



**Continuous  
Mortality Investigation**

Institute and Faculty of Actuaries

# **Discussion Forum: Proposed “08” Series Accelerated Critical Illness and Term Mortality tables**

**CMI Assurances Committee**

# Introduction

James Tait

# CMI Mission and Vision

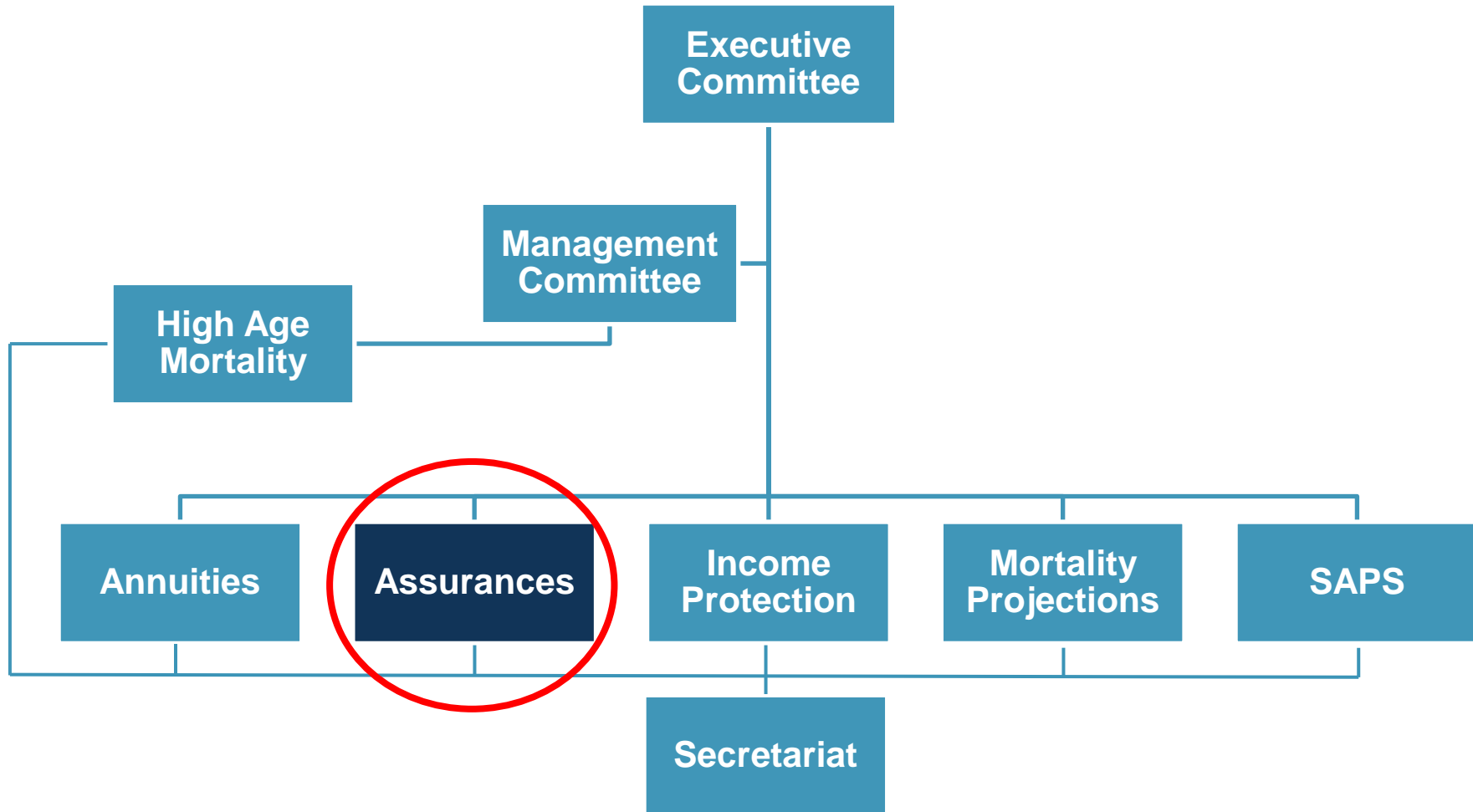
## Mission

- To produce high-quality impartial analysis, standard tables and models of mortality and morbidity for long-term insurance products and pension scheme liabilities on behalf of subscribers and, in doing so, to further actuarial understanding.

## Vision

- To be regarded across the world as setting the benchmark for the quality, depth and breadth of analysis of industry-wide insurance company and pension scheme experience studies.

# CMI Structure



# Change in CMI Committee structure

## Assurances Committee

- Focus on mortality and critical illness under Term/Endowment/Whole Life assurance policies
- Annuities Committee now has responsibility for annuities data

## Rationale for the change

- Better reflects the structure in most life offices
- Simplifies communications with data contributors
- Allows volunteer committee members to be more closely aligned to their areas of work.

# Assurances Committee

Current members:

- |                         |                 |
|-------------------------|-----------------|
| • James Tait (Chairman) | Pacific Life Re |
| • Bill Baker            | Swiss Re        |
| • Stephen Courquin      | RGA             |
| • Jamie Leitch          | SCOR            |
| • Chris Reynolds        | Partner Re      |
| • James Shattock        | UNUM            |

**We will be seeking new members shortly!**

# Agenda for today's Forum

- Introduction James
- Overview of data Dave
- Graduation of Term Assurances experience in 2007-2010 ) Stephen
- Analysis of 2007-10 experience by other risk factors )
- Comparisons with existing tables ) Dave
- Extension to younger and older ages )
- Summary and next steps James

# Hopes for today's Forum

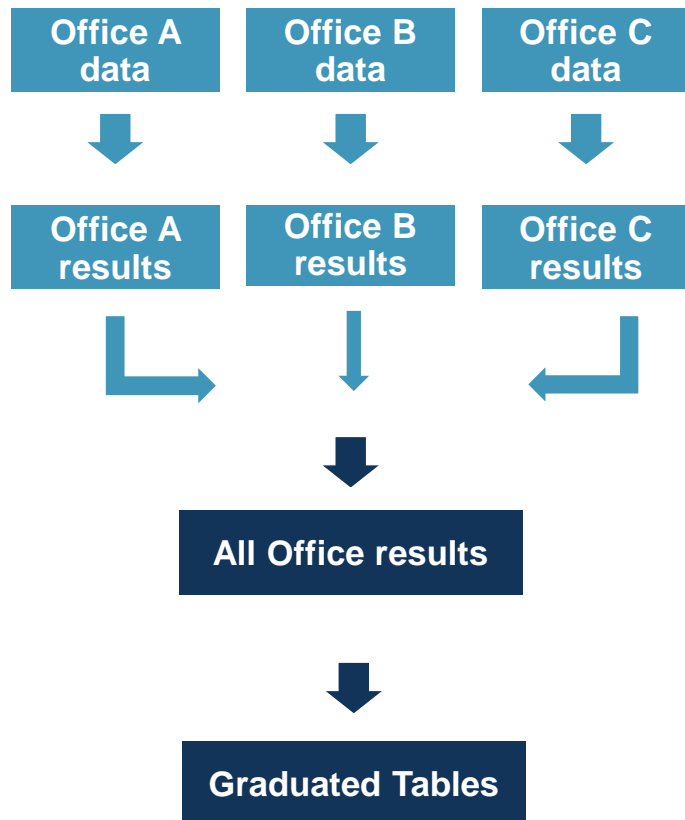
- Disseminate information
  - Current proposals for graduations of 2007-2010 experience
    - Accelerated critical illness (Working Paper 89)
    - Term mortality (Working Paper 92)
- Receive feedback / comments
  - How do you use our outputs – practical applications?
  - Will the proposed tables meet your needs?
- Open dialogue
  - No recording / attribution of comments



# Overview of the Data

Dave Grimshaw

# Data collection process



- Offices submit data to the CMI Secretariat
- We process the data and send individual office results back
- (Committee members do not receive individual office results)
- Once every (large) office has been processed, “All Office” results are issued
- Periodically, graduated tables are published using All Office data.

# Data collection formats

## Scheduled / Census

- Used up to 2006
- Scheduled (Mortality) collected aggregated data
- Census (Critical Illness) collected individual records

## Per Policy

- Used 2005 onwards
- Rigid format
- Large number of fields

## Special exercise

- Used 2007-2011 (and subsequent)
- Flexible format
- Minimal number of mandatory fields

# Data collection formats: Scheduled data

- Census data – i.e. end-year in force plus deaths
- Total numbers by age (and duration) – no individual details
- Offices submitted data by “investigation”
- Only investigations 01 and 02 were graduated for the “00” Series tables.

Number	Description
01	Permanent (whole life and endowment) assurances issued after the provision of satisfactory evidence of health
02	Temporary assurances
04	Linked contracts (excluding unitised with-profit business)
06	Joint-life-first-death issued after the provision of satisfactory evidence of health
07	Permanent (whole life and endowment) assurances completed without any medical selection whatever
29	Temporary assurances effected under Section 637(1) of ICTA 1988
81	Permanent (whole life and endowment) assurances completed on minimum evidence of health
86	Joint-life-first-death completed on minimum evidence of health

# Data collection formats: Scheduled data

- Census data – i.e. end-year in force plus deaths
- Total numbers by age (and duration) – no individual data
- Offices submitted data by “investigation”
- Only investigations 01 and 02 were required to be submitted.

Number	Description
01	Permanent (whole term) assurances completed on satisfactory evidence of health
02	Temporary (whole term) assurances completed on satisfactory evidence of health
04	Temporary (whole term) assurances completed on satisfactory evidence of health
06	Temporary (whole term) assurances completed without any medical selection whatever
29	Temporary (whole term) assurances completed under Section 637(1) of ICTA 1988
81	Whole life and endowment assurances completed on minimum evidence of health
86	Whole life-first-death completed on minimum evidence of health

# Data collection formats: Per policy data

- Intended to allow greater checking and richer analyses
- Individual benefit records
- Detailed information on each record; e.g.
  - Benefit amount at start and end of year and date and rate of change
  - Combination of 4 fields to determine type of product
- Secretariat undertook detailed reconciliation of data within / between years and queried individual records

# Data collection formats: Per policy data

- Intended to allow greater checking and richer analyses
- Individual benefit records
- Detailed information on each record:
  - Benefit amount at start and end
  - Benefit type to distinguish between retirements and spouses
  - Combination of products
- Conciliation of data within / between years

**Data requirements too complex for some offices; those that did submit data had difficulty in resolving Secretariat's queries**

# Data collection formats: 2007-2011

- CMI recognised that Per Policy data was a barrier for many offices; special data collection exercise launched:
  - To bring results “up-to-date”
  - To (re-)engage with offices
- Flexible format; still seeking individual benefit records e.g.
  - Date of birth/commencement – so CMI could calculate age and duration
  - Benefit amount (initial and/or current)
- Secretariat undertook high-level checking of data



# 2007-2011 data collection exercise: timeline

- May 2012 – exercise launched at CILA
- June 2012 – first data received
- Sept 2012 – Secretariat started focussing on annuities over assurances
- May 2013 – last annuities data received
- Oct 2013 – Working Paper 70 / All-Offices annuities results
- **May 2014 – last assurances data received**
- **Dec 2014 – Working Paper 75 / All-Offices assurances results**
- March 2015 – Working Paper 78 / draft annuities tables (final in June)
- **May 2016 – Working Paper 89 / draft accelerated critical illness tables**
- **Oct 2016 – Working Paper 92 / draft term mortality tables**

*2011 data used to “complete” claims data for 2007-2010 to reduce impact of late-reporting*

# 2007-2011 data: offices

Aegon

Ageas Protect (now AIG Life)

Aviva

Friends Life (now Aviva)

Guardian Financial Services

HSBC

Legal and General

National Farmers Union

Royal London

Royal London (CIS)

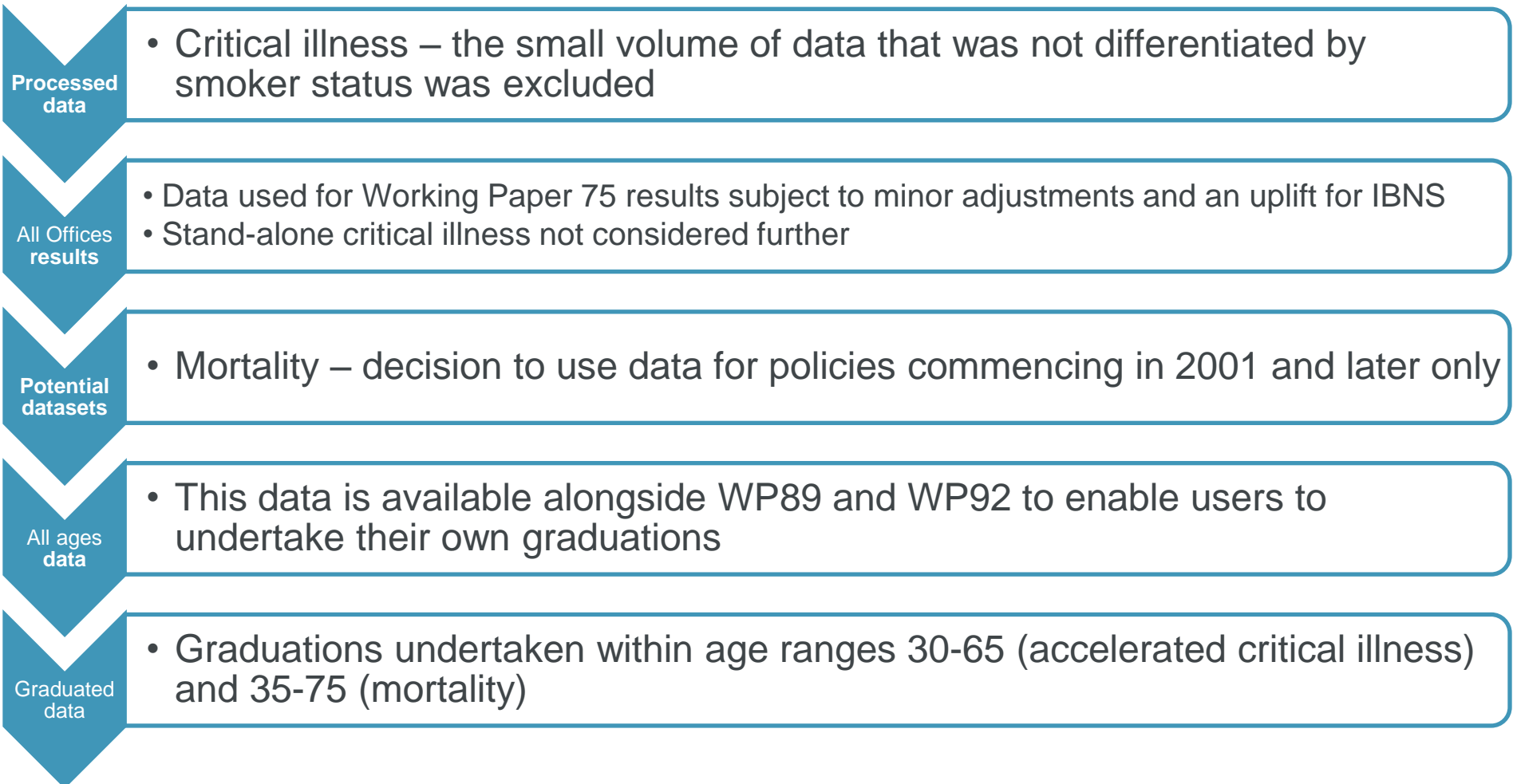
Scottish Widows

Standard Life

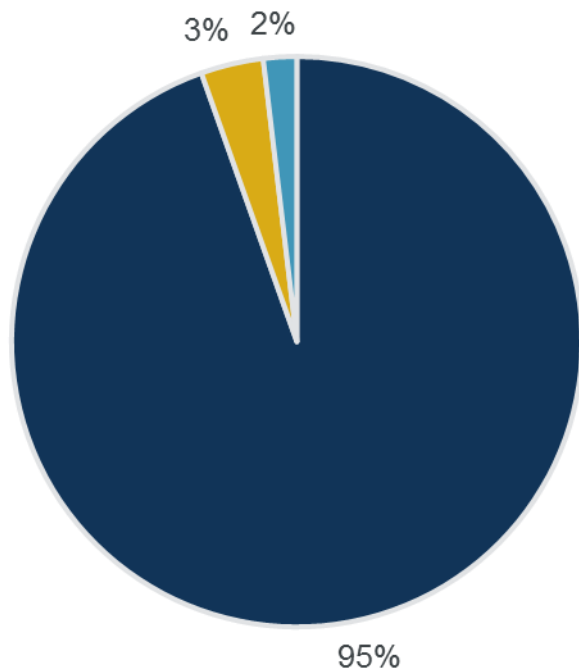
Zurich

**THANK YOU!**

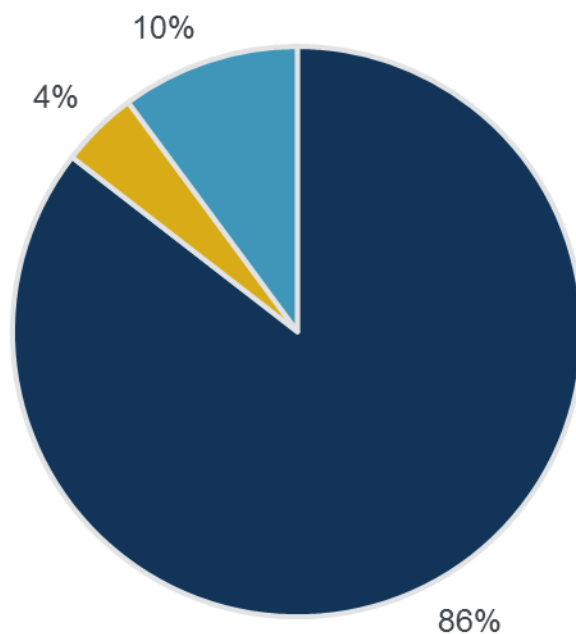
# Development of the graduations datasets



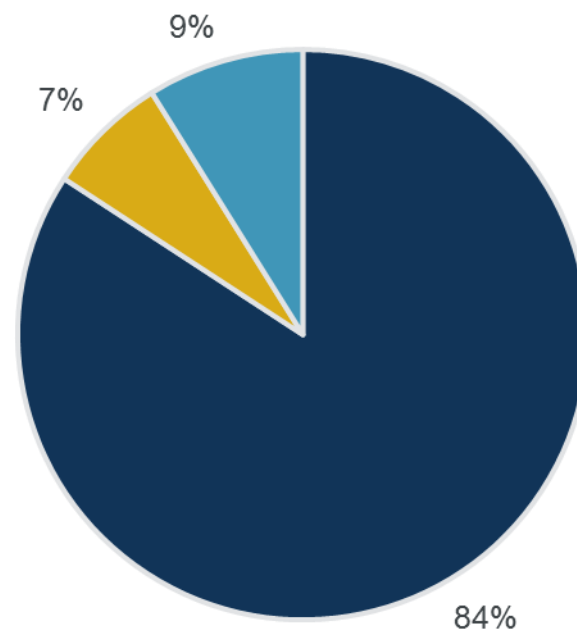
# 2007-2010 data: exposure (life-years)



**Accelerated critical illness (ACI)**  
Total exposure = 10.8m



**Stand-alone critical illness**  
Total exposure = 1.1m

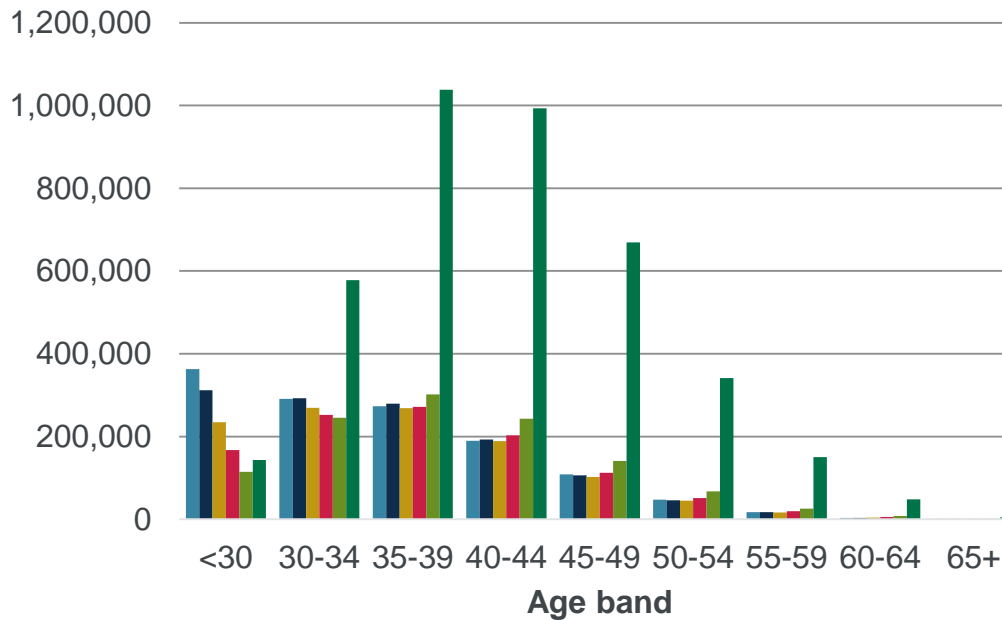


**Mortality**  
Total exposure = 25.9m

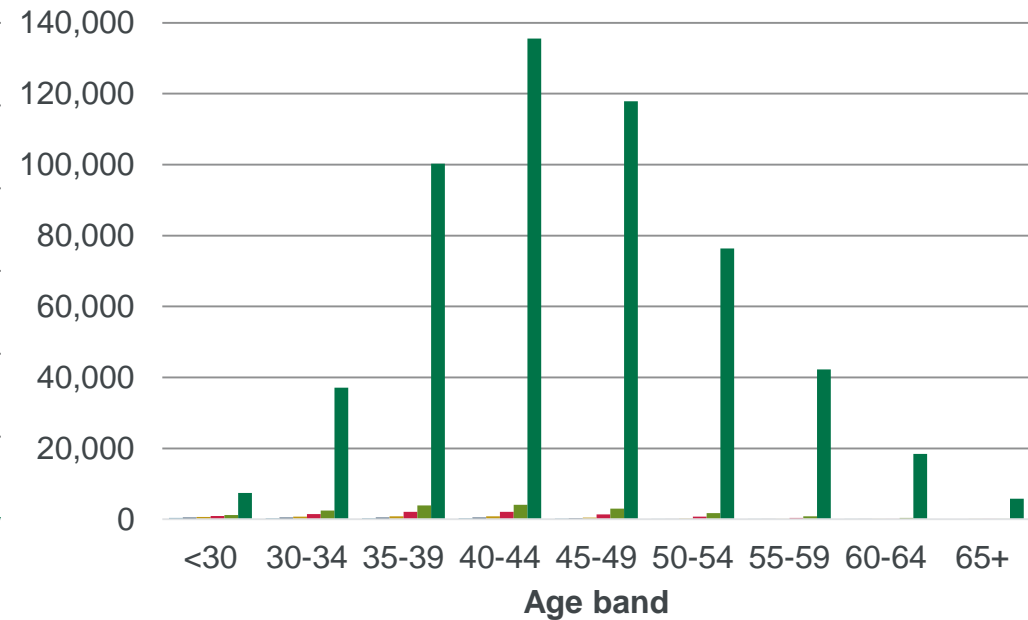
■ Term   ■ Endowment   ■ Whole Life

# 2007-2010 data: ACI exposure

Term



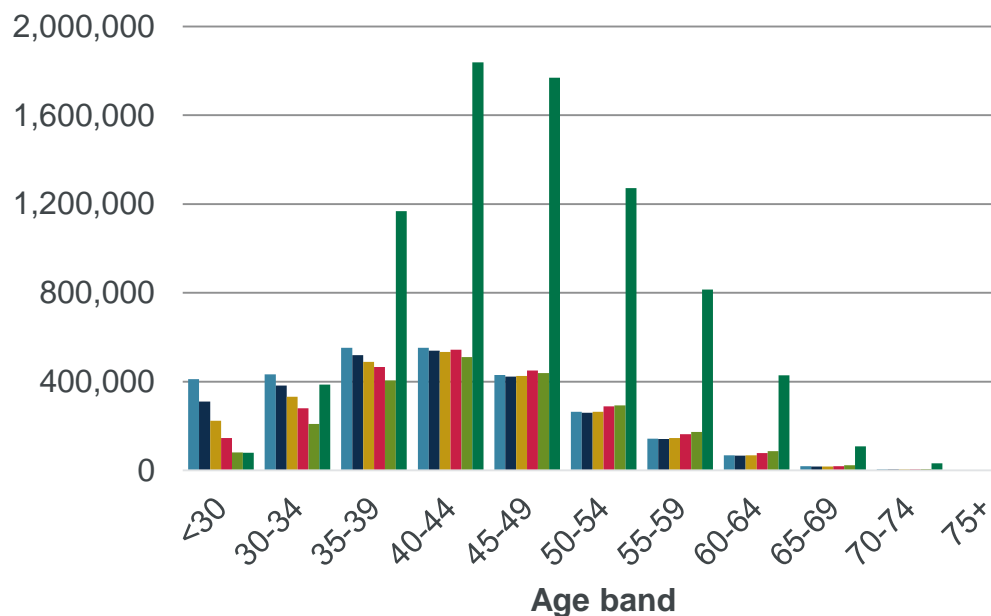
Whole Life & Endowment



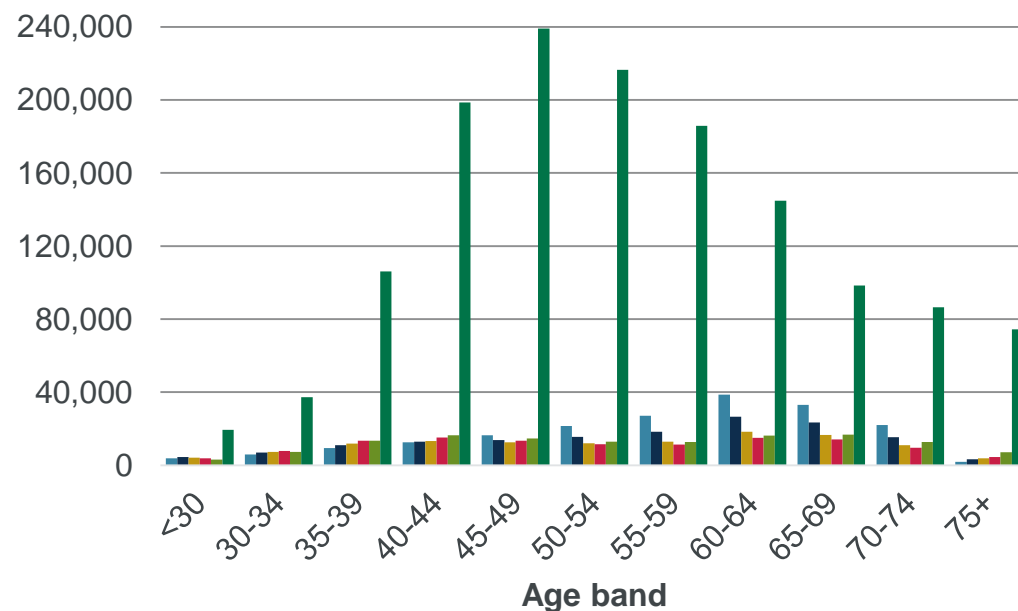
■ Duration 0 ■ Duration 1 ■ Duration 2 ■ Duration 3 ■ Duration 4 ■ Durations 5+

# 2007-2010 data: Mortality exposure

Term



Whole Life & Endowment



■ Duration 0 ■ Duration 1 ■ Duration 2 ■ Duration 3 ■ Duration 4 ■ Durations 5+

# 2007-2010 data: Mortality

**Actual/Expected values (and numbers of claims) for pre-2001 and post-2000 term assurances; ages 35-75 and durations 5+**

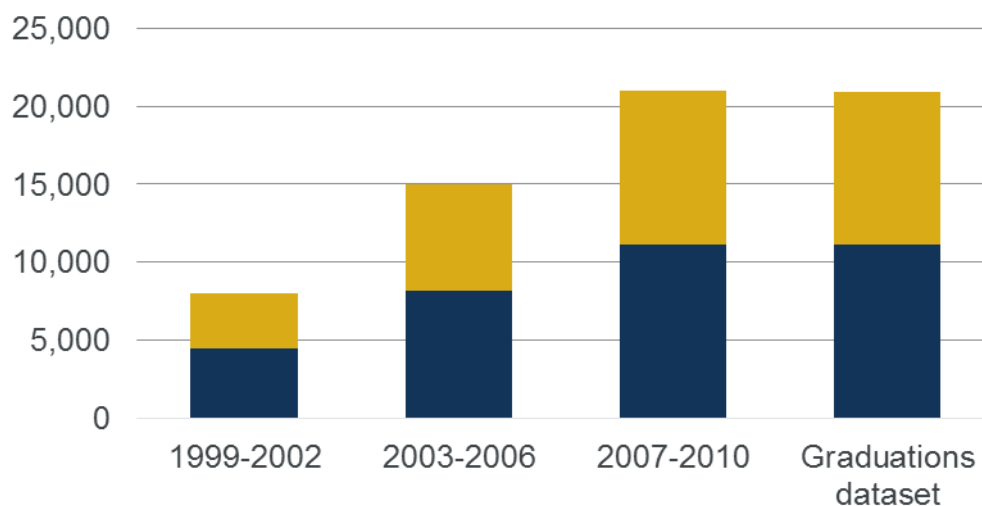
	Pre-2001 business	Post-2000 business
Male non-smokers	109% (1,812.5)	100% (3,142.5)
Male smokers	109% (688)	101% (1,641)
Female non-smokers	116% (1,198.5)	100% (1,738.5)
Female smokers	113% (407.5)	100% (819.5)
ALL	112% (4,106.5)	100% (7,341.5)

- Issue not apparent in the accelerated critical illness dataset.

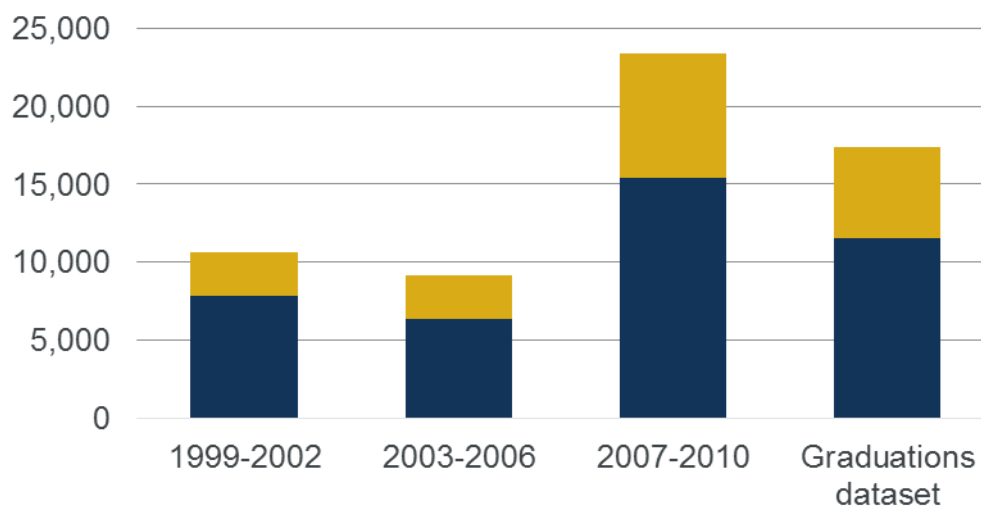
- Issue highlighted when examining the select shape for female non-smokers
- Concluded that experience of “old” business significantly higher than “recent” business
- For practical reasons, we split the data between pre 2001 and 2001+ commencement and chose to graduate the latter
- WP92 compares experience of pre-2001 business with the graduated rates.

# 2007-2010 data: Numbers of claims by quad

## Accelerated critical illness



## Mortality



■ Males ■ Females



# Discussion Questions

- Do you agree with our proposal that the tables are based only on term assurance data (not endowment and/or whole life data)?
- Do you agree with our proposal not to produce combined tables, covering both non-smokers and smokers?
- Do you agree with our proposal to produce the T08 tables based only on policies written from 2001 only?
- Do you agree with our proposal not to produce separate tables for endowment and/or whole life assurances?
- Do you agree with our proposal not to produce tables for stand-alone critical illness?

# **Graduation of Term Assurances experience in 2007-2010**

**Stephen Courquin**

# Section contents

**1** Initial data exploration

**2** Key principles followed during the graduation

**3** Graduation process followed including examples

# Initial data exploration

- Agree factors by which to graduate the tables
  - Combination of evidence and practicality
  - Supported maintaining the current format of graduating by age, gender, smoker status and duration
- Raised high level issues to be solved prior to embarking on the graduation process
  - Mortality data – graduation of data for business written in 2001+ only

# Graduation principles

- Favoured a simpler graduation model, with fewer parameters where graduations materially the same
- Graduate the ultimate experience separately for each gender and smoker status, and then consider experience at earlier durations in relation to this
- Chose to limit age range to where data was of reasonable volume:
  - 30-65 for accelerated critical illness
  - 35-75 for mortality.

# Graduation process

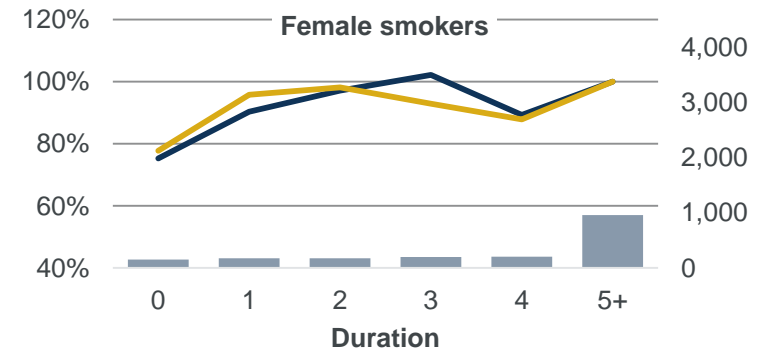
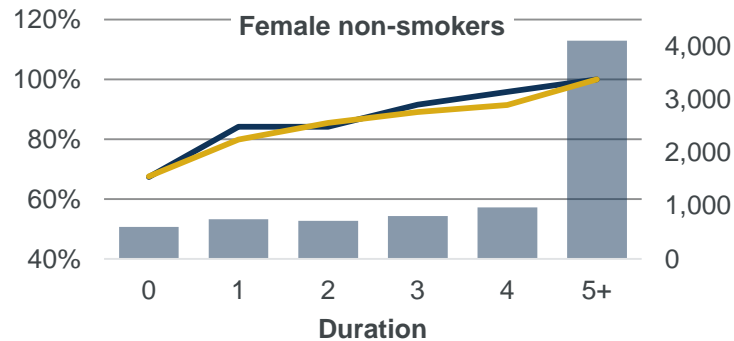
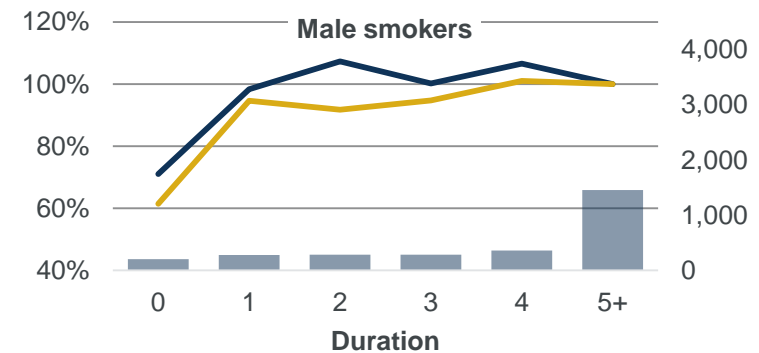
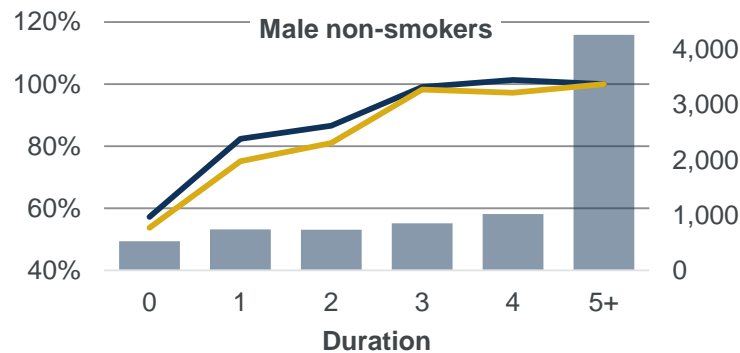
## Step 1: Initial analysis of crude data

- Determine length of select period
- Examine age shape of select rates
- Shape of smoker versus non-smoker rates

# Graduation process

## Step 1: Initial analysis of crude data (Example: ACI)

Comparison of crude age-standardised claim rates at durations 0-4 and 5+ as percentages of those at durations 5+ (LH axis) and numbers of claims (RH axis)

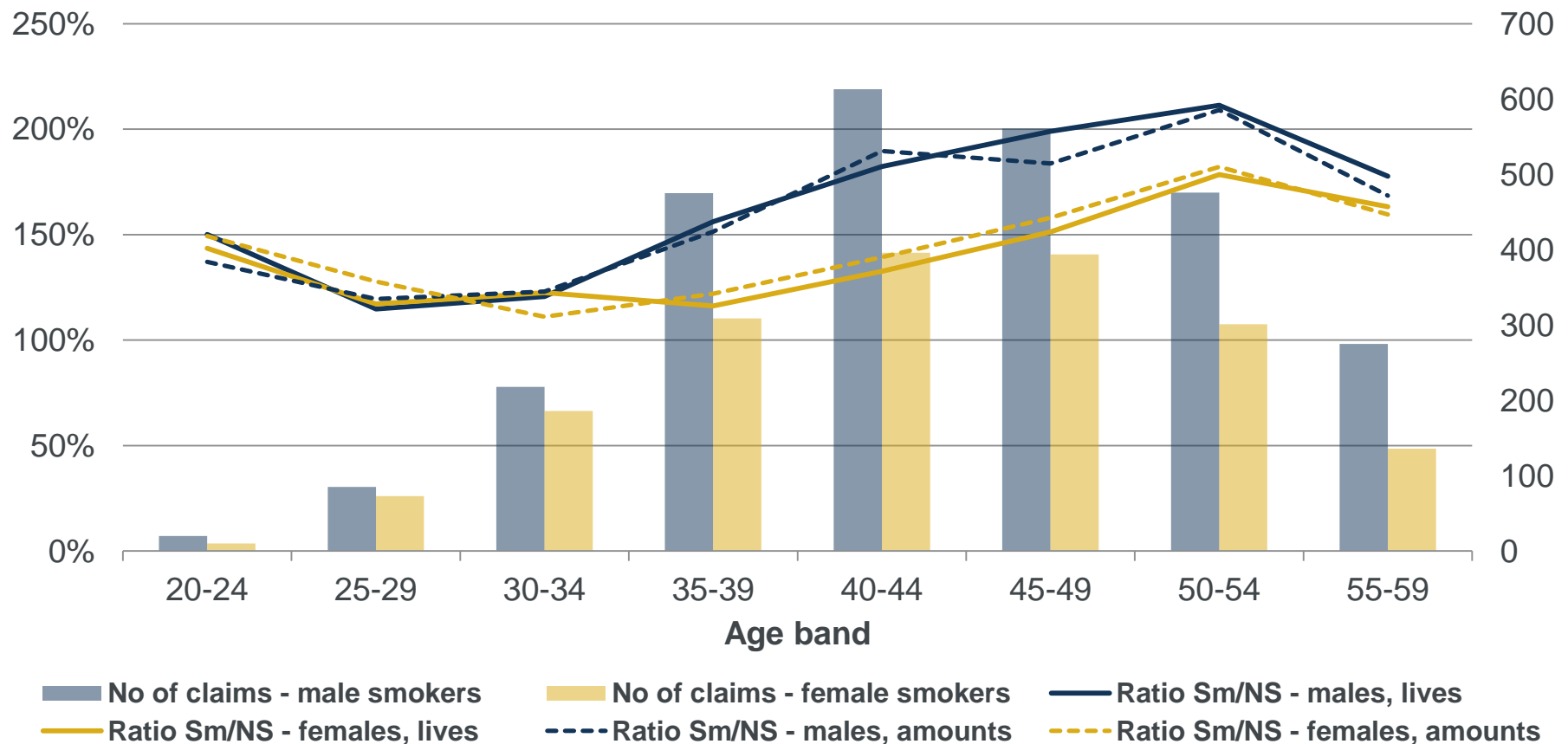


■ No. of claims    — Lives    — Amounts

# Graduation process

## Step 1: Initial analysis of crude data (Example: ACI)

Ratio of smoker (Sm) to non-smoker (NS) crude five-year age-grouped rates by age and gender (LH axis) and number of claims for smokers (RH axis)





# Graduation process

## Step 2: Graduate the ultimate rates

- Made good use of the CMI graduation tool
- Approach:
  - Identify graduation formula that produced the lowest AIC and BIC statistics
  - Used the other tests and graphical output to confirm our choice
  - Where results close we chose the simpler model

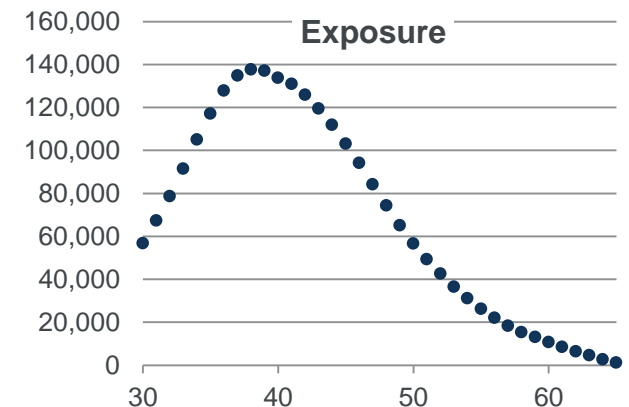
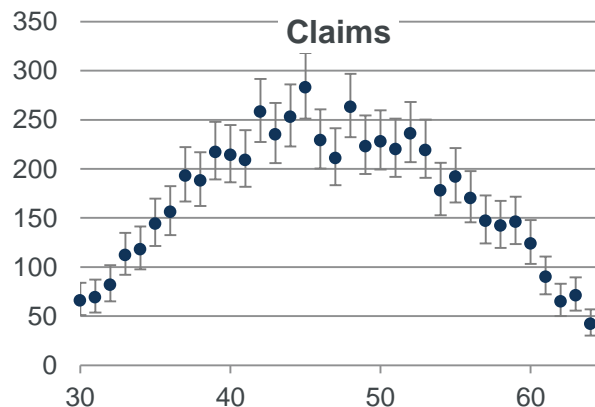
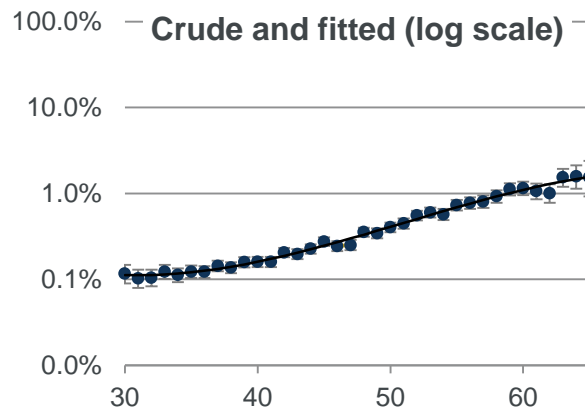
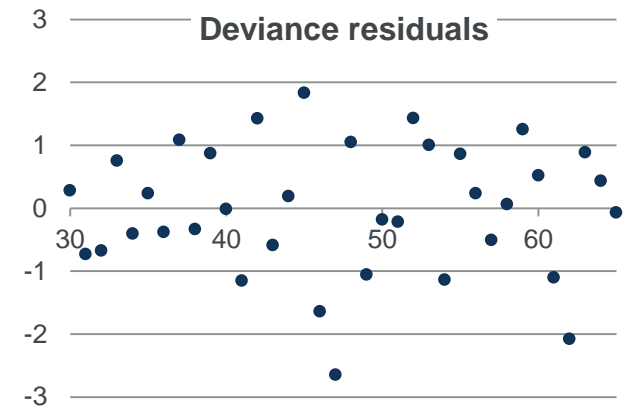
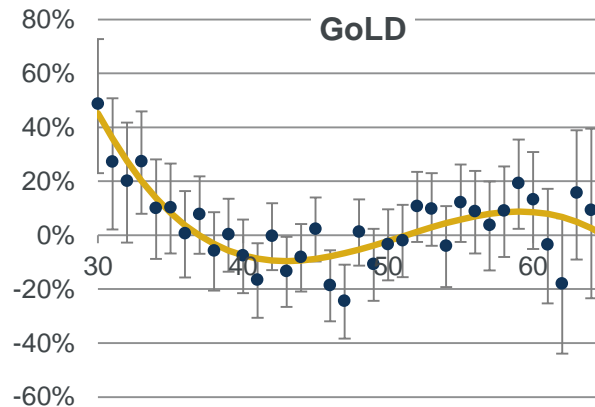
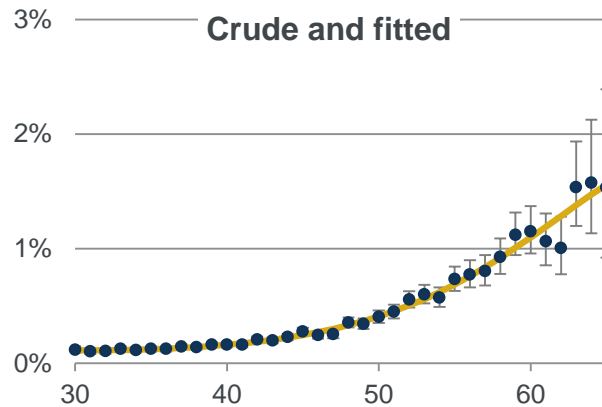
# Graduation process

## Step 2: Graduation of ultimate rates (Example: ACI, MNS)

Run	1	2	3	4	5	6	7	8
Formula	G(s)	G(s)	G(s)	G(s)	GM(r,s)	GM(r,s)	GM(r,s)	GM(r,s)
	(s=2)	(s=3)	(s=4)	(s=5)	(r=1,s=2)	(r=1,s=3)	(r=1,s=4)	(r=1,s=5)
NumParameters	2	3	4	5	3	4	5	6
MinAge	30	30	30	30	30	30	30	30
MaxAge	65	65	65	65	65	65	65	65
NumAges	36	36	36	36	36	36	36	36
Total deaths	6,012	6,012	6,012	6,012	6,012	6,012	6,012	6,012
Total exposure	2,442,699	2,442,699	2,442,699	2,442,699	2,442,699	2,442,699	2,442,699	2,442,699
NumGroups	36	36	36	36	36	36	36	36
Deviance	93.78	58.29	36.90	36.10	49.60	36.63	35.93	35.93
Overdispersion	2.76	1.77	1.15	1.16	1.50	1.14	1.16	1.20
ChiSquared	96.49	57.59	36.39	35.75	48.80	36.20	35.61	35.61
ProbChiSquared	0.00	0.01	0.27	0.26	0.04	0.28	0.26	0.22
SigChiSquared								
AIC	97.78	64.29	44.90	46.10	55.60	44.63	45.93	47.93
AICc	98.14	65.04	46.19	48.10	56.35	45.92	47.93	50.82
BIC	100.94	69.04	51.23	54.02	60.35	50.96	53.85	57.43
PositiveSigns	21	20	18	18	18	19	18	18
NegativeSigns	15	16	18	18	18	17	18	18

# Graduation process

## Step 2: Graduation of ultimate rates (Example: ACI, MN)

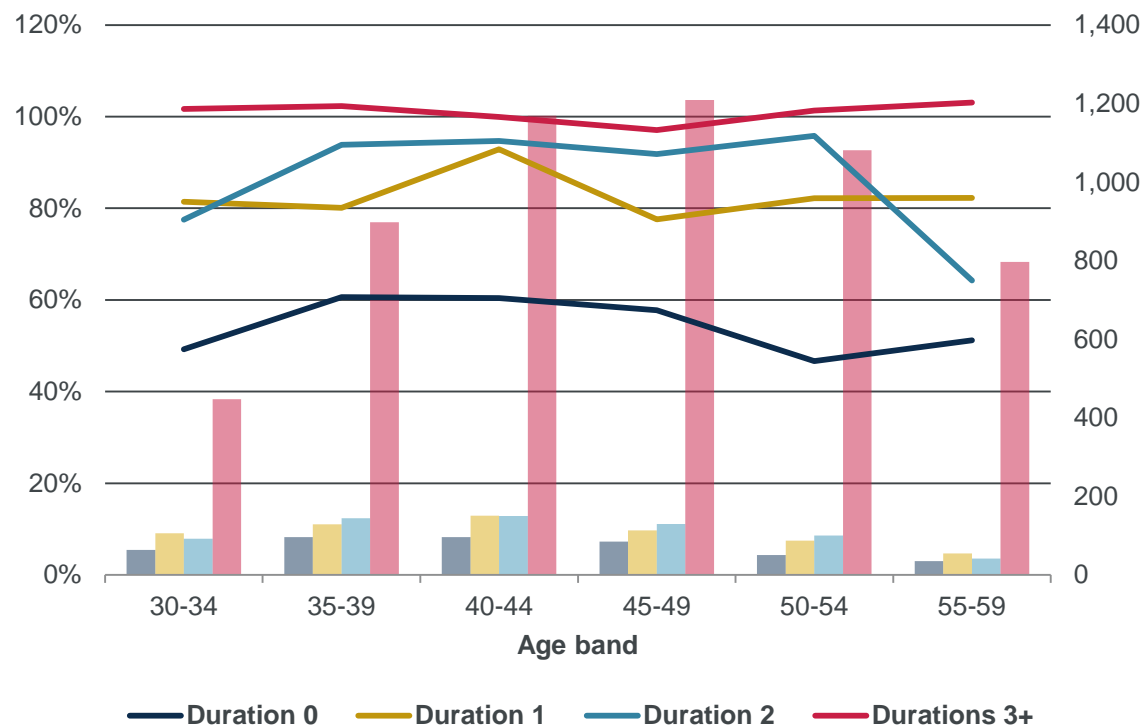


# Graduation process – summary of outcomes

	Accelerated Critical Illness				Mortality			
	MN	MS	FN	FS	MN	MS	FN	FS
Formula	G(4)	G(3)	G(4)	G(3)	GM(1,2)	G(3)	G(3)	G(2)
Durations	3+	1+	5+	2+	5+	4+	5+	5+
Age range	30-65	30-65	30-60	32-60	35-75	36-75	35-75	35-75

# Graduation process

## Step 3: Production of select rates (Example: ACI, MN)



- Plotted the A/Es by 5 year age band against the graduated ultimate rates
- Given the relatively few claims in the early durations we concluded there was limited justification for a more complex model than a level percentage adjustment
- Only male smokers for mortality showed any clear shape by age – selection discounts appear to increase with age – but level adjustment proposed for consistency.

# **Analysis of 2007-10 experience by other risk factors**

# Analysis of other risk factors

Examine impact of:

- Office
- Distribution channel
- Sum assured band
- Product category (primarily LTA & DTA)
- Commencement year, and
- Calendar year

Used traditional one-way analysis and GLMs

- GLMs aim to capture the underlying drivers of the claim rate by considering the effects of all the factors simultaneously
- Also examined interactions by age and duration to check for any obvious patterns to challenge choice of graduated tables.

# Analysis of other risk factors

## GLM analysis

- First step was to prepare the data so that it was suitable for analysis
- Impact of the data preparation:

Product	% Claims compared to full dataset		No. Offices
	All Ages	Key age range	
ACI	84%	90%	10 from 16
Mortality	88%	96%	13 from 17

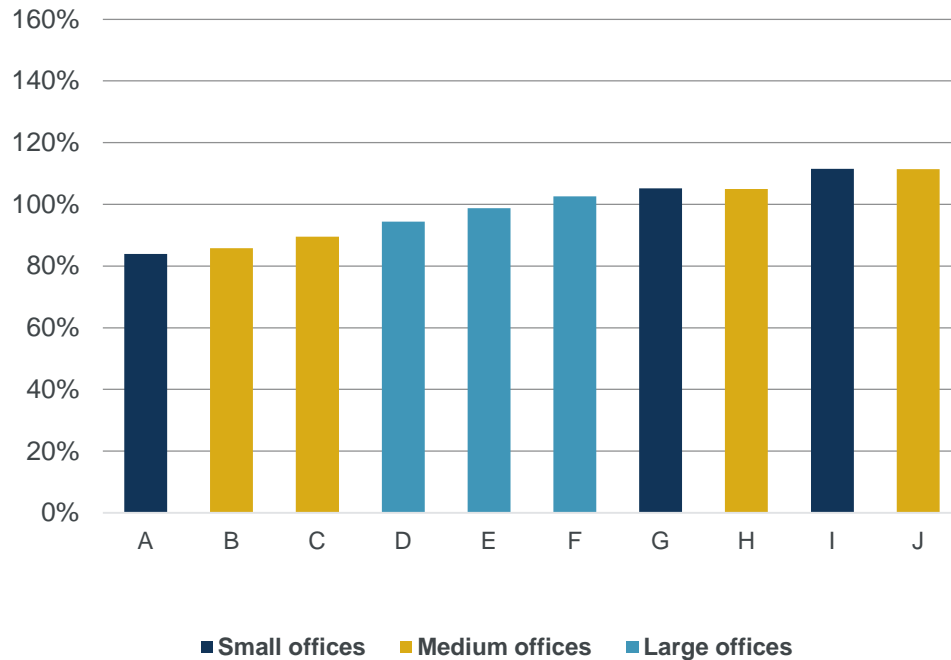
- We used expected claims (calculated using the graduated rates) as an “offset”
- Ability of GLMs to analyse the datasets impaired by:
  - Limited spread of data across multiple risk factors, and
  - Large proportion of data labelled as “unknown” for some risk factors.



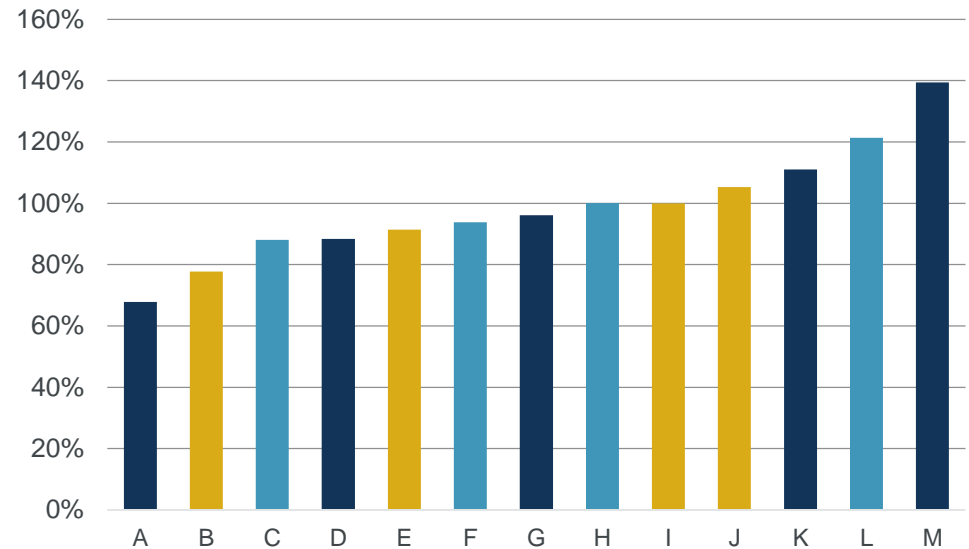
# Analysis of other risk factors – office

GLM coefficients by office from the Simple Model, categorised by office size according to lives exposure

## Accelerated critical illness



## Mortality



# Analysis of other risk factors – sum assured band

Full A/Es, Modelling A/Es and GLM coefficients by sum assured band

## Accelerated critical illness

Sum assured band	Full A/E (Number of Claims)	Modelling A/E (Number of Claims)	GLM coefficient
0 (Unknown)	100.2% (6,197)	98.6% (5,721)	100.1%
1 (£0 - £25,000)	94.1% (2,833)	94.2% (2,501)	91.1%
2 (£25,001 - £75,000)	102.8% (6,153)	101.7% (5,596)	101.1%
3 (£75,001 - £125,000)	102.8% (2,595)	103.5% (2,369)	104.0%
4 (£125,001+)	100.2% (1,509)	102.1% (1,350)	103.3%

## Mortality

Sum assured band	Full A/E (Number of Claims)	Modelling A/E (Number of Claims)	GLM coefficient
0 (Unknown)	103.2% (4,786.5)	103.2% (4,742.5)	101.7%
1 (£0 - £25,000)	102.8% (2,196)	106.1% (2,023.5)	105.6%
2 (£25,001 - £75,000)	102.2% (4,313)	101.7% (4,171.5)	102.3%
3 (£75,001 - £125,000)	98.5% (2,471)	98.5% (2,360.5)	99.5%
4 (£125,001+)	89.4% (2,109)	90.4% (1,989.5)	91.7%

# Analysis of other risk factors – distribution channel

Full A/Es, Modelling A/Es and GLM coefficients by distribution channel

## Accelerated critical illness

Distribution channel	Full A/E (Number of Claims)	Modelling A/E (Number of Claims)	GLM coefficient
Bancassurance	104.3% (5,715)	105.5% (5,393)	101.3%
IFA	89.7% (6,162)	93.9% (5,893)	97.5%
Single Tie	101.9% (2,512)	97.9% (2,018)	100.3%
Unknown	111.4% (4,878)	102.8% (4,233)	102.0%
Multi-tie	88.3% (20)	-	-

## Mortality

Distribution channel	Full A/E (Number of Claims)	Modelling A/E (Number of Claims)	GLM coefficient
Bancassurance	104.1% (3,380)	104.3% (3,346)	101.3%
IFA	94.8% (6,811)	95.7% (6,466)	102.5%
Single Tie	110.6% (1,820)	110.6% (1,764)	106.1%
Unknown	102.5% (3,826.5)	101.9% (3,711.5)	93.9%

# Analysis of other risk factors – product type

Full A/Es, Modelling A/Es and GLM coefficients by product category

## Accelerated critical illness

Product category	Full A/E (Number of Claims)	Modelling A/E (Number of Claims)	GLM coefficient
Decreasing term	100.7% (11,780)	99.9% (11,389)	98.8%
Level term	100.2% (6,969)	99.7% (6,148)	101.6%

## Mortality

Product category	Full A/E (Number of Claims)	Modelling A/E (Number of Claims)	GLM coefficient
Decreasing term	104.1% (6,652.5)	104.0% (6,583.5)	102.8%
Level term	98.1% (8,831)	98.1% (8,704)	98.9%

# Analysis of other risk factors – commencement year

Full A/Es, Modelling A/Es and GLM coefficients by commencement year

## Accelerated critical illness

Commencement year group	Full A/E ( <i>Number of Claims</i> )	Modelling A/E ( <i>Number of Claims</i> )	GLM coefficient
Unknown	103.1% (8,899)	101.5% (8,542)	97.5%
Pre – 1997	85.0% (127)	-	-
1997 - 2004	99.8% (6,544)	99.2% (5,908)	103.1%
2005 - 2010	95.8% (3,717)	96.5% (3,087)	99.7%

## Mortality

Commencement year group	Full A/E ( <i>Number of Claims</i> )	Modelling A/E ( <i>Number of Claims</i> )	GLM coefficient
2001 - 2004	101.2% (9,460)	101.2% (9,263)	99.3%
2005 - 2010	98.6% (6,415.5)	99.6% (6,024.5)	102.5%

# Analysis of other risk factors – calendar year

Full A/Es, Modelling A/Es and GLM coefficients by calendar year

## Accelerated critical illness

Calendar year	Full A/E ( <i>Number of Claims</i> )	Modelling A/E ( <i>Number of Claims</i> )	GLM coefficient
2007	100.0% (3,668)	94.7% (3,243)	95.9%
2008	104.6% (5,157)	104.8% (4,802)	104.4%
2009	99.5% (5,076)	99.4% (4,678)	99.2%
2010	97.7% (5,386)	99.2% (4,814)	98.9%

## Mortality

Calendar year	Full A/E ( <i>Number of Claims</i> )	Modelling A/E ( <i>Number of Claims</i> )	GLM coefficient
2007	106.6% (2,925)	104.9% (2,791)	109.3%
2008	104.5% (3,883)	105.3% (3,767)	104.1%
2009	97.6% (4,162)	98.7% (4,022)	97.7%
2010	95.4% (4,905.5)	96.3% (4,707.5)	95.7%

# Discussion Questions

- Do you agree that only age, gender, duration and smoker status should be reflected in the tables?
- Do you agree with our approach to graduating the ultimate data over a limited age range?
- Do you agree with our proposal to produce lives-weighted tables only?
- Do you consider the quality of the fit of the graduated tables to the crude data to be reasonable, including at select durations?
- Do you consider the overall shape of the graduated rates to be reasonable?

# **Comparisons with existing tables and extensions to younger and older ages**

**Dave Grimshaw**



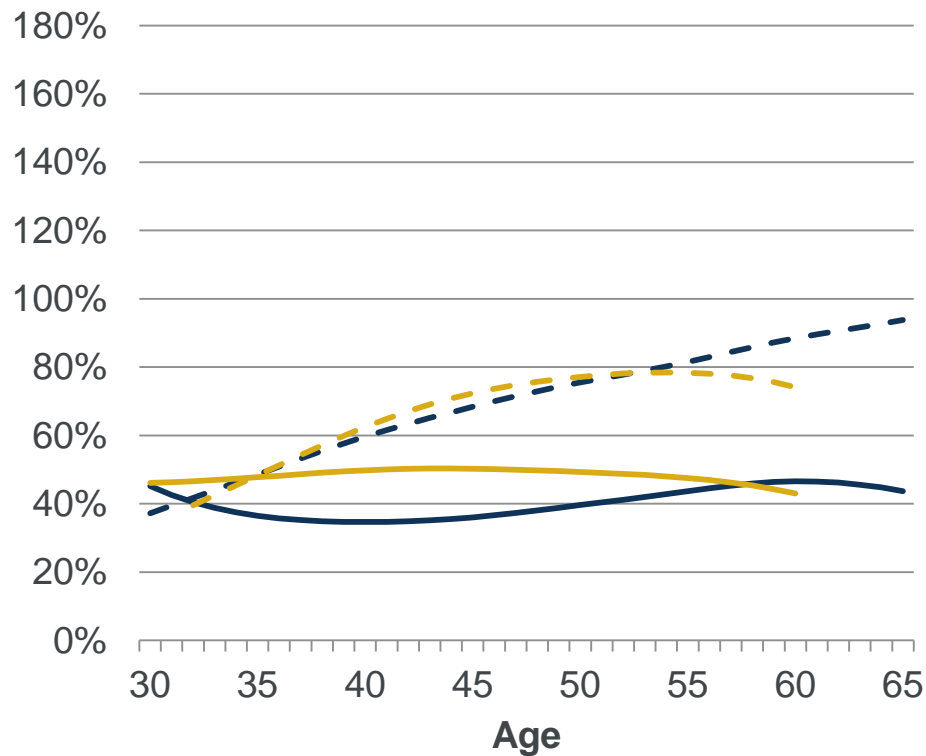
# **Comparisons of the graduated rates with existing tables**

# Introduction

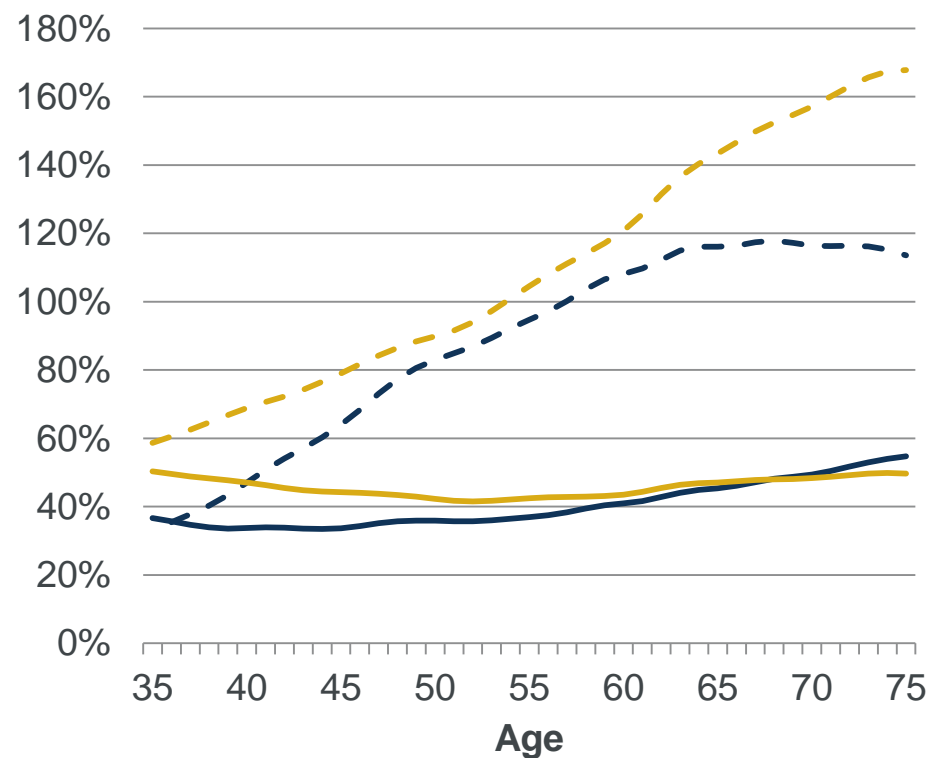
- In this section we compare the graduated rates (ages 30-65 for ACI, 35-75 for Mortality) with various tables:
  - Ultimate rates (selection discounts also differ)
  - Accelerated critical illness rates compared with:
    - AC04 rates – the previous set of CMI tables, and
    - CIBT08 rates – based on population data (approx. 2008)
    - *(Working Paper 89 also showed comparisons with CIBT02 rates)*
  - Mortality rates compared with:
    - 00 Series rates – the previous set of CMI tables, and
    - ELT17 rates – based on population experience in 2010-12
    - Both sets of comparator rates for mortality are adjusted to 2008 using CMI\_2015
    - *(Working Paper 92 also showed comparisons with the unprojected 00 Series rates CIBT02 tables).*

# Graduated rates compared with population

## Accelerated critical illness



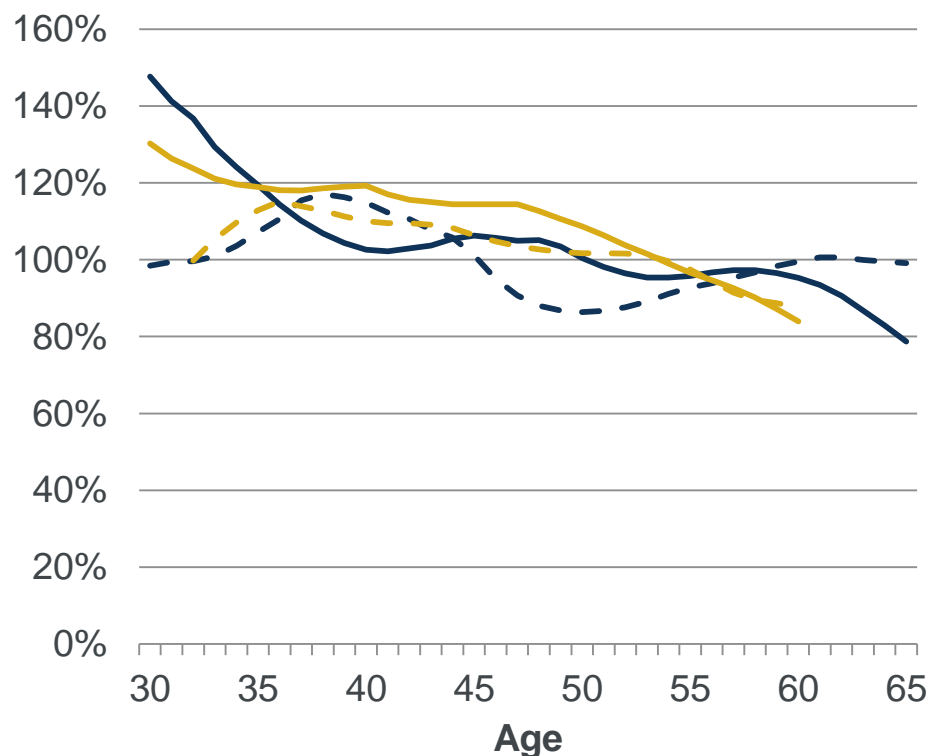
## Mortality



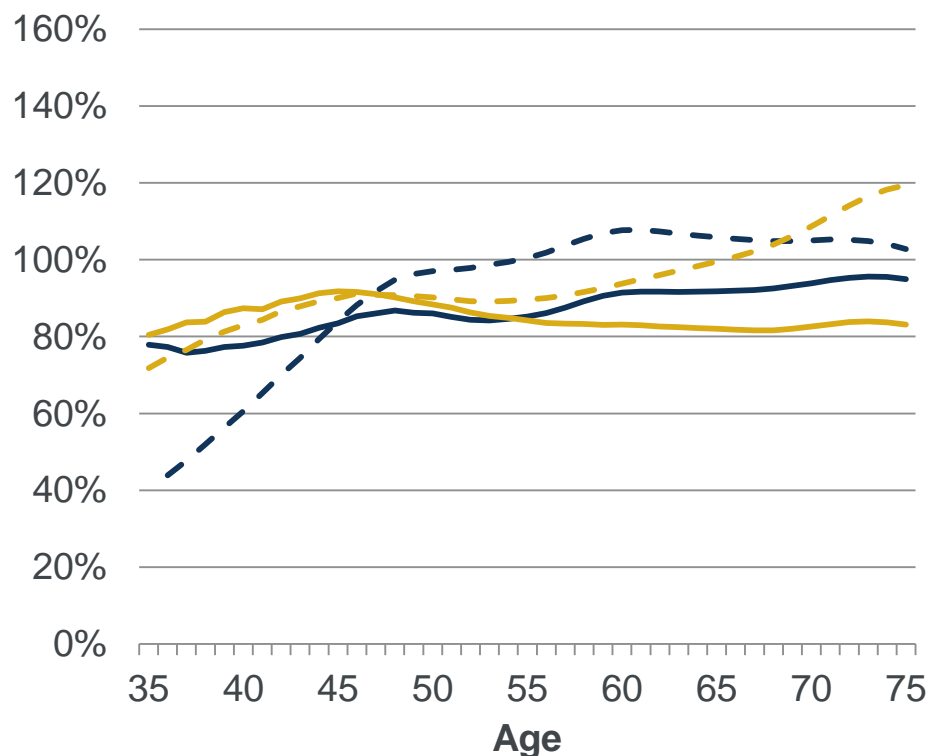
— Male non-smokers    - - - Male smokers    — Female non-smokers    - - - Female smokers

# Graduated rates compared with previous CMI table

## Accelerated critical illness

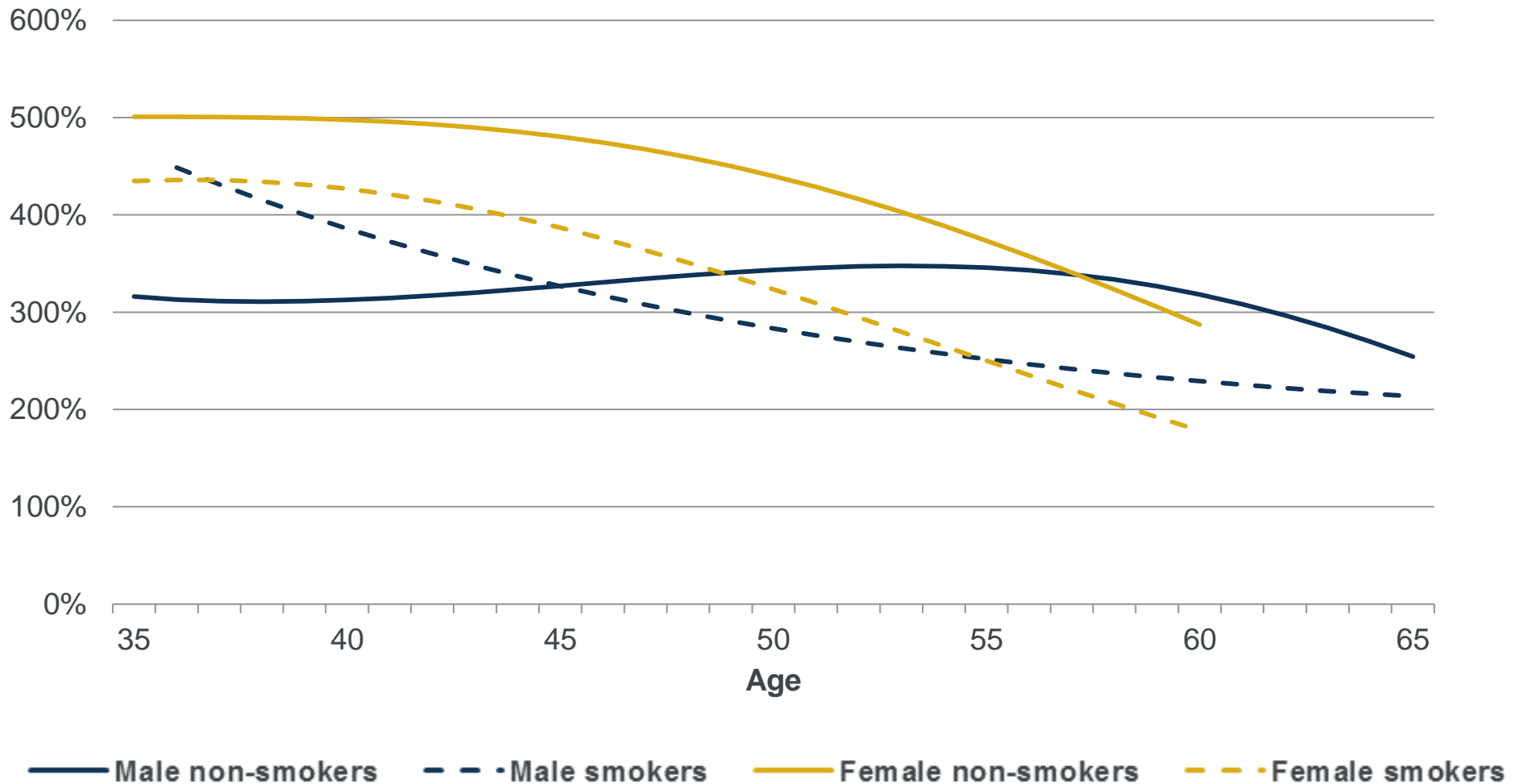


## Mortality



— Male non-smokers    - - - Male smokers    — Female non-smokers    - - - Female smokers

# Graduated rates: Accelerated critical illness compared with mortality



# **Extending the graduated rates to younger and older ages**

# Introduction

- The data has only been graduated within the age ranges 30-65 for ACI, 35-75 for Mortality, where we were confident of the credibility of the data
- However actuaries may need tables that apply across a wider age range and the proposed tables provide rates at ages:
  - 18 to 110 for ACI (and tables are closed; i.e.  $q=1$ )
  - 18 to 90 for Mortality => can't be used for whole life assurances

## WARNINGS

- We have sought a pragmatic means of extending the rates; other approaches may be equally valid
- Younger and older age rates have been produced for convenience and are not based on credible volumes of data!

# Younger ages – principles

- Although we only have ultimate data at ages 30+ (ACI) and 35+ (Mortality) we have (some) data at younger ages at shorter durations
- We produced proposed rates based on the following principles:
  1. Rates should reduce smoothly as age decreases
  2. Non-smoker rates should never exceed smoker rates
  3. Overall, actual claims should approximately equal expected claims
  4. Rates should behave reasonably in comparison with population mortality experience (No corresponding assumption for ACI)
- If any of the graduated rates breached these criteria we chose to overwrite them.

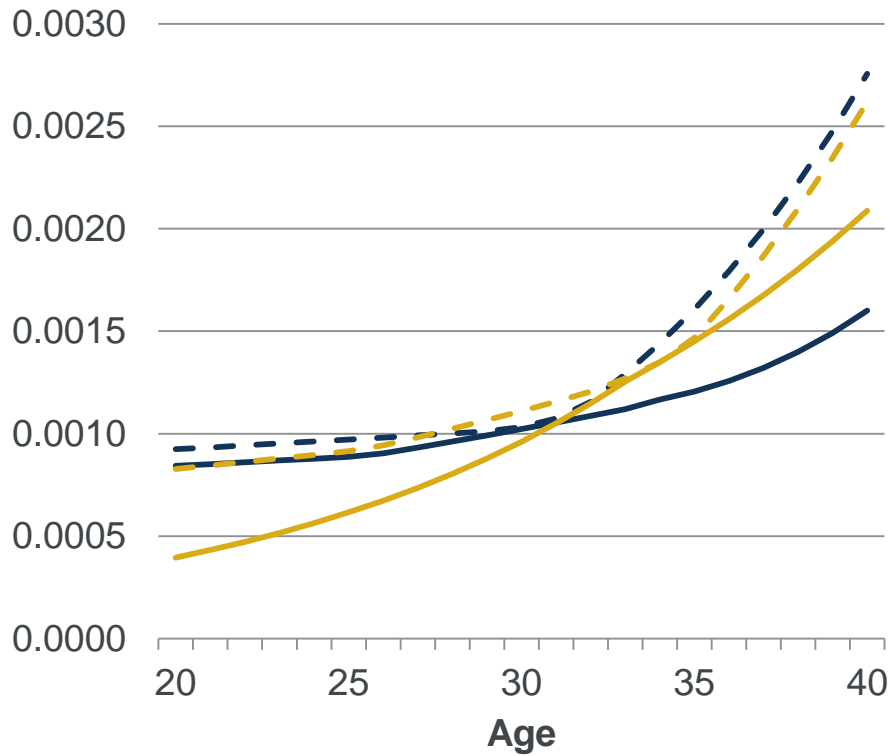


# Younger ages – practice

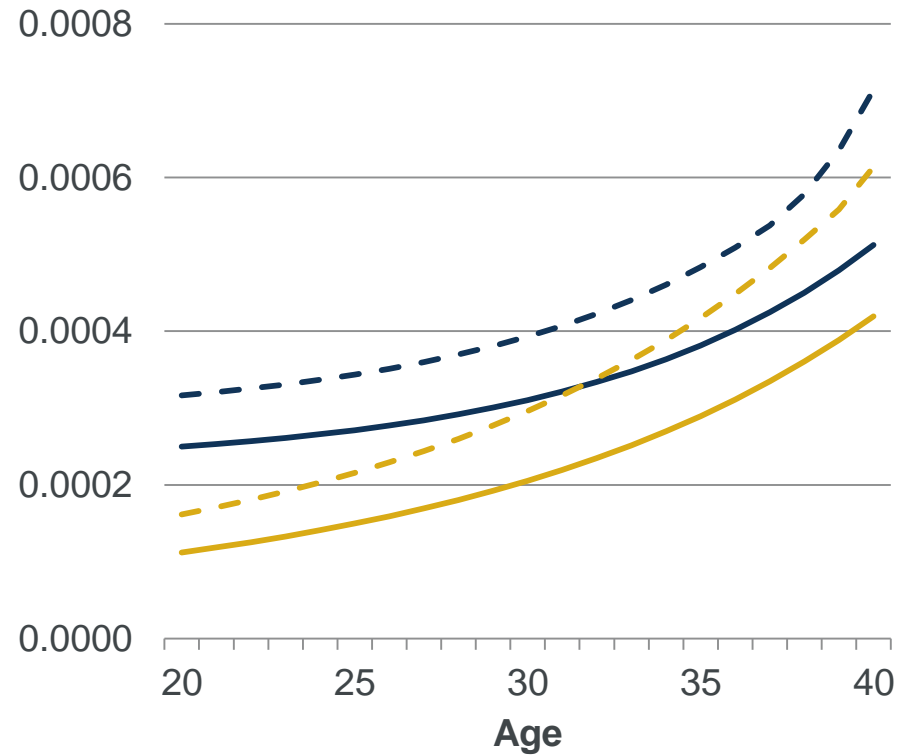
- Based on our “principles” we used an arbitrary approach. For ACI:
  1. Use the graduated rates to as low an age as they appear sensible
  2. Apply the same select differentials as at core ages
  3. Reduce the (ultimate) rates smoothly as age decreases, starting from the “rate of reduction” in the graduated rates ...
  4. ... adjusting the “rate of reduction” so that actual claims  $\approx$  expected claims...
  5. ... whilst ensuring non-smoker rates never exceed smoker rates
- For Mortality:
  - Steps 3 & 4 were achieved for non-smoker rates by extending the graduation formula
  - We could not meet all our principles for smokers and compromised by tolerating A/Es of 112% (M) and 90% (F).

# Younger ages – ultimate rates

## Accelerated critical illness



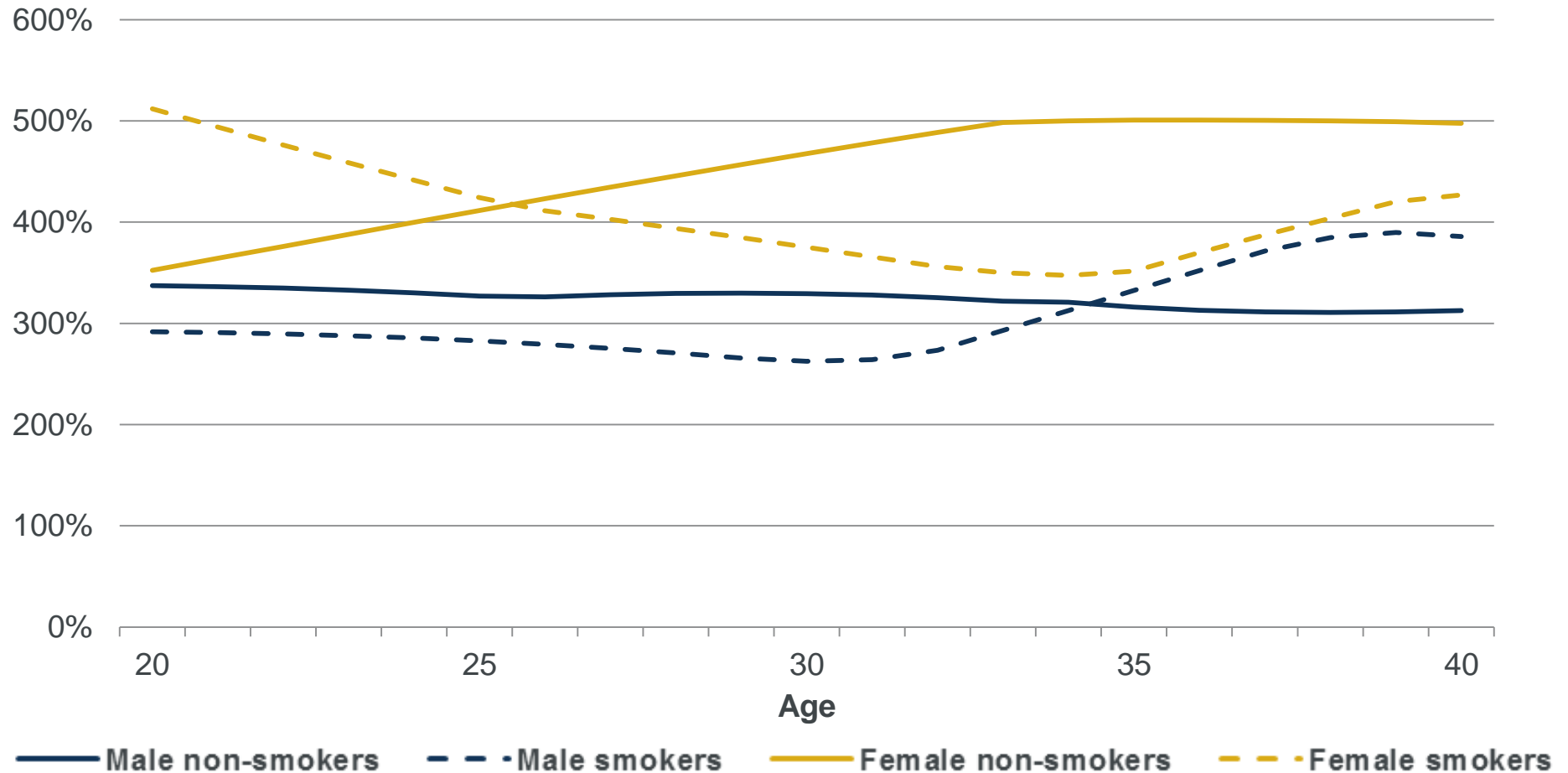
## Mortality



— Male non-smokers    - - Male smokers    — Female non-smokers    - - Female smokers

# Younger ages – ultimate rates

## Accelerated critical illness compared with mortality



# Older ages – principles

- Limited values of data at ages over 65 (ACI) and over 75 (Mortality)
- We produced proposed rates based on the following principles:
  1. Rates should increase smoothly as age increases
  2. Non-smoker rates should never exceed smoker rates
  3. For each gender, non-smoker and smoker rates should converge with increasing age
  4. The table should close at an appropriately high age (ACI only)
  5. Actual claims should appear reasonable relative to expected claims.

# Older ages – practice (ACI)

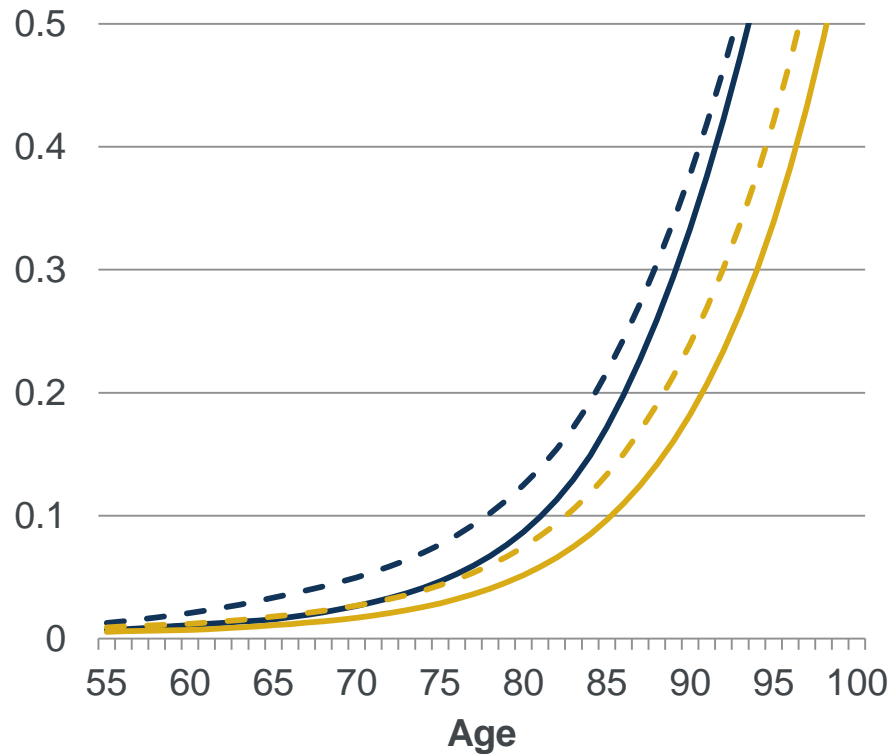
- Based on our “principles” we used an arbitrary approach
- For accelerated critical illness we used a similar approach to that used for the AC04 rates. This involved:
  1. Setting a target for insured/CIBT08 at age 85 based on the ratio of insured mortality to population mortality
  2. Extrapolating the ultimate rates to increase steadily to this target and deriving smoker-differentiated rates using an assumed proportion of smokers and an assumed smoker/non-smoker differential at each age
  3. From age 86, increasing the rates steadily to reach unity at age 110
  4. Applying the same select differentials as at core ages for ages up to 65 at entry.

# Older ages – practice (mortality)

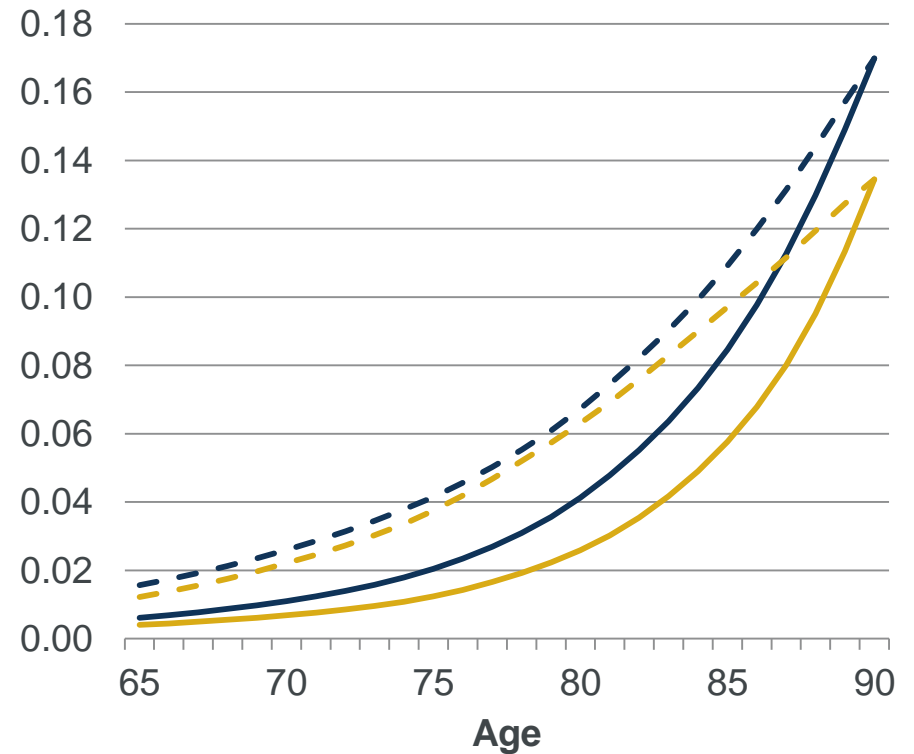
- Based on our “principles” we used an arbitrary approach
- For mortality:
  1. Consider progression of insured/population at
  2. Set a target for insured rates at age 90 of 90% of population mortality (ELT17 projected)
  3. Extrapolating the ultimate rates to increase steadily to this target and deriving smoker-differentiated rates using an assumed proportion of smokers and an assumed smoker/non-smoker differential at each age
  4. From age 86, increasing the rates steadily to reach unity at age 110
  5. Applying the same select differentials as at core ages for ages up to 65 at entry

# Older ages – ultimate rates

## Accelerated Critical Illness



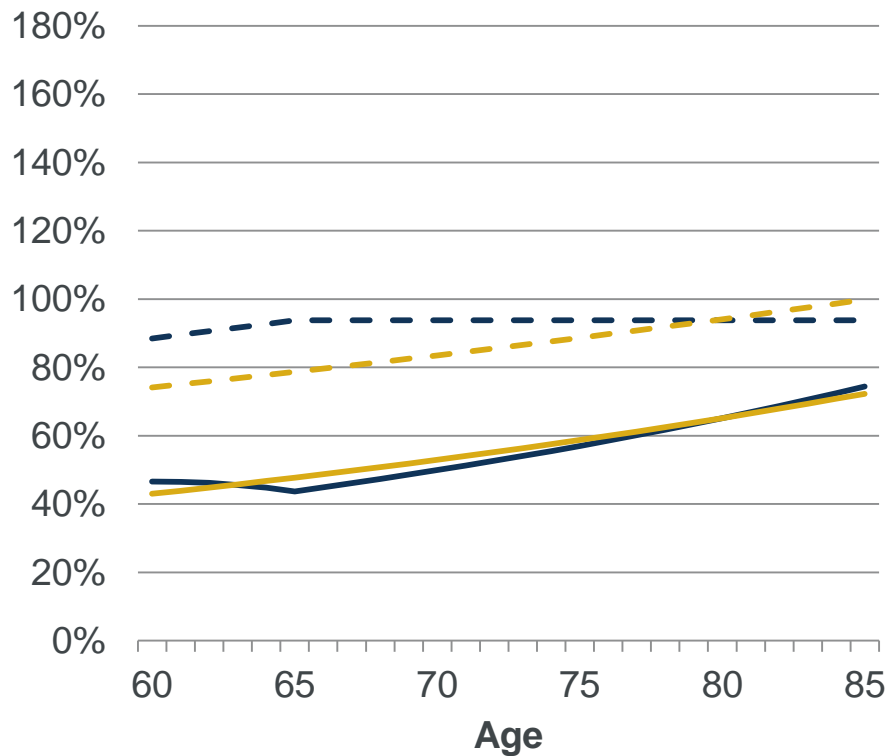
## Mortality



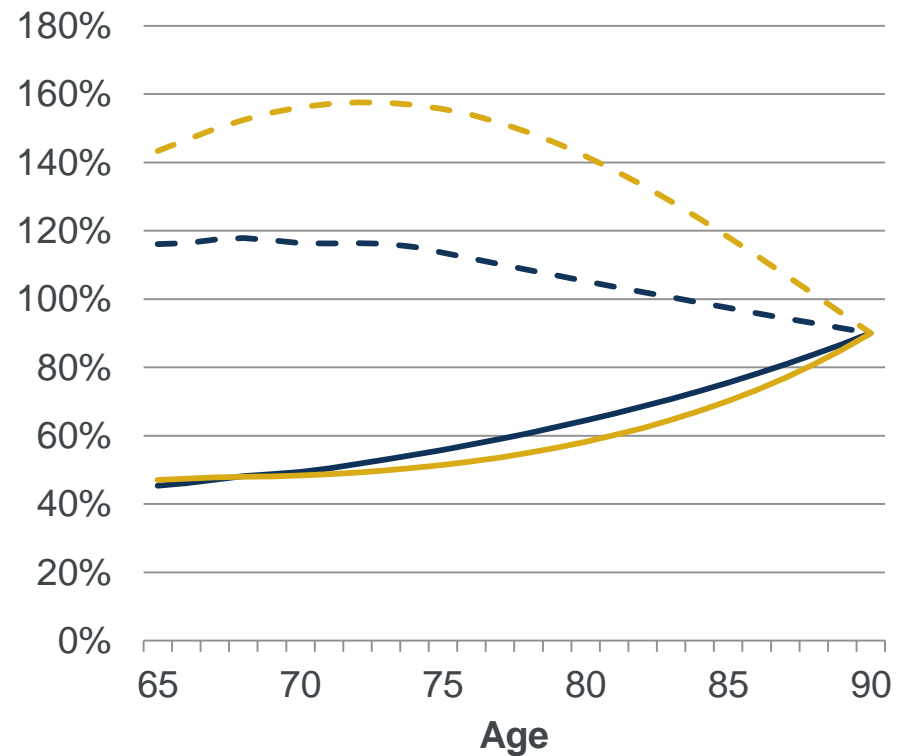
— Male non-smokers    - - Male smokers    — Female non-smokers    - - Female smokers

# Older ages – ultimate rates compared with population tables

## Accelerated Critical Illness



## Mortality

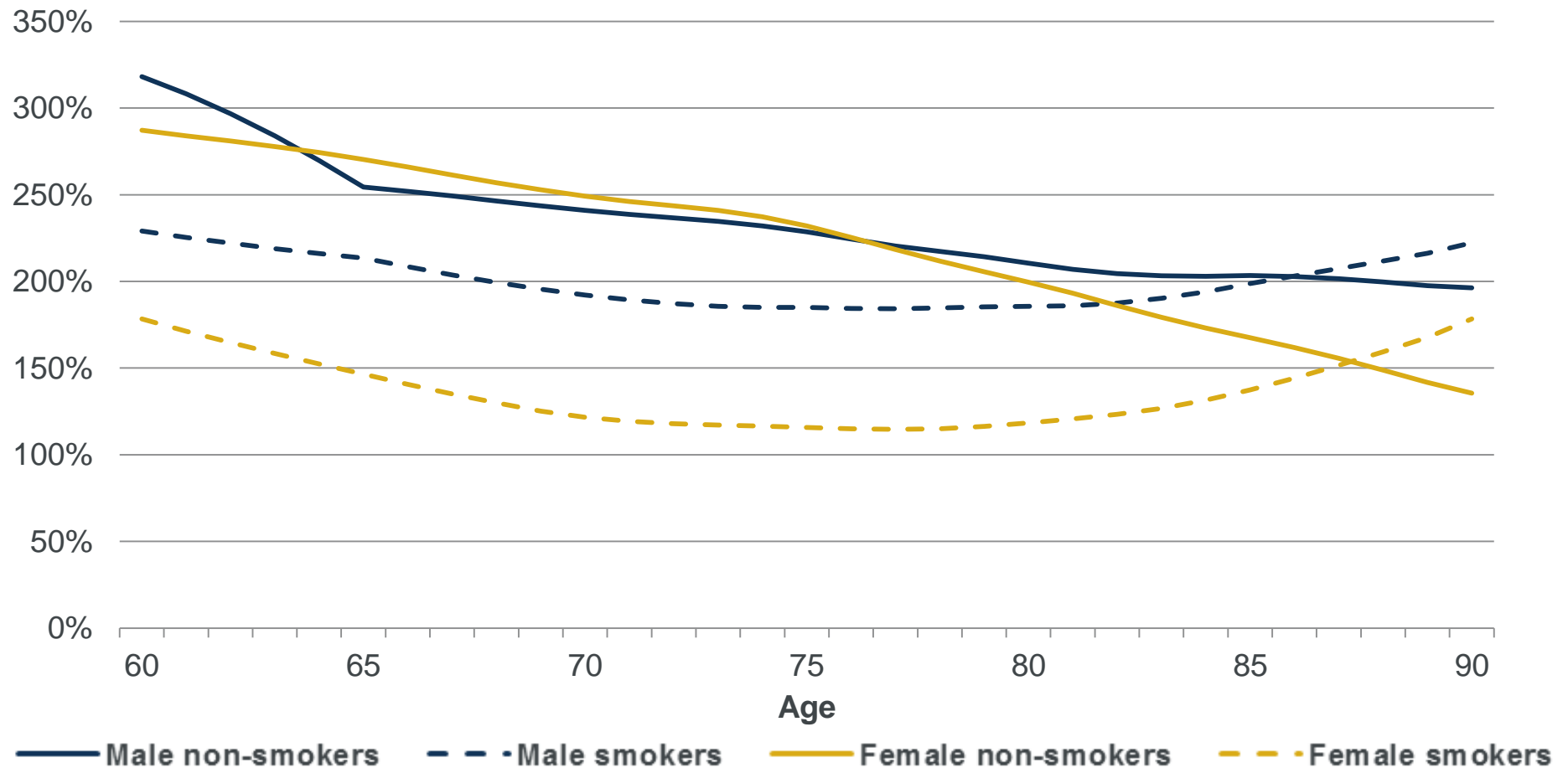


— Male non-smokers    - - Male smokers    — Female non-smokers    - - Female smokers



# Older ages – ultimate rates

## Accelerated critical illness compared with mortality



# Discussion Questions

- Do you agree with our proposed age ranges for the tables?
- Do you consider the approach taken at younger ages to be reasonable?
- Do you consider the approach taken at older ages to be reasonable?

# Summary and next steps

James Tait

# Summary of derivation of proposed tables

- Data collected for 2007-2011 to produce results and rates for 2007-2010
- Early decisions:
  - Not to produce tables for stand-alone critical illness
  - To keep Term assurance data separate from Endowment and Whole Life assurances
  - To produce lives-weighted tables only
- Graduation of ultimate data at core ages using conventional formulae
- Simple approach to discounts in select period
- Potential 10-year select period for female non-smokers on mortality tables led us to restrict that dataset to business written in 2001 and later
- Rates extended to younger and older ages using pragmatic approaches.

# The proposed tables

Table name	Risk Type	Product Type	Gender	Smoker Status
ACMNL08	Accelerated critical illness	Term assurances	Males	Non-smokers
ACMSL08	Accelerated critical illness	Term assurances	Males	Smokers
ACFNL08	Accelerated critical illness	Term assurances	Females	Non-smokers
ACFSL08	Accelerated critical illness	Term assurances	Females	Smokers
TMNL08	Mortality (incl. terminal illness)	Term assurances	Males	Non-smokers
TMSL08	Mortality (incl. terminal illness)	Term assurances	Males	Smokers
TFNL08	Mortality (incl. terminal illness)	Term assurances	Females	Non-smokers
TFSL08	Mortality (incl. terminal illness)	Term assurances	Females	Smokers

# Discussion Questions

- Do you agree with our proposed table names?

# Consultation on the proposed tables

- Consultation covers both the accelerated critical illness tables (Working Paper 89) and the term mortality tables (Working Paper 92)
- Comments that support our proposals are also requested, to ensure that changes are not made in the final tables reflecting a minority view
- Responses to the consultation are requested by **30 November 2016**
- Responses can be sent to [assurances@cmilimited.co.uk](mailto:assurances@cmilimited.co.uk) or they can be submitted online at: <https://www.surveymonkey.co.uk/r/CMI-AC08andT08rates>
- All responses will be shared with members of the Committee. A summary of responses and a list of respondents may then be made more widely available but we will not attribute comments to particular companies or individuals.

# Future work

- The Committee is keen to receive outstanding Term assurances data for 2011-2015 and has a target date of 31 Dec 2016 for submissions to allow:
  - All-offices results for 2011-2014 to be produced early in 2017
  - Analysis of 2007-2014 experience; e.g. the apparent reduction in mortality experience between 2007 and 2010
- Consult key writers of Whole Life policies to assess potential for an exercise to collect data for underwritten and non-underwritten business
- Possible extensions to Term mortality & CI analyses for data from 2015:
  - Rated cases
  - Lapse analysis
  - Children's CI
  - Declined claims
- Is there anything else that you think it would be valuable for us to analyse?



# Key Discussion Questions

- Do you agree with our proposals that the tables:
  - are based only on term assurance data?
  - are for non-smokers and smokers only (not combined)?
  - for mortality are based only on policies written from 2001?
  - reflect age, gender, duration and smoker status only?
- Do you have any comments on the graduations themselves?
- Do you agree with our proposed age ranges for the tables?
- Are the approaches taken at younger and older ages reasonable?
- Do you agree with our proposal not to produce separate tables for endowments or stand-alone critical illness, and to seek “better” data for whole life assurances?



# Questions



# Comments

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

Please send any additional questions, views or feedback to:  
[assurances@cmilimited.co.uk](mailto:assurances@cmilimited.co.uk).



# Continuous Mortality Investigation

Institute and Faculty of Actuaries

Continuous Mortality Investigation Limited

Registered in England & Wales (Company number: 8373631)

Registered Office: 7<sup>th</sup> floor, Holborn Gate, 326-330 High Holborn, London, WC1V 7PP

Correspondence address: Cheapside House, 138 Cheapside, London, EC2V 6BW, United Kingdom

Email: [info@cmilimited.co.uk](mailto:info@cmilimited.co.uk)

Tel: +44 20 7776 3820

Website: [www.cmilimited.co.uk](http://www.cmilimited.co.uk) (redirects to [www.actuaries.org.uk](http://www.actuaries.org.uk))

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