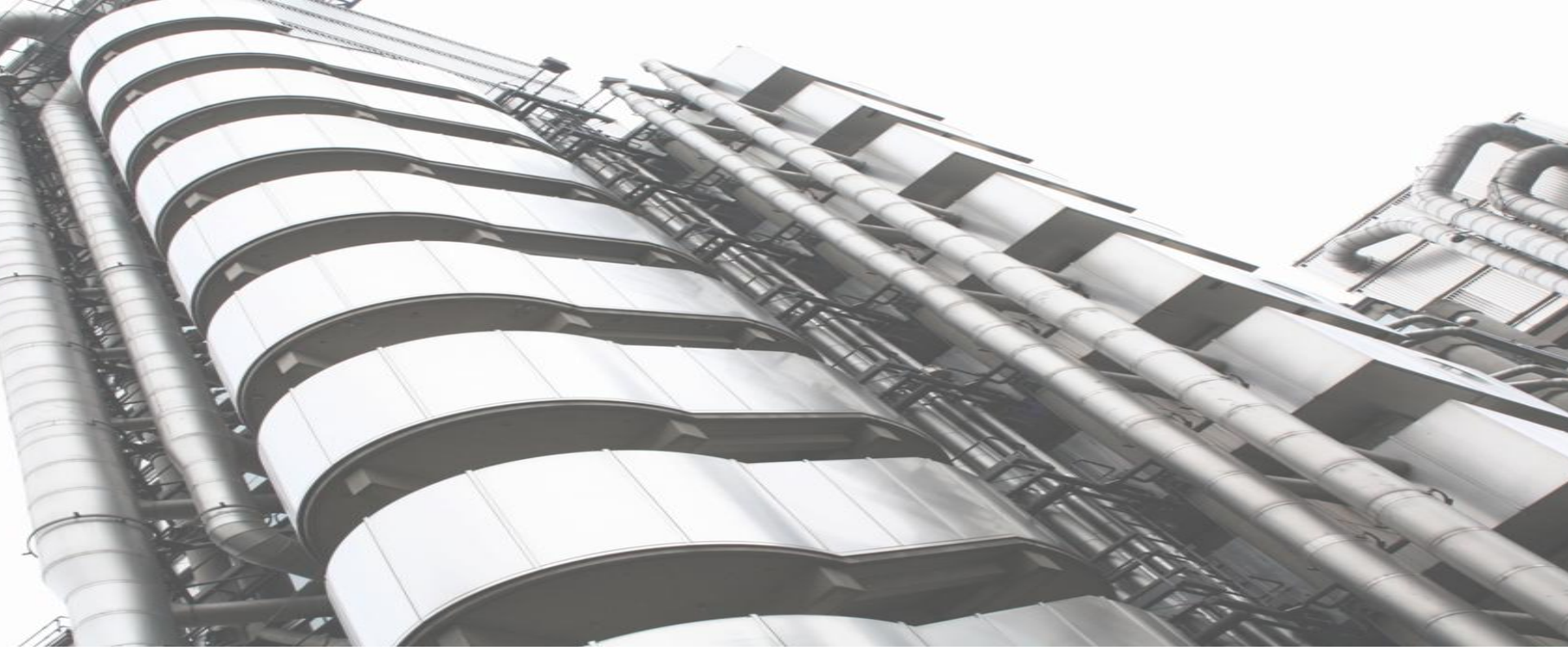

The emergence of emergence factors
LMAG presentation – 22 July 2015

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AIG

Insight
Risk Consulting

Contents

- Emergence factors
  - To lay out a common foundation of understanding
- The business case
  - To outline why one year risk is important
- Emergence factor challenges
  - Management judgements
  - Portfolio mix
  - Non-triangular approaches
- Emergence factor developments
  - Emergence patterns
  - Emergence vectors
- Questions

Emergence factors: The story so far…

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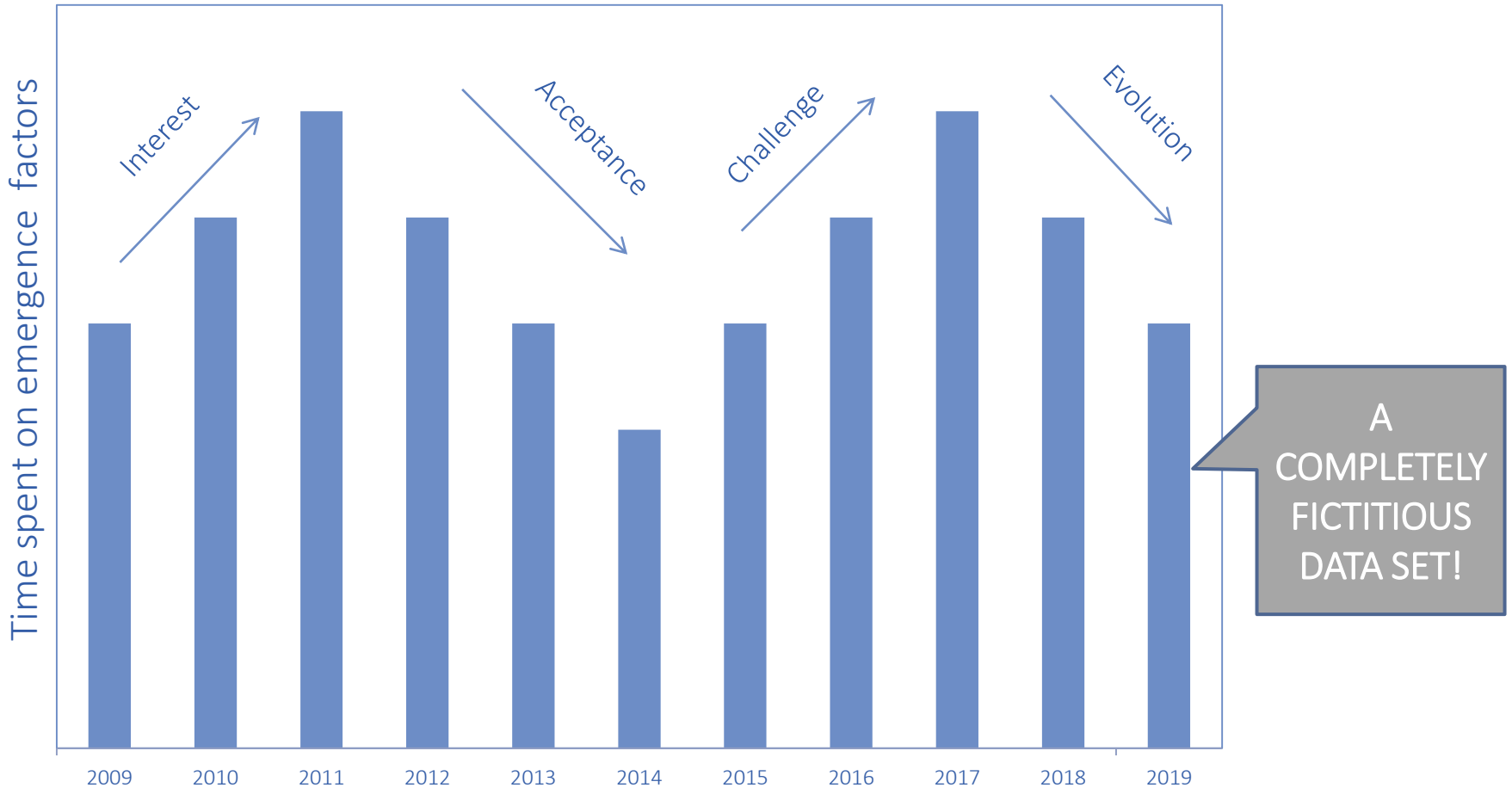

Emergence factors: What are they again?

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- 1 in 200 one year movement as a percentage of 1 in 200 ultimate movement
- For normal insurance products - a factor between 0 and 1
- There are a number of different statistical methods, but often methods are not appropriate for many volatile London Market lines
- These deterministic factors are used in a large number of capital models (even if stochastic processes are used to determine them)
- A key expert judgement for the SCR but difficult to justify or validate

The business case:
One year risk is useful

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- Management of capital should be aligned with the way businesses operate.
  - Most businesses write new business which is available to diversify against existing risk.
  - Most businesses (and certainly the industry) can replenish capital if required. Therefore, capital management should consider the value of businesses and the timing of capital requirements.

 Runoff basis

 Fixed capital level

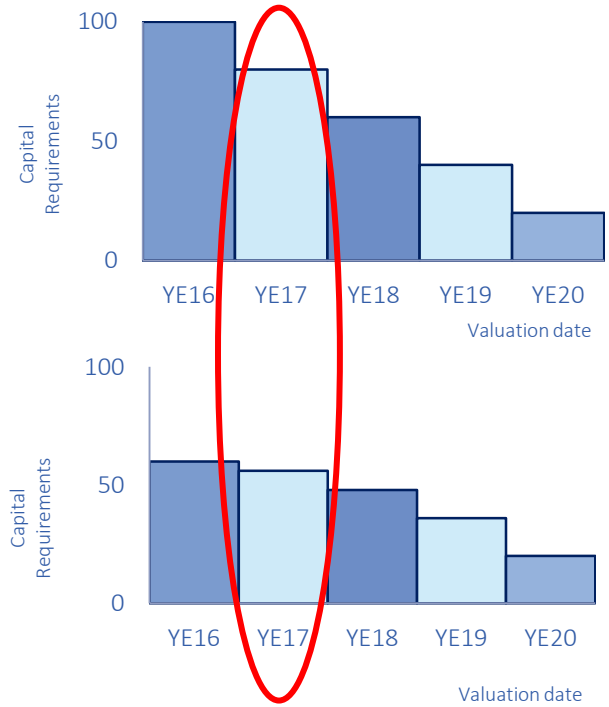
- For pricing, there is one chance to price for the right cost of capital at the outset.
- For business planning, capital is required for a long term view for risks where these may emerge slowly.

The business case: Different views of risk

The graph shows capital for a portfolio and how this runs off over time

Ultimate horizon

One-year horizon



The difference between capital requirements on a one-year horizon and ultimate horizon is due to the *emergence factor*.

This is the most penal

Ultimate risk ≠ Life time of ultimate risk ≠ Life time of one year risk

The business case: What is the right horizon?

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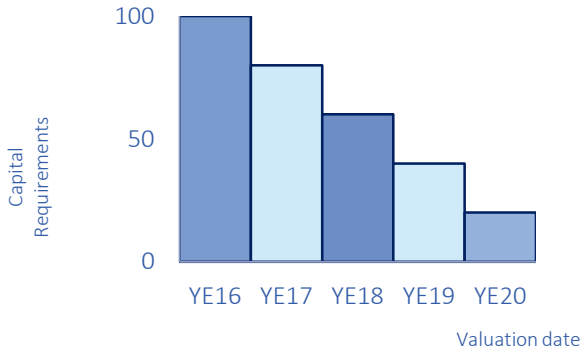
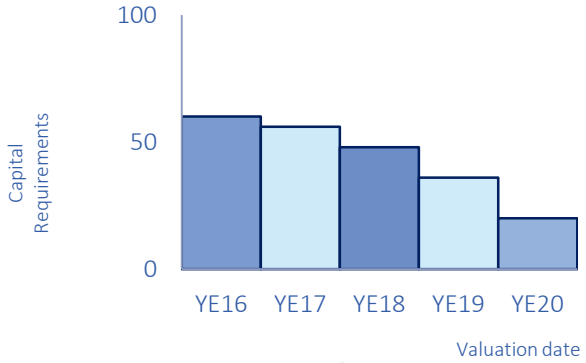
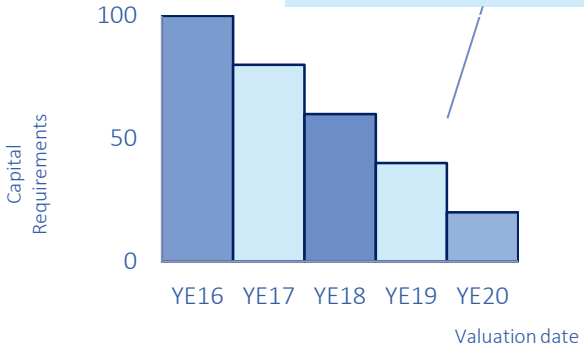
Ultimate horizon



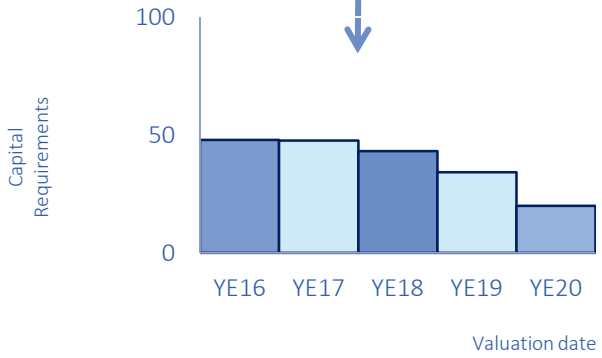
One-year horizon



What if we used something more prudent than 1 in 200? Would the capital requirements be bigger?



Quarterly horizon



What if a quarterly time horizon had been chosen rather than a one-year horizon? Would the capital requirements be lower?

The business case: Allowance for risk

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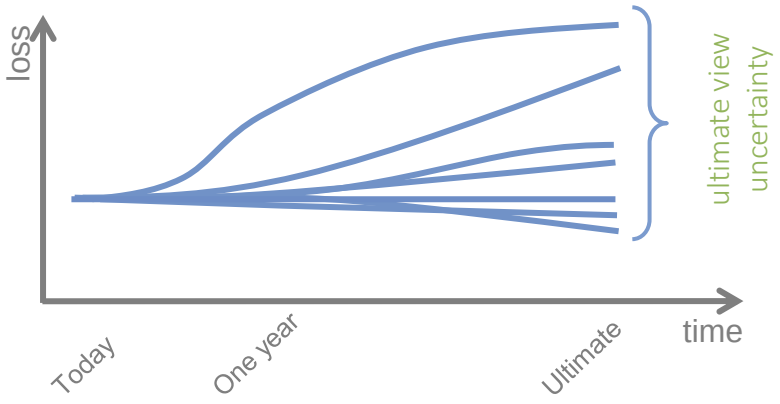
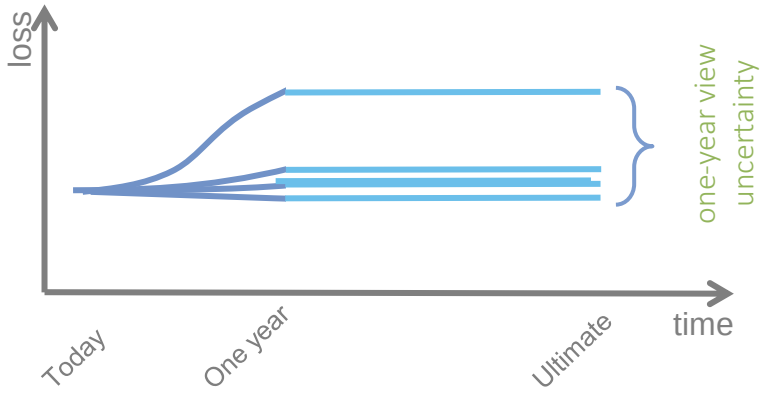
- To what extent is the mix of the risk types below different for one year risk and ultimate risk?
  - Systemic process risk: random chance events that don't diversify such as inflation or tort environment
  - Specific process risk: random chance events which diversify
  - Parameter risk: uncertainty in data used





Emergence factor challenges: Management judgements

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- Re-reserving with a more reactive chain ladder approach and as opposed to an anchored Bornheutter-Ferguson can lead to significantly different results.
- The method chosen for re-reserving might be different in a stressed event than in the current environment.

- Given the management judgement in estimating an emergence factor, including parameter error is reasonable and significant.

Emergence factor challenges: Portfolio mix

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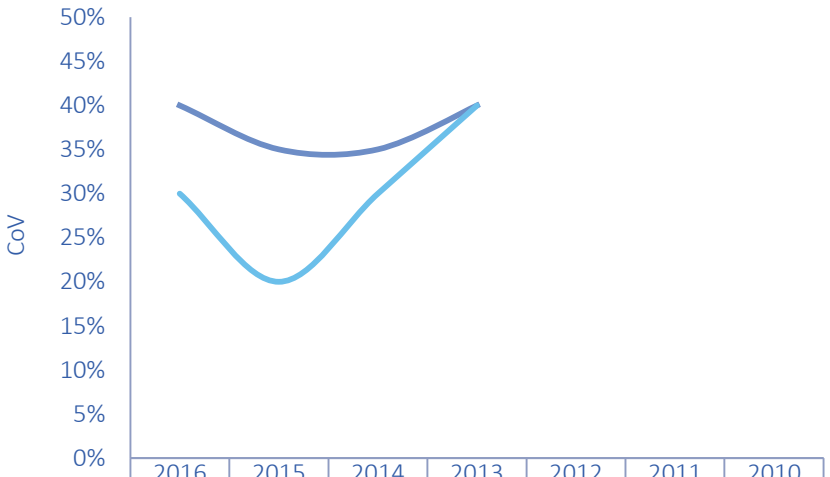
- It is always true that:

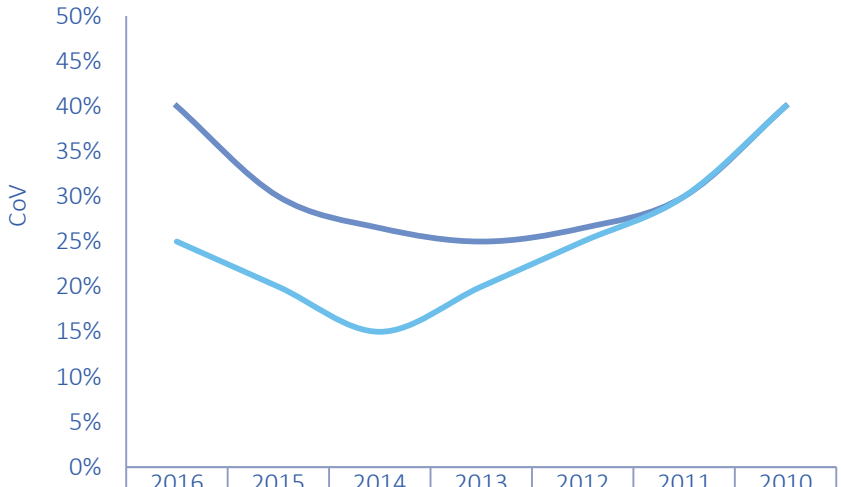
  "Short-tailed line emergence factors are greater than long-tailed line emergence factors…"

- **It is not so simple!** There are various portfolio mix issues that can distort intuitive relationships.
- Let us consider: Length of tail; age of risk and change in portfolio size.

Emergence factor challenges: Portfolio mix



	2016	2015	2014	2013	2012	2011	2010
Ult	40%	35%	35%	40%			
1 yr	30%	20%	30%	40%			
RF	75%	57%	86%	100%			



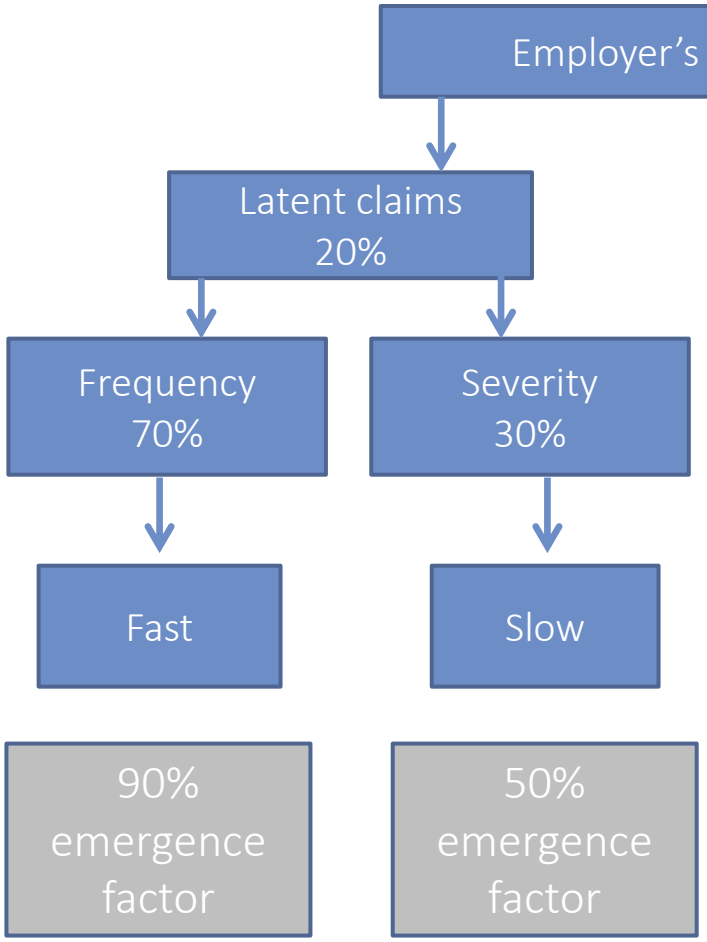
	2016	2015	2014	2013	2012	2011	2010
Ult	40%	30%	27%	25%	27%	30%	40%
1 yr	25%	20%	15%	20%	25%	30%	40%
RF	63%	67%	57%	80%	94%	100%	100%

	UW risk EF 2016	Reserve risk EF 2015 and prior
Ult yr 99.5th shock	40%	37%
1 yr 99.5th shock	30%	30%
Emergence factor	75%	82%

If we assume equal weighting, this contrived example show a 'counter-intuitive result'.

	UW risk EF 2016	Reserve risk EF 2015 and prior
Ult yr 99.5th shock	40%	30%
1 yr 99.5th shock	25%	25%
Emergence factor	63%	84%

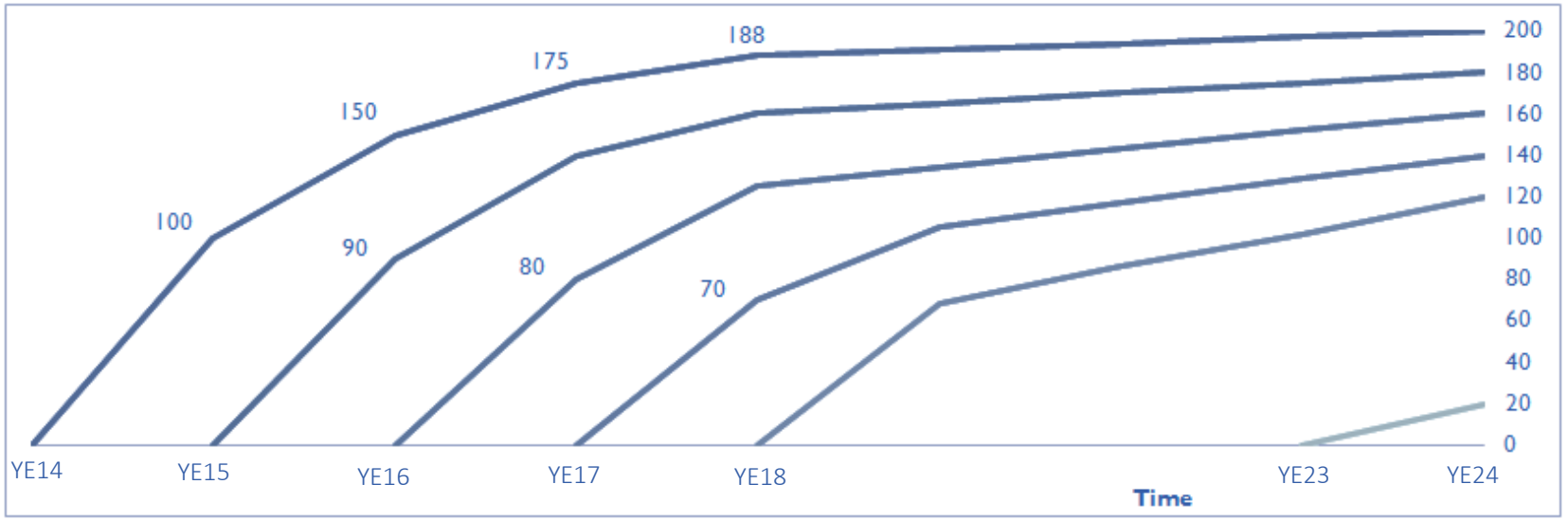
Emergence factor challenges: Non-triangular approaches



Risk drivers of the overall 'latent claim' category can be split between risk factors. The weights represent the risk drivers relative contribution to overall volatility.

Fast at 90% is because a large number of speculative claims could be submitted in the first year limiting further downside. Slow at 50% is because the average cost of a claim won't be clear particularly quickly.

Emergence factor developments: Emergence patterns



	YE14	YE15	YE16	YE17		YE24
Ultimate risk at time t	200	180	160	140		0
Expected risk expiration	0	20	40	60		200
Conditional emergence pattern	0%	10%	20%	30%		100%
Extreme risk expiration (x year VaR)	0	100	150	175		200
Unconditional emergence pattern	0%	50%	75%	88%		100%

When talking about emergence patterns, we should differentiate conditional from unconditional emergence patterns to avoid confusion.

Emergence factor developments: Emergence vectors

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	One year	Emergence vector	Ultimate
Stage one f(One year) = k* g(Ultimate)	Scaled version of ultimate distribution	Fixed constant	Ultimate distribution
Stage two f(One year) = h* g(Ultimate)	**Implied** one-year distribution	Vector	Ultimate distribution
Stage three g(Ultimate) = f(One year) / h	One-year distribution	Vector	**Implied** ultimate distribution

* f and g need to be sorted for the vector to apply

A consequence of stage two is that we will discuss diversification between one year developments and 'one to ultimate ' developments. There are different ways to implement emergence vectors.

Questions?

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