Biennial Convention 2007
Adventures in Risk
23-26 September 2007 • Christchurch, New Zealand
Institute of Actuaries of Australia

Reinsurance Profit Share

Damian Thornley

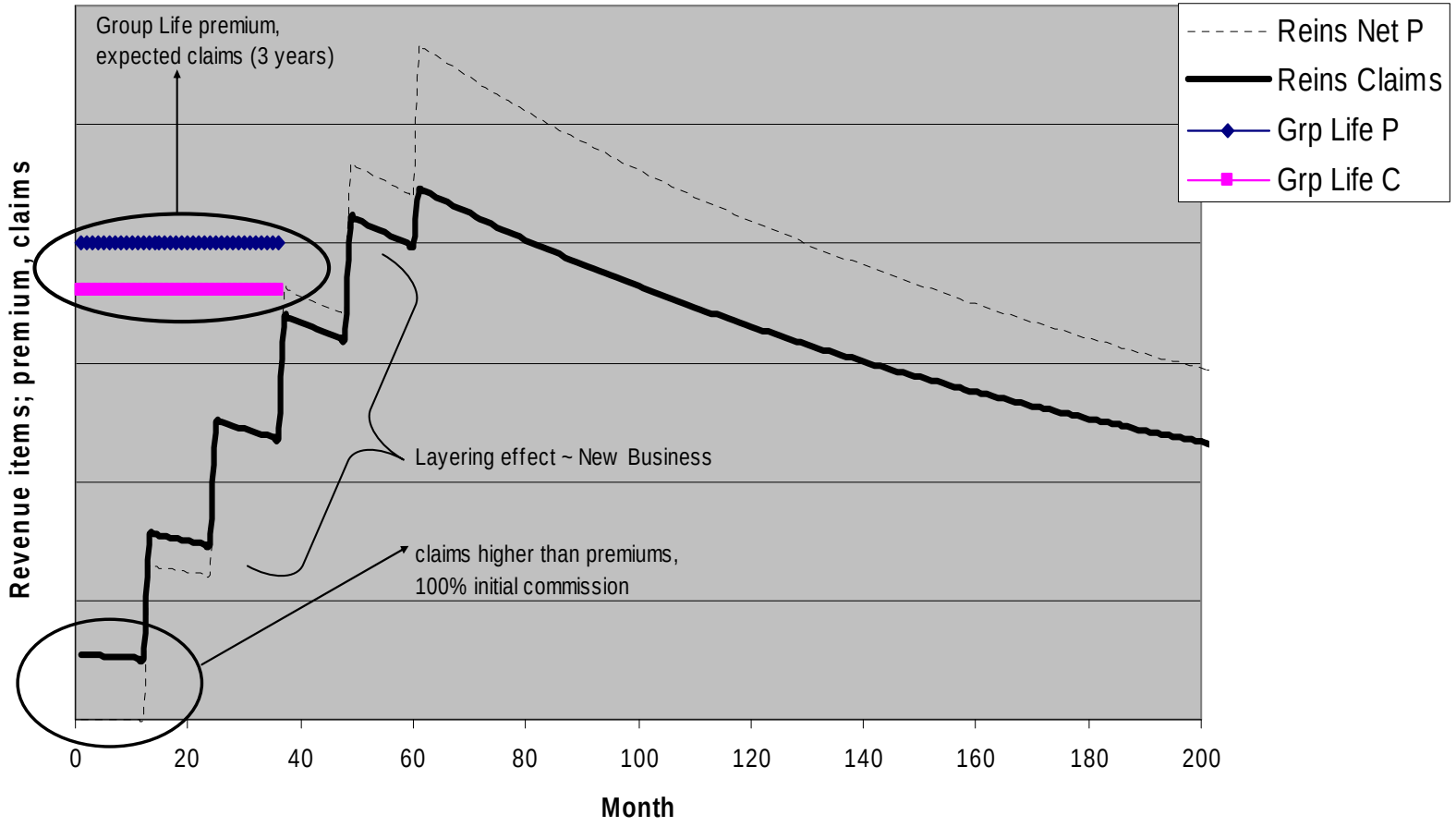
What is reinsurance profit share?

- Profit share = X% (Y% P – C – LCF)
  - X sometimes tiered according to P
  - Importantly, P is net of reinsurance commissions
  - LCF ~ losses carried forward, > Y% P

Motivation

- Wanted to investigate different behaviour of Group Life vs Reinsurance profit share;
  - Losses carried forward impact
  - Initial financing in reinsurance
  - Timeframe, GL 3-years vs Reinsurance “natural expiry”

Reinsurance vs Group Life premiums, claims

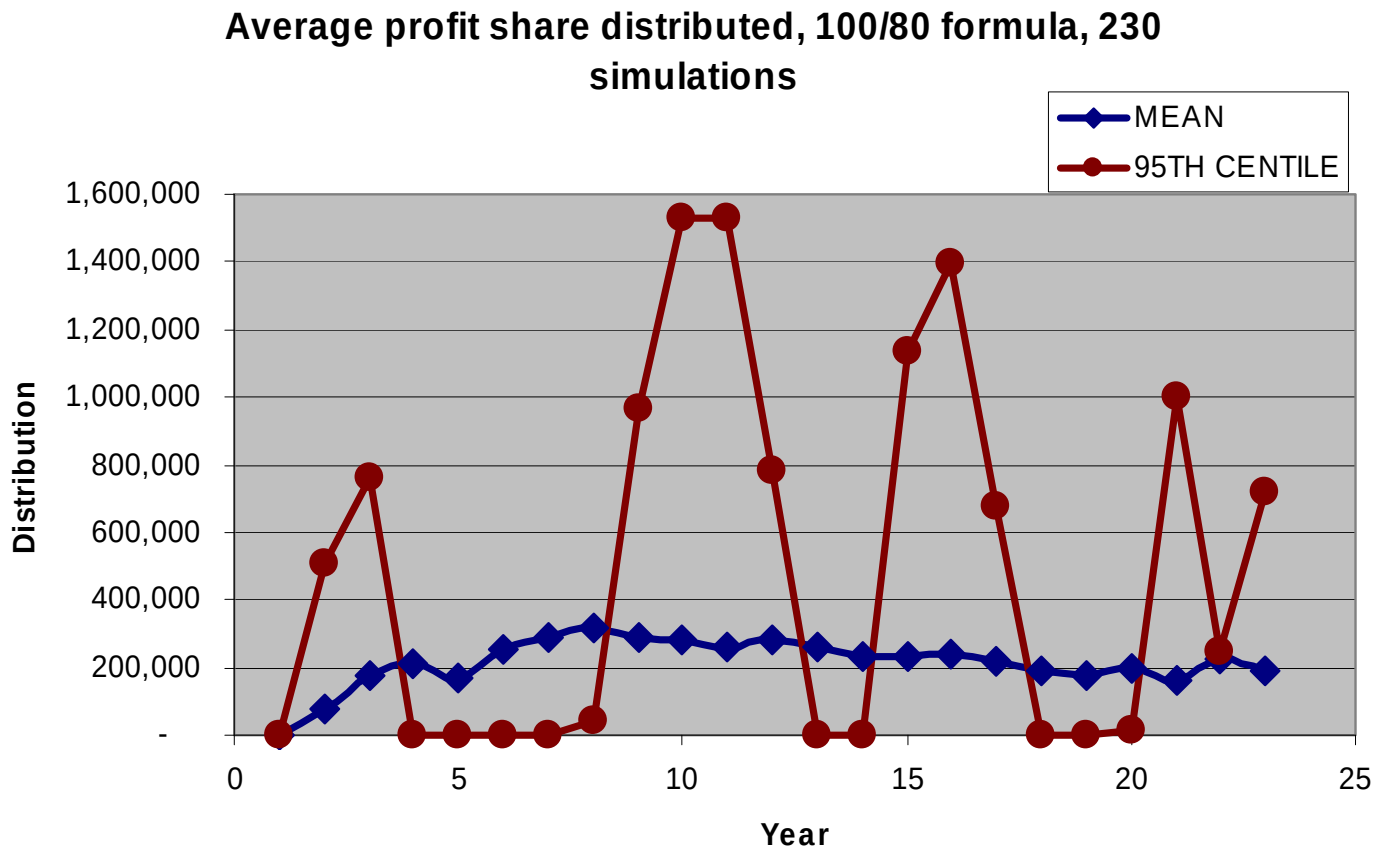


Results

- Table from paper (section 4.2.2)
  - Shows the adjustment to non-par rates required to achieve the same ROC after PC distribution
  - To nearest 0.5%

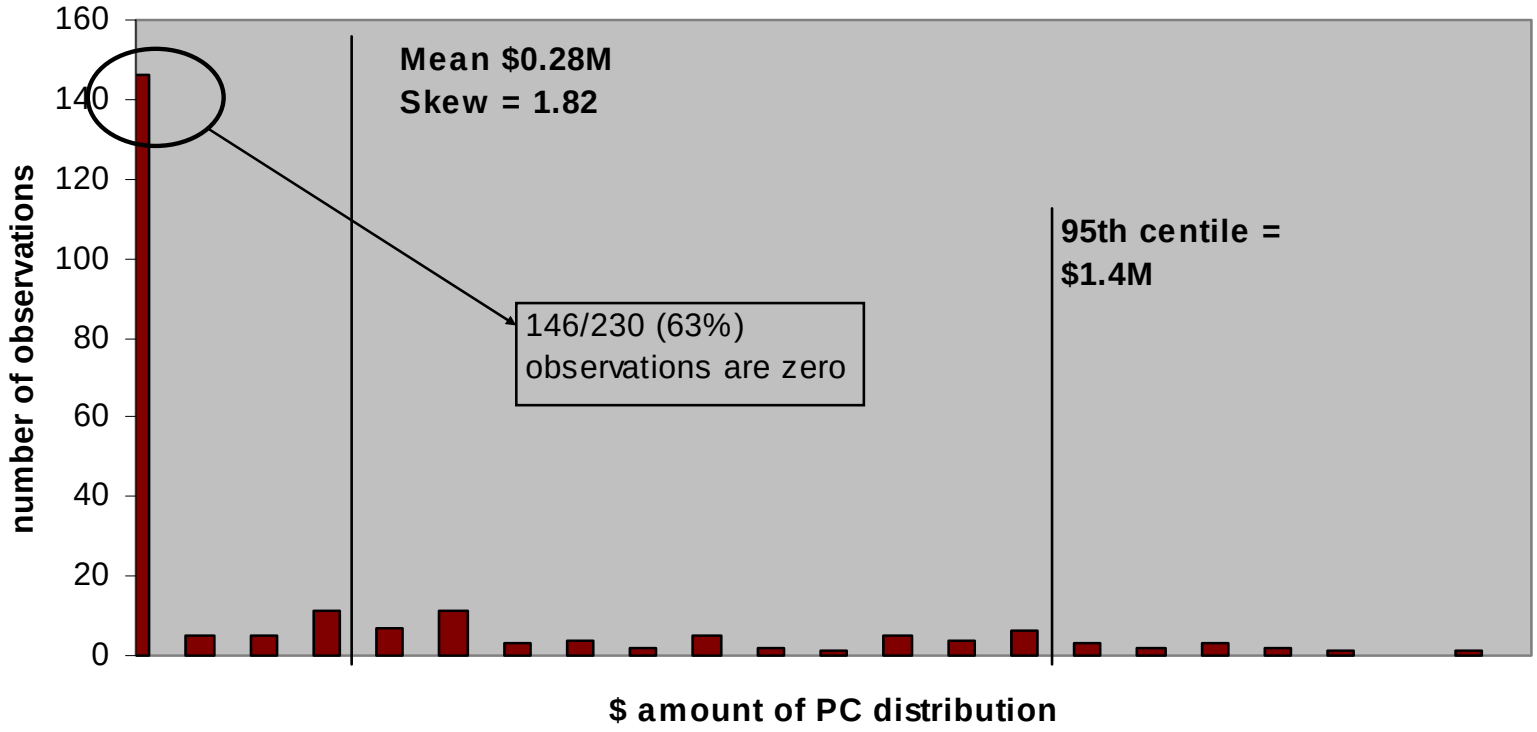
Profit share terms (X%/ Y%)	60/75	60/80	60/85
adjustment required to non-par reinsurance rates	+1.5%	+2.0%	+3.5%

Results: profit share behaviour



Results: profit share behaviour

Probability distribution frequency of {Year 10 PC distribution}, 230 simulations, 100/80 formulae

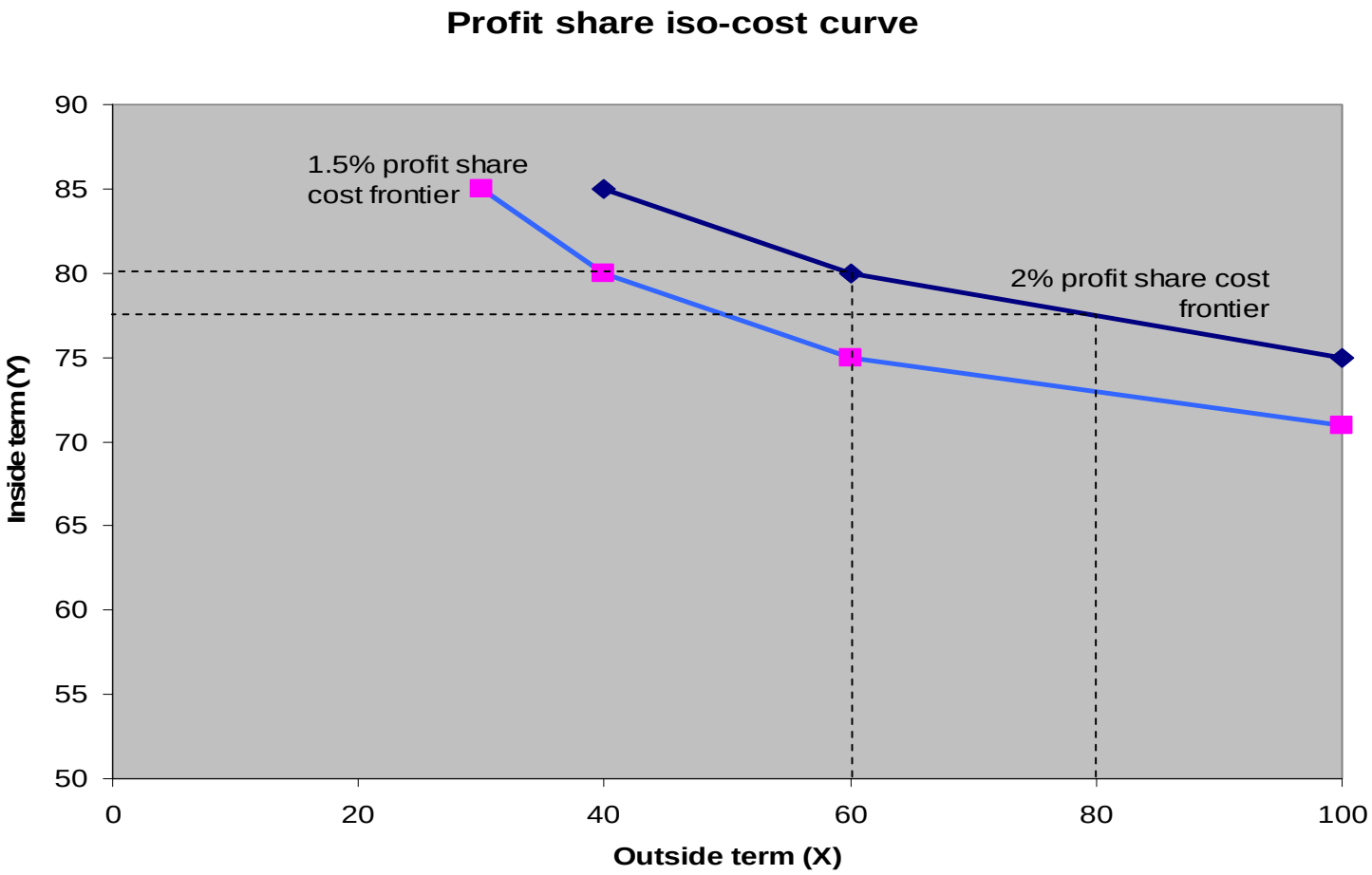


Results

- PC terms depend on number of policies written and sum insured variation.
- Example of different starting assumptions;

	Business type	
	as from Paper	"Low risk"
Num. policies pa	5,000	10,000
Ages	varies from 25-60	single age ~ 40
Sum insured	varies, $0-$2M	$400,000
Reins. arrangement	surplus 300K	quota-share
Other assumptions	same	
estimated premium loading required to place reinsurer in unchanged situation for 100/80 profit share		
- stochastic risk only*	approx 3%	< 0.5%
- including systemic risk**	> 3%	1%
* means no change to BE assumptions across life of the projection		
** means that mortality table varies across future durations with a random walk		

Profit share iso-cost curve



Practical considerations

- Practical difficulty for estimating PC costs
  - long time span means that systemic risk must be addressed
    - Model for systemic risk in the Paper is too simplistic
- Measurement basis
  - I used equal ROC before / after PC
  - % of premium is an alternative

Return on capital measurement

- Value to s/h = PV (P+I-B-E) – COC – PV(Profit share)
- In my model, change to profit share loading impacts on terms 1 and 2 with different sensitivity.
  - Higher PC loading reduces COC and dampens the 'cost' of profit share
- Table shows estimated required loadings and PC % of Prem
-

Table 4.2.2, with PC distributions as % of Premium			
	60/75	60/80	60/85
Loading	1.5%	2.0%	3.50%
% of Prem	3.0%	3.8%	6.5%

LCF impact

- Wanted to check the 'power' of the Losses carried forward term
  - Intuitively, if LCF is very powerful, a deterministic approximation would serve us well because option volatility will be 'ironed out' by LCF

Item	Zero PC	+2% prem loading to pay for 60/80
PV(P)	5,520	5,630
PV(B)	-4,639	-4,639
PV(E)	-275	-281
COC	-606	-504
PV(PC Cost)	0	-207
TOTAL	**0**	**0**

LCF check….

- PC distributed = 60% x ((80% x 5630) – 4639)
  = 60% x (-ve item)….run time error!

- On deterministic basis, no distribution since E{PV(C/P)} = 82% from the table above
  - Greater than the ‘strike price’ for the PC option.
- Therefore, we can say that despite the LCF, the ‘optionality’ is still important
  - This is partly because the LCF is retrospective only – there’s usually no clawback of physical cash once a distribution is paid.

Conclusion

- PC terms offered need to be customised to the portfolio and the risk type
- Difficulty of estimating systemic risk
- Terms offered, low / high vs high / low
  - 50 / 85 vs 100 / 75
- LCF is strong, but not all-conquering