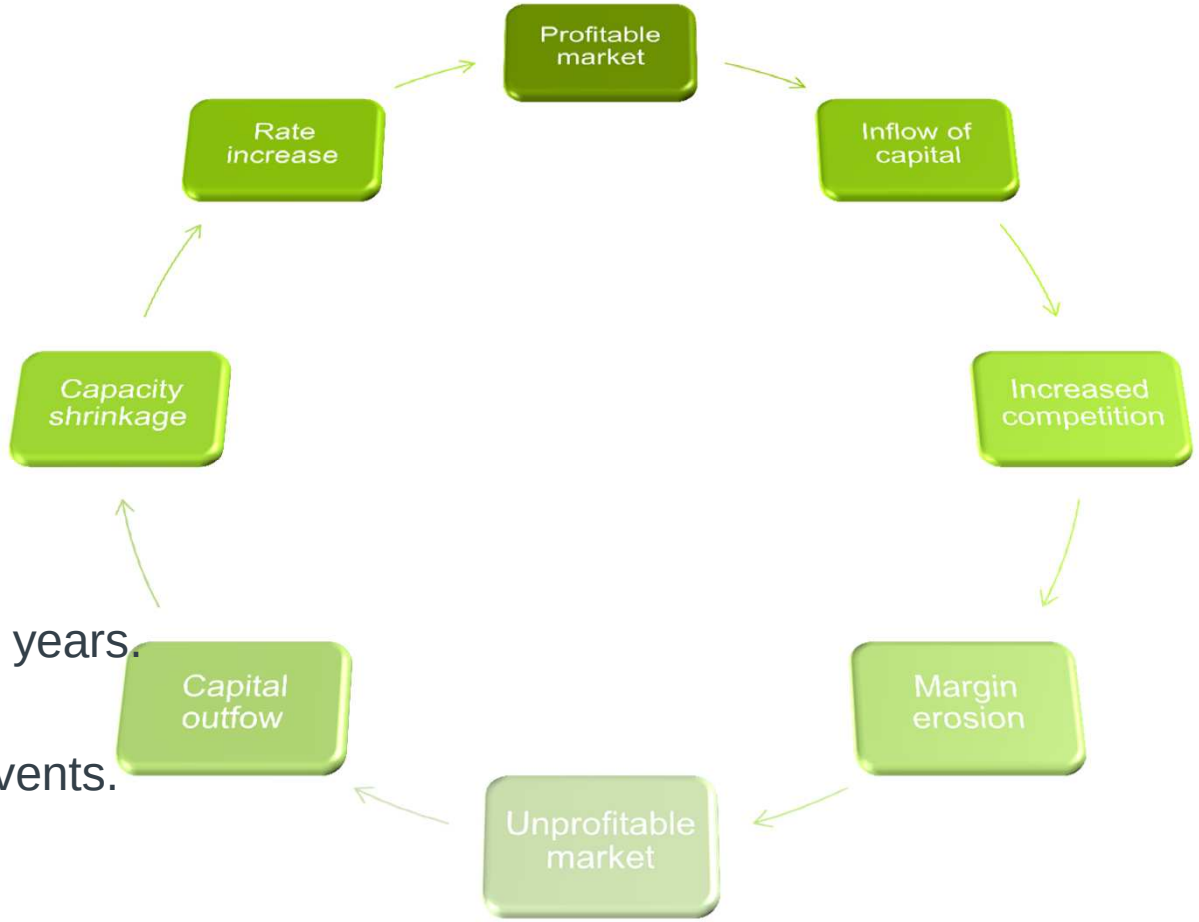
The Underwriting Cycle

Various approaches have been proposed to explain the cycle:

- Financial approaches (ROE models, option price models).
- Capital constraint approaches.
- Behavioral approaches

The Underwriting Cycle

Capital approach view:



- Typical cycle duration 9 years.
- Acceleration after big events.

The Underwriting Cycle

Behaviour view:

3 Monkeys principle

- Do not hear
- Do not see
- Do not tell

The Underwriting Cycle

AON has published an interesting time serie approach to the cycle:

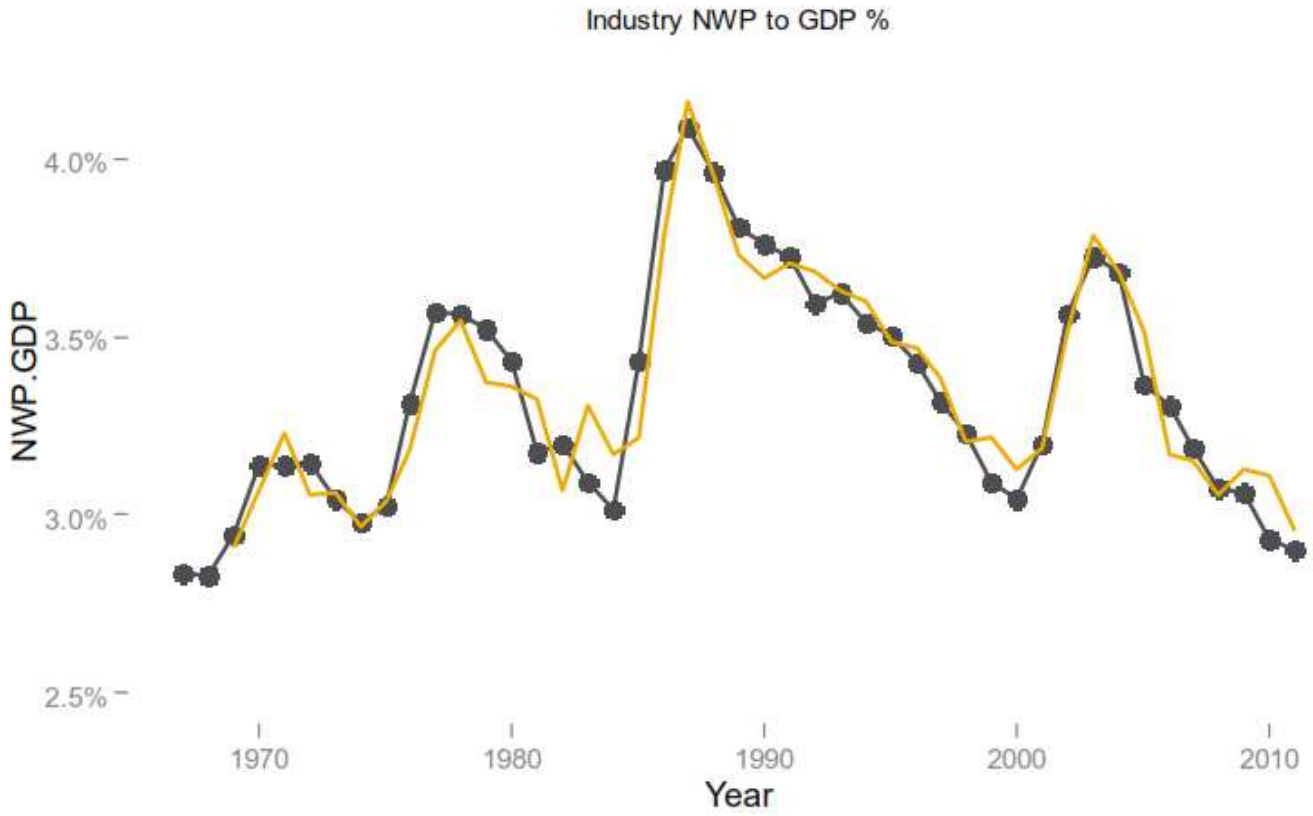
- The mesure for the cycle state is P_i = net written premium to GDP
- The serie reads

$$P_{i+1} = 1.06\% + 34.5\% P_i + 67.06\% (P_i - P_{i-1}) + 45.12\% L_i + \varepsilon_i$$

with L_i being the Loss to GDP.

The Underwriting Cycle

Here you see the matching of experience and series:



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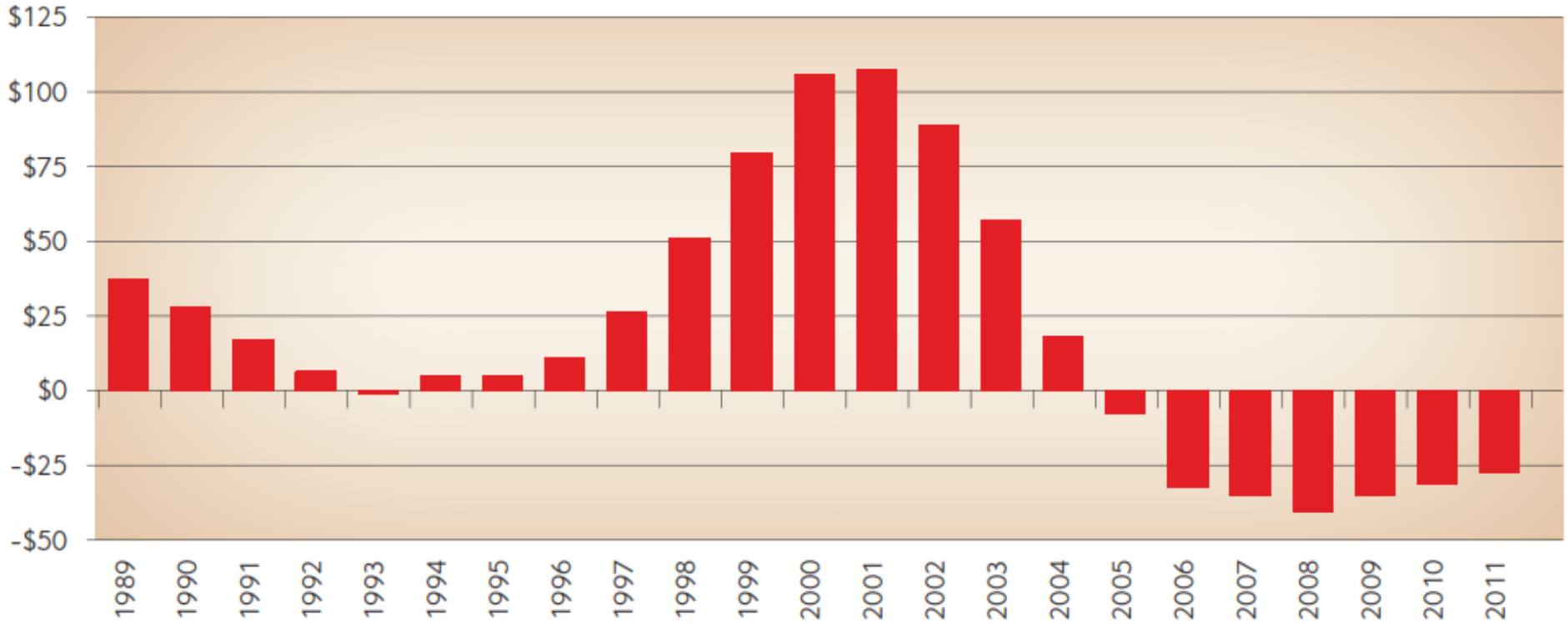
The Reserving Cycle

The Reserving Cycle

US P&C reserve development over years in $B:



The Reserving Cycle

In the past decade, various approaches and analysis have been made:

- Actuarial Reserving model approach.
- Behavioral approaches.

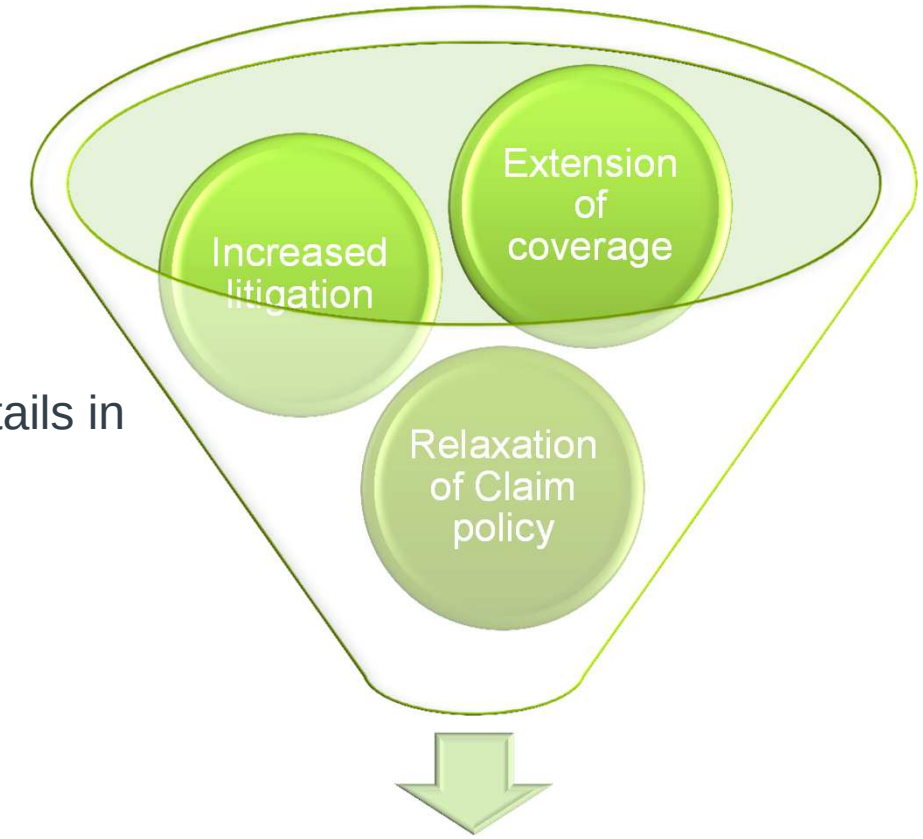
The existence of such cycles have been analyzed by various professional bodies:

- UK working party for 1985-2001
- Several CAS publication on the subject

The Reserving Cycle

Actuarial approach view:

- Various elements lead to longer tails in soft market.
- Conversely, the tails shortens in harder market.



Extension of Claim Patterns

The Reserving Cycle

On such assumptions, standard reserving models lead to pro-cyclical reserving deficiencies:

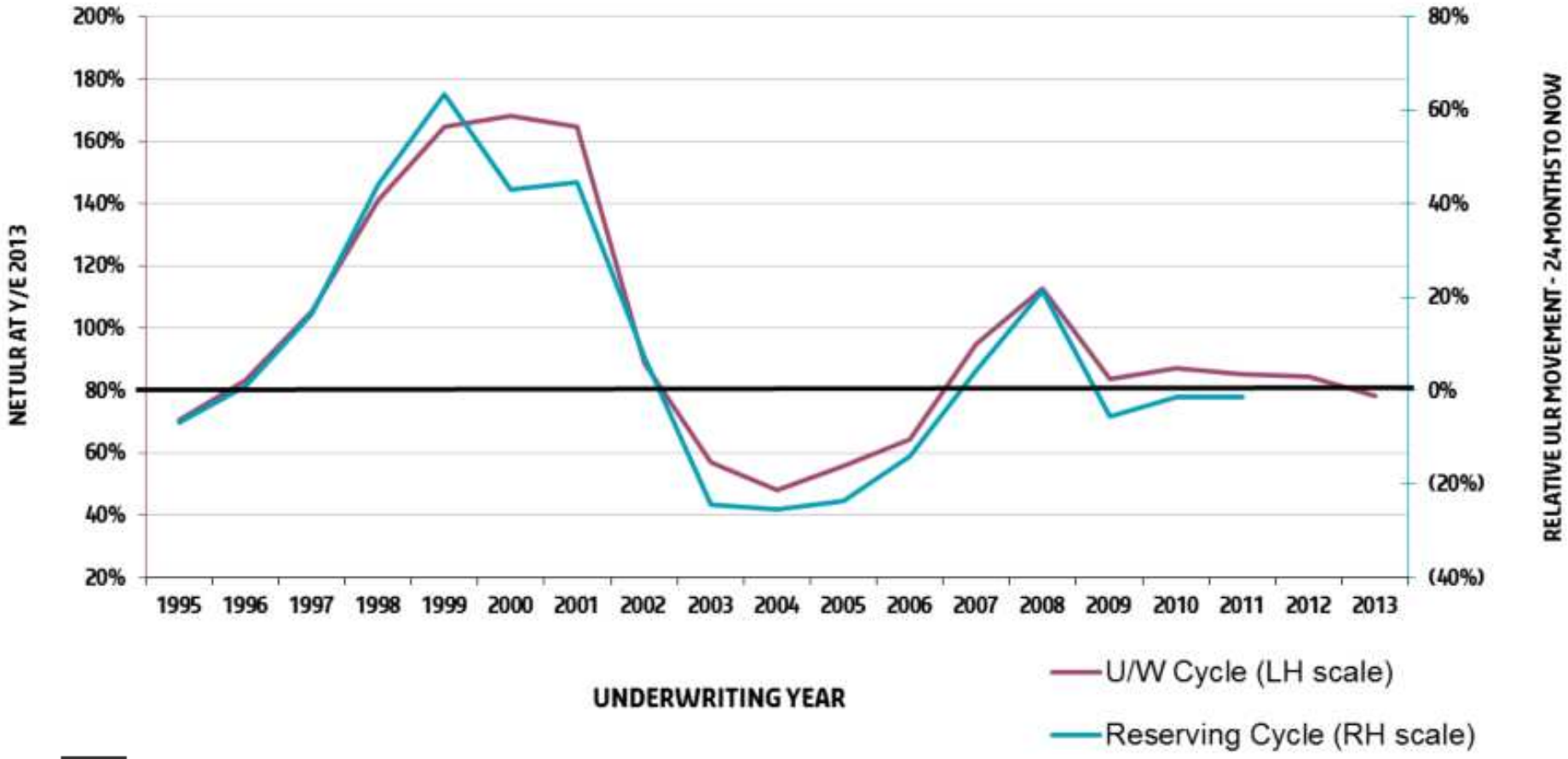
Year	Actual	Existing Naïve	Existing Naïve	Hard/Soft
1	10,452	10,452	-	Soft
2	9,800	9,800	-	Soft
3	10,377	10,390	13	Hard
4	10,464	10,513	49	Hard
5	11,743	11,845	102	Hard
6	11,860	11,992	132	Hard
7	12,472	12,594	122	Hard
8	12,597	12,663	66	Hard
9	12,140	12,112	- 28	Soft
10	13,169	13,034	- 135	Soft
11	12,307	11,962	- 346	Soft
12	13,202	12,654	- 549	Soft
13	14,774	14,081	- 693	Soft
14	13,447	13,203	- 244	Soft
15	15,805	16,320	514	Hard
16	16,156	17,367	1,211	Hard
17	17,450	17,519	69	Hard
18	16,402	17,185	783	Hard
19	16,877	17,450	572	Hard
20	17,891	17,986	94	Hard
Hard Years	170,096	173,823	3,727	
Soft Years	99,292	97,298	- 1,994	
All Years	269,388	271,121	1,733	

Year	Actual	Existing Naïve	Existing Naïve	Hard/Soft
1	10,462	10,462	-	Hard
2	10,134	10,134	-	Hard
3	10,729	10,731	1	Hard
4	10,384	10,359	- 24	Hard
5	11,460	11,367	- 93	Soft
6	12,525	12,363	- 162	Soft
7	12,410	12,188	- 222	Soft
8	12,742	12,546	- 196	Soft
9	13,085	12,943	- 143	Soft
10	13,067	13,037	- 29	Hard
11	14,264	14,491	227	Hard
12	14,241	14,696	454	Hard
13	14,060	14,654	594	Hard
14	15,272	15,165	- 107	Hard
15	15,068	14,291	- 777	Soft
16	15,805	14,029	- 1,776	Soft
17	16,292	15,674	- 618	Soft
18	16,151	16,520	369	Soft
19	18,041	17,795	- 246	Soft
20	18,677	18,534	- 143	Hard
Hard Years	131,290	132,263	973	
Soft Years	143,580	139,718	- 3,862	
All Years	274,870	271,981	- 2,889	

Simulations are using chain ladder and BF for recent years.

The Reserving Cycle

Casualty reserving cycle at Lloyd's



The Reserving Cycle

Behavioral view:

- Claim handlers feel comfortable having margin to avoid blame in case of adverse development.
- Actuaries feel comfortable having margin to absorb adverse development.
- Management strives to produce consistent profit from quarter to quarter.

Hence:

- When profit is high, margins are built.
- When profit is low, management scans the claims handling and reserving policy looking for unjustified redundancies.

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Reserve Releases in Reinsurance

Reserve Releases in recent years

Combined ratios of some Reinsurers by year excluding prior year reserve adjustments

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014Q1	Average
ACE Tempest Re	117%	76%	78%	91%	74%	82%	93%	84%	75%	80%	80%
Alterra	86%	96%	99%	107%	100%	94%	106%	98%	118%	105%	97%
Arch	103%	85%	88%	105%	86%	88%	112%	97%	87%	99%	81%
Aspen Re	139%	87%	85%	100%	84%	94%	132%	94%	88%	85%	92%
Axis	106%	81%	84%	104%	86%	100%	127%	96%	91%	95%	90%
Berkley	93%	92%	91%	102%	109%	105%	108%	108%	104%	100%	99%
Endurance	133%	82%	83%	101%	83%	96%	137%	102%	94%	92%	93%
Everest Re	102%	84%	96%	94%	83%	102%	121%	92%	80%	78%	93%
Odyssey	122%	95%	99%	105%	97%	95%	119%	95%	93%	97%	98%
Partner Re	123%	92%	93%	107%	96%	107%	139%	105%	102%	106%	94%
Platinum	119%	87%	88%	107%	87%	105%	158%	104%	96%	87%	91%
Trans Re	104%	91%	93%	99%	94%	100%	117%	91%	97%	96%	99%
XL Re	125%	88%	96%	106%	96%	96%	110%	97%	92%	89%	92%
Average	114%	87%	85%	93%	83%	92%	115%	88%	83%	81%	93%

2005 & 2011 have been adversely affected by Cat events explaining the high C/R.

Reserve Releases in recent years

Reserve adjustments as percentage of net premium income (negative figures are releases)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014Q1	Average
ACE Tempest Re	-1.3%	-1.8%	-4.0%	-1.4%	-0.3%	-2.5%	-15.6%	-14.5%	-9.9%	-7.1%	-6.1%	-8.6%	-7.4%	-6.6%
Alterra	8.2%	4.1%	-0.8%	19.6%	-2.4%	-15.5%	-19.9%	-8.3%	-7.1%	-9.7%	-6.9%		-11.0%	-4.5%
Arch	0.2%	-2.6%	-5.4%	-5.8%	-4.6%	-13.9%	-19.8%	-12.0%	-13.9%	-24.3%	-16.6%	-17.2%	-25.5%	-13.8%
Aspen Re		-1.0%	-6.4%	-5.2%	-5.6%	-2.0%	-8.4%	-10.4%	-5.7%	-6.5%	-9.0%	-11.4%	-12.4%	-7.3%
Axis					-3.5%	-8.1%	-11.6%	-13.0%	-11.1%	-8.1%	-6.6%	-8.6%	-13.1%	-8.2%
Berkley	8.1%	11.8%	4.1%	10.7%	8.0%	5.9%	-2.3%	-11.9%	-11.2%	-5.8%	-7.7%	-6.5%	-3.1%	-0.4%
Endurance		-2.5%	-9.5%	-7.3%	-0.3%	-6.4%	-10.4%	-7.3%	-8.7%	-11.5%	-7.0%	-17.6%	-20.3%	-8.4%
Everest Re	4.5%	6.3%	7.9%	-0.8%	4.4%	-7.0%	-1.5%	2.0%	-1.6%	-1.8%	-1.7%	-4.1%	-1.3%	-1.4%
Odyssey		-1.6%	-6.0%	-4.6%	-0.2%	-3.5%	-4.3%	-0.6%	-0.2%	-2.6%	-6.6%	-9.0%	-11.0%	-3.9%
Partner Re	1.8%	1.8%	-4.4%	-7.4%	-7.9%	-12.9%	-12.5%	-13.8%	-11.9%	-13.8%	-17.0%	-17.0%	-22.2%	-13.2%
Platinum		-3.7%	-4.8%	-4.2%	-3.8%	-6.9%	-15.0%	-10.8%	-19.5%	-15.1%	-41.6%	-33.1%	-33.7%	-13.2%
Trans Re				7.9%	5.0%	2.3%	-0.0%	-1.0%	-1.5%	-3.2%		-6.8%	-7.7%	0.1%
XL Re	14.1%	29.2%	-0.9%	3.4%	-3.8%	-11.6%	-15.3%	-13.9%	-16.3%	-12.5%	-9.5%	-10.8%	-12.3%	-9.1%
Average	5.0%	4.8%	-2.3%	-0.6%	-0.9%	-6.0%	-8.4%	-7.1%	-7.4%	-8.1%	-8.6%	-10.5%	-12.6%	-6.5%

2002-2004 are partially estimated, the average per company is for the years 2005-2014.

Reserve Releases in recent years

Linear correlation between C/R (excluding reserve actions) and reserve release ratio:

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014Q1	Correlation
Berkley	93%	92%	91%	102%	109%	105%	108%	108%	104%	100%	**-0.93**
Alterra	86%	96%	99%	107%	100%	94%	106%	98%	118%	105%	**-0.87**
Arch	103%	85%	88%	105%	86%	88%	112%	97%	87%	99%	**-0.50**
Everest Re	102%	84%	96%	94%	83%	102%	121%	92%	80%	78%	**-0.21**
Axis	106%	81%	84%	104%	86%	100%	127%	96%	91%	95%	**-0.15**
Endurance	133%	82%	83%	101%	83%	96%	137%	102%	94%	92%	**-0.12**
Trans Re	104%	91%	93%	99%	94%	100%	117%	91%	97%	96%	**-0.10**
Partner Re	123%	92%	93%	107%	96%	107%	139%	105%	102%	106%	**0.06**
Platinum	119%	87%	88%	107%	87%	105%	158%	104%	96%	87%	**0.08**
Odyssey	122%	95%	99%	105%	97%	95%	119%	95%	93%	97%	**0.12**
ACE Tempest Re	117%	76%	78%	91%	74%	82%	93%	84%	75%	80%	**0.23**
Aspen Re	139%	87%	85%	100%	84%	94%	132%	94%	88%	85%	**0.30**
XL Re	125%	88%	96%	106%	96%	96%	110%	97%	92%	89%	**0.46**
Correlation	**-0.76**	**0.05**	**-0.25**	**-0.41**	**0.05**	**-0.10**	**-0.20**	**-0.44**	**-0.26**	**-0.19**	**-0.11**

Table sorted by linear correlation, grey values are C/Rs.

Reserve Releases in recent years

- Linear correlation are mostly negative.
- Data are not clean of underlying trends. Especially heavy cat years distort the picture.

Here the same correlation with the exclusion of the cat years 2005 & 2011:

In recognized cat years, there is less pressure to reduce the C/R as a negative result is expected anyway.

	Correlation
Berkley	-0.95
Arch	-0.72
XL Re	-0.64
Trans Re	-0.53
Partner Re	-0.53
Axis	-0.50
Endurance	-0.38
ACE Tempest Re	-0.38
Platinum	-0.36
Everest Re	-0.34
Aspen Re	0.03
Odyssey	0.11
Alterra	0.11
Correlation	-0.24

Reserve Releases in recent years

- Here the same correlation with the exclusion of figures where the published C/R was above 100%:

	Correlation
Berkley	-0.97
Arch	-0.78
Alterra	-0.68
Trans Re	-0.53
Partner Re	-0.53
XL Re	-0.51
Axis	-0.50
Everest Re	-0.42
Endurance	-0.38
Platinum	-0.36
ACE Tempest Re	-0.25
Aspen Re	0.03
Odyssey	0.20
Correlation	-0.34

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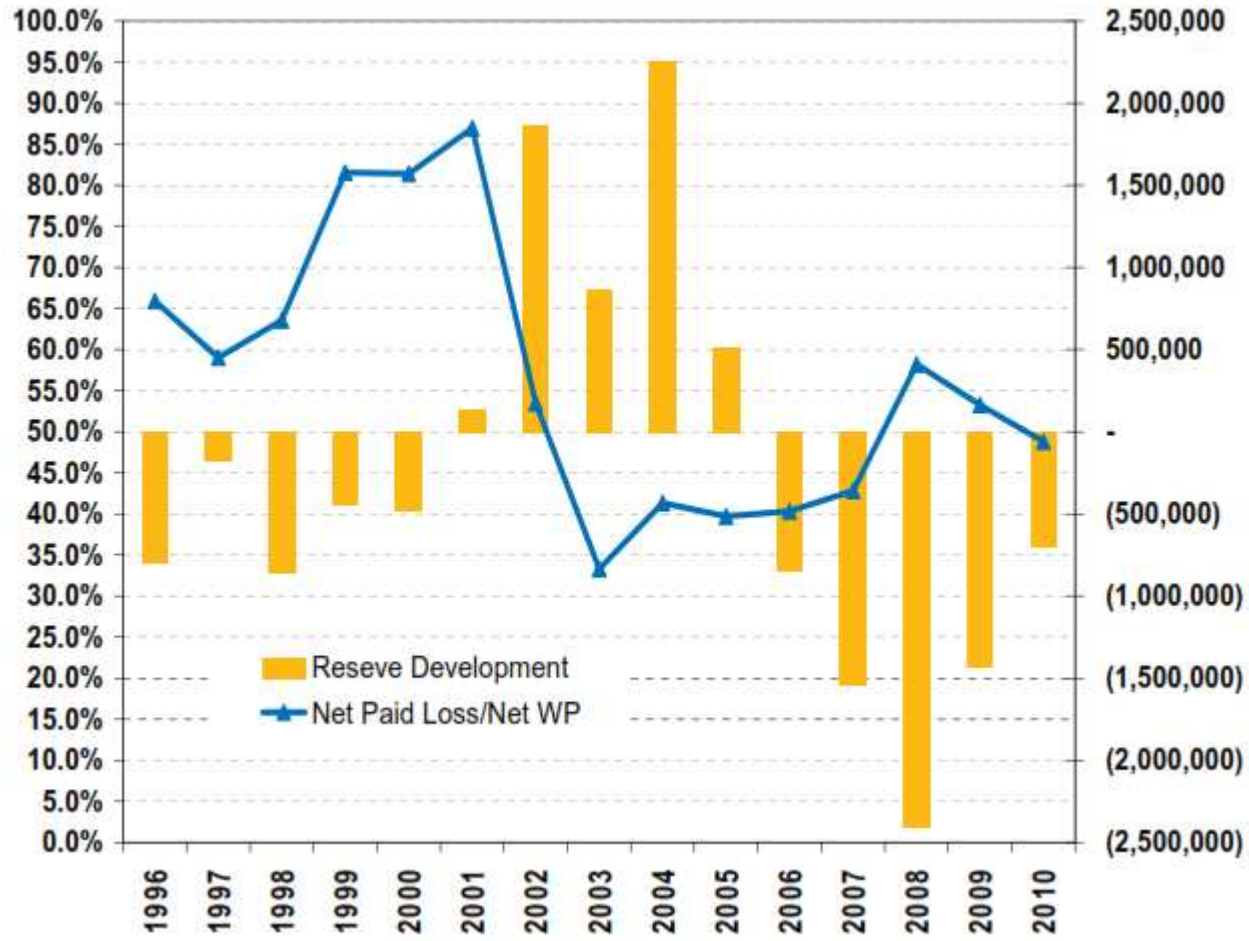
Interdependency between both cycles

Interdependency between both cycles

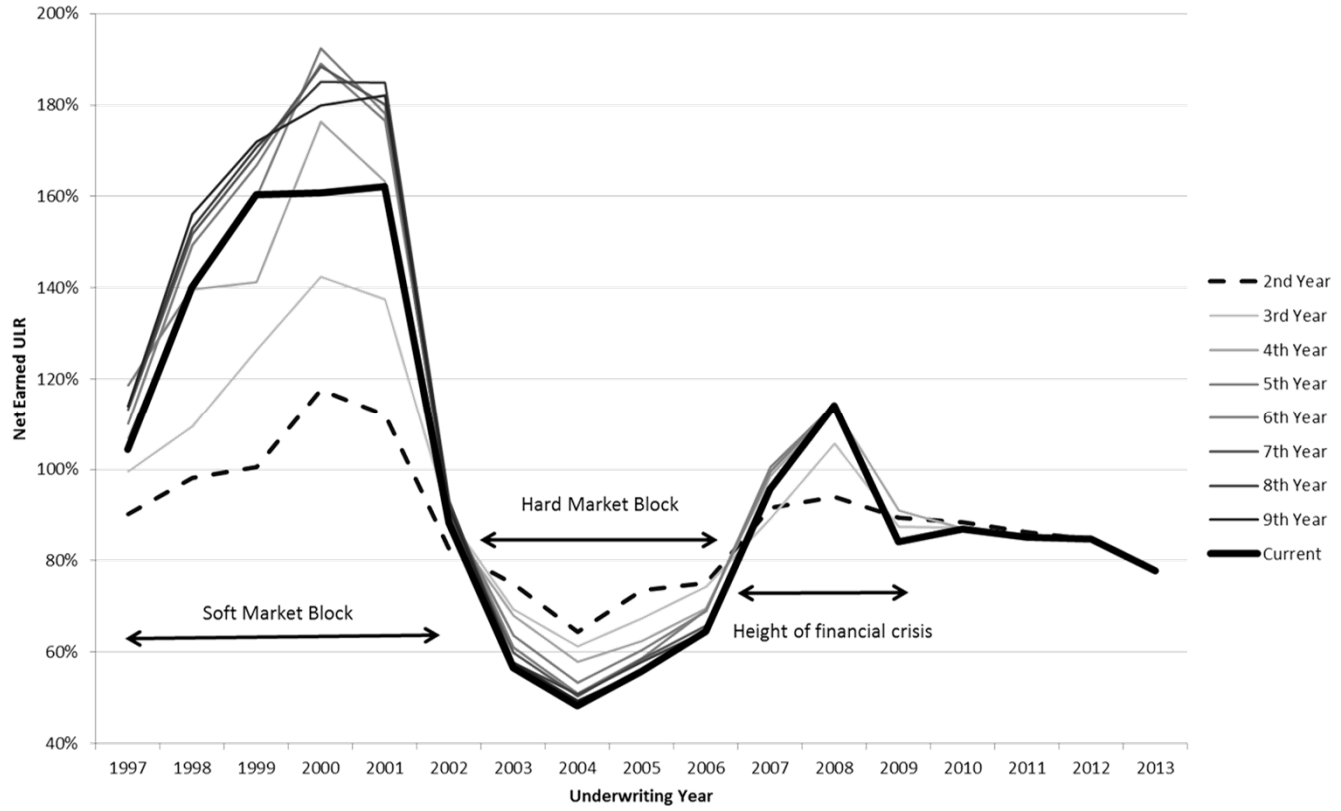
US P&C L/R and reserve development over years:



Source: Willis

Interdependency between both cycles

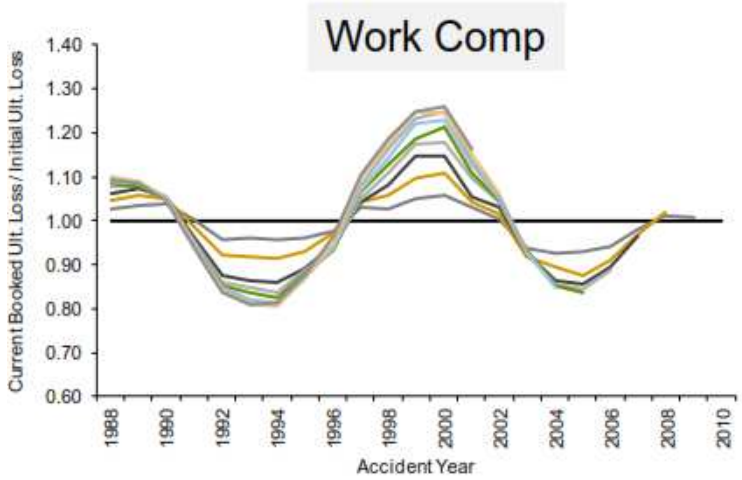
Reserve development for a single UWY is highly positively correlected:

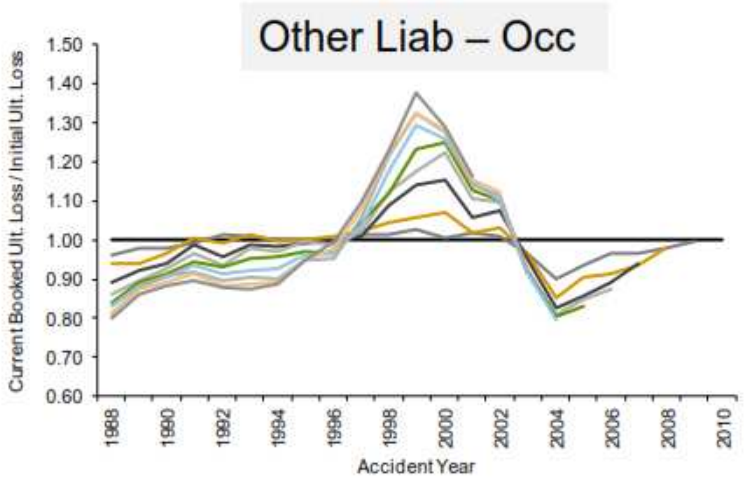


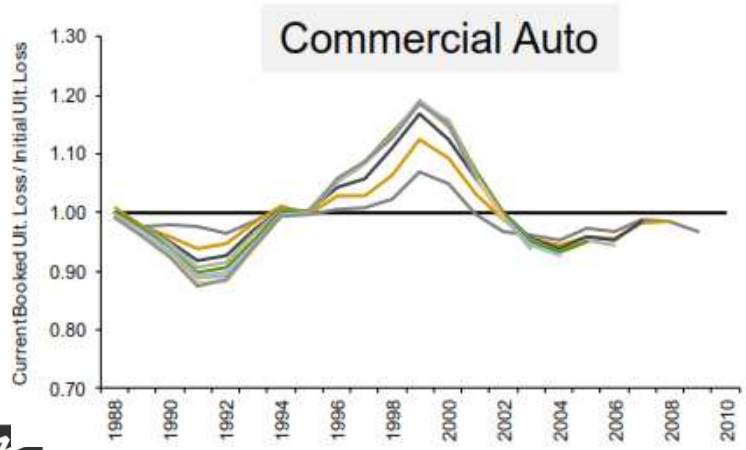
Source: Lloyd's

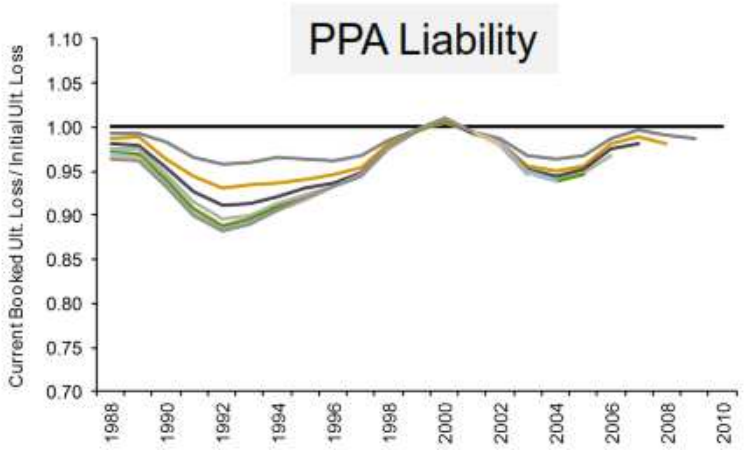
Interdependency between both cycles

Examples from the US:





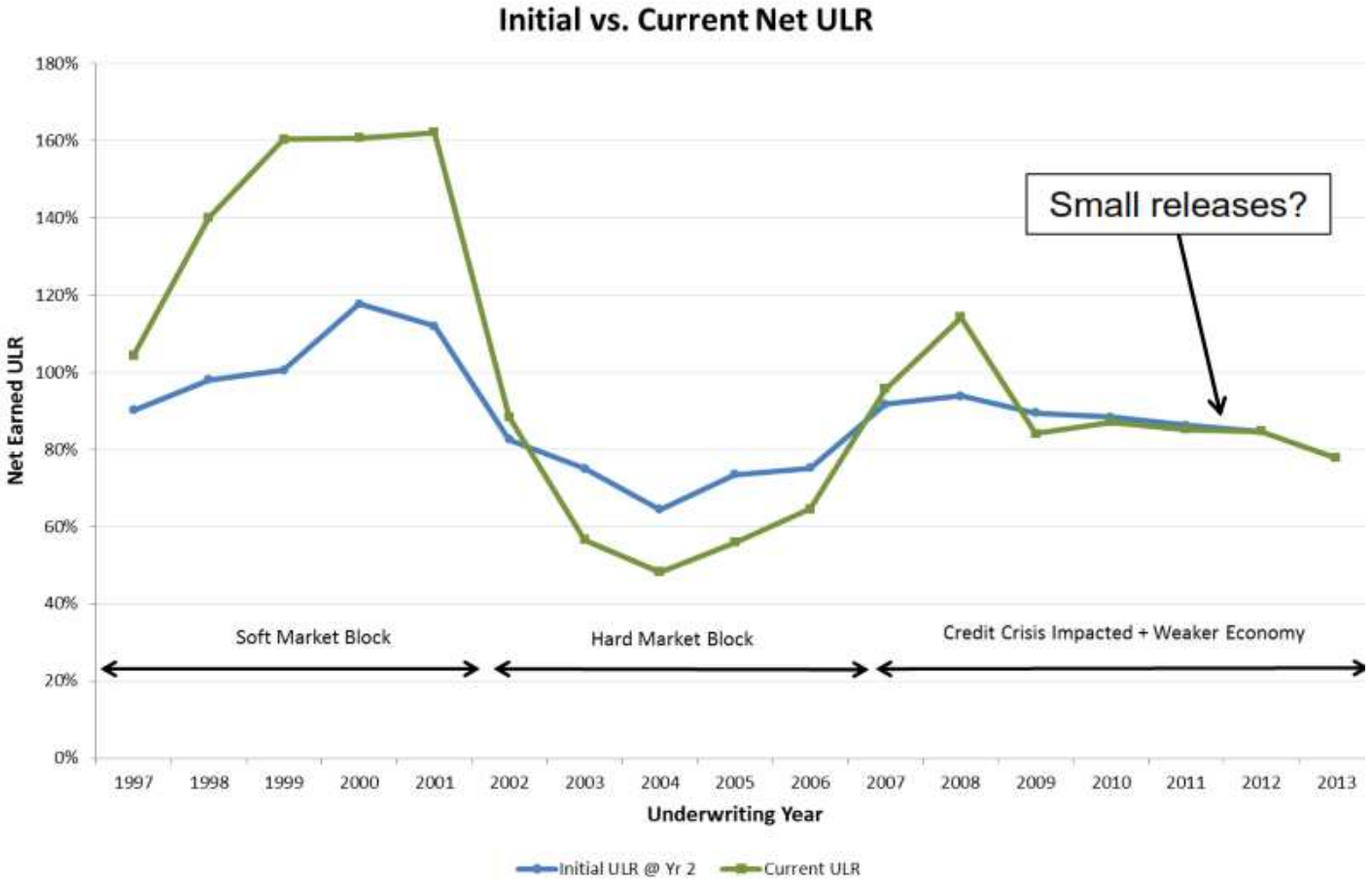




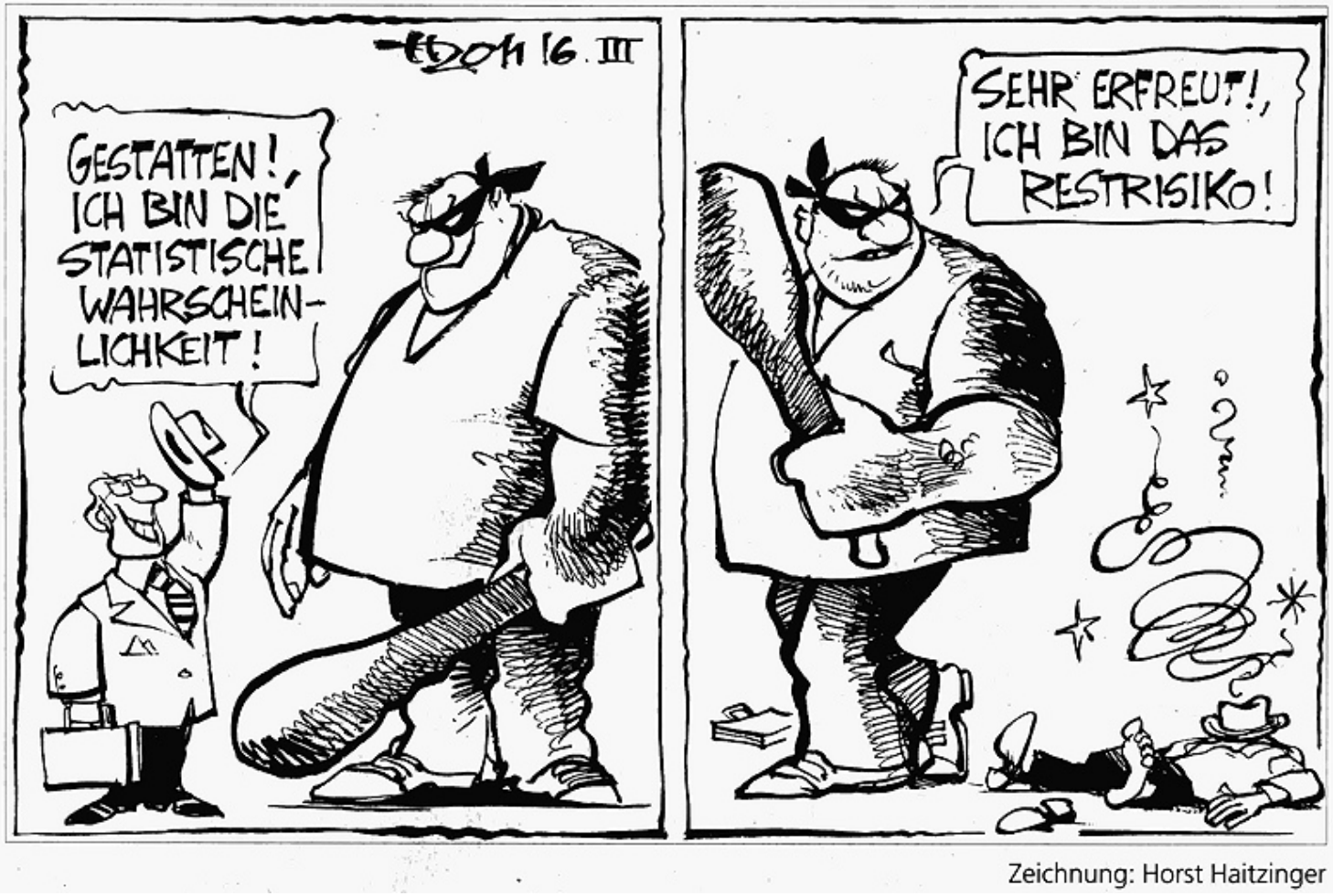
Source: Aon

Interdependency between both cycles

When things get sour (Lloyd's)



Interdependency between both cycles



Hi, I am the Statistical Probability!

Nice to meet you, I'm the Downside Risk!

Interdependency between both cycles

➢ Empirically, adverse developments imply future adverse developments and conversely.

From an accounting point of view:

- After a soft cycle, deteriorations from various UWY will cummulate on several accounting years in row.
- Conversly, after a hard cycle, a stream of redundancies will enhance several accounting years.

Source: Lloyd's

Interdependency between both cycles

Business mix impact on the depth of the reserving cycle:

More long tail line → More reserve movements → More smoothing

	Correlation	Long Tail
Berkley	-0.97	++
Arch	-0.78	++
Alterra	-0.68	+
Trans Re	-0.53	++
Partner Re	-0.53	++
XL Re	-0.51	+
Axis	-0.50	o
Everest Re	-0.42	--
Endurance	-0.38	+
Platinum	-0.36	--
ACE Tempest Re	-0.25	o
Aspen Re	0.03	o
Odyssey	0.20	--
Correlation	-0.34	

Source: Lloyd's

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Conclusion

Conclusion

Independently of behavior and motivation of market participants:

- reserving effects can produce an underwriting cycle through delayed **negative feed-back** loops.

Conclusion

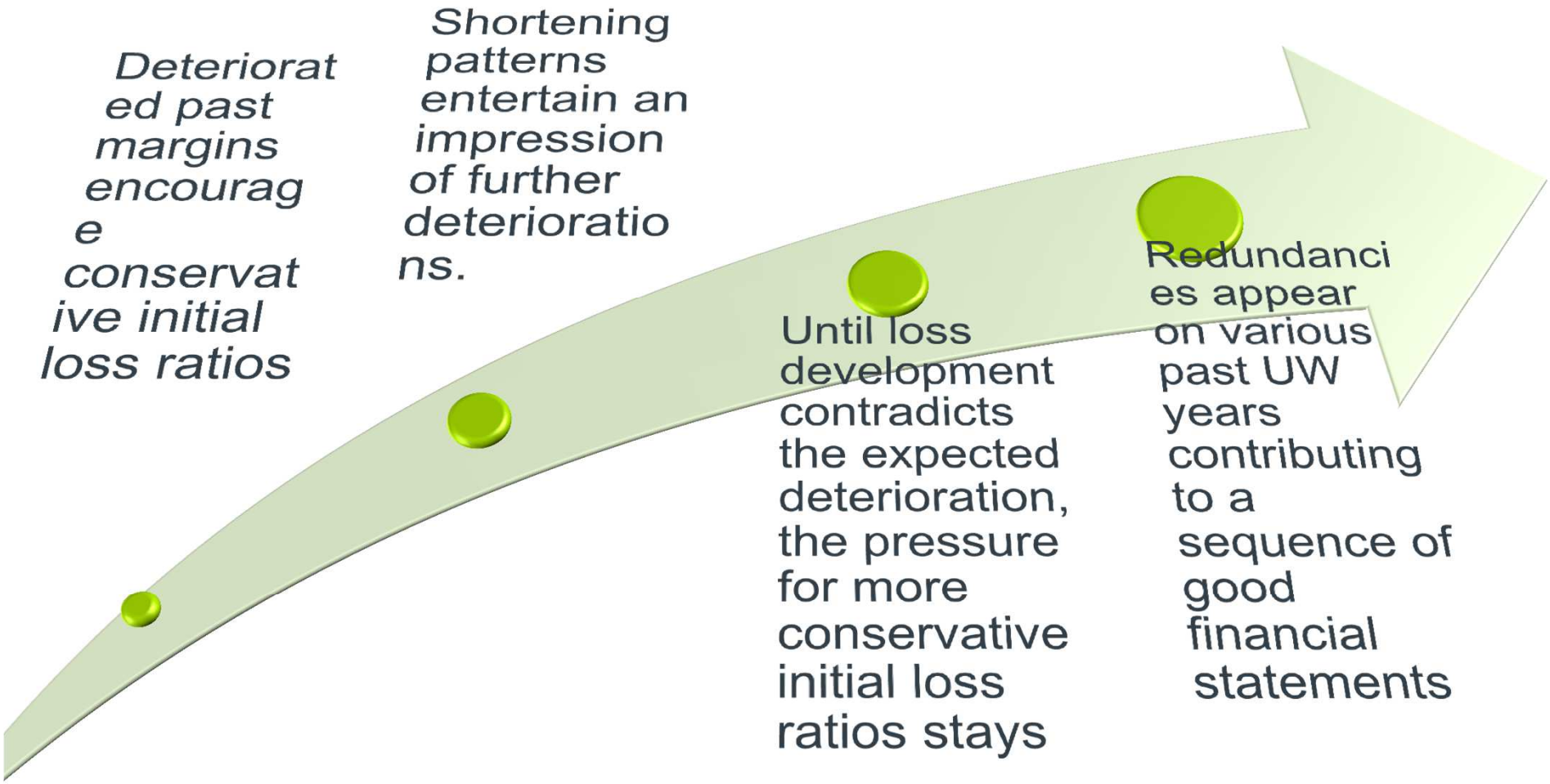
Years of good experience encourage more optimistic initial loss ratios

Longer pattern emerge maintaining an illusion of favorable developments.

The correction comes with a delay so that several UW years will incur negative developments on the same financial years.

Deterioration of financial results do not encourage for swift correction on all past years.

Conclusion


Deteriorated past margins encourage conservative initial loss ratios
Shortening patterns entertain an impression of further deteriorations.
Until loss development contradicts the expected deterioration, the pressure for more conservative initial loss ratios stays
Redundancies appear on various past UW years contributing to a sequence of good financial statements

Conclusion

It is like a spring:

- Position is the current profitability
- Compression is the embedded L/R and pattern mismatch

Conclusion

- Beside the classical underwriting cycle, a reserving cycle exists.
- They reciprocally fuel one another.
- The reserving cycle deepens and extends the underwriting cycle.
- Underwriting cycle management has to extend into a reserving cycle management.

AGENDA

Thanks

Main References

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