



**The Actuarial Profession**

making financial sense of the future

# 33<sup>rd</sup> ANNUAL GIRO CONVENTION

Hilton Vienna Hotel, Am Stadtpark

- Need to measure the uncertainty in your reserves?
- How are you going to do that?

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# Agenda

- Why are we doing this?
- What methods are available?
- How are we going to communicate the results?

# Why worry about uncertainty in reserves?

- Because we are now required to!
  - GRIT
  - GN 12
  - GN 50
  - IFRS Phase 2
  - ICAs
  - Requirements of other regulators
- Good practice

# What GRIT says...

- “In particular we recommend that actuaries provide a quantitative indication of the range of outcomes for the reserves, and that our profession defines a common vocabulary for communicating uncertainty.”
- “An actuary should be required to show a numerical measure of uncertainty in any formal report wherever a point estimate of reserves is supplied.”

# New Guidance Notes

- GN 12 – “The report *should normally* indicate the nature, degree and sources of uncertainty surrounding the results and sensitivities to key assumptions. Uncertainty *should normally* be quantified where practicable, but otherwise *should normally* be reported using an appropriate descriptive summary.”
- GN 50 – “The *member* must consider the uncertainty surrounding advice or opinions formed and communicate this appropriately.”

# ICAs

- Stakeholders want to understand risk drivers in business
- Reserving risk is a key element for insurers
- Benchmarks can be used in this process
- Best estimate reserves for ICA can be lower than booked reserves

# Other countries' requirements

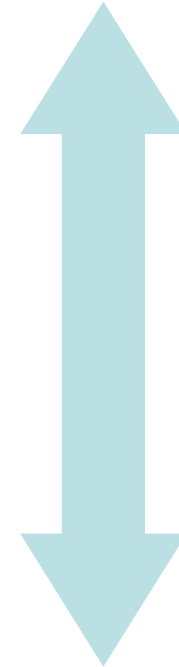
- US
  - Actuarial Opinion Summary (“AOS”)
- Australia
  - Minimum of 75<sup>th</sup> percentile or COV/2
- Canada
  - DCAT



# Widely-used techniques

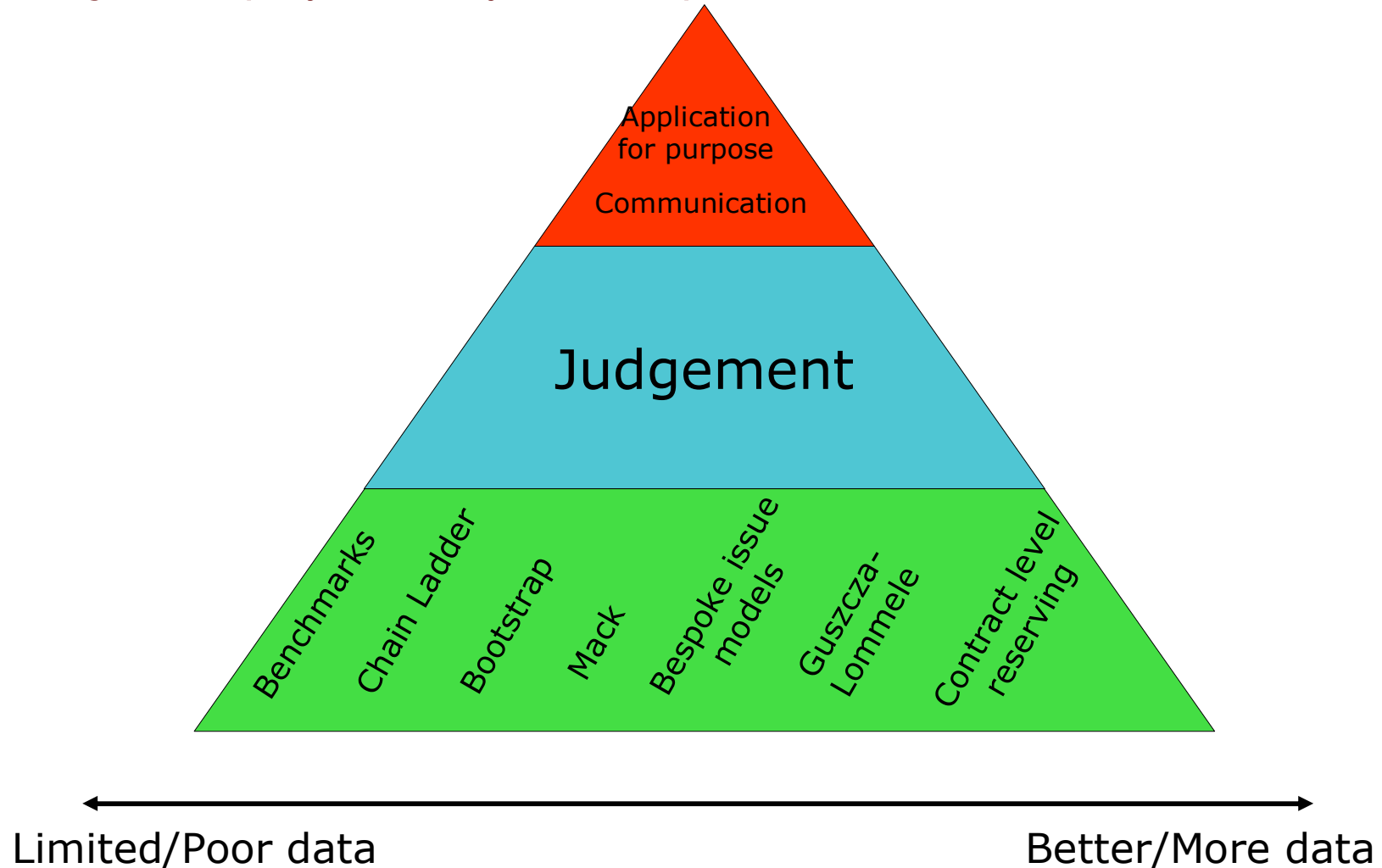
- Higher and lower estimates
- Range of chain ladder and Bornheutter-Ferguson type methods
- Bootstrap
- Mack
- Something different!

Judgement?



Automation?

Actuarial techniques to measure uncertainty  
*Judgement plays the key role despite the choice of methods*



# Actuarial techniques to measure uncertainty

## *Where application of judgement arises most*

- Challenging portfolios – eg: small, rapid growth, run-off, “lumpy”, special issues
- Scaling
- Reinsurance
- Combining portfolios
- High-level view

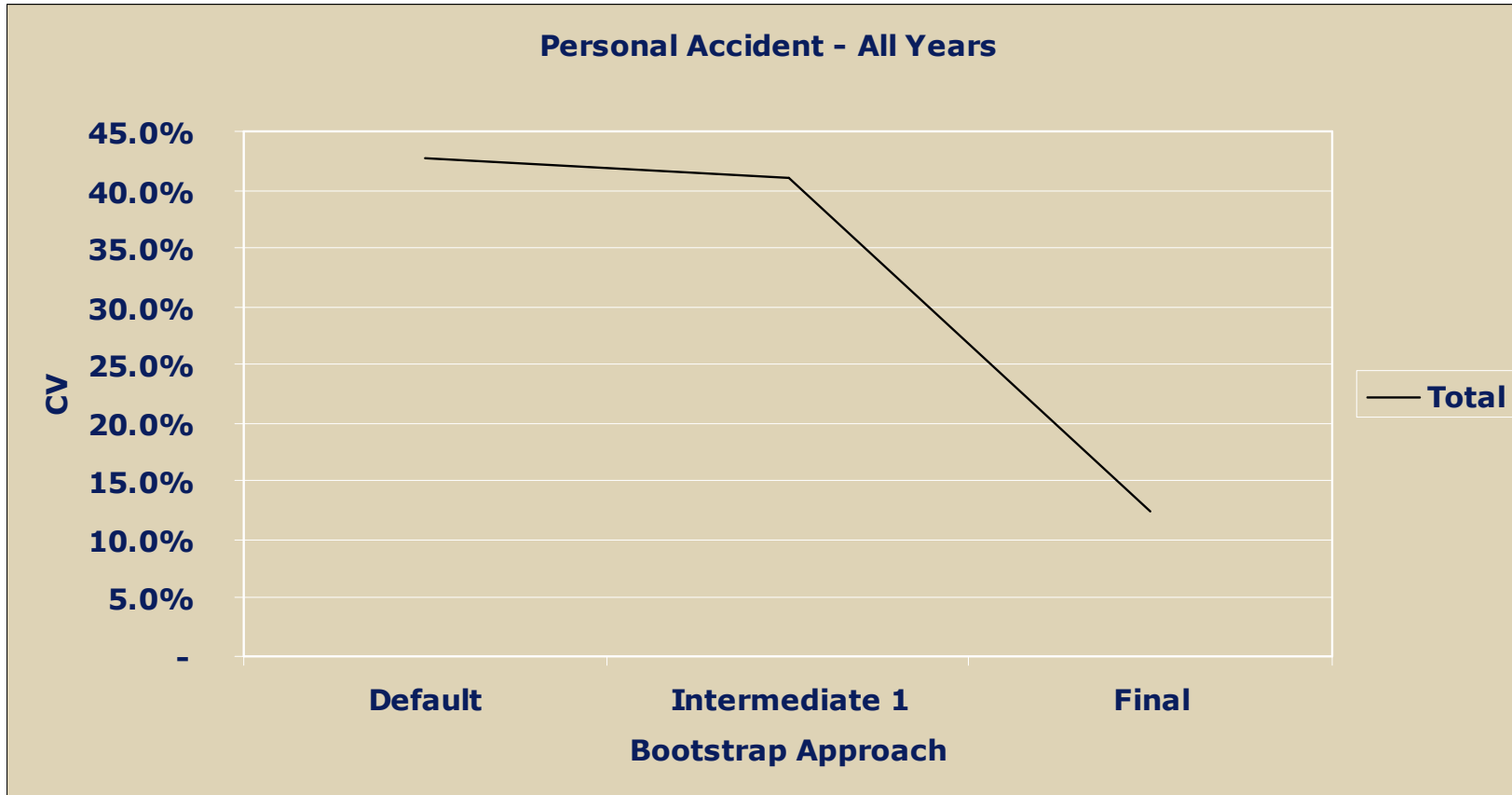
# Issues to consider in practice when selecting a method

- Parameter risk
- Process risk
- Practitioner competence
- Data availability
- The need to compare methods

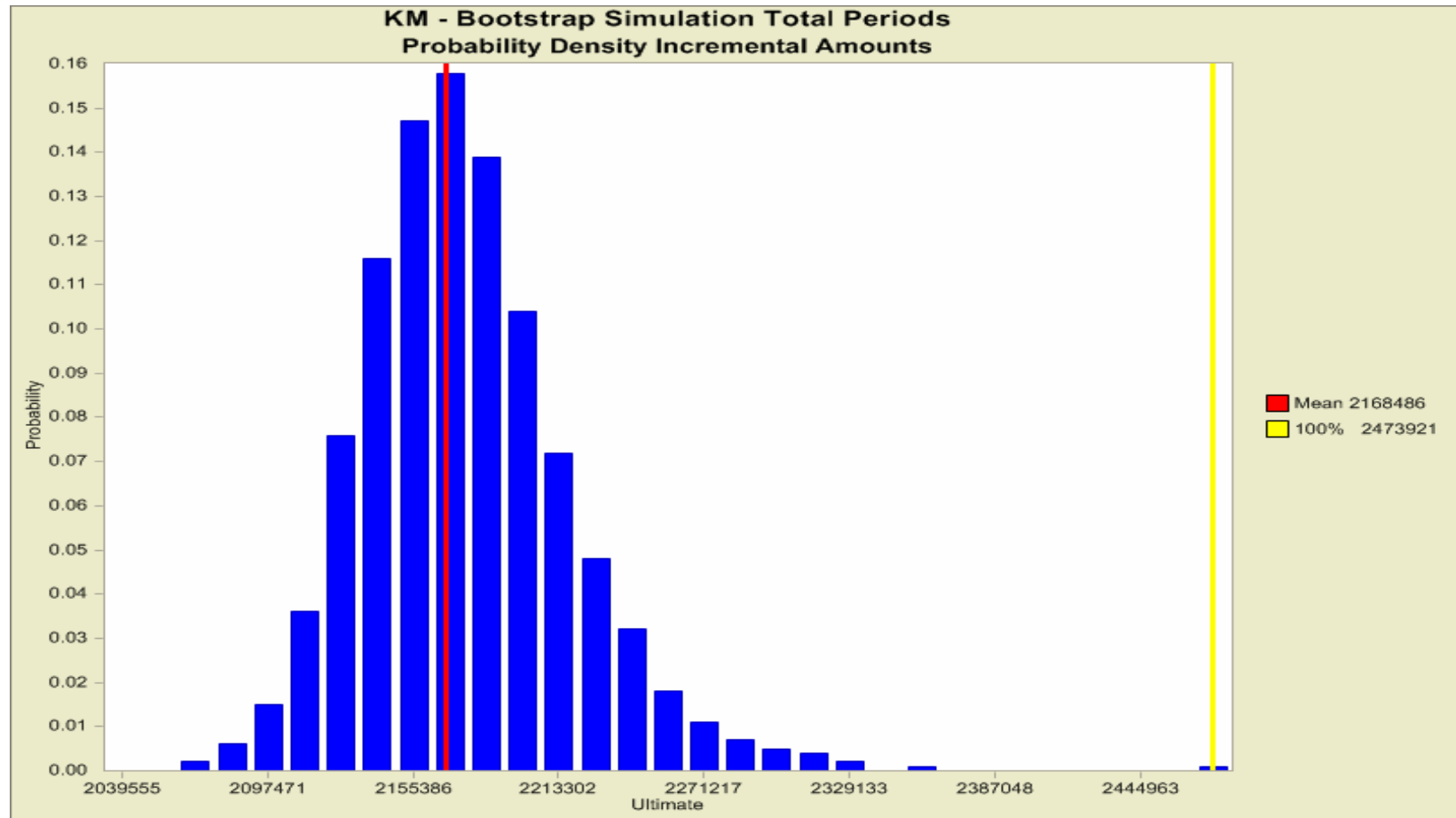
# Bootstrapping

- Overview of the method
- Pros
- Cons

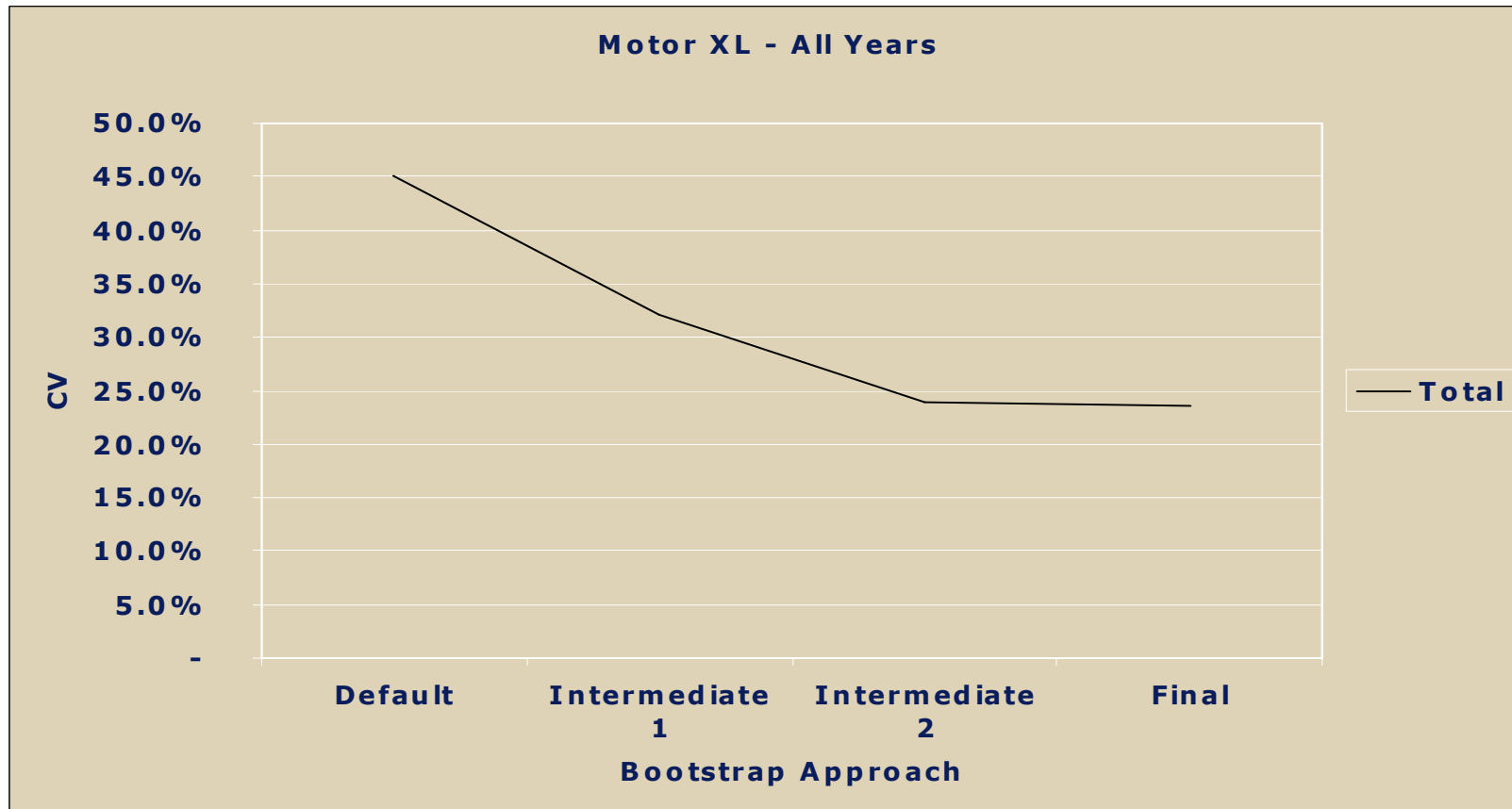
# The impact of applying judgement Short Tail – Personal Accident



# Actuarial techniques to measure uncertainty

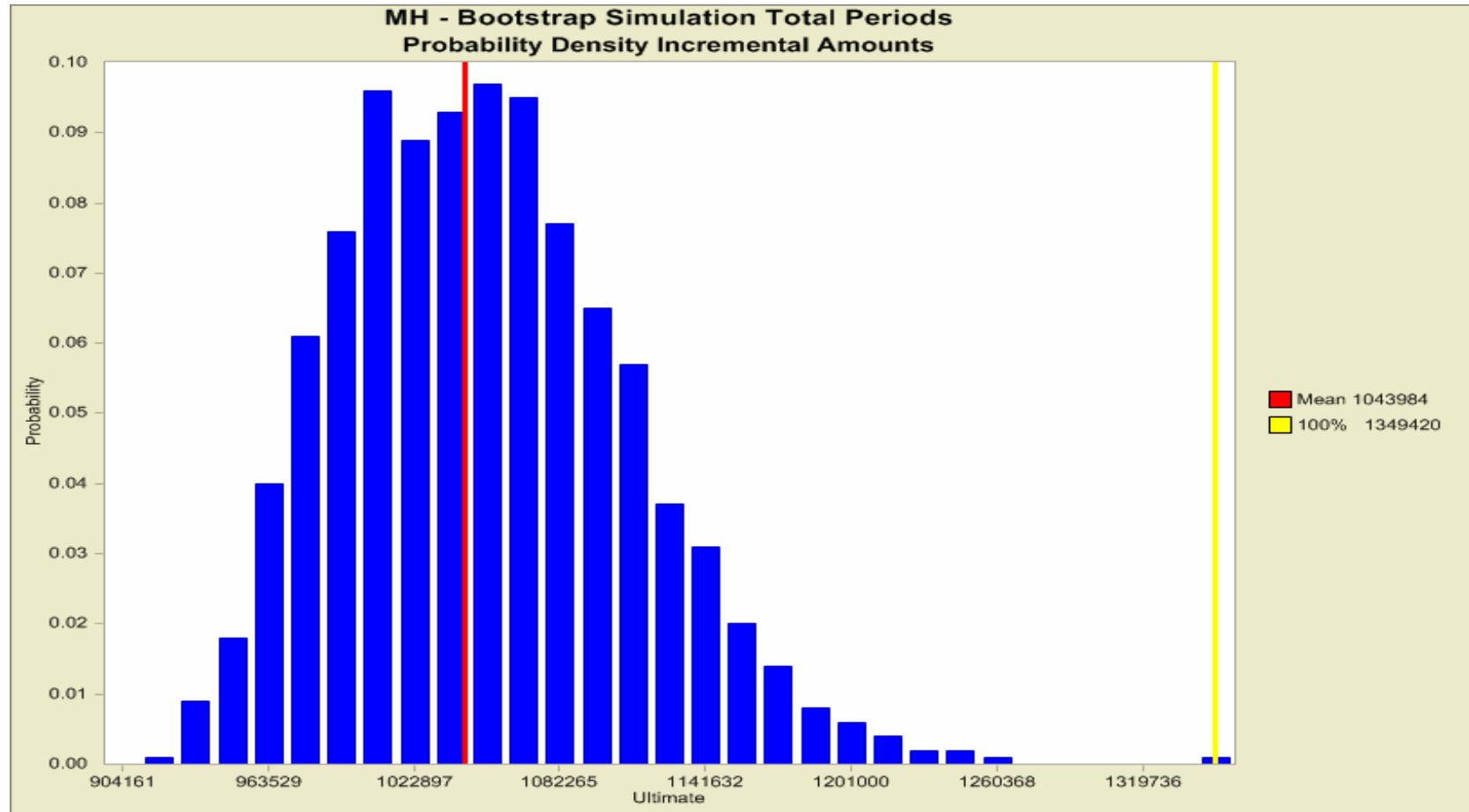


# The impact of applying judgement Medium Tail – Motor XL

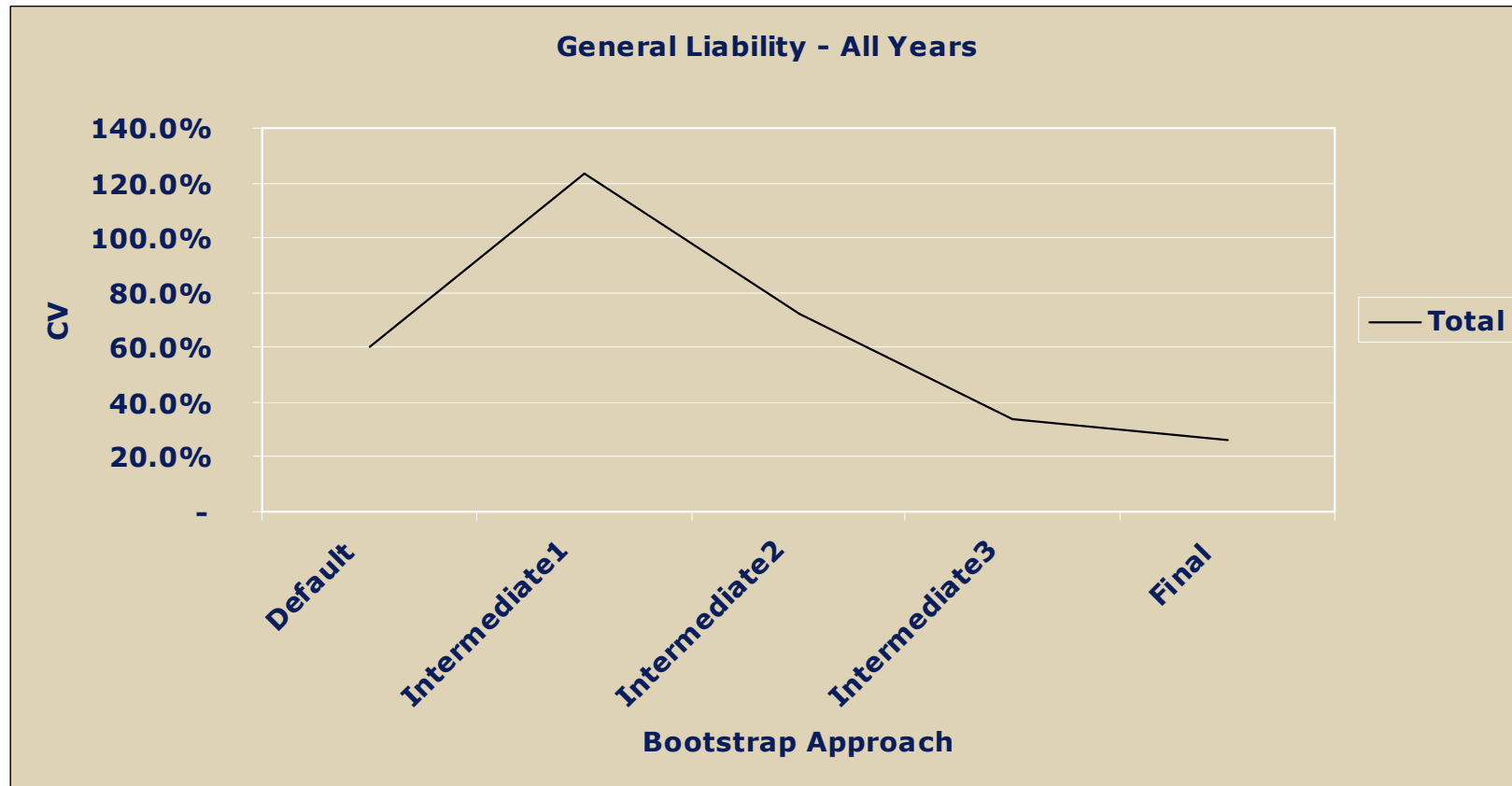




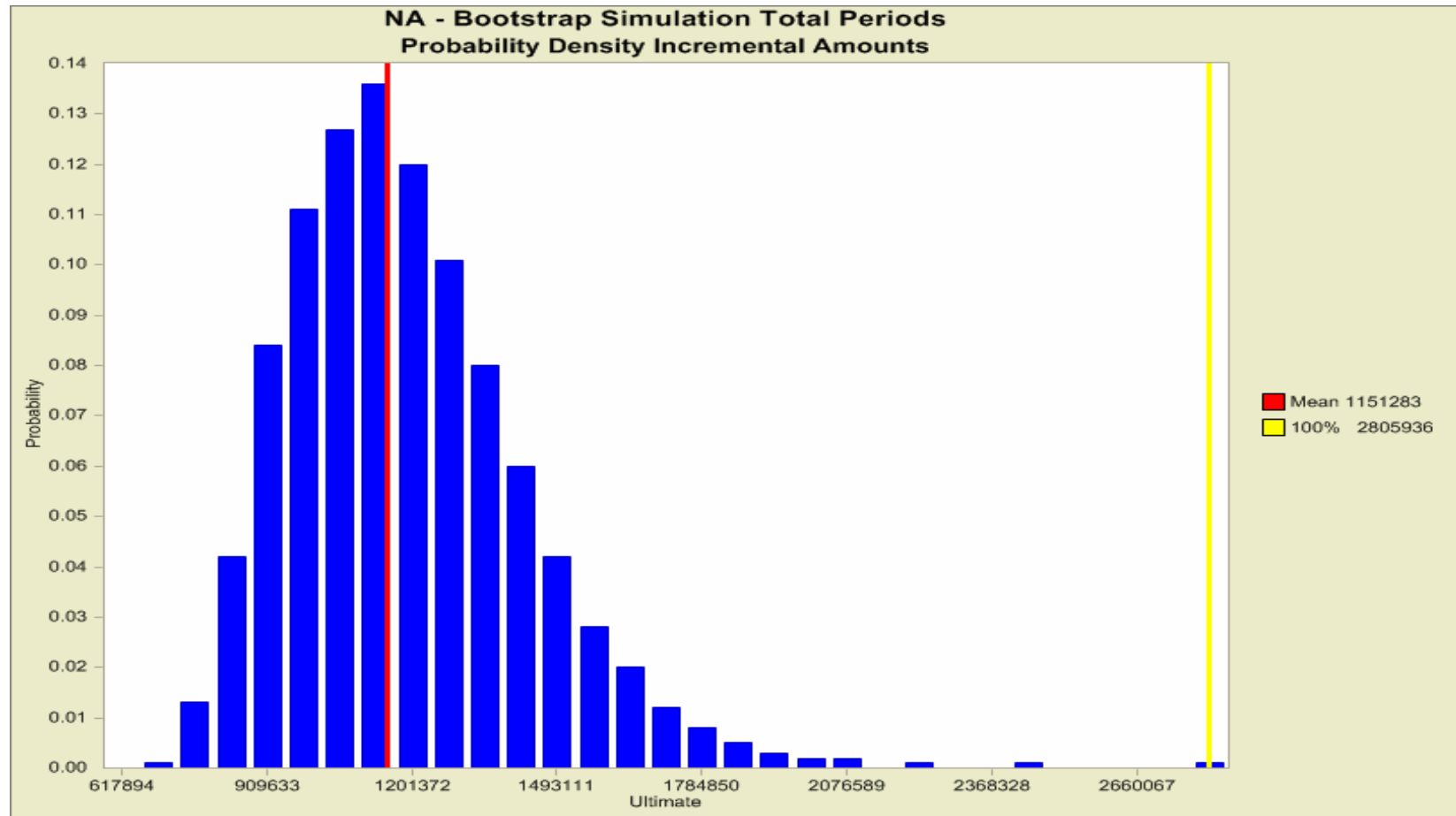
# Actuarial techniques to measure uncertainty



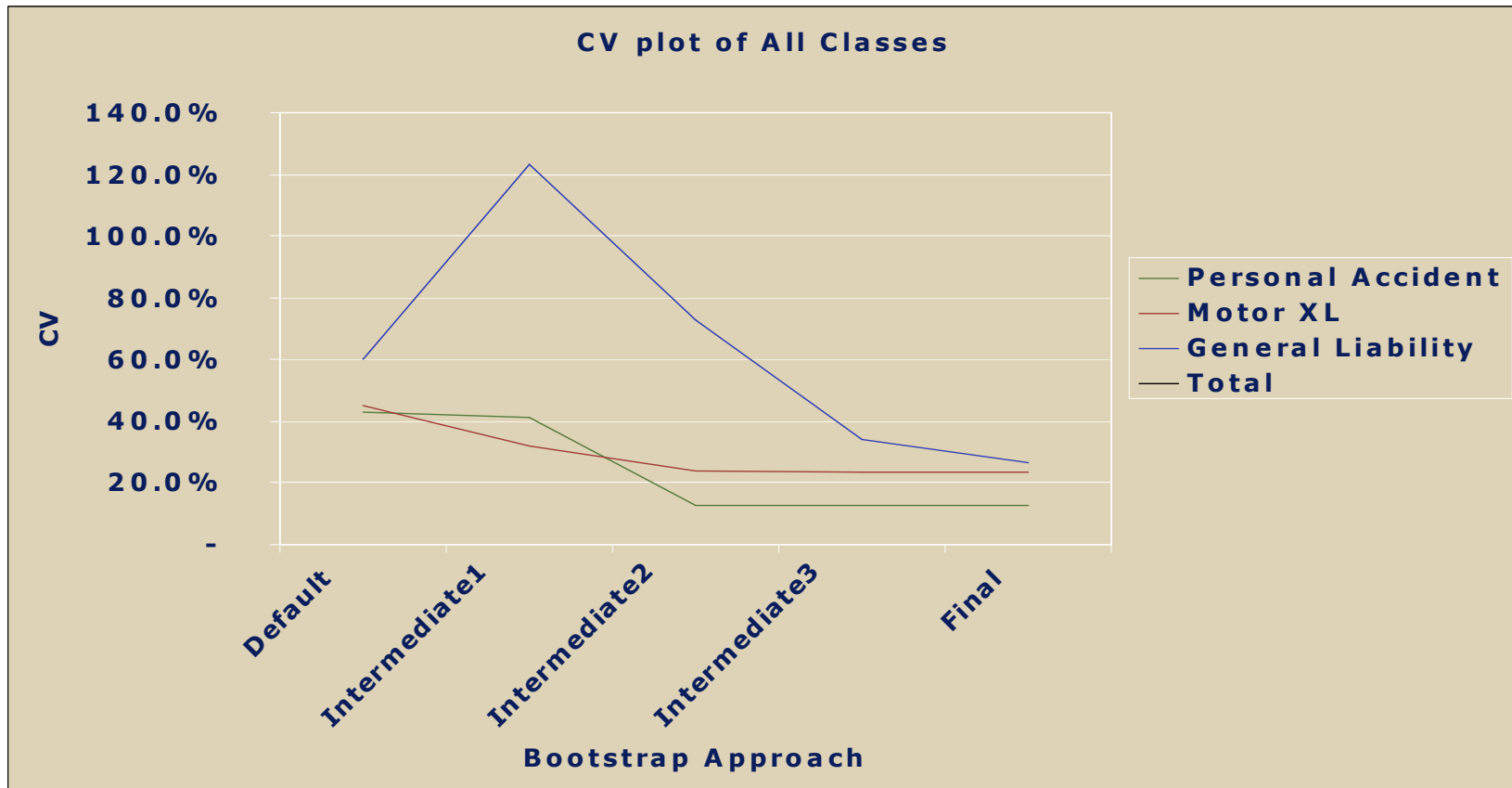
# The impact of applying judgement Long Tail – General Liability



# Actuarial techniques to measure uncertainty

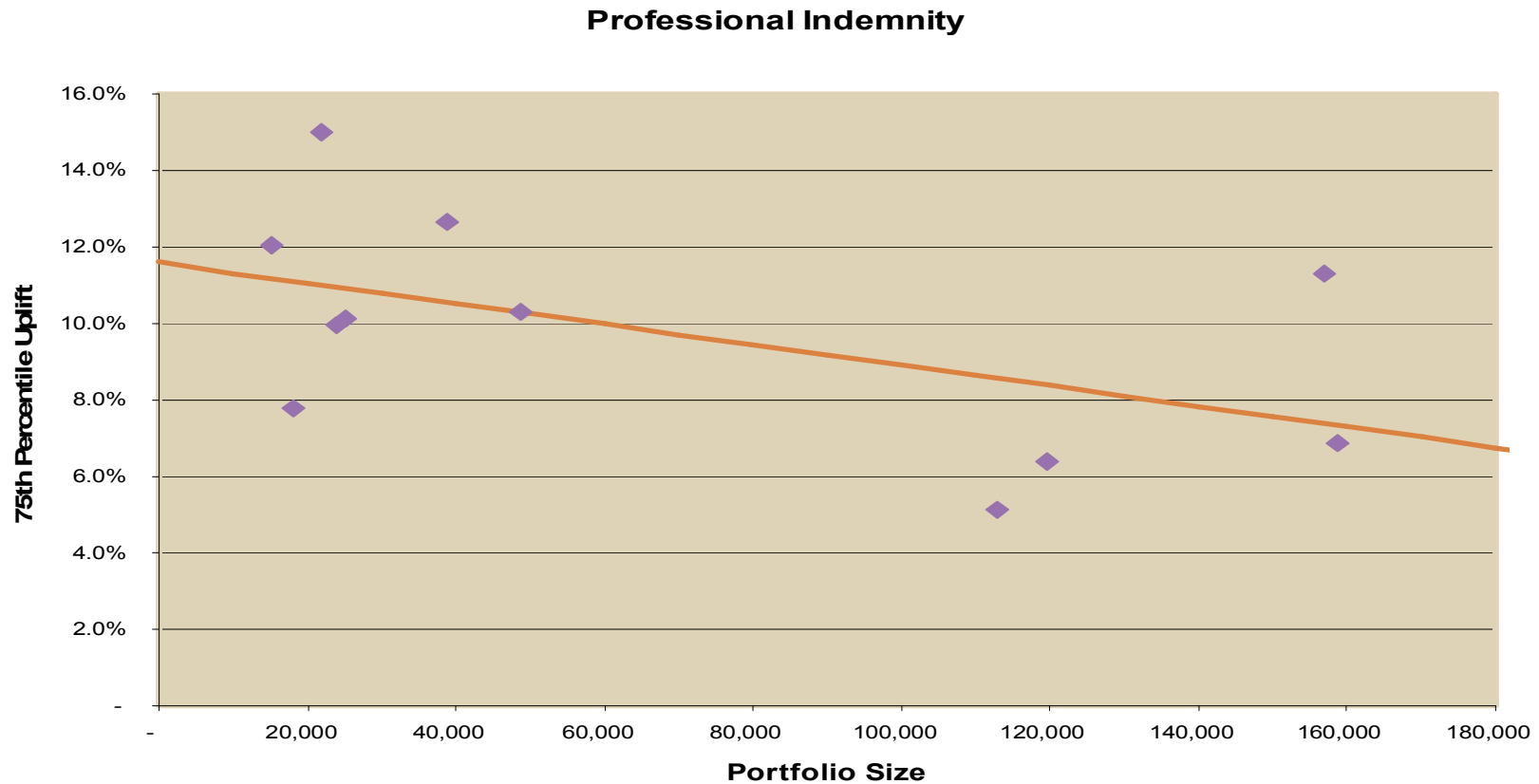


# The impact of applying judgement Combined



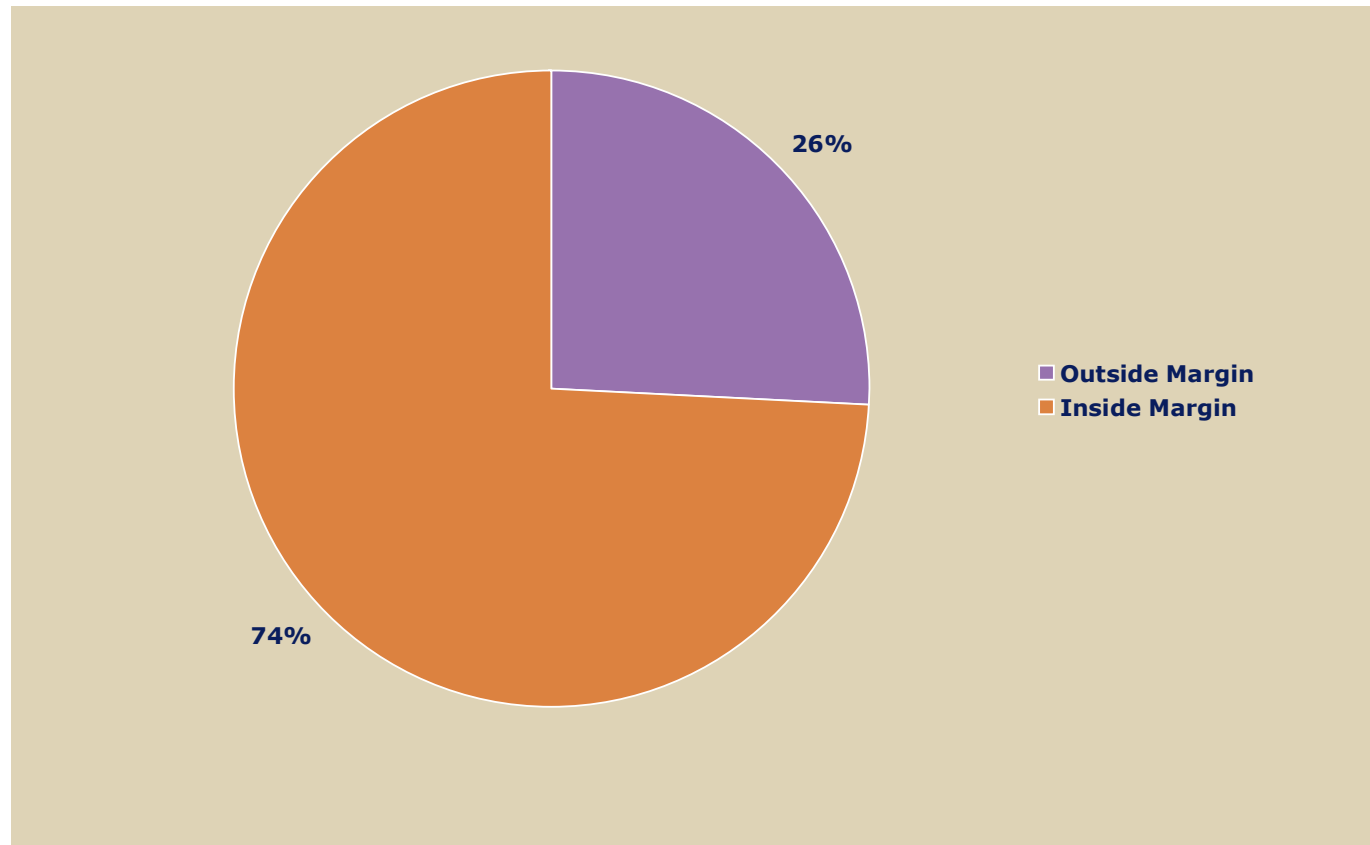
# Accuracy of the Bootstrap technique

## *Professional Indemnity worked example*



# Accuracy of the Bootstrap technique

## *How good are our models?*



# Mack

- Overview of the method
- Pros
- Cons

# Guszcza-Lommele

- Not chain ladder-based
- Looks to use predictive modelling



# Other methods

- Others such as Panning and Zenwirth have proposed approaches.
- Recent CAS Forum has many papers on this subject.

# Communicating uncertainty

- What is a best estimate?
- What do our stakeholders think?

# Clear communication

- Quantitative or qualitative?
- Absolute or relative?

# Some qualitative descriptions

## *Absolute*

- A. *“My estimates contain an element of uncertainty”*
- B. *“My estimates contain a significant amount of uncertainty”*
- C. *“My estimates contain a material amount of uncertainty”*
- D. *“My estimates contain a great deal of uncertainty”*

Q1. Can you rank these statements 1-4?

Q2. What is the 75<sup>th</sup> percentile divided by the mean reserve?

Q3. Would your answer change if I told you that this was US direct property business?

# Some qualitative descriptions

## *Relative*

- E. “My estimates contain a degree of uncertainty consistent with a portfolio of this type”*
- F. “My estimates contain less uncertainty than is typical for a portfolio of this type”*
- G. “My estimates contain more uncertainty than is typical for a portfolio of this type”*
- H. “My estimates contain significantly more uncertainty than is typical for a portfolio of this type”*

Q4. How much more variable than a typical portfolio? (eg  $\frac{1}{2}$  -  $\frac{3}{4}$  x, 1-2 x etc)

Q5. What extra factors do you need me to specify?

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# Some quantitative descriptions

## *Relative and absolute*

- I. “There is a 25% chance that my estimates will prove to be deficient by more than 10%”*
- J. “The variability in this portfolio is more than twice the level I would expect to see in a portfolio of this type”*

Q6. Which conveys greater uncertainty? Or are they both the same?

# Some descriptions of skew portfolios

## *Quantitative and qualitative*

- K. “I believe the chance of my estimates being deficient by more than 10% is less than 10%, however if this threshold is exceeded, then on average I would expect my estimates to be deficient by 50%”*
- L. “I believe that there is a small chance of my estimates being exceeded by a significant amount, however there remains the remote possibility of their proving deficient by a very great deal”*

Q7. Which conveys greater uncertainty?

Q8. Could you ever see yourself using these descriptions?

# Conclusions

- We are going to have to do this!
- There are many techniques available and some are already in wide use. We need to understand the limitations of these and decide whether any of the new techniques being developed are more appropriate.
- A common and effective language for uncertainty needs to be developed so that all stakeholders can understand us.