Latest developments in life expectancy: The NAPF longevity model

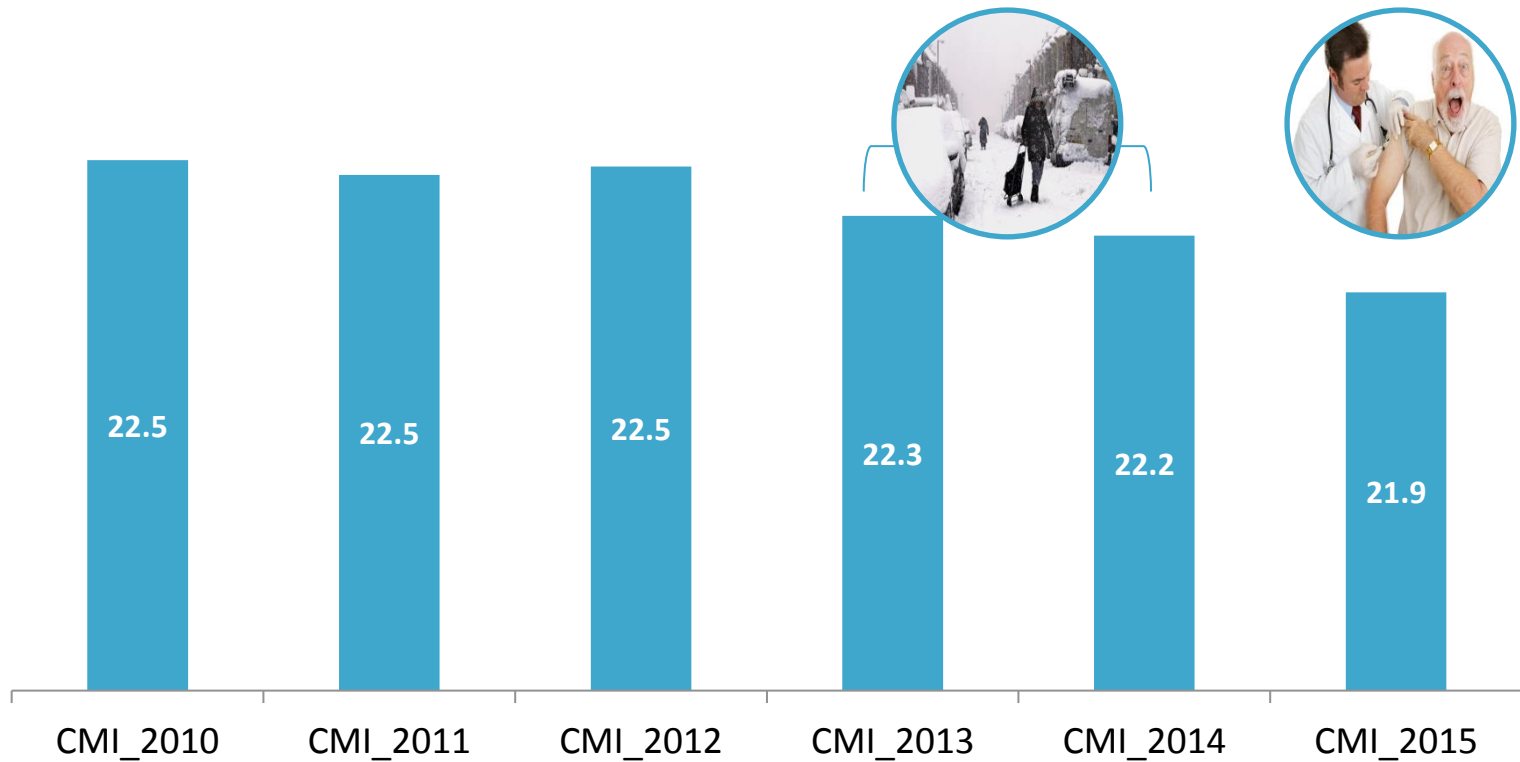**Presentation to Birmingham Actuarial Society**

Steven Baxter

8 September 2015

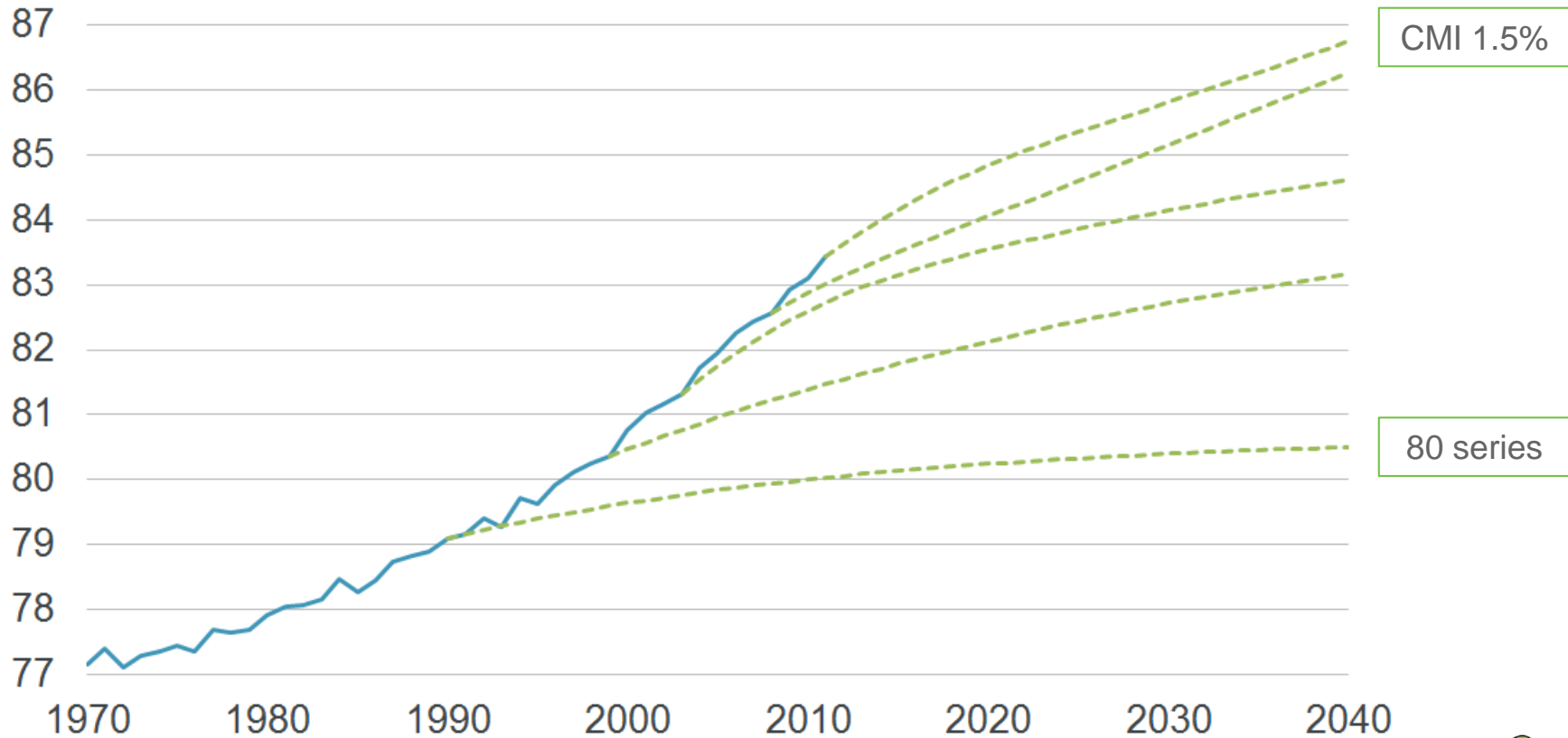# Developments last week: CMI15

Life expectancy for man aged 65
(man aged 65 in 2011, base table S2PMA,
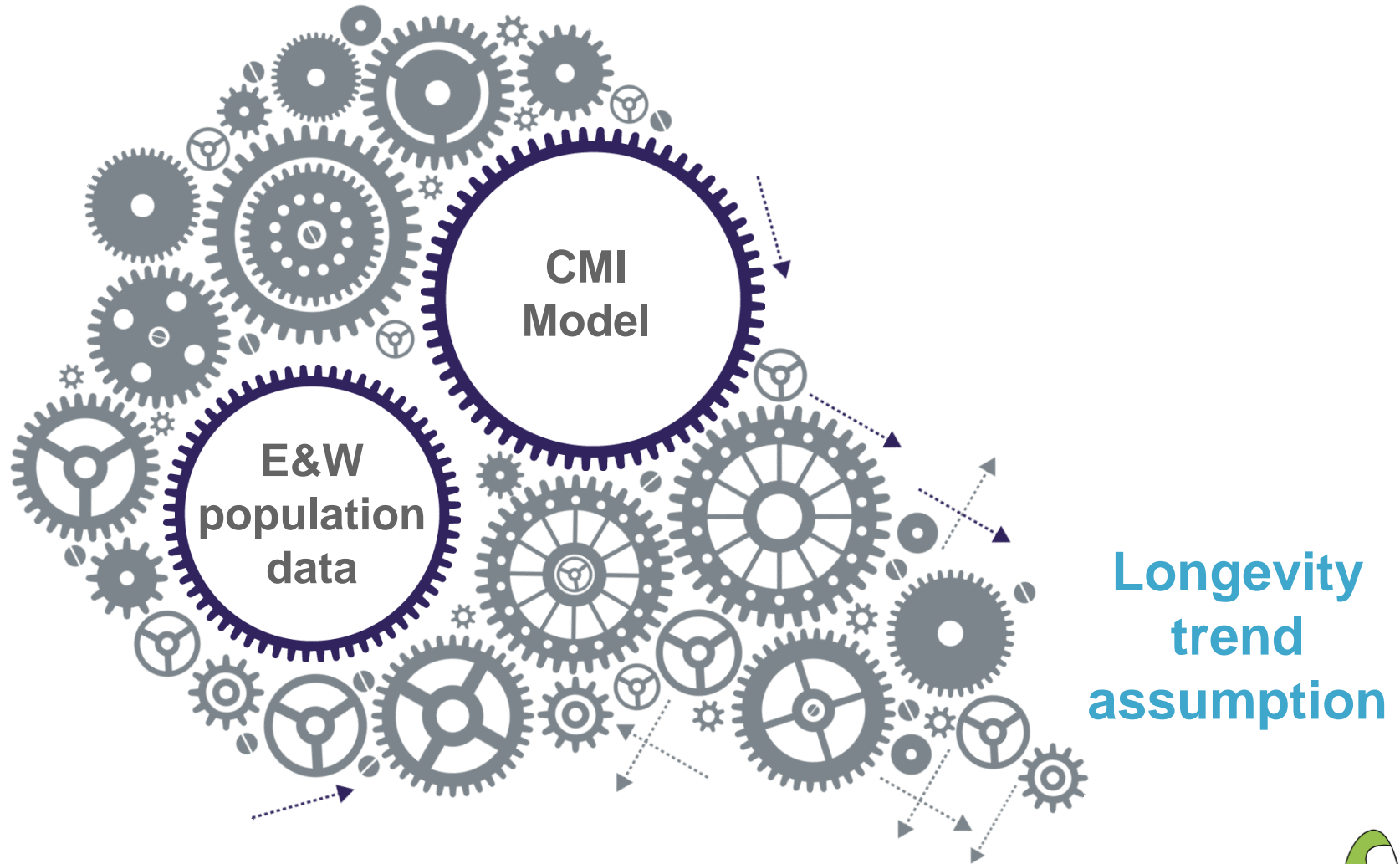core CMI model with 1.5% long term rate)

CMI_2010	CMI_2011	CMI_2012	CMI_2013	CMI_2014	CMI_2015
22.5	22.5	22.5	22.3	22.2	21.9

Longevity trends

Life expectancy of a man aged 65
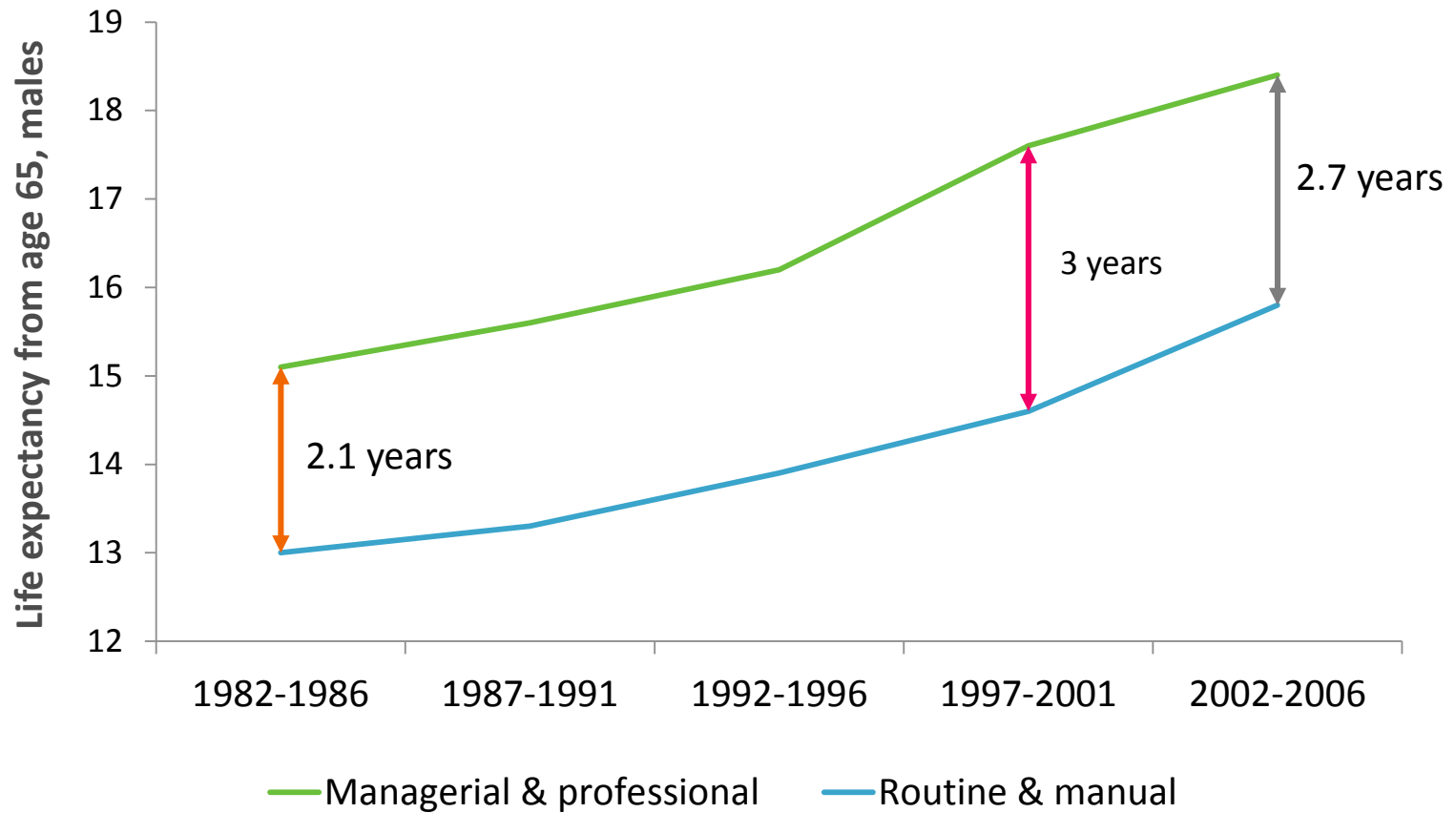**(Period life expectancy, blue line observed, green dotted lines projections)**

CMI 1.5%

80 series

Reflecting on current practice

CMI Model

E&W population data

Longevity trend assumption

Digging beneath the surface

Period life expectancy at 65 for men
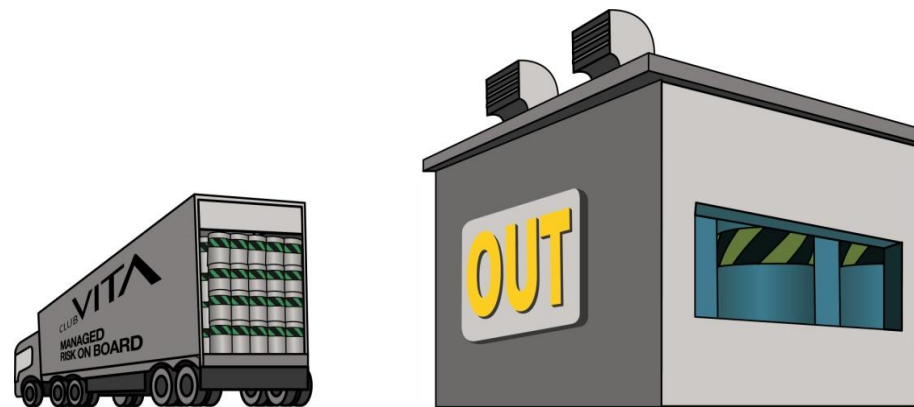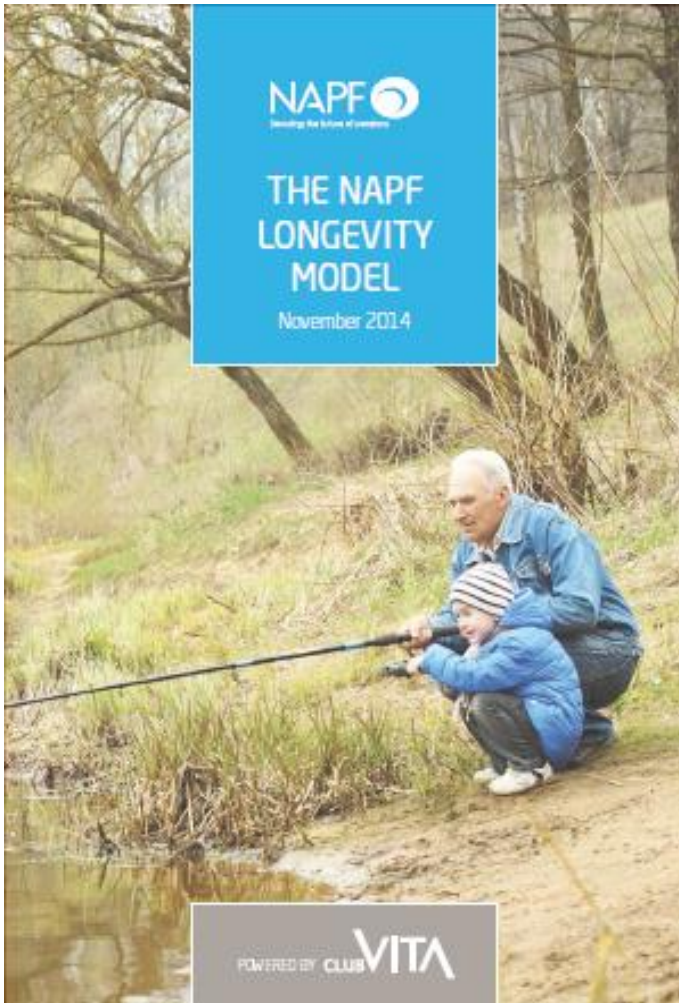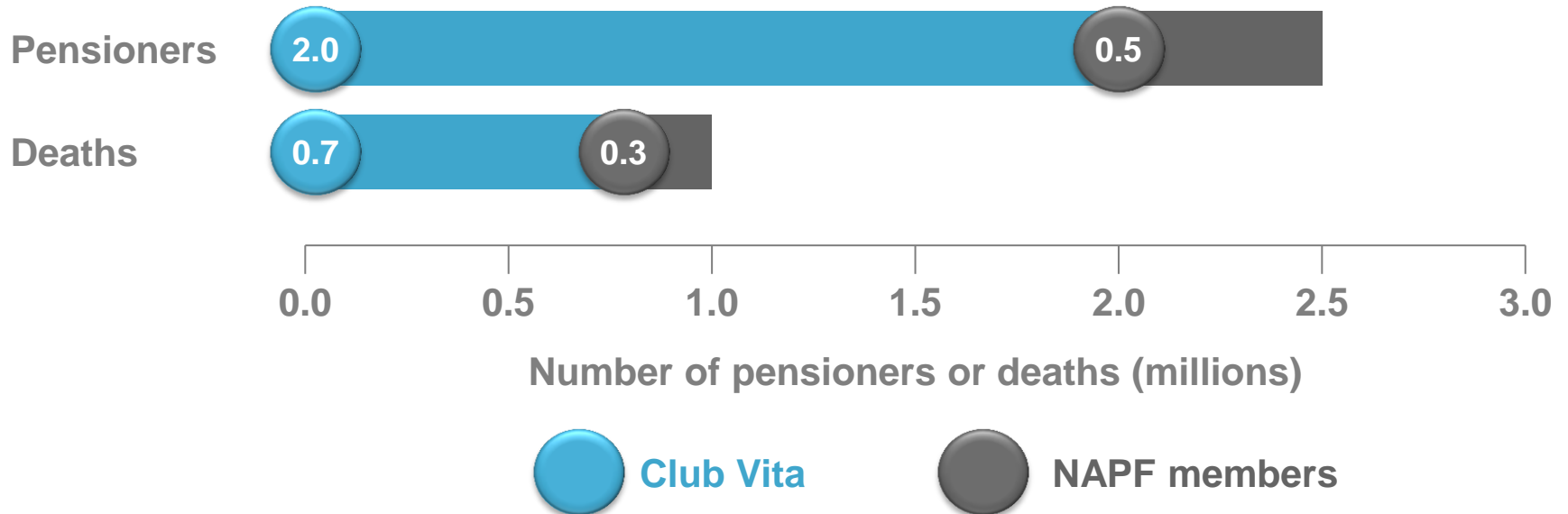

Source: ONS

NAPF Longevity Model

NAPF longevity model

- Longevity trends have differed by socio economic groups

- Forms foundation of a **six future scenarios**

- Posed three questions of advisors

Data

Number of pensioners or deaths (millions)

Club Vita — NAPF members

- We assembled a large, quality-checked dataset to ensure our results would be credible and reliable

- We can recognise the differences between E&W population and DB schemes in longevity assumptions

Forming longevity trend groups

Public vs Private

Location

Pension amount

Lifestyle measures

Industry

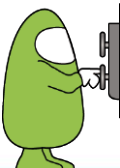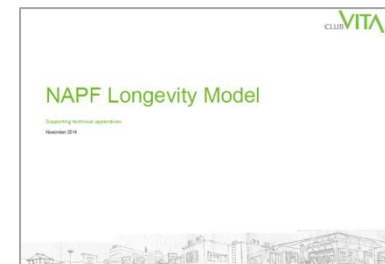Deprivation

Occupation

Salary

Gender

Method used to form the groups
A technical interlude

- Clustering based on pension and deprivation

- Split pension into 4 groups and 5 deprivation quintiles

- Clustered according to six core principles

- 3 groups for men and 2 groups for women

- Used combination of methods:
  - Partitioning about medoids
  - Fuzzy analysis

Principles

1. Credible size groups
2. Clear differences in improvements between groups
3. Group where similar improvements
4. Separate clear differences in mortality levels
5. Interpretable
6. Manageable number

NAPF Longevity Model

Longevity trend groups

Men

Pension amount	Deprivation of the area				
	High deprivation		Low deprivation		
< £5k p.a.	Hard-pressed		Making do		
£5k - £7.5k p.a.					
> £7.5k p.a.		Comfortable			

Women

Deprivation of the area	
High deprivation	Low deprivation
Hard-pressed	Making do/ comfortable

Longevity trend groups - experience
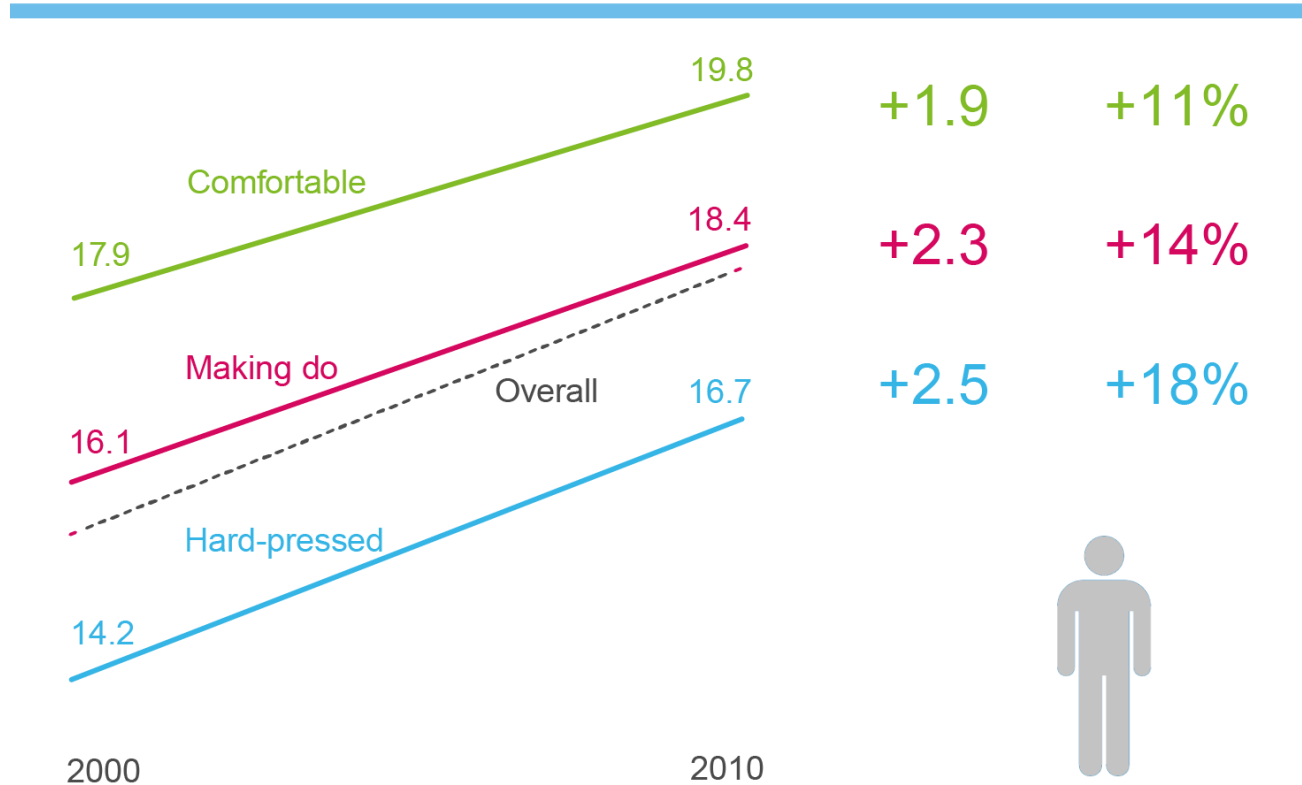
Change in period life expectancy	Years	%

Comfortable: 17.9 → 19.8, +1.9, +11%

Making do: 16.1 → 18.4, +2.3, +14%

Overall

Hard-pressed: 14.2 → 16.7, +2.5, +18%

2000   2010

Longevity trend groups - experience

Change in period life expectancy | Years | %

Making do / comfortable

+1.6   8%

21.3

19.7

Overall

+2.0   11%

19.6

Hard-pressed

17.6

2000   2010
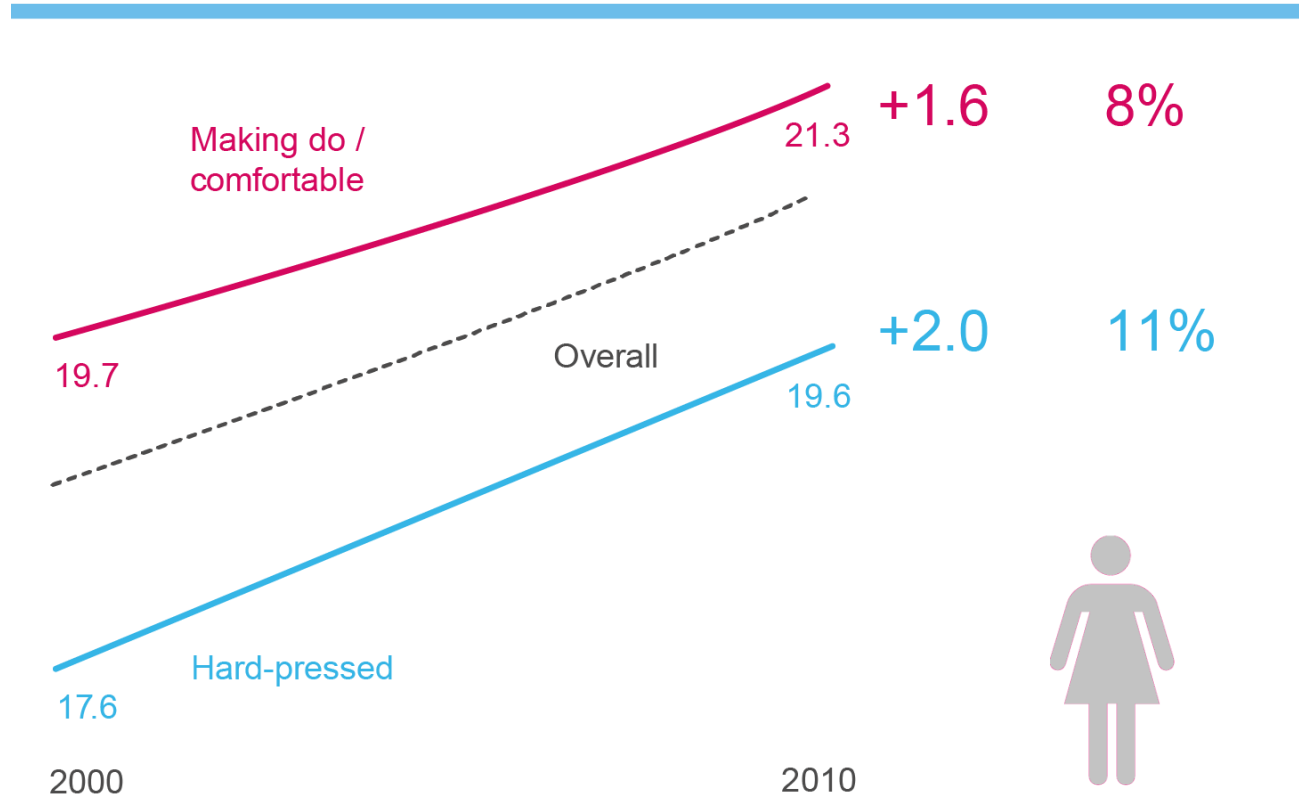
Supporting evidence:
Recent research from Kings Fund

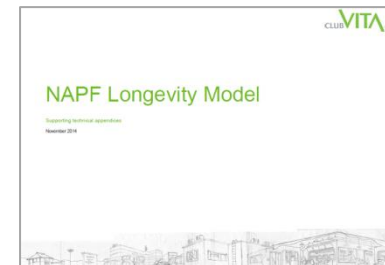Figure 3 Original (1999–2003) and updated (2006–10) Marmot curves – life expectancy by percentiles of income deprivation for English MSOAs (2011 Census geography)
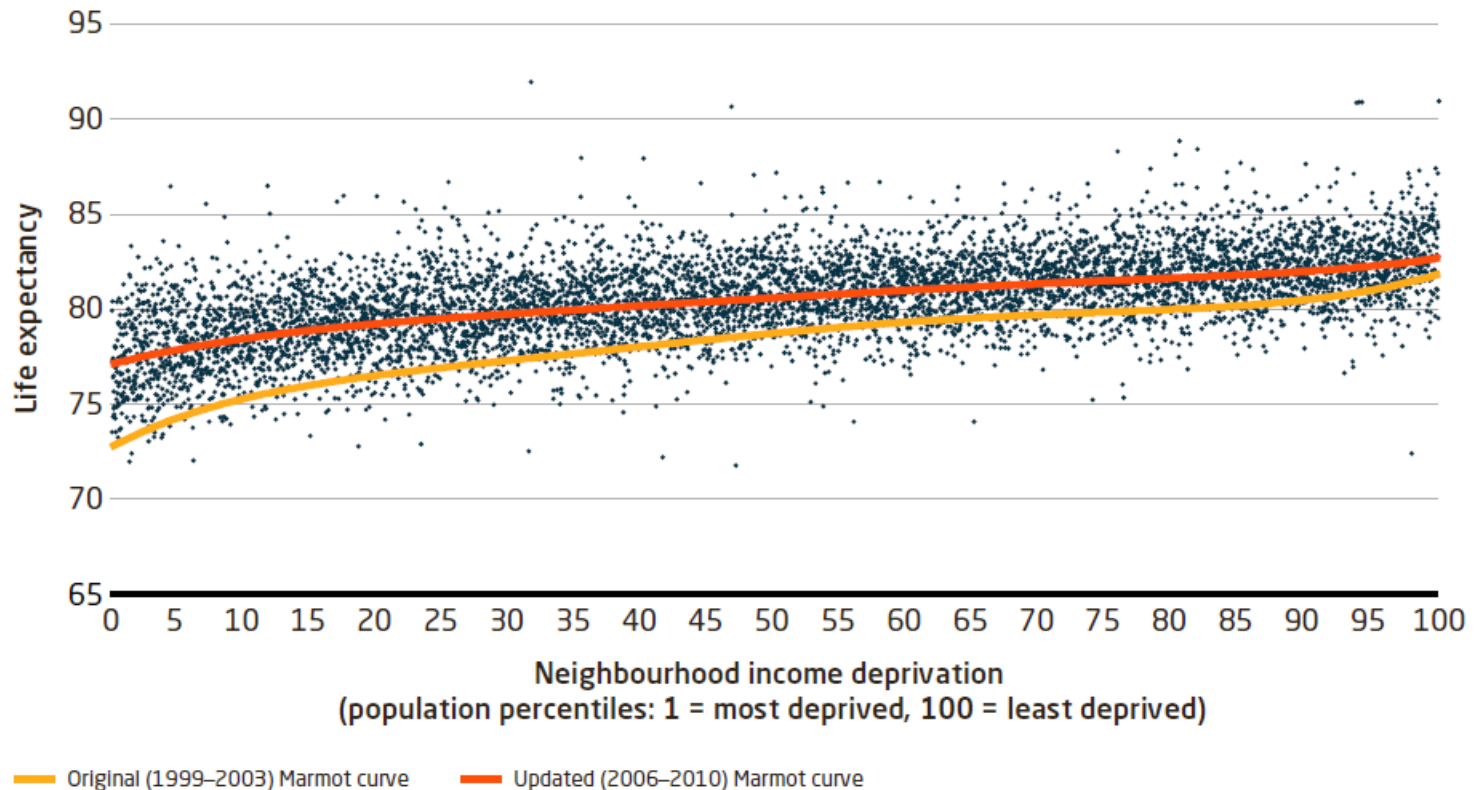
Embedding these differences in projections
A technical interlude

- Have calibrated initial rates for CMI model

- Four step process

    1. CMI approach to aggregate Club Vita / NAPF data to get age-period-cohort decomposition of initial rates

    2. Smooth data for each longevity trend group as per CMI approach

    3. Determine age-period-cohort decomposition for each trend group allowing for cohort effect to be 'inherited' from aggregate data

    4. Pragmatic extension to younger cohorts / older ages
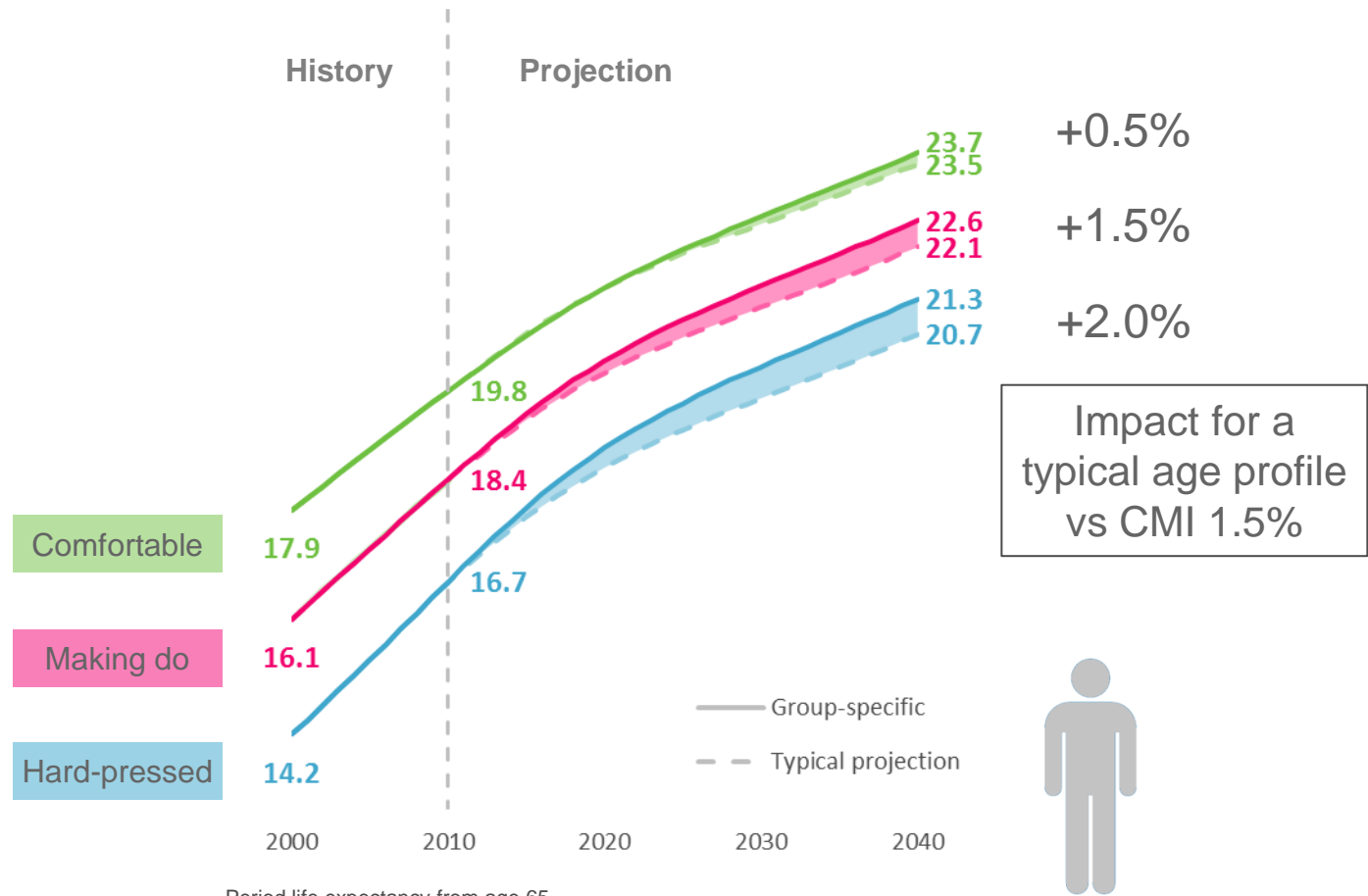
NAPF Longevity Model

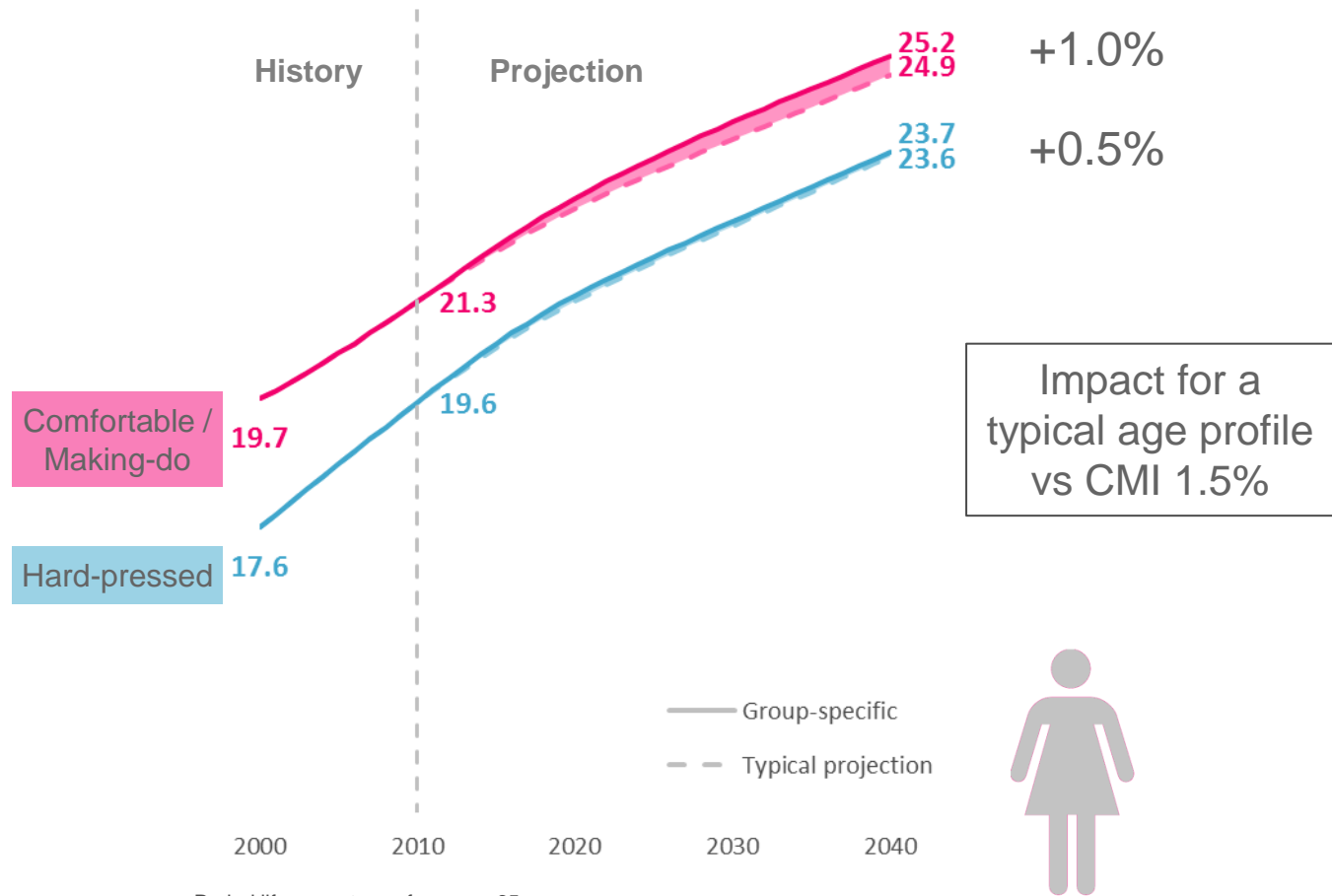# Projecting the future:
Revising the CMI starting rates

Period life expectancy from age 65
Typical projection is CMI model with CMI starting improvement and 1.5% long-term rate

Projecting the future:
## Revising the CMI starting rates

History | Projection

Comfortable / Making-do 19.7
Hard-pressed 17.6

21.3
19.6

25.2
24.9 **+1.0%**

23.7
23.6 **+0.5%**

Impact for a typical age profile vs CMI 1.5%

——— Group-specific
– – – Typical projection

2000   2010   2020   2030   2040

Period life expectancy from age 65
Typical projection is CMI model with CMI starting improvement and 1.5% long-term rate
Source: Kings Fund – Inequalities in life expectancy (2015)

NAPF Longevity Scenarios
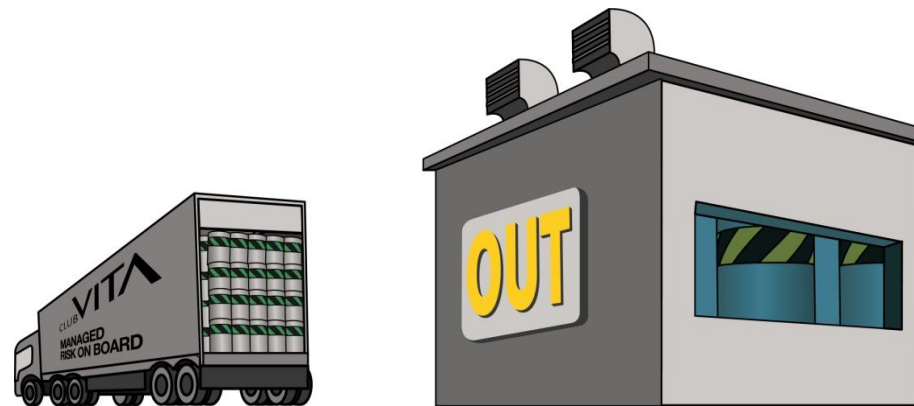
Range of scenarios

Low trend scenarios	Central(ish) scenarios	High trend scenarios

Back to the fifties	Challenging Times	Improvement decline	Health Cascade	Cancer revolution	Extended Youth

Do not suggest is that some of these scenarios are better than others, represent or even place outer boundaries on what we might experience in the future. The purpose of sharing these scenarios is purely to support more informed discussions between the key stakeholders in managing pension schemes – trustees, sponsoring companies and their advisors and service providers.

Health cascade

Health cascade

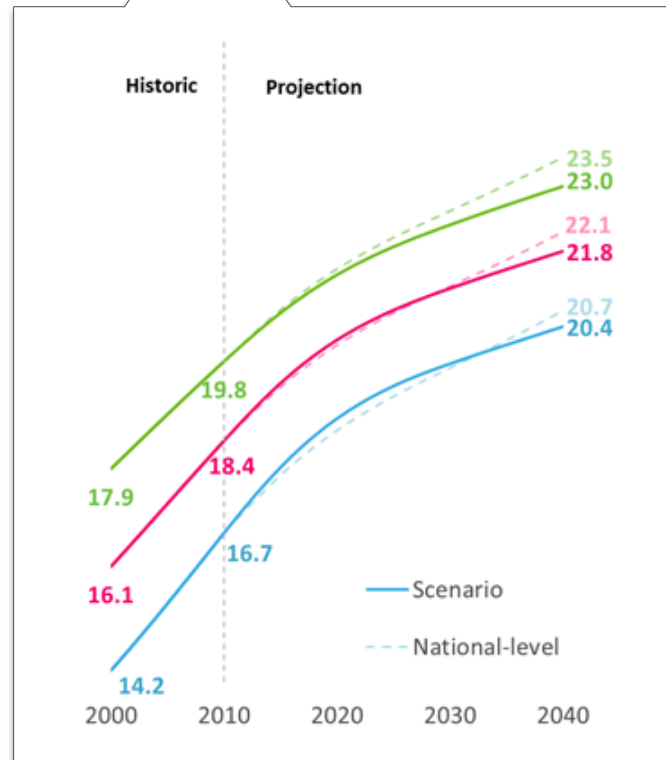# Improvement decline

Improvement decline

| Back to the fifties | Challenging Times | Improvement decline | Health Cascade | Cancer revolution | Extended Youth |

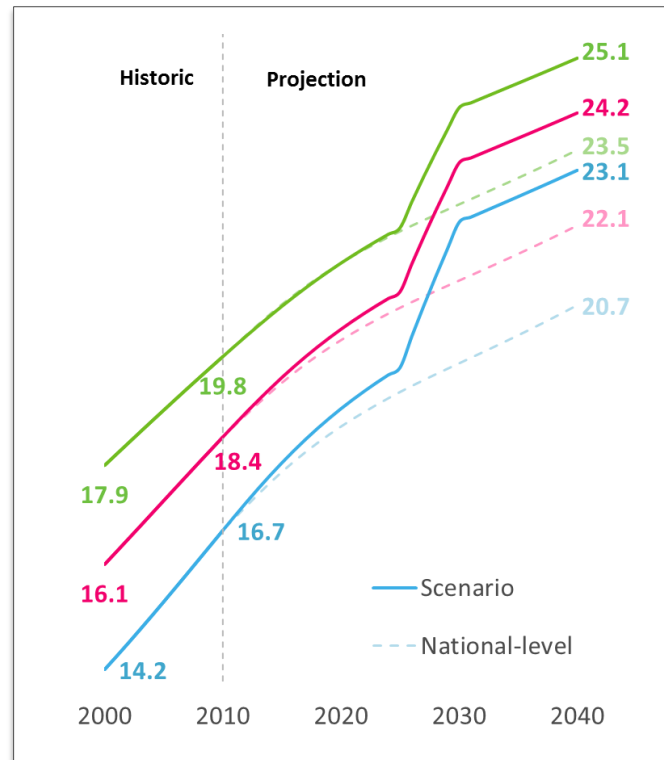# Cancer revolution

Cancer revolution

| Back to the fifties | Challenging Times | Improvement decline | Health Cascade | Cancer revolution | Extended Youth |

Challenging Times

Challenging times

Extended Youth

Back to the Fifties

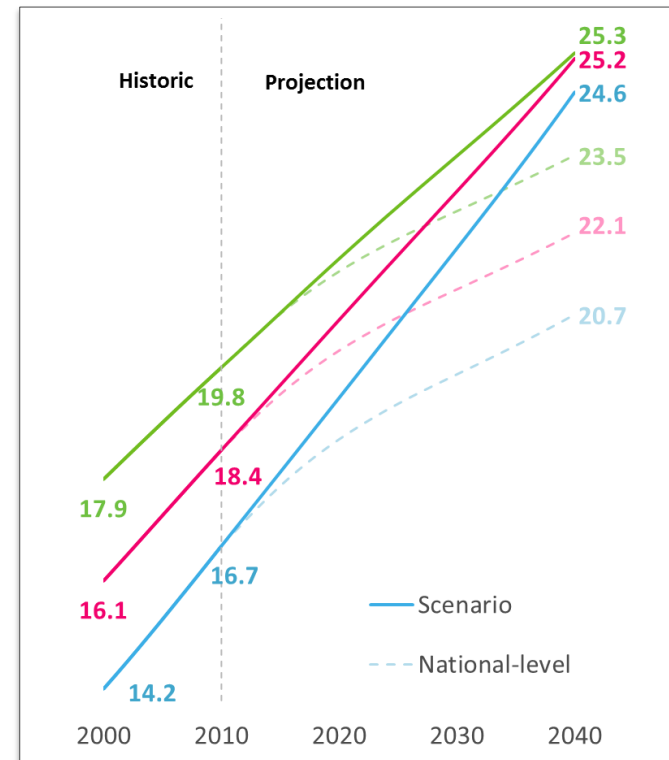# Back to the fifties / extended youth
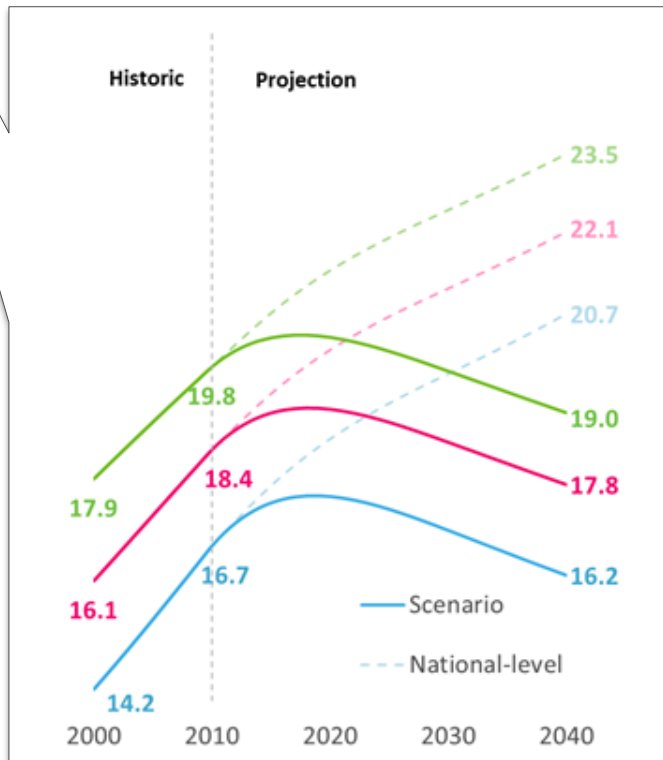
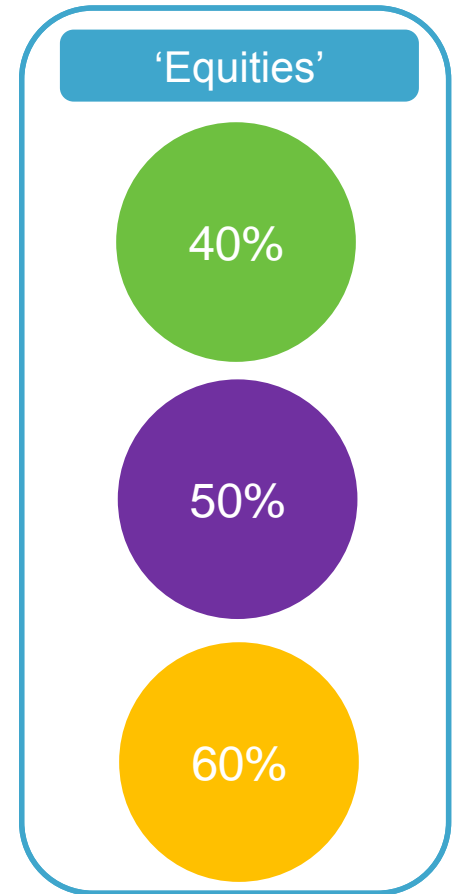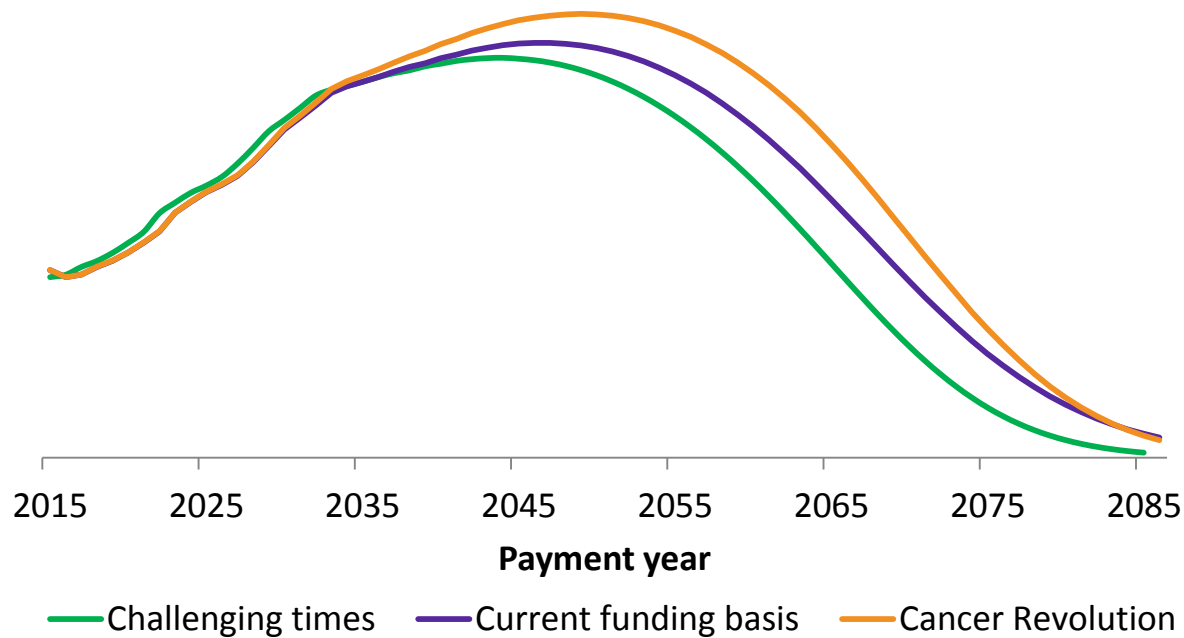| Back to the fifties | Challenging Times | Improvement decline | Health Cascade | Cancer revolution | Extended Youth |

What does this mean for DB schemes?

Questions posed to trustees / pension scheme managers

1. What starting point is being used for the longevity trend assumption?

2. If we were to use the longevity groups set out in the NAPF research report, what would be the impact on scheme liabilities?

3. How would our funding and investment strategies change if longevity trends developed in line with one of the scenarios set out in the NAPF research report (e.g. 'cancer revolution') or another plausible scenario?

A case study

Future cashflows from the pension scheme

Legend:
— Challenging times — Current funding basis — Cancer Revolution

X-axis: Payment year (2015, 2025, 2035, 2045, 2055, 2065, 2075, 2085)

'Equities'
- 40%
- 50%
- 60%

Example pension scheme with typical age profile. 85% funded with a 15 year recovery plan under current funding basis. 50% in risk seeking assets. Alternative recovery plans and asset mixes calculated assuming only that part of the funding/investment strategy is revised. Risk seeking assets assumed to return 2% over swaps yield curve.

Reference material
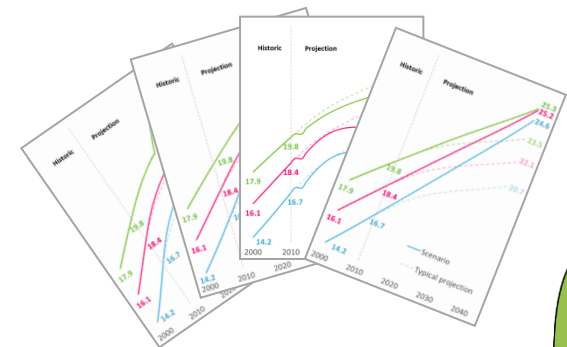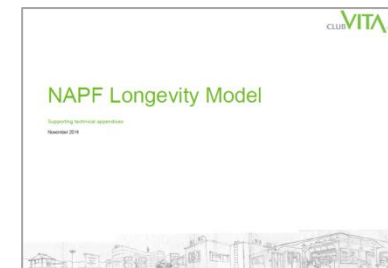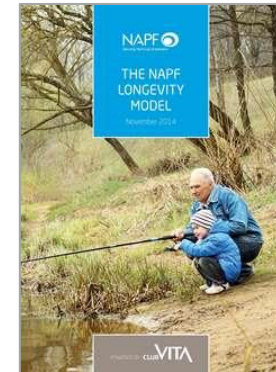
Summary of the research:

http://www.napf.co.uk/longevity-model

Longevity Model:

http://www.napf.co.uk/~/media/Policy/Documents/0414_Longevity_model_Nov14_2.pdf

Technical Report:

http://www.clubvita.co.uk/SiteCollectionDocuments/NAPF%20Technical%20Report.pdf

CLUBVITA

The independent longevity risk management specialists