General Insurance Pricing Seminar

Institute of Actuaries of Australia

What Profit Margin Should We Require for Short Tail Business?

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Introduction

- "When a firm makes a profit this means that productive factors have been properly employed and corresponding human needs have been duly satisfied."
  - *Pope John Paul II, Centesimus Annus, 1991*

- This presentation discusses some of the issues around setting profit margins for short tail business
  - What should an insurer's required profit margin be?
  - … or what is a 'reasonable' / 'fair' profit margin?

Contents

- A large, complex and (sometimes) contradictory body of actuarial research exists on profit margins.
  - Tension between financial economic and more traditional actuarial methods.

- This presentation will first consider, applied to personal home and motor business:
  - The Myers-Cohn method.
  - Return on Risk Based Capital (‘RORBC’) type methods.

Financial economic theory

Myers-Cohn method

- The 'fair' premium for an insurance contact is:

$$P = \sum_t E\left[d_t X_t\right]$$

- Discount factors (d_t) are dependent on correlation of insurance cashflows with the economy.
- The profit margin is then a function of the contract's *undiversifiable* volatility (measured via CAPM β).
  - If cashflows are uncorrelated with the state of economy, then the premium is simply the risk premium i.e. no profit margin.
  - If cashflows are negatively (positively) correlated with the state of the economy, the premium and profit margin will be higher (lower).

Financial economic theory

Myers-Cohn method

- Trying to apply this methodology to short tail business:
  - The level of undiversifiable risk can be measured empirically.
    - Methodologies generally consider historic performance of share prices.
    - This is poor data for the problem. Not surprisingly there are widely varied results.
  - *Thinking* about the nature of short-tail risk seems to suggest it will generally be uncorrelated with the state of the economy.
    - Although theft related claims are often thought to be negatively correlated.
      - … but note it isn't clear that this correlation is always present, and such claims are only a relatively small part of the total claim cost.
  - As *short*-tail, the claim payments and expenses occur quickly, and hence limited ability to discount cashflows heavily.
- ***Tentatively* argue that the Myers-Cohn profit margins for short-tail business will be close to zero.**

Profit margin for RORBC

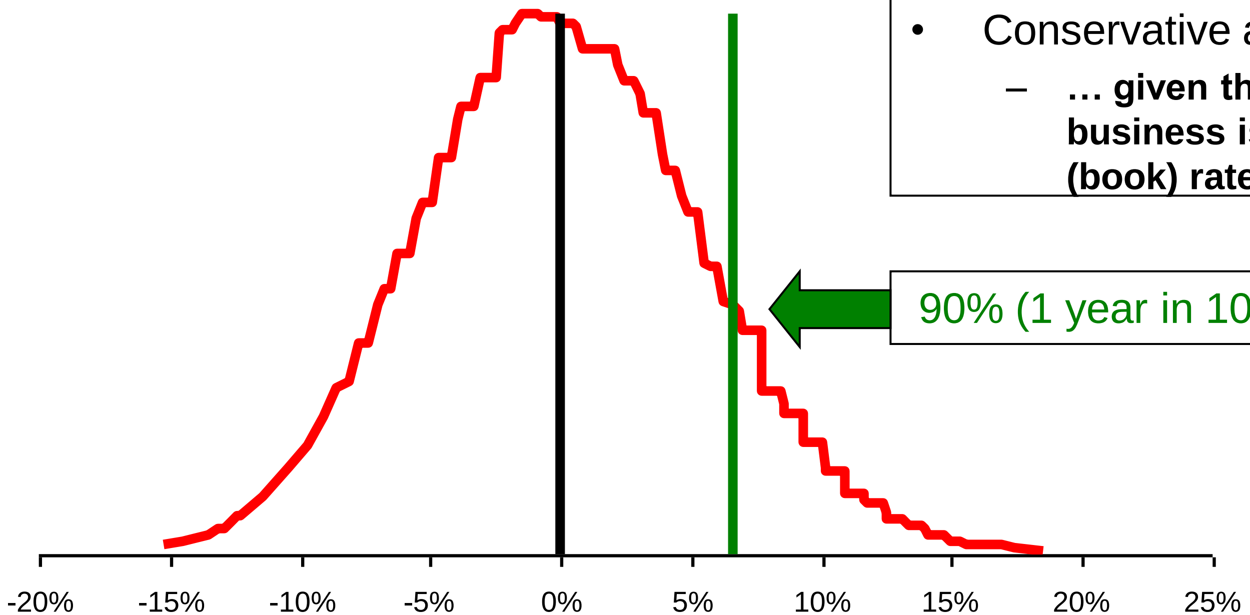
'RORBC' = Return On Risk Based Capital

- Consider required profit margin for a portfolio of risks.
  - Not necessarily the same as that required for an individual contract.
    - … although under certain steady-state type assumptions, the difference should be small.
- Ignore complications, including:
    - Large, monoline insurer.
    - No risk margins.
    - All assets invested risk free and all claim payments at end of period.
- Portfolio required profit margin is a function of:
  - Capital required.
  - Return on this capital.

Profit margin for RORBC

'RORBC' = Return On Risk Based Capital

- Motor insurance *attritional* claims.
  - no investment risk, reserving risk, large / catastrophic claims risk.
- Conservative assumption.
  - **… given that we are assuming that business is priced according to our (book) rates.**



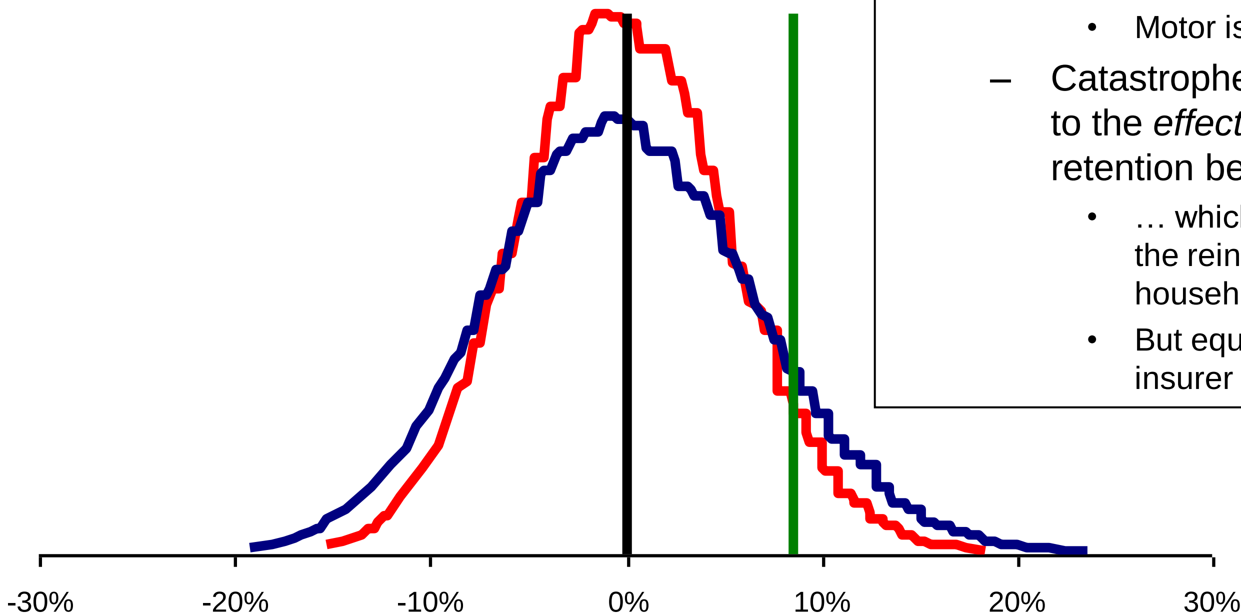
90% (1 year in 10) loss is 7% of premium.

Profit (% premium) ⟷ Loss (% premium)

Profit margin for RORBC

'RORBC' = Return On Risk Based Capital

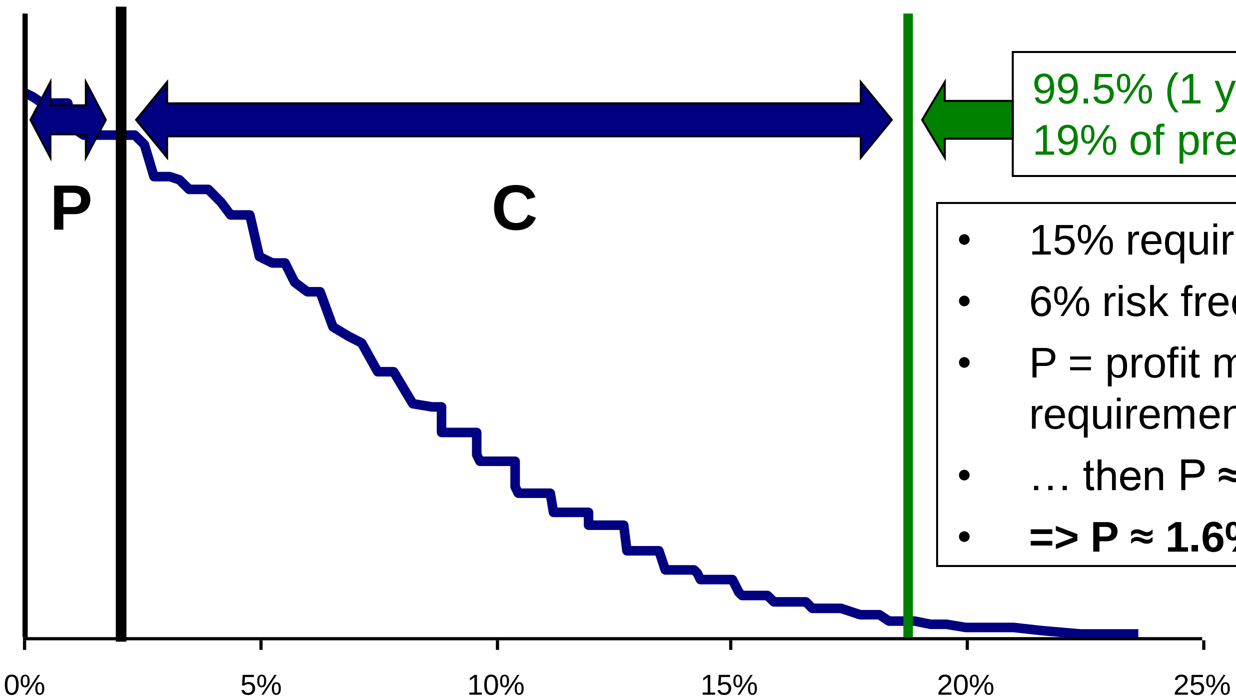
- Including other insurance risks only moderately changes the distribution.
  - Reserving risk is small.
    - Motor is very short tail.
  - Catastrophe risk is only moderate due to the *effective* motor reinsurance retention being low.
    - … which is a function of the sharing of the reinsurance retention with a large household portfolio.
    - But equivalent to a monoline motor insurer having relatively low retention.



Profit (% premium) ⟷ Loss (% premium)

Profit margin for RORBC

'RORBC' = Return On Risk Based Capital



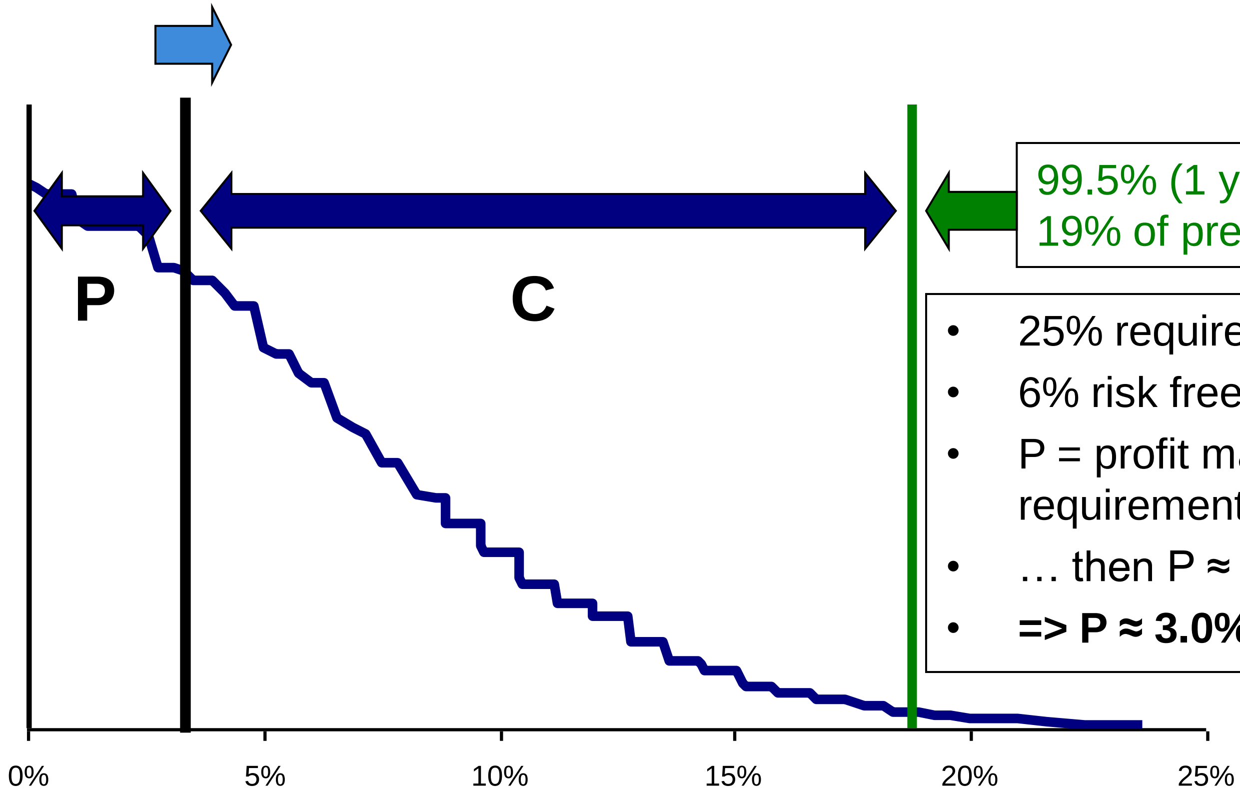
99.5% (1 year in 200) loss
19% of premium.

- 15% required RORBC
- 6% risk free rate
- P = profit margin, C = capital requirement (19% here)
- … then P ≈ (15% - 6%) x (C – P)
- **=> P ≈ 1.6%**

Loss (% premium relative to expected profit)

Profit margin for RORBC

’RORBC’ = Return On Risk Based Capital



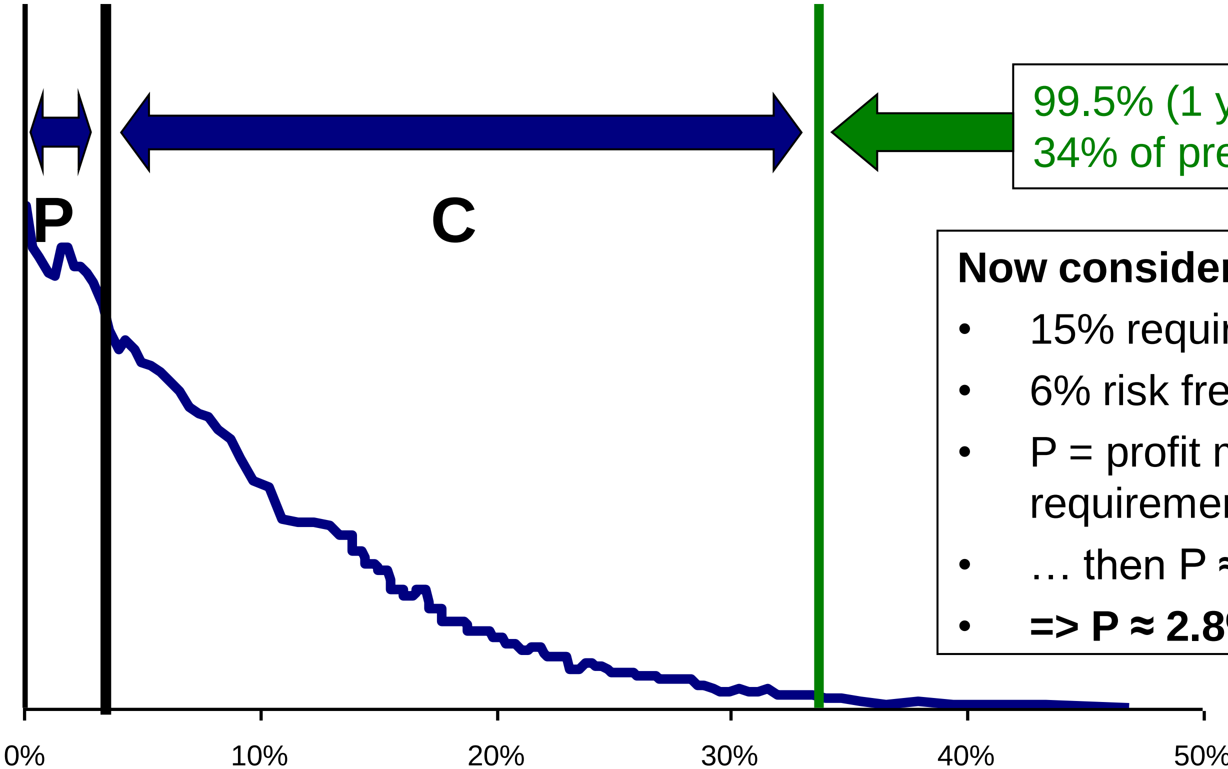
99.5% (1 year in 200) loss
19% of premium.

- 25% required RORBC
- 6% risk free rate
- P = profit margin, C = capital requirement (19% here)
- … then P ≈ (25% - 6%) x (C – P)
- **=> P ≈ 3.0%**

Loss (% premium relative to expected profit)

Profit margin for RORBC

'RORBC' = Return On Risk Based Capital



99.5% (1 year in 200) loss
34% of premium.

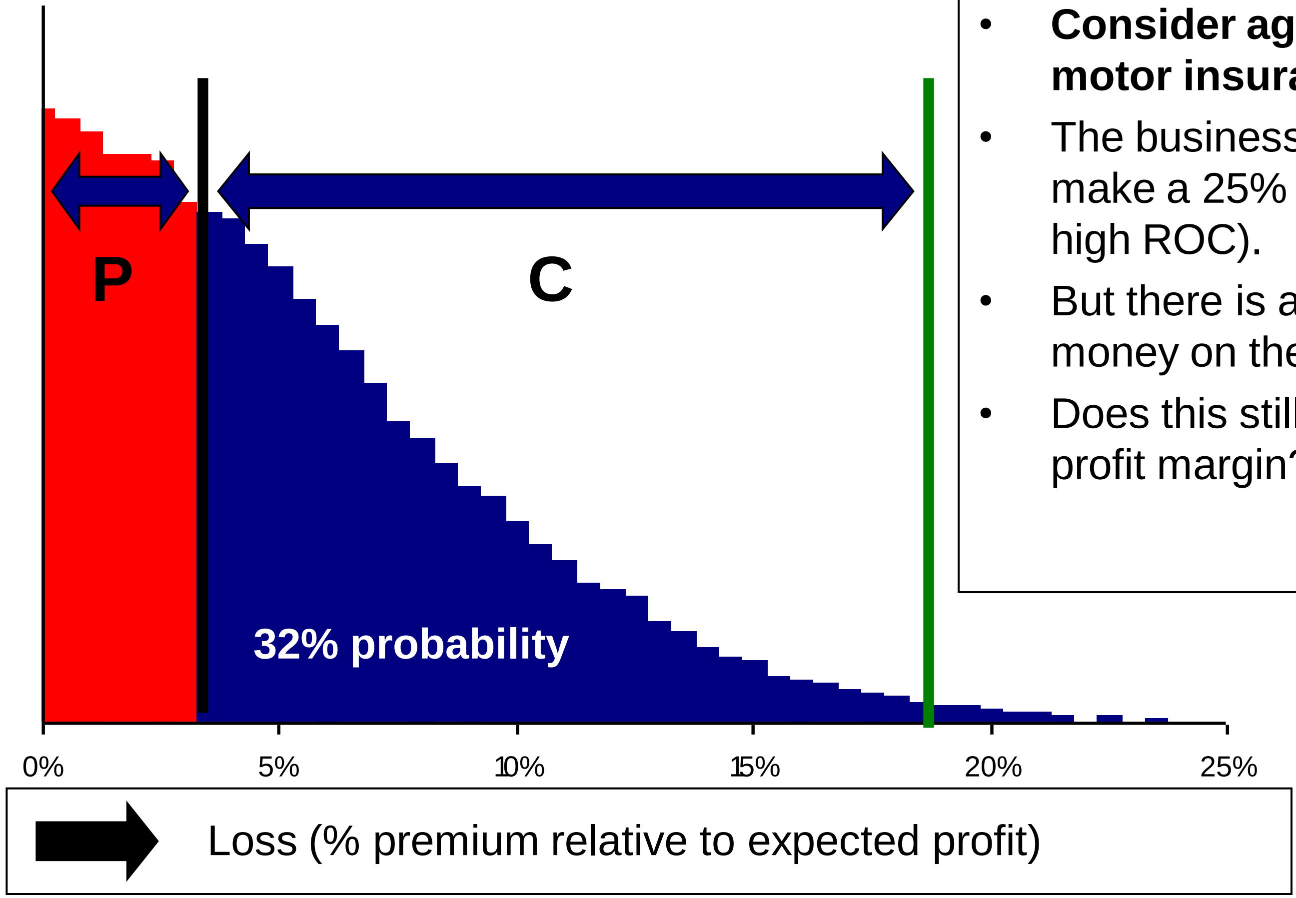
Now consider home insurance

- 15% required RORBC
- 6% risk free rate
- P = profit margin, C = capital requirement (34% here)
- … then P ≈ (15% - 6%) x (C – P)
- **=> P ≈ 2.8%**

Loss (% premium relative to expected profit)

Profit margin for RORBC

'RORBC' = Return On Risk Based Capital



- **Consider again the 25% RORBC motor insurance example.**
- The business will, on *average*, make a 25% RORBC (i.e. a *very* high ROC).
- But there is a 32% chance of losing money on the portfolio.
- Does this still seem a reasonable profit margin?

Summary

Method	Motor	Home
Myers-Cohn	≈ 0%	≈ 0%
Portfolio 15% RORBC	2%	3%
Portfolio 15% RORBC using 1.6x MCR	2%	3%

Other forms of capital

- The above results are extremely low:
  - Myers-Cohn focuses on undiversifiable volatility of the cashflows.
  - RORBC focuses on the required amount of *risk* capital.
- What about intangible assets / capital?
  - Brand value.
  - Distribution.
  - Value of business processes.
  - Value of data.
    - Value of sophisticated pricing methods.
      - Value of Actuaries (??!).
  - etc.

Conclusion

- Throw out the theory and keep things simple?
  - The function of the firm is to maximize shareholder value.
    - **… note that this includes taking due allowance of other stakeholders!**
  - Setting prices / profit margins to maximize shareholder value is an entirely different question…