Institute
and Faculty
of Actuaries

Introduction

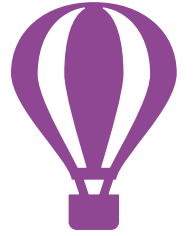**IFoA GIRO Conference 2024**

Agenda

2024 survey results

- Trends
- Class of business specifics

Reserving during inflationary change

- Methods
- Evaluation
- Conclusions and considerations

Claims Inflation Working Party

To comprehensively explore and produce pragmatic guidance on the challenges posed by claims inflation, across all areas of actuarial involvement in general insurance

Participation

Did you participate last year?

36 (47%)

41 (53%)

■ Yes ■ No
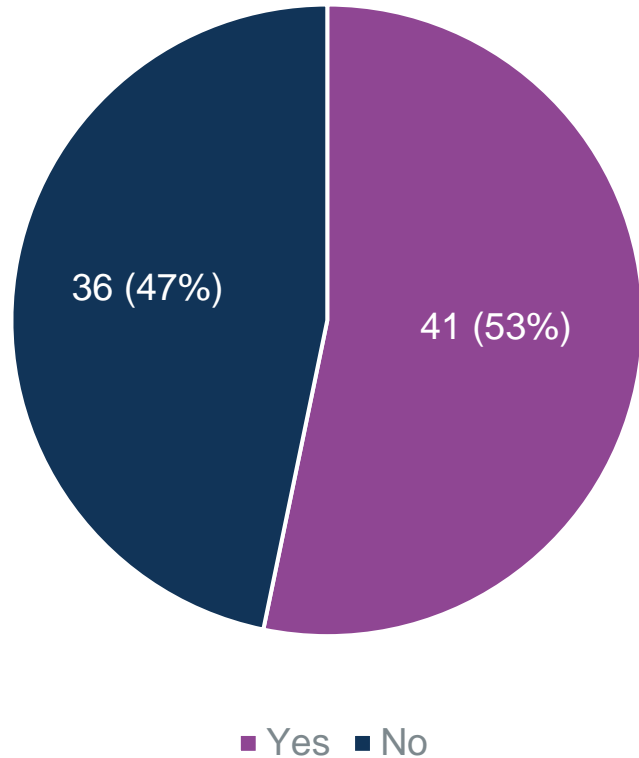
Participation mainly:

- Lloyd's and London Market

- Reserving & Pricing

- International P&C

See Appendix

Year	Response Count
2022	145
2023	99
2024	78

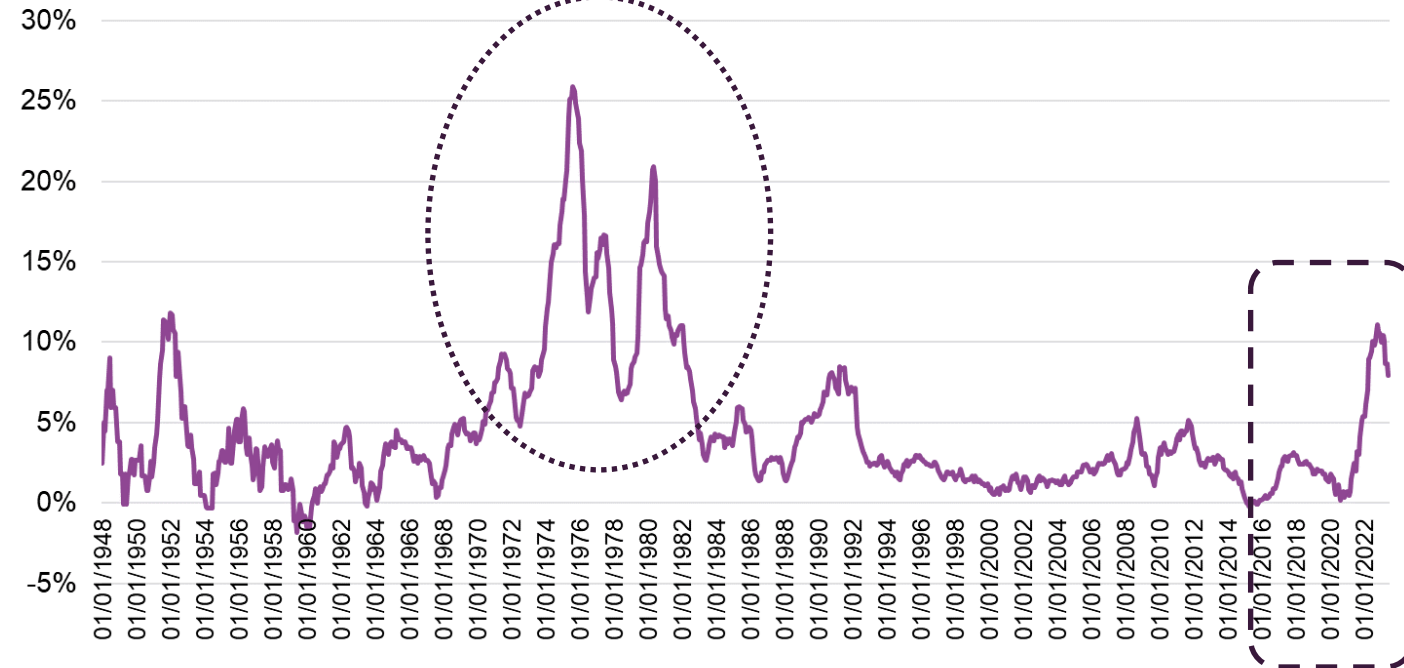# Historical UK CPI Inflation up to June 2023

15 months ago CPI inflation was still high, but had started to trend downward:

- How fast would it decline

- Would it be smooth

- Would it spike back up, like 1980?

CPI Inflation - post-2014

Post-WWII CPI History (RPI adjusted prior to 1990)

Sources: Inflation and price indices - Office for National Statistics (ons.gov.uk) and
Retail Prices Index: Long run series: 1800 to 2024: Jan 1974=100 - Office for National Statistics (ons.gov.uk)

Survey views on expected inflation last year
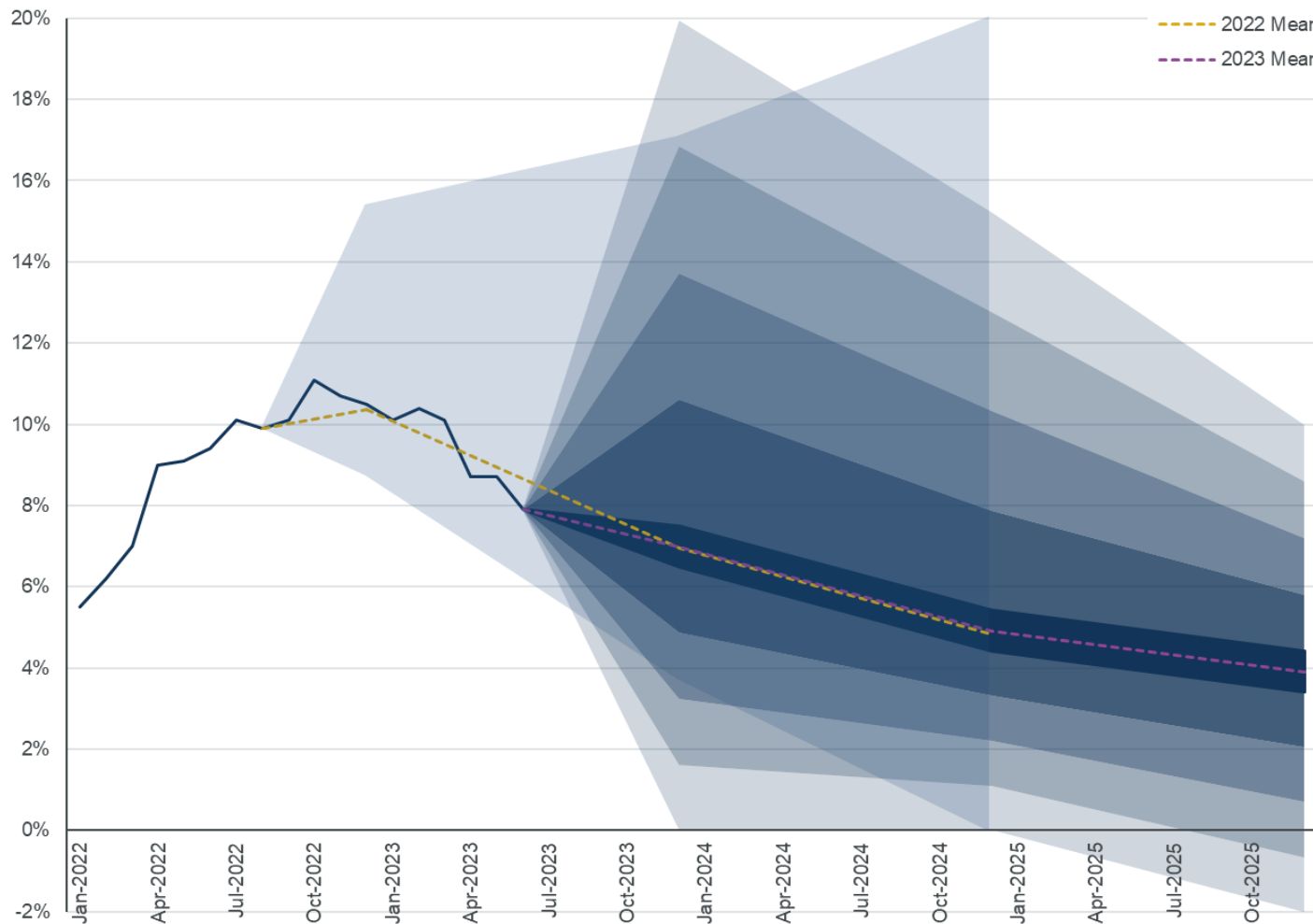
Last year, from 8% p.a. start

- Wide range of views, but less than in 2022

- Majority expected inflation to decline

- Some expected an initial bounce back up

- Majority expected inflation to remain above 3% p.a. through to Dec 2025

Outturn over last year and 2024 Survey views
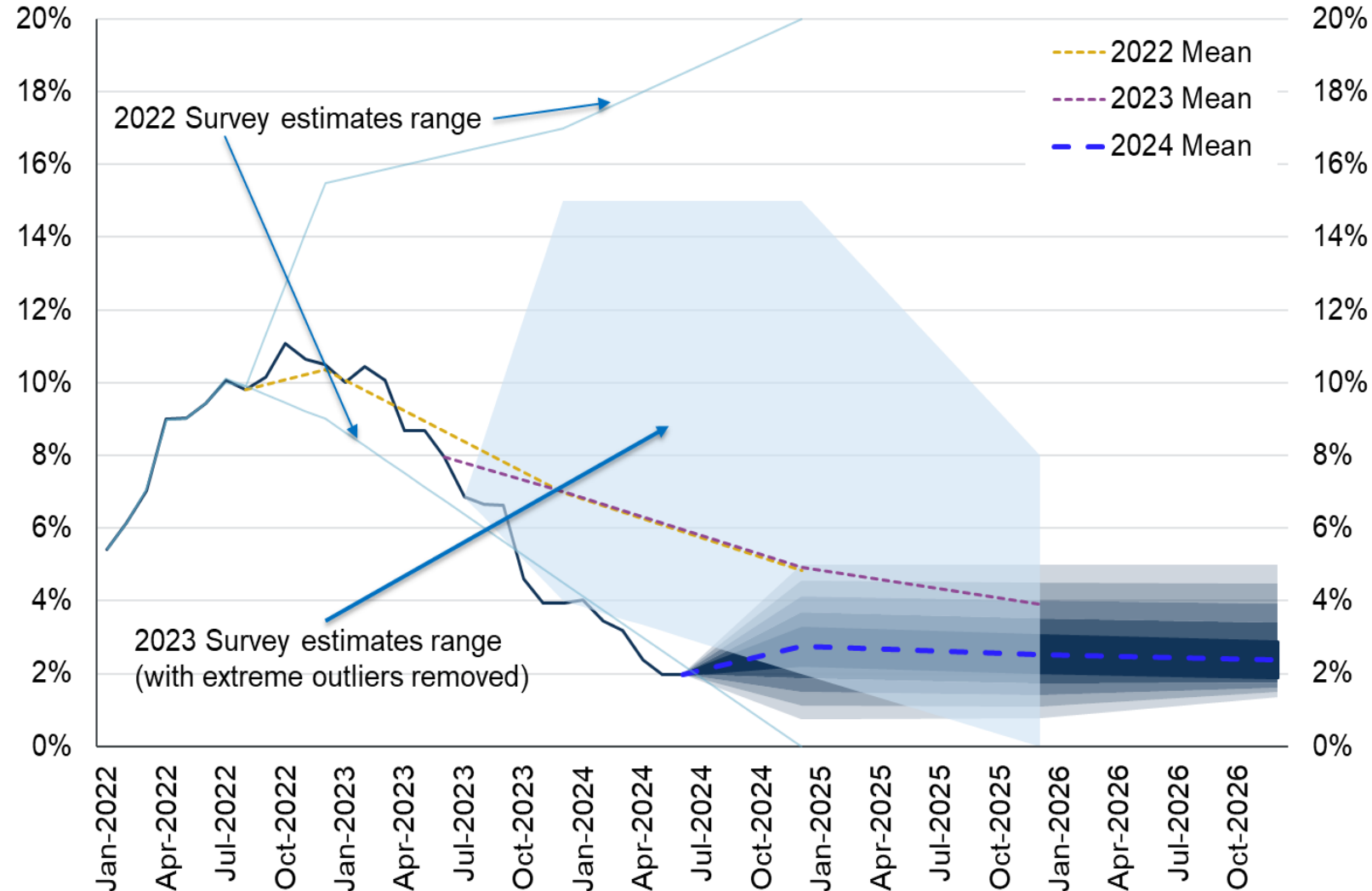

Very different inflation picture now:

- Inflation fell more swiftly than E'd
- Expectations now for slight rise, but generally staying low
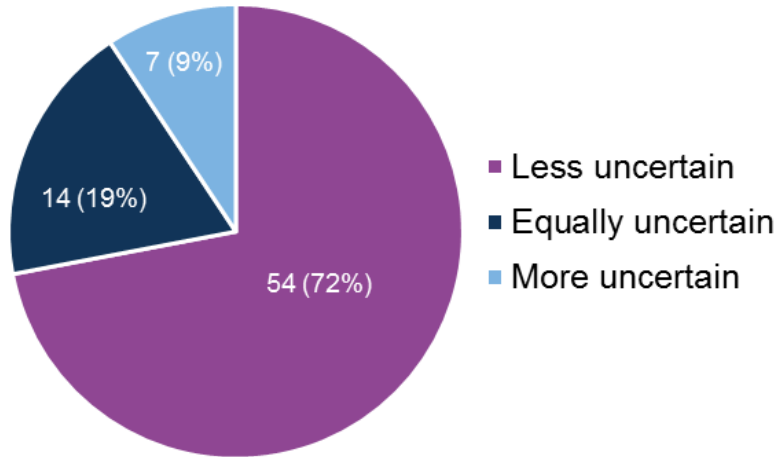- Much smaller range of views

How realistic is this?

- Reasonable range for central estimates

Views on uncertainty?

Chart legend:
- 2022 Mean
- 2023 Mean
- 2024 Mean

2022 Survey estimates range

2023 Survey estimates range (with extreme outliers removed)

Inflation Uncertainty

Short Term Uncertainty vs 2023

- Less uncertain
- Equally uncertain
- More uncertain

7 (9%)
14 (19%)
54 (72%)

Long Term Uncertainty vs 2023

- Less uncertain
- Equally uncertain
- More uncertain

11 (15%)
20 (27%)
44 (58%)
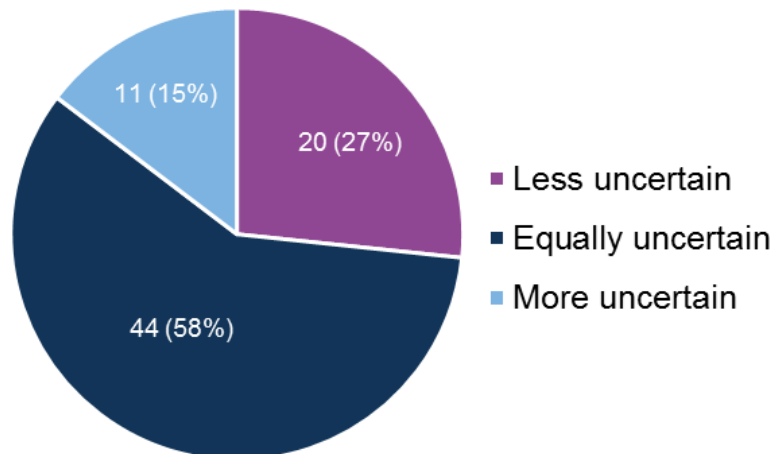
Comparing views with last year:

- Most consider inflation in the short term to be less uncertain than last year

- More balanced views on long-term
  - Majority say equally uncertain
  - But many feel differently
  - Do we really have much new insight on how inflation will look in 10 years' time than we did last year?

Example Scenario: Early 1970s/80s pattern

CPI Inflation - post-2014

Legend:
- Scaled 1970s/80s scenario
- Mean Survey Estimate
- Actual CPI
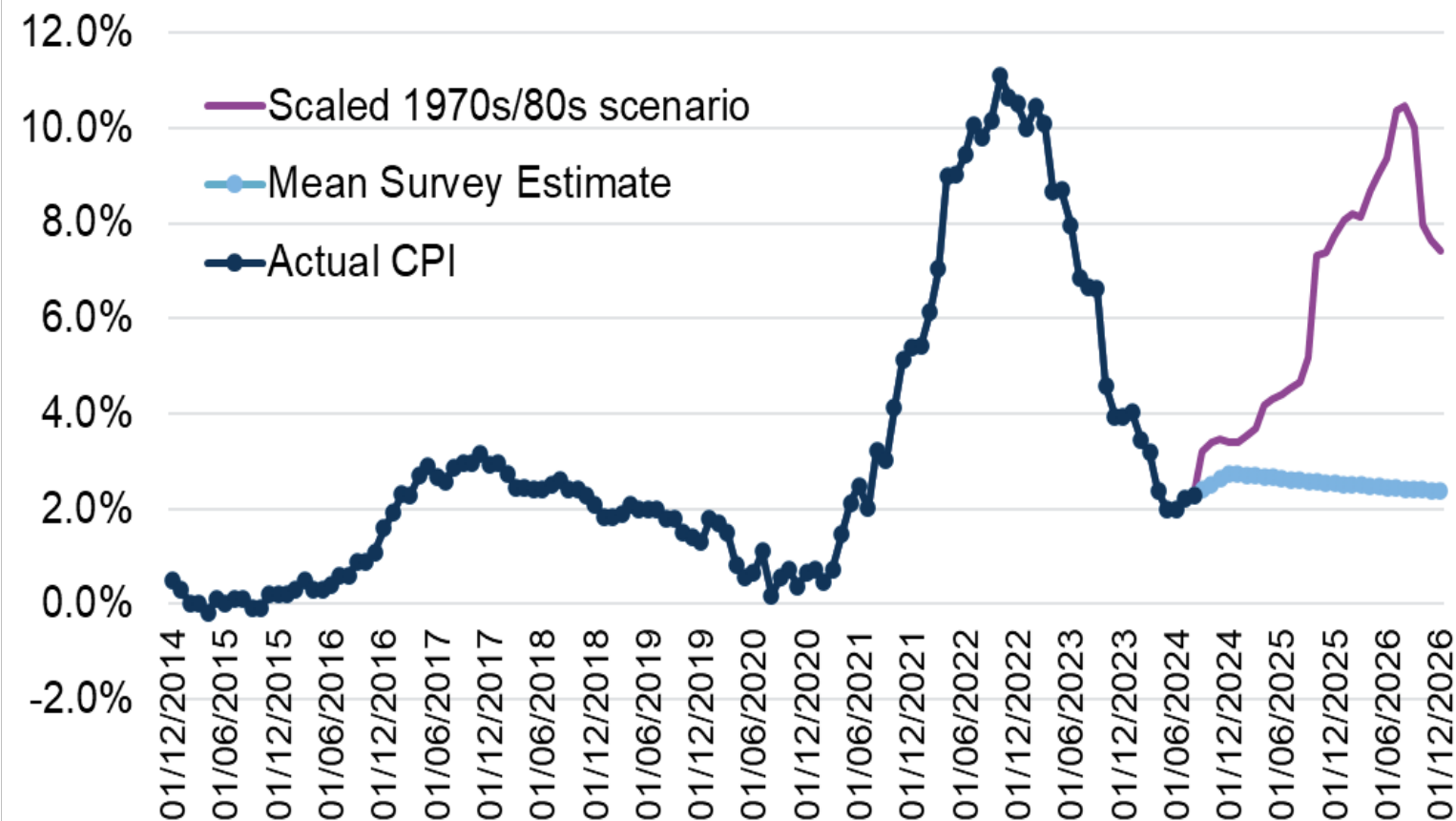
How easy is it to estimate what's next?

- In 1978 when inflation was declining from its recent high, few will have expected another sharp rise

- Surveyed expectations are for inflation to remain low

- But could world events result in a similar pattern to 1979/80?

- Is anyone considering the possibility?

- How good are our actuarial methods at allowing for this and other potential outcomes?

Class specific estimates
Inflation Expectations by LoB for December 2024
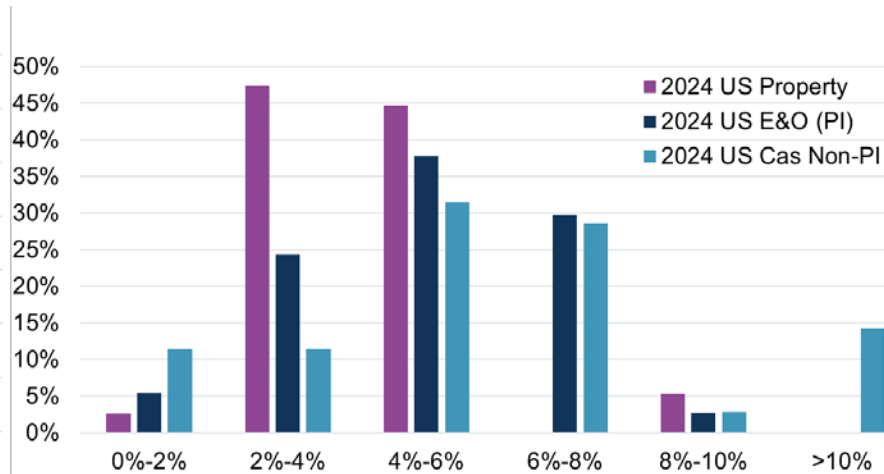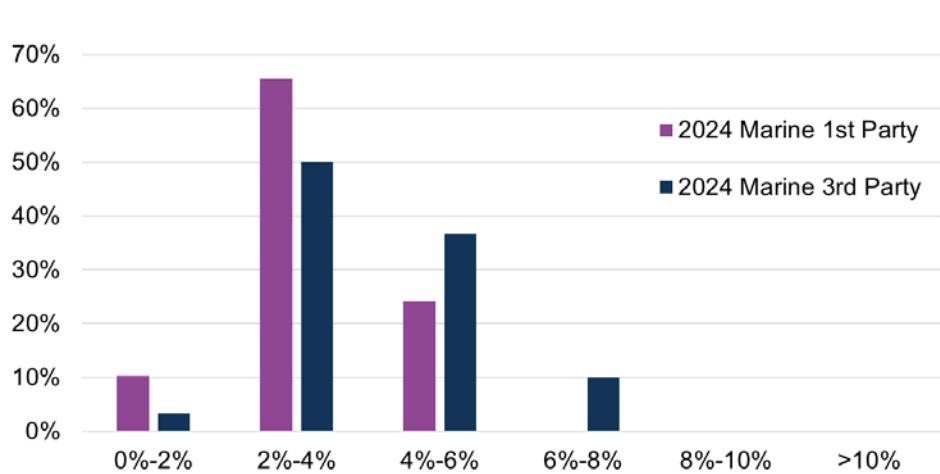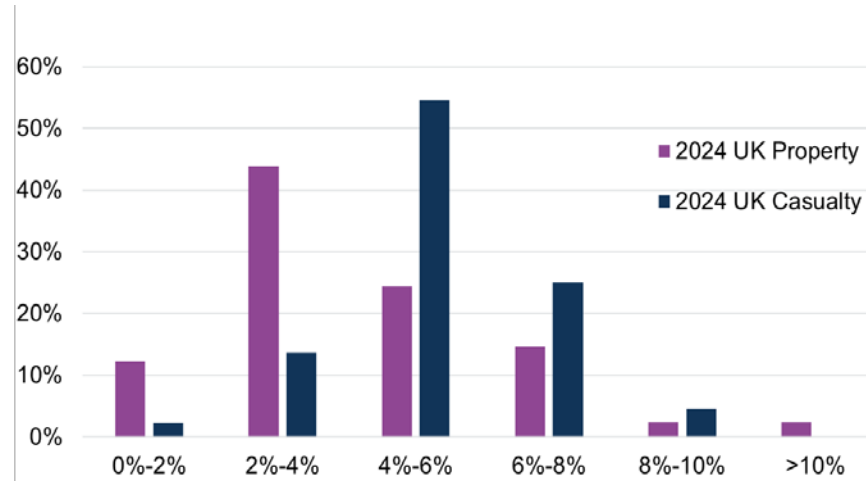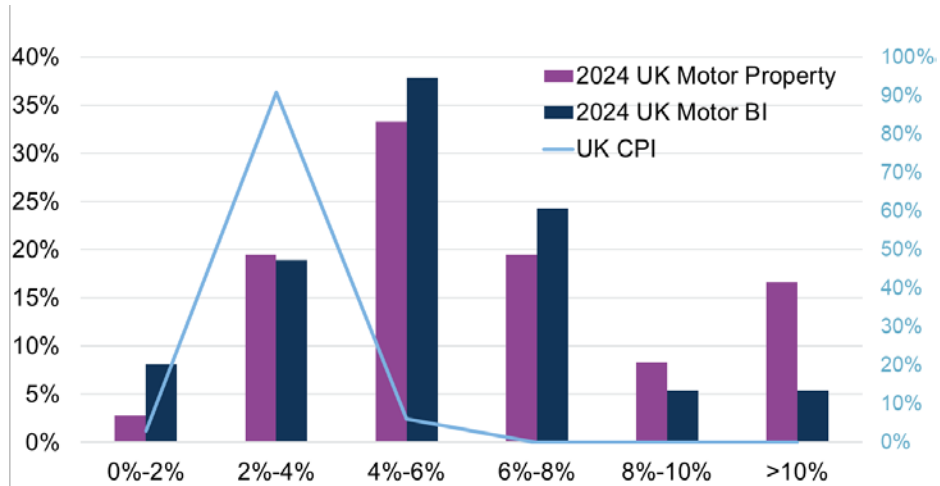
Observations:

- Motor BI surprisingly similar to Motor Property
  - Lower & less skewed

- Marine estimates surprisingly low relative to other classes

- US non-PI Casualty appears the highest and most uncertain

Indices: Main usage themes

Business Class	Main Indices Used
UK Motor Own Damage	Much variation: 2nd hand car prices; internal data; CPI components e.g. vehicle maintenance/spare parts
UK Motor 3rd Party	Strong weighting towards wage inflation or ASHE
UK Property	HRCI / CPI / blend (e.g. CPI/HRCI blend or weighting towards specific PPI components)
UK Casualty	Lack of consensus. Some preference for wage/ASHE; also blends of medical, legal, etc. often with additive "social" load
US Property	HRCI / CPI / blend (with blend including sector specific wage indices, specific material costs, "Turner" construction cost, etc.)
US Casualty (E&O + Other)	Lack of consensus. Most use blends encompassing legal costs, wage, medical, legal, or sector specific; sometimes with additive load
Global Marine	Mostly blend with specific reference to key materials such as steel, or specific geographies (e.g. Chinese wage inflation)

Rationale

To evaluate a variety of potential approaches which may be employed in setting or adjusting claims reserves during periods of inflationary volatility

Estimation Data
Consistent with 2023 study

Stochastic claims' generation via VBA	10 years per simulation with mean 5 claims per year following Poisson distribution	50 simulations run – each represents an individual insurer's data
Pareto severity with fixed seed for reproducibility	Development pattern applied to create triangles	User-specified economic, social and shock inflation applied to incremental development claim amounts

Scenarios and Assumptions

		DY1	DY2	DY3	DY4	DY5	DY6	DY7	DY8	DY9	DY10
Large	Incurred Pattern	4%	24%	43%	57%	66%	73%	79%	84%	90%	100%

Input claim (severity) inflation

Calendar Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Comment
A	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	Constant stable inflation
B	4%	4%	4%	4%	6%	6%	6%	6%	6%	6%	Social inflation from 2018
C	4%	4%	4%	4%	6%	6%	6%	6%	12%	10%	'Shock' inflation in 2022
D1	4%	4%	4%	4%	6%	6%	6%	6%	12%	10%	C with 5% decreasing mean frequency
D2	4%	4%	4%	4%	6%	6%	6%	6%	12%	10%	C with 5% increasing mean frequency

Base reserving methods applied:
- Chain ladder: volume-weighted average of the most recent 4 link ratios.
- BF is used for origin years less than 70% developed.

Methods

A priori estimate uplift	Cashflow uplift	Explicit management loading	Inflation-adjusted chain ladder (IACL)
• Typically use IELRs based on pricing • Initially on-levelled for expected rate change and inflation. • **A priori estimates should be adjusted over time** to reflect observed calendar year inflation and revised expectations of future inflation.	• Recognise inflation already captured in current projection method and estimate what this implicit inflation is. • Estimate future inflation • **Uplift future cashflows for difference between implicit historical inflation and future inflation** • Can (and should!) apply different uplifts for each origin year.	•Explicit high-level loading, either within best estimate or above it. •Calculate best estimate provisions as normal, assuming unchanged inflation •WP approach: **Apply an uplift for the difference between forecast and historical inflation compounded by duration of mean time to payment of total reserves.**	• **Inflate incremental triangle** values to appropriate date • **Perform basic CL on inflated cumulative tri.** • **Inflate incremental future triangle values** for chosen calendar year inflation. • Adjusted IBNR = sum of future inflated incremental vales.

- A priori uplift will only adjust BF years to extent of development and will not adjust 'pure' CL years.
- Additional adjustment needed for chain-ladder component of origin years.
- IACL, CF Uplift and Mgmt. load applied *in addition* to adjusting priors.
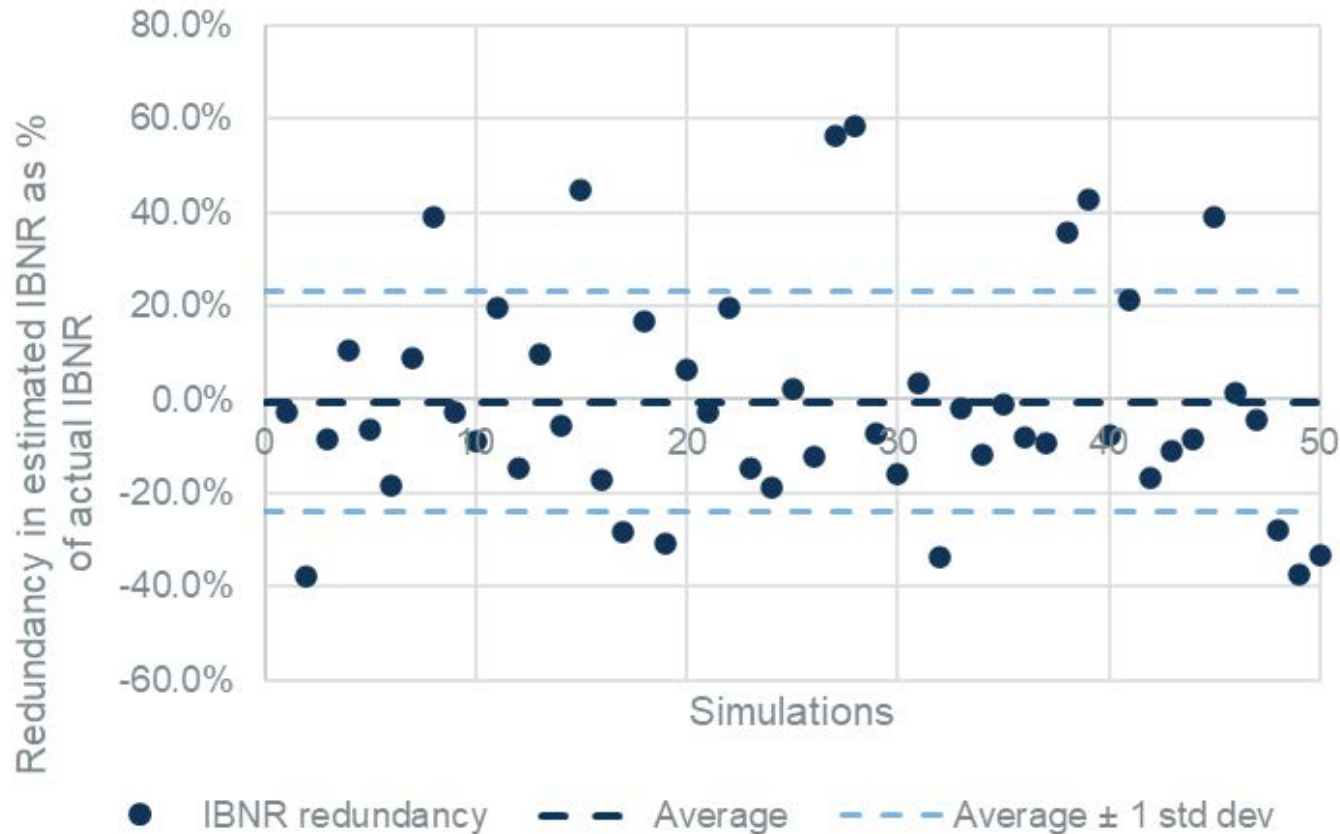
Scenario A – Stable Inflation

	IBNR Deficiency (-) or Redundancy (+)
A Priori Uplifts	-0.6%
IACL	-0.6%
Cashflow Uplift	-0.6%
Management Uplift	-0.6%

- All methods functionally equivalent and produce comparable results

- Level of error in any individual observation can be quite significant

- Later slides include standard chain-ladder & BF approach, where user naively assumes inflation in data remains unchanged at 4% p.a.
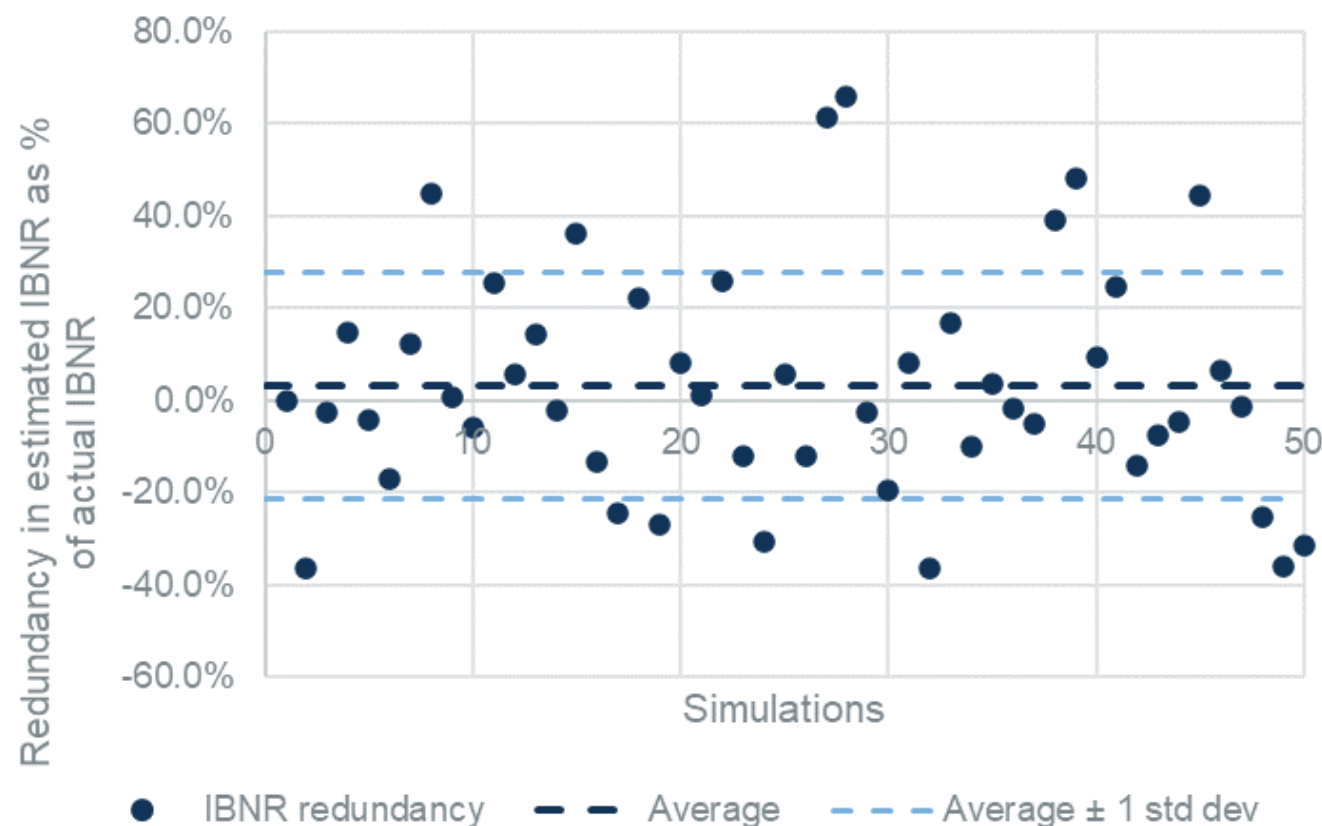
Figure 1: Scenario A - A priori method IBNR error

Scenario B – Emerging Social Inflation

Figure 2: Scenario B - A priori method IBNR error

	IBNR Deficiency (-) or Redundancy (+)
A Priori Uplifts	3.3%
IACL	4.4%
Cashflow Uplift	3.3%
Management Uplift	3.3%
No Inflation Adjustment	-1.8%

- On average, all methods over-estimate IBNR
- Relatively simple case with a persistent increase in inflation part-way through
- Because we are using a fairly short averaging period in the CL method (4 years), we effectively take account of this change already.
- IACL overestimates slightly more than other methods.
- A strong degree of symmetry in a priori method with near equal likelihood of 20% redundancy/deficiency and only slight tendency towards over-estimation
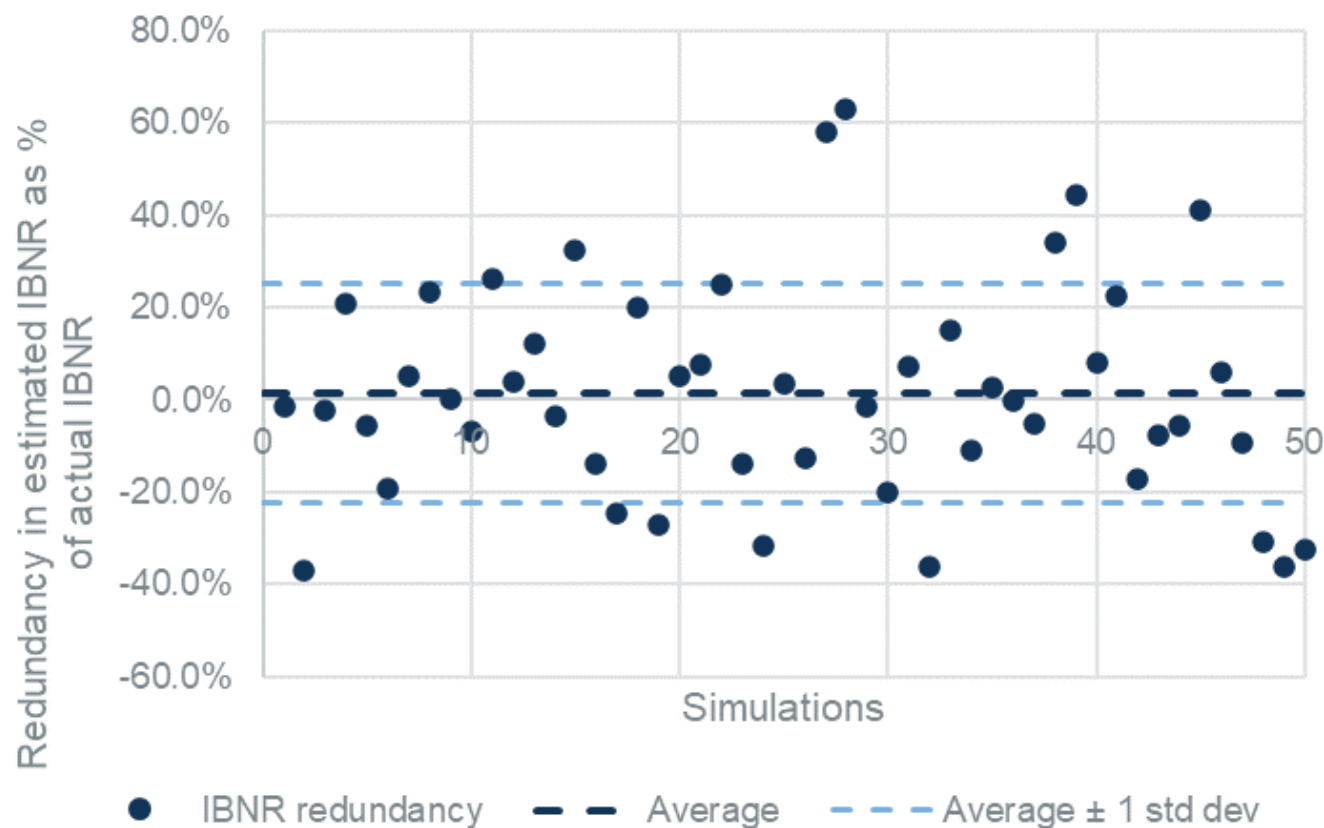
Scenario C – Sudden Shock Inflation

Figure 3: Scenario C – Management uplift method IBNR error

	IBNR Deficiency (-) or Redundancy (+)
A Priori Uplifts	3.8%
IACL	11.0%
Cashflow Uplift	2.4%
Management Uplift	1.5%
No Inflation Adjustment	-5.6%

- A priori and IACL methods overestimate the inflationary adjustment.
- IACL overestimation is particularly extreme, owing to scenario design.
- Expectation that we are at the top of an inflation spike, and it would revert downwards in future
- Cashflow and management uplift methods also overestimate, but to a very modest degree.
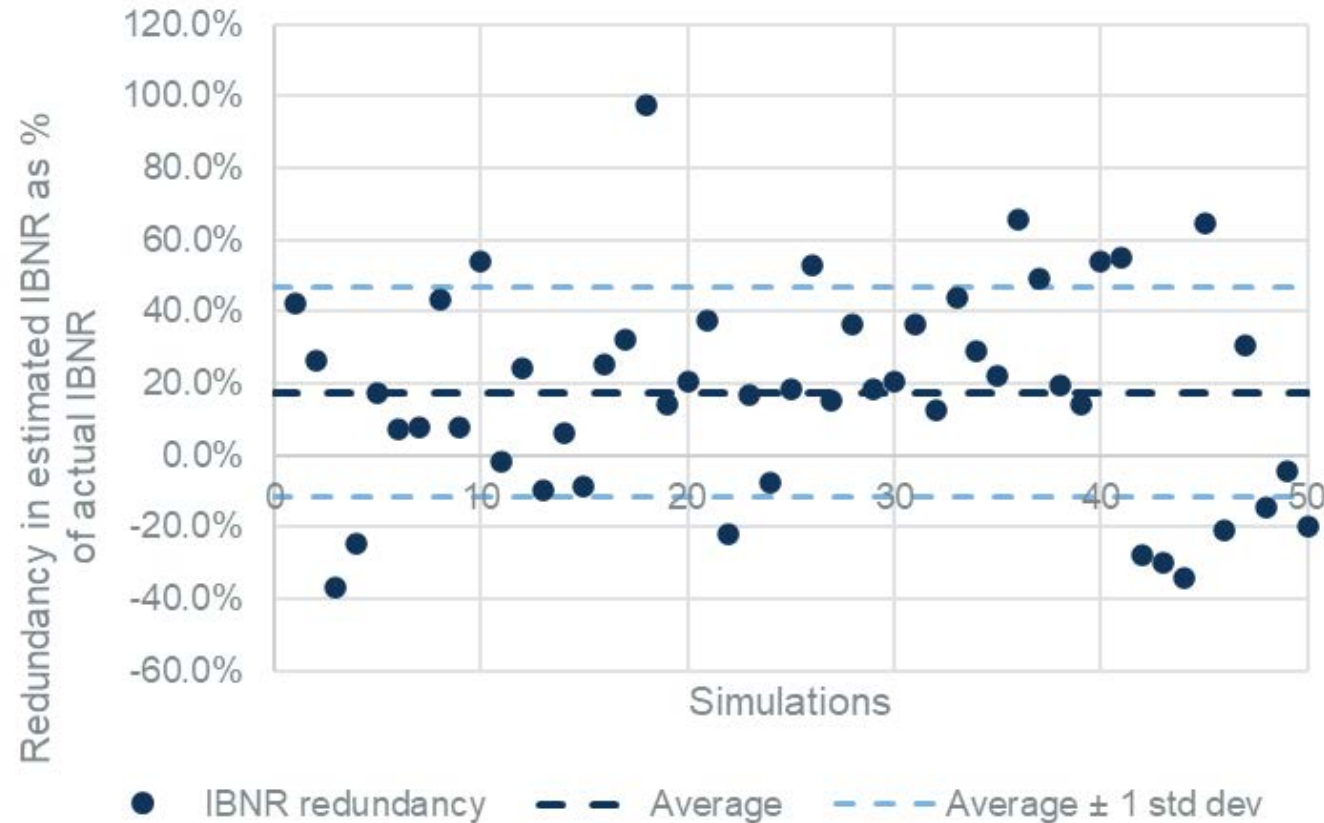
Scenario D1 – Decreasing Frequency Trend

	IBNR Deficiency (-) or Redundancy (+)
A Priori Uplifts	22.0%
IACL	27.6%
Cashflow Uplift	19.1%
Management Uplift	17.6%
No Inflation Adjustment	12.5%

- All methods significantly over-estimate the true level of IBNR in the case of falling frequency
- This is perhaps unsurprising because none of the methods tested allow for a variation in claim frequency
- This effect is further amplified by the IACL and A priori methods.
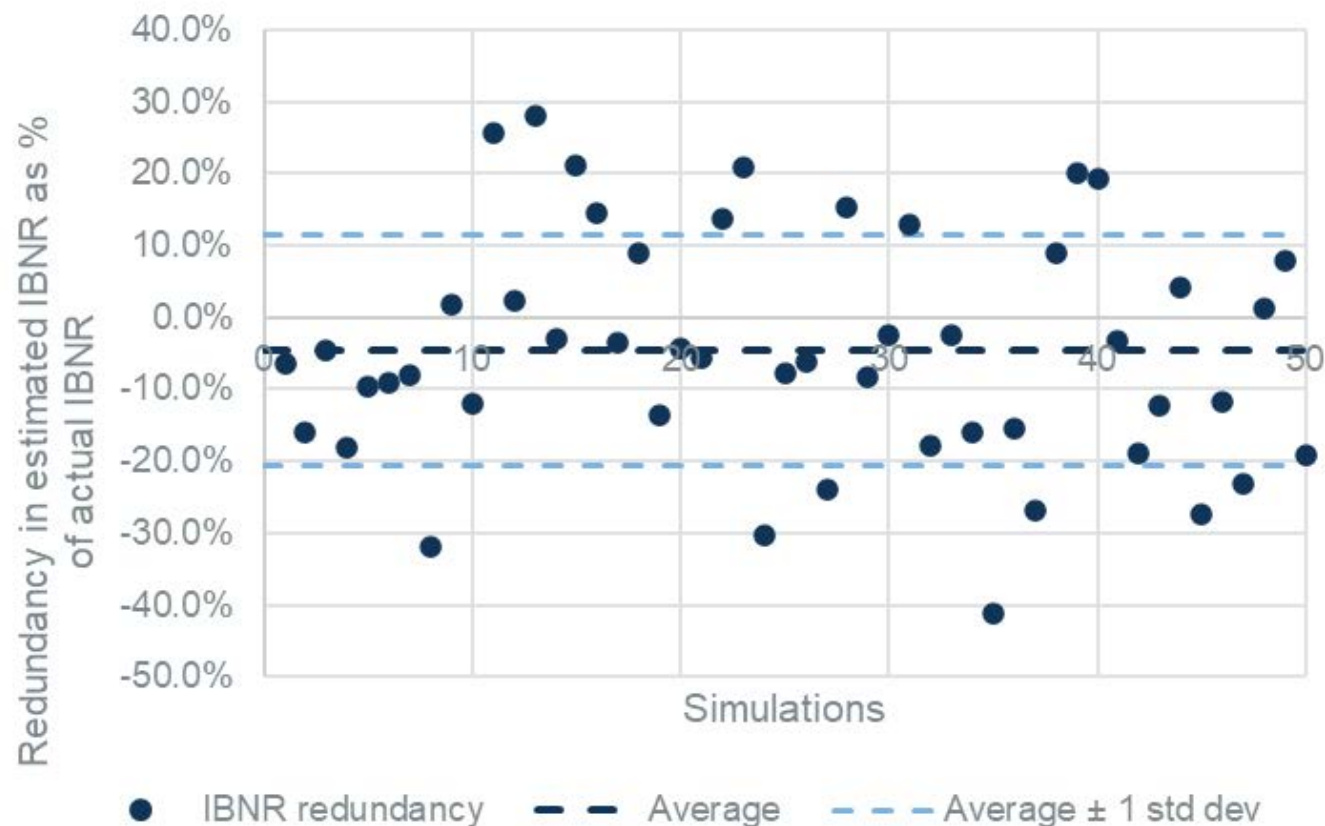
Figure 4: Scenario D1 – Management Uplift method IBNR error

Scenario D2 – Increasing Frequency Trend

	IBNR Deficiency (-) or Redundancy (+)
A Priori Uplifts	-8.3%
IACL	-4.7%
Cashflow Uplift	--10.5%
Management Uplift	-11.5%
No Inflation Adjustment	-15.3%

Figure 5: Scenario D2 – IACL method IBNR error

- This scenario is starkly different to the others in that all methods significantly underestimate the IBNR.
- The level of underestimation is lowest in the IACL method, which partially picks up on the frequency uptick.
- It is interesting that the IACL "better" handles an uptick in frequency than it does a downward trend. However, this is likely a result of the IACL consistently producing higher ultimates than the other methods.

Conclusions

- None of the methods work perfectly – difficult to get right even with perfect foresight and knowledge!

- Ideally need to consider a scenario where we do not have perfect knowledge (see appendix).

- Methods explored in this paper are better-suited to severity inflation, but don't deal well with changes in frequency. If frequency variation is a concern, Australian methods (appendix) may be better or further adjustment considered.

- 2022 Lloyd's guidance mentions the cashflow uplift as a preferred adjustment approach. Results show it performs favourably in most cases…

- … However! Cashflow uplift and management uplift methods require careful consideration of "how much" inflation is in each cohort and what "gap" vis à vis changing inflation needs to be allowed for.

- Important to update older years' IELRs for known inflation changes on long-tail classes, but this may be a departure from existing practices in many firms.
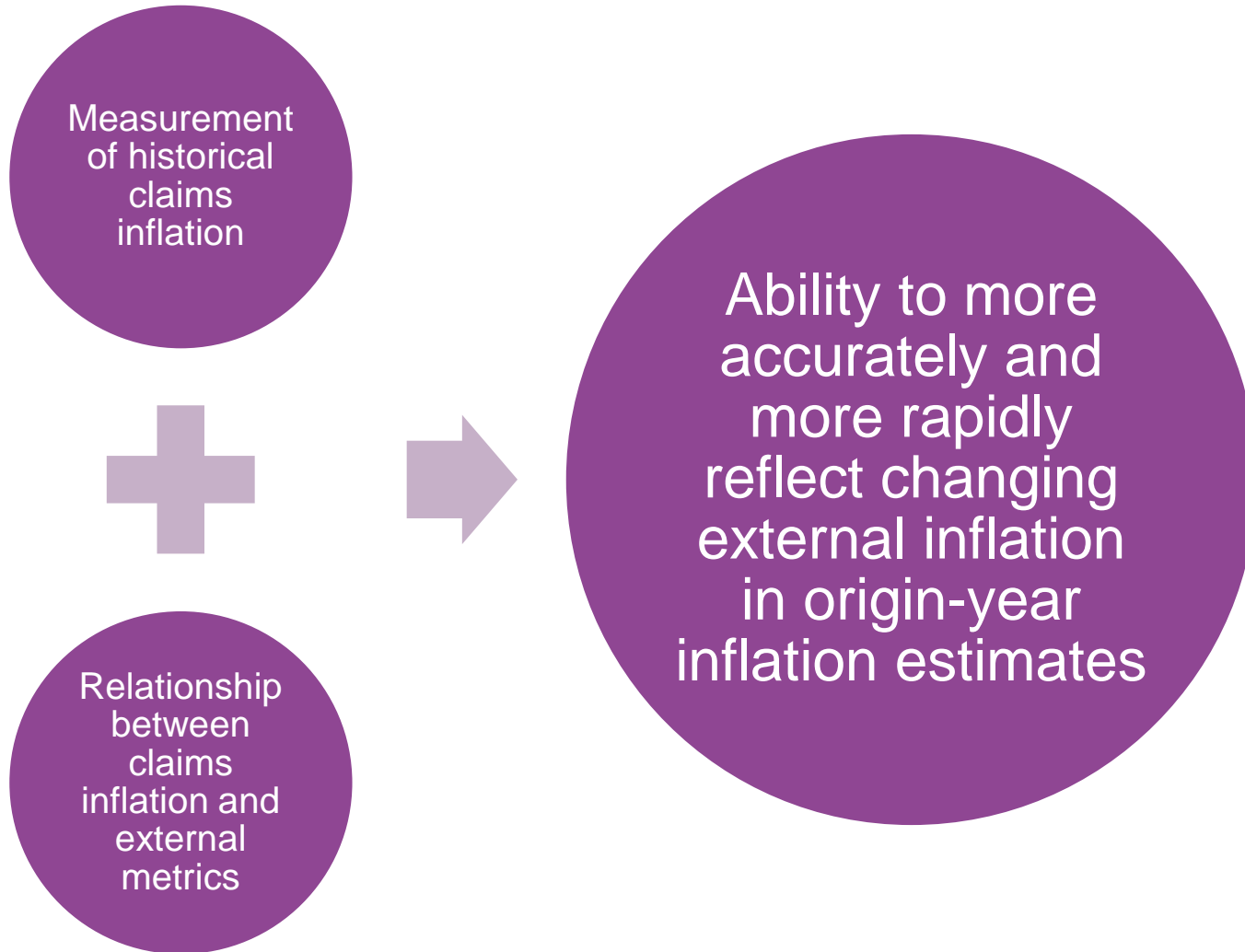
Closing Comments

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Future Research

Measurement of historical claims inflation

+

Relationship between claims inflation and external metrics

→

Ability to more accurately and more rapidly reflect changing external inflation in origin-year inflation estimates

To be considered:

- Mapping external indices to observed claim inflation;

- Multi-linear regression approaches;

- Calendar/payment years; and

- Whether calendar year claims inflation may also lag metric change (e.g. due to fixed fee schedules).

Acknowledgements

In addition, we would like to thank:

- José Gomez Mena of Marcuson Consulting;

- Greg Taylor of UNSW;

- Dave Clark of Munich Re; and

- Kate Bible of Aon.

Questions

Comments

Expressions of individual views by members of the Institute and Faculty of Actuaries and its staff are encouraged.

The views expressed in this presentation are those of the presenters.

APPENDICES

IFoA GIRO Conference 2024

Participation - 1

Company Type
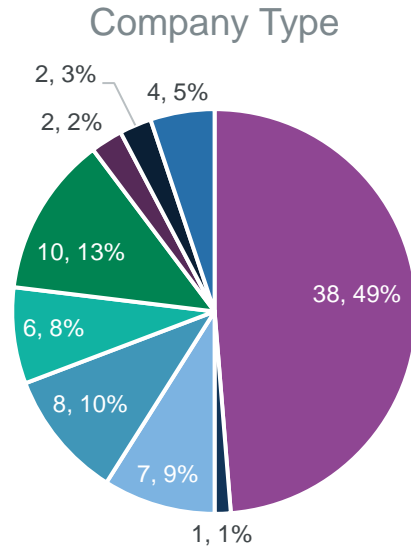

Legend:
- Lloyd's/London Market Insurer
- MGA
- Personal Lines' Insurer
- Commercial Lines' Insured (ex. London Market)
- Broker
- Reinsurer
- Consultant
- Regulator (including Corporation of Lloyd's)
- Loss Adjuster

Values: 38, 49%; 1, 1%; 7, 9%; 8, 10%; 6, 8%; 10, 13%; 2, 2%; 2, 3%; 4, 5%

Work Area
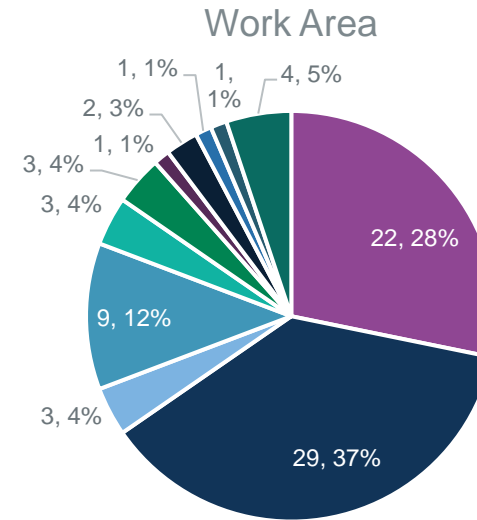
Legend:
- Reserving (Actuarial)
- Pricing (Actuarial)
- Other
- C-suite including Chief Actuary
- Claims Handling/Management (In-house)
- Capital Modelling
- Outwards Reinsurance
- Underwriting
- Portfolio Management and Business Planning
- Other (please specify)
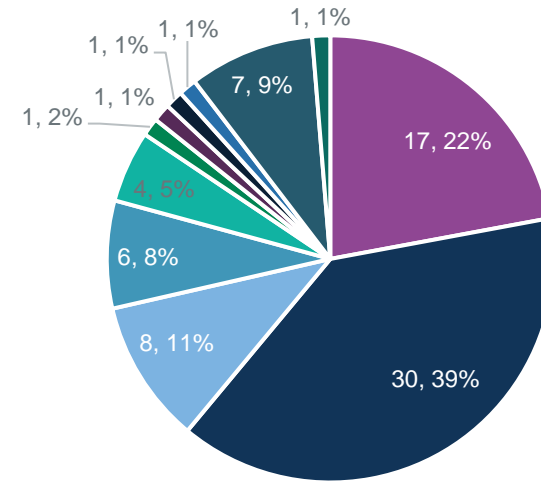- Third-Party Loss Adjustment

Values: 22, 28%; 29, 37%; 3, 4%; 9, 12%; 3, 4%; 3, 4%; 1, 1%; 2, 3%; 1, 1%; 1, 1%; 4, 5%

Participation - 2

Survey Responses Last Year

- Yes
- No

36, 47%
41, 53%

Lines of Business

1, 1%
1, 1%
1, 1%
1, 2%
1, 1%
7, 9%
17, 22%
4, 5%
6, 8%
8, 11%
30, 39%
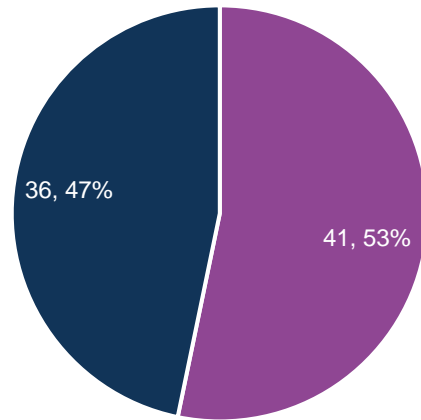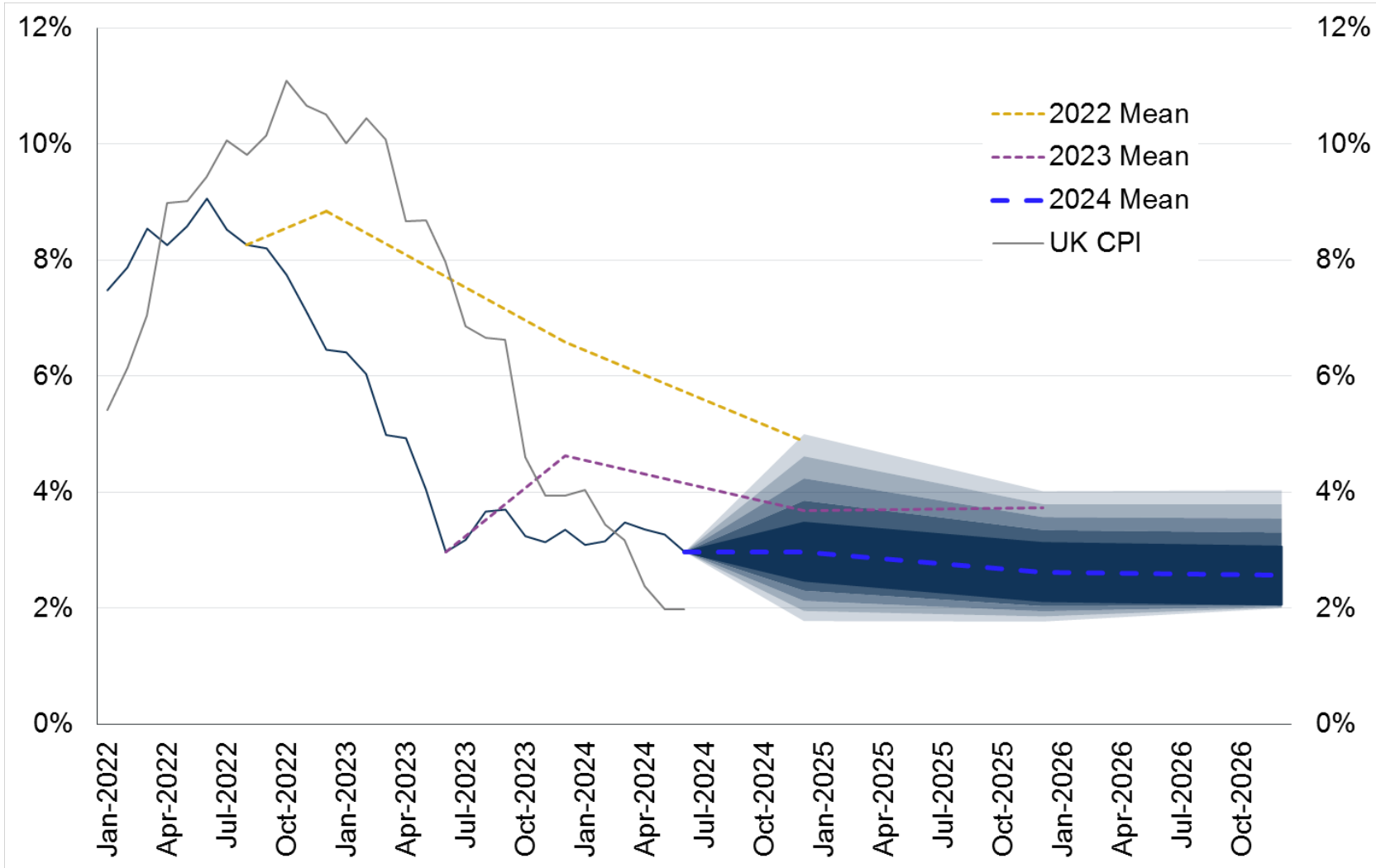
- London Market/International Property
- London Market/International Casualty
- UK Motor
- Multiple
- UK Household
- Other Specialty (CAR/EAR, Crop, PVT, etc.)
- Personal Accident and Health
- UK Commercial Property
- UK Commercial Liability
- Marine and Aviaton
- Cyber

US CPI outturn and 2024 Survey views

Quite different from UK:

- 2022: fell more swiftly than:
  - our survey respondents E'd,
  - vs the UK

- 2023: small rise E'd, but remaining stable and well below peak
  - Outturn similar but below E'ns

- 2024: Expectations for continuing low and stable
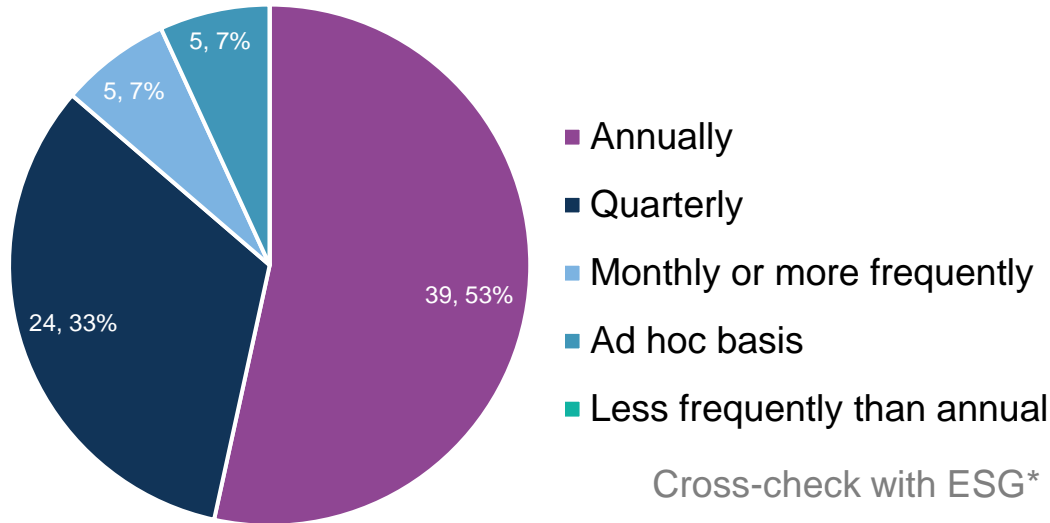 - Much smaller range of views than previous surveys

Sources: U.S. Bureau of Labor Statistics for US - Consumer Price Index Data from 1913 to 2024 (usinflationcalculator.com) and Inflation and price indices - Office for National Statistics (ons.gov.uk)

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Modal Inflation Estimates by Class

Class of Business	2022	2023	2024
2024 UK Motor Property	10%-15%	6%-8%	4%-6%
2024 UK Motor BI	6%-8%	6%-8%	4%-6%
2024 UK Casualty	6%-8%	6%-8%	4%-6%
2024 UK Property	8%-10%	6%-8%	2%-4%
2024 US Property	8%-10%	4%-6%	2%-4%
2024 US E&O (PI)	8%-10%	4%-6%	4%-6%
2024 US Casualty Non-PI	6%-8%	4%-6%	4%-6%
2024 Marine 1st Party	8%-10%	4%-6%	2%-4%
2024 Marine 3rd Party	4%-6%	4%-6%	2%-4%

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Inflation Assumption Review Frequency & Consistency

Inflation Estimate Review Frequency

- Annually
- Quarterly
- Monthly or more frequently
- Ad hoc basis
- Less frequently than annual

5, 7%
5, 7%
24, 33%
39, 53%

Inflation Assumption Consistency

6, 8%
13, 18%
23, 32%
30, 42%

- Central view, with scope for practitioners
- Strong consistency
- No consistency/central view

Cross-check with ESG*

31, 48%
34, 52%

- Yes
- No
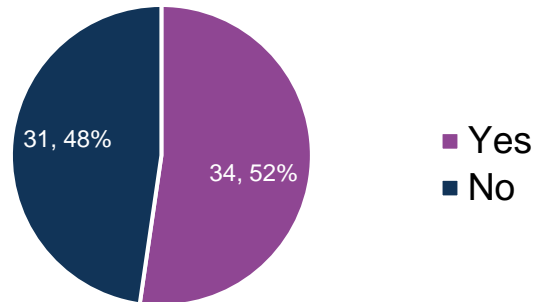
Economic Scenario Generator
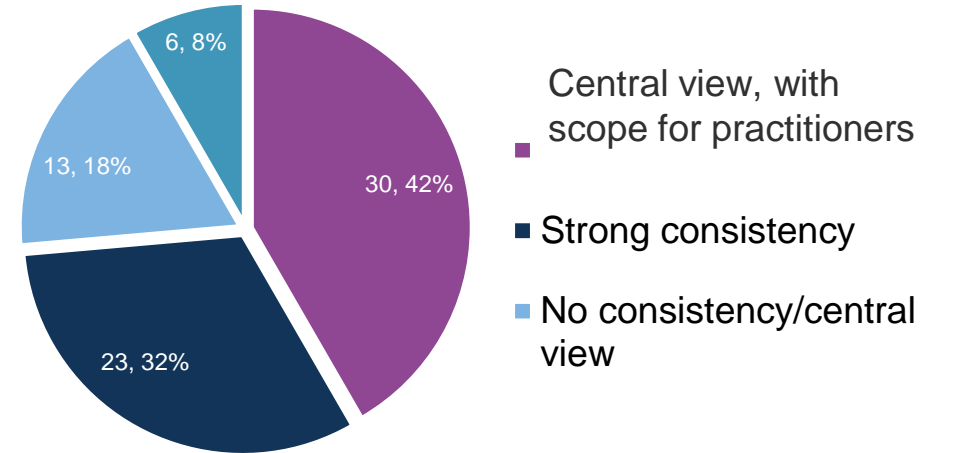
Appendix 2 – Additional Considerations for Inflationary Reserving

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Inflation Scenario E – Parameter Error

Perfect Knowledge

- All scenarios considered thus far have been assessed with perfect knowledge of both historical and future inflation.

- In reality, practitioners will only have an estimate of historically-experienced inflation and highly uncertain knowledge of the future.

Unknown Inflation

- For our 2023 study, we also considered this problem and performed an assessment of inflation estimation methods with the estimator having no knowledge of the input inflation parameters.
- We will look to repeat our reserving work on this dataset using that analyst's "best guess" of input inflation parameters from 2023.
- This will ultimately feature in our research paper!

Addendum – Australian methods

Market Features

Retail, Australia-specific focus

Statutory schemes

Discount

75th %ile

Mono-tremes
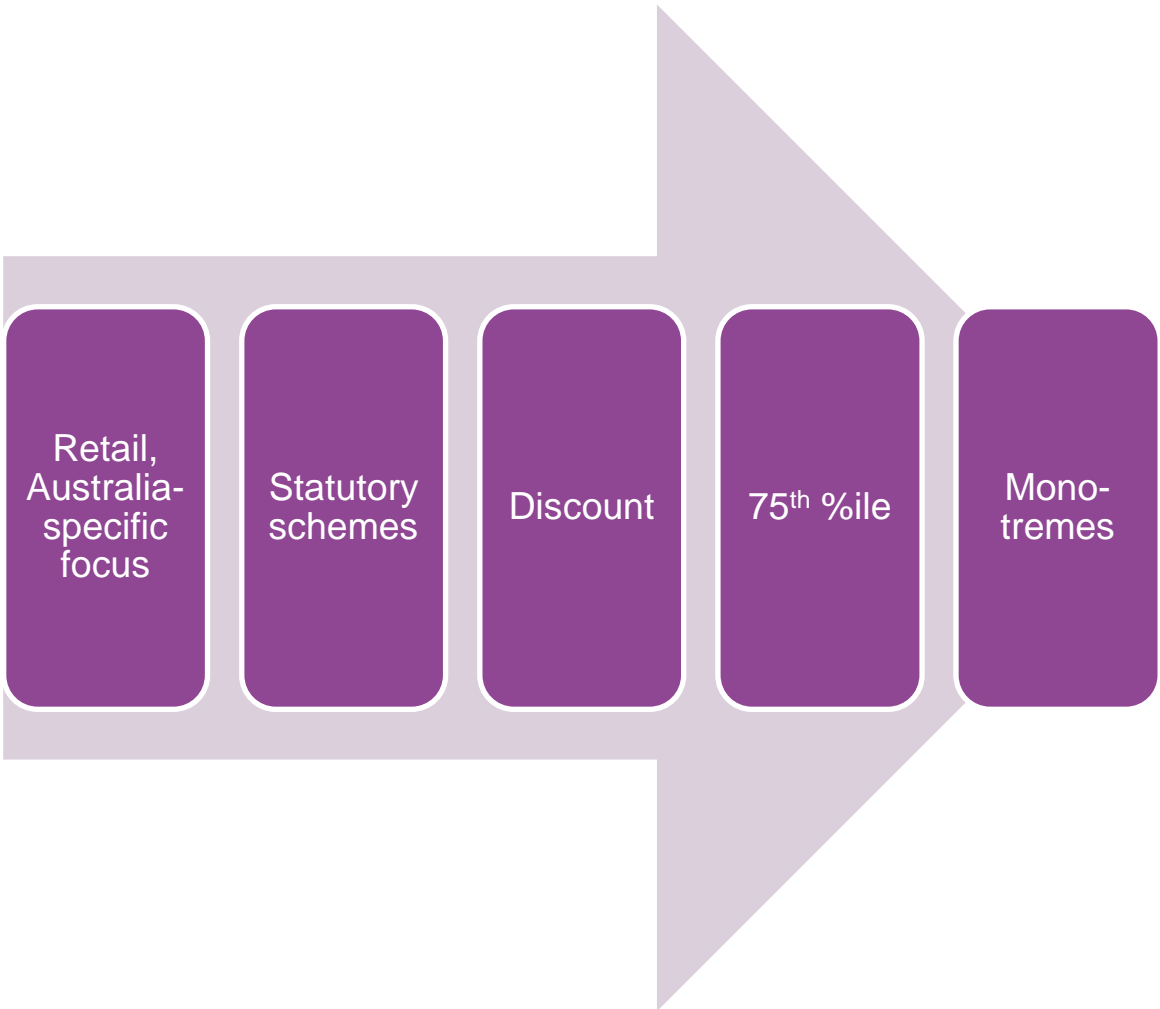
Freq-sev

- PPCI* and PPCF
- Paid focus
- Explicit past and future inflation by CY like IACL
- Use of claim count data enables differentiation of trend elements

- *Taylor-Bennett

Projected Case Estimate (PCE)

- Joint consideration of paid and OS (à la Munich CL)
- Combination of implicit past/explicit future inflation

Addendum – Truncation and Frequency Effects

Research Article

When Inflation Causes No Increase in Claim Amounts

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It is well known that when (re)insurance coverages involve a deductible, the impact of inflation of loss amounts is distorted, and the changes in claims paid by the (re)insurer cannot be assumed to reflect the rate of inflation. A particularly interesting phenomenon occurs when losses follow a Pareto distribution. In this case, the observed loss amounts (those that exceed the deductible) are identically distributed from year to year even in the presence of inflation. Nevertheless, in this paper we succeed in estimating the inflation rate from the observations. We develop appropriate statistical inferential methods to quantify the inflation rate and illustrate them using simulated data. Our solution hinges on the recognition that the distribution of the number of observed losses changes from year to year depending on the inflation rate.

Considerations

Gearing

- Well-known that FGU inflation of i will lead to "geared" inflation of aggregate claims of $j >= i$ upon application of excess/deductible.
- Effect arises are more claims are "pushed" above deductible.
- However, for Pareto-distributed claims, gearing effect will effectively result in nil severity inflation!
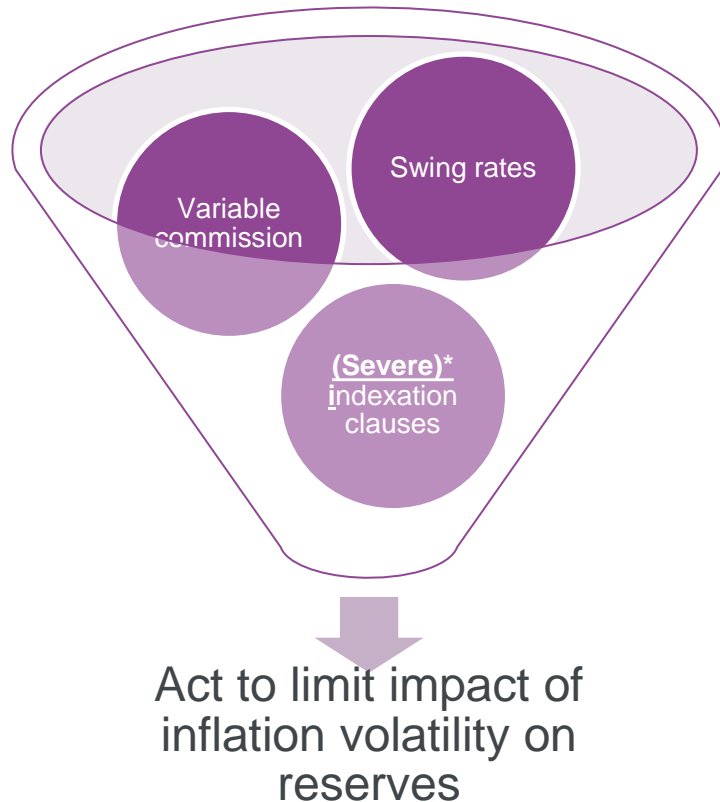
Treatment

- May need to carefully consider adjustment approaches in light of this.
- Pure uplift approaches may overlook the nuanced relationship between frequency and severity.

Addendum – Inflation-dampening features
Common to Reinsurance, notably Casualty

Overview

Variable commission

Swing rates

(Severe)* indexation clauses

Act to limit impact of inflation volatility on reserves

How do we best give credit/calculate quantum?

SIC are a particularly extreme and impactful case

Allowance in Reserving

Reinsurer view

Top-down	Bottom-up
• Allocate IBNR to individual policy. • Calculate impacts at policy level. • Likely quite an onerous calculation and data/systems may not permit.	• Calculate impact on 'test' treaty for each feature. • Scale up for prevalence of said feature in the portfolio. • Approach better suited to adjusting any management margins held above best estimate.

Will also impact cedants' net reserves, but impact likely easier to calculate, owing to smaller number of treaties

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Settlements vs. Origin Year Inflation

- 'Cleaner' to estimate inflation using settled claims

- External indices effectively measure settlement year inflation

- *But* need to *apply* inflation on origin year (AY or UWY) basis

- Need to "allocate" inflation from calendar/settlement year to origin year

Example Cumulative Payment Pattern
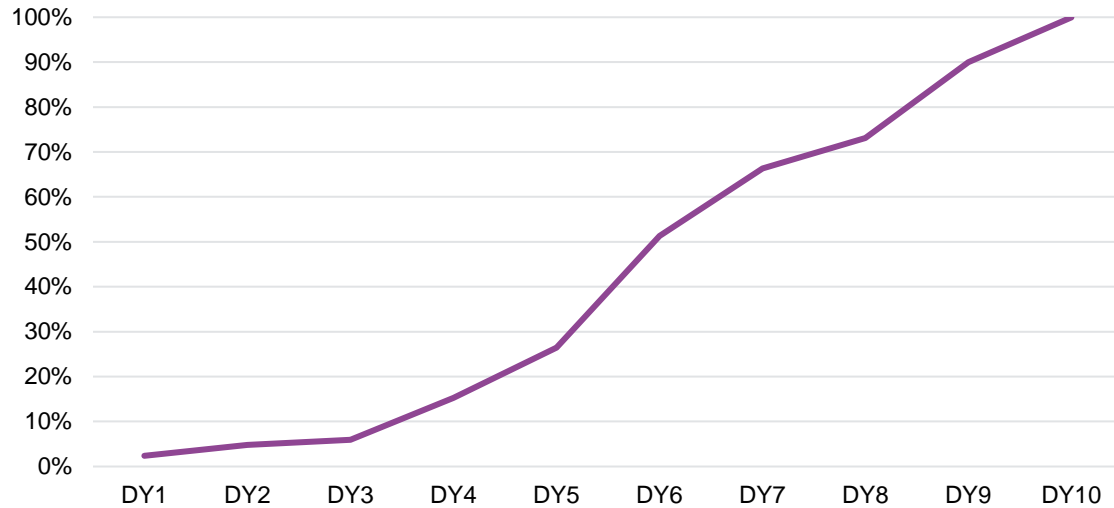
Origin Year Inflation Split - Historical Settlement Year vs. Prospective Settlement Year as-at YE 2023

Proportion of Inflation in Historical SY   Proportion of Inflation Prospective SY