



Institute
and Faculty
of Actuaries

The breakdown of society... ...by past and projected mortality experience

Steven Baxter, Hymans Robertson LLP
Alice Woolley, RMS

03 May 2017

The next 30 minutes...



Historical perspective...



Building projections...

03 May 2017



2



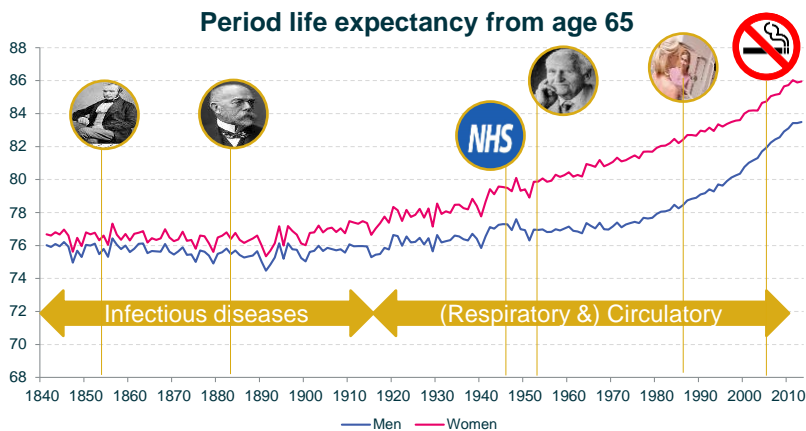
Institute and Faculty of Actuaries

A social history of improvements

Why socio-economics matter

advertise
 Sponsorship
 Thought leadership
 Progress
 Community
 Sessional Meetings
 Education
 Working parties
 Volunteering
 Research
 Shaping the future
 Networking
 Professional support
 Enterprise and risk
 Learned society
 Opportunity
 International profile
 Journals
 Support

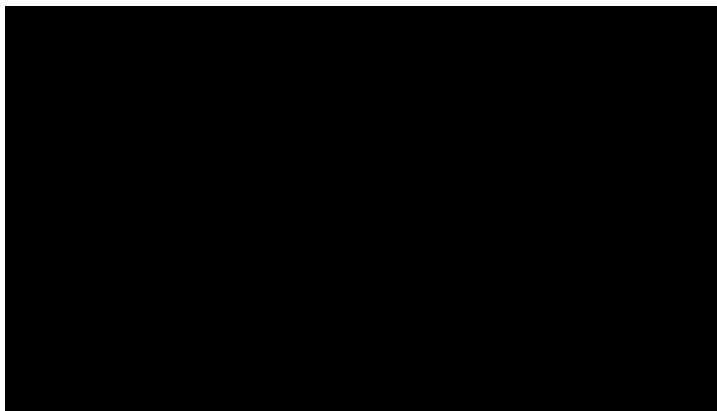
170 years of longevity..



Source: Hymans Robertson using data from ONS and Human Mortality Database



A long history of socio-economic differences



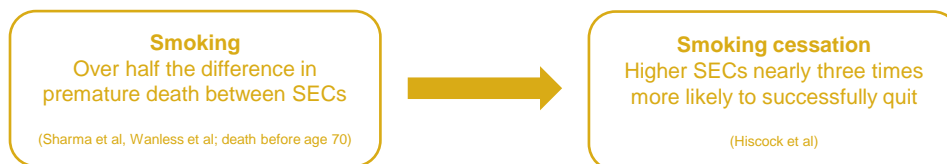
Source: BBC via YouTube

03 May 2017



5

Why socio-economics matter

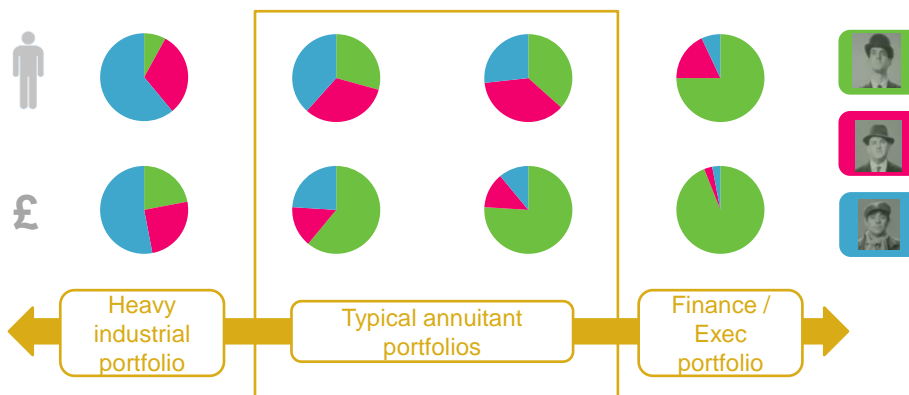


03 May 2017



6

Why socio-economics matter



Source: Club Vita. Coloured areas relate to Club Vita based socio-economic classes (VitaSegments) which are subtler than the Cleese / Barker / Corbett socio groupings.



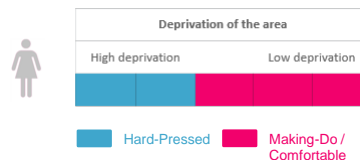
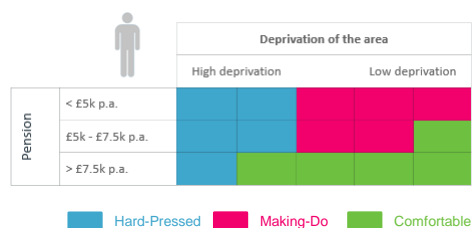
03 May 2017

7

VITASEGMENTS

Key features

1. Calibrated to over 20 years of BPA back history
2. Based on 2m+ lives / 60k annual deaths
3. Use widely available variables
4. Statistically credible groups capturing differences in historical mortality improvements



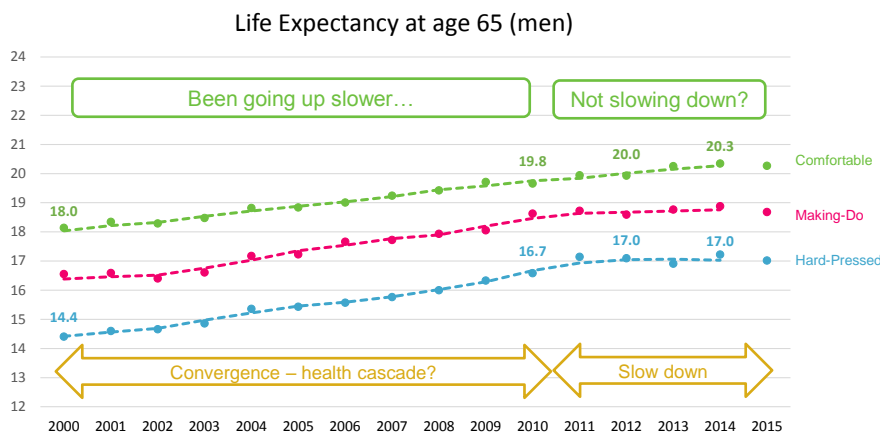
Source: Club Vita



03 May 2017

8

Latest emerging evidence



Notes to chart:
 (i) Points relate to life expectancy for the calendar year (using crude mortality smoothed over the age range via a Gompertz curve)
 (ii) Dashed lines apply three year smoothing (i.e. calendar year and year prior and after)
 (iii) Labels relate to the values under three year smoothing

Source: Club Vita / Hymans Robertson



03 May 2017

9

Underlying improvements

Group	Annualised mortality improvement (age-standardised)		
	2000-2005	2005-2010	2010-2015
England & Wales	2.8% (±0.1%)	2.8% (±0.1%)	1.1% (±0.1%)
Club Vita	2.4% (±0.5%)	2.8% (±0.3%)	1.3% (±0.4%)

- 1
- 2
- 3

- 1 Annuitant improvements mirror national data on a **lives** basis (including recent slowdown)
- 2 Comfortable annuitants who dominate liabilities seen **stabler** improvements and no recent slow down
- 3 Lower socio-economic groups had been catching-up (convergence, 2005-2010)...
...but recently slowed down (divergence, 2010-2015)

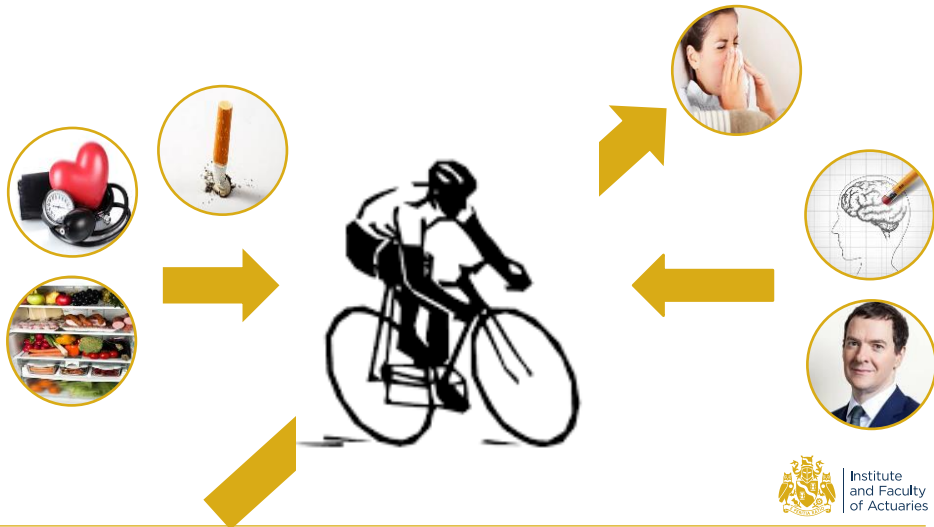
Source: Club Vita / Hymans Robertson. Confidence intervals calculated consistently with the approach set out in CMI WP97



03 May 2017

10

Tail winds, head winds and side winds...



Unpacking the VitaSegments

Hard-pressed



Comfortable



Source: Club Vita / Hymans Robertson. Statistics quoted during seminar using Club Vita data and data from English Longitudinal Study of Ageing (ELSA) All comments relate to those in retirement with DB pensions (typically aged 65+)



Institute and Faculty of Actuaries

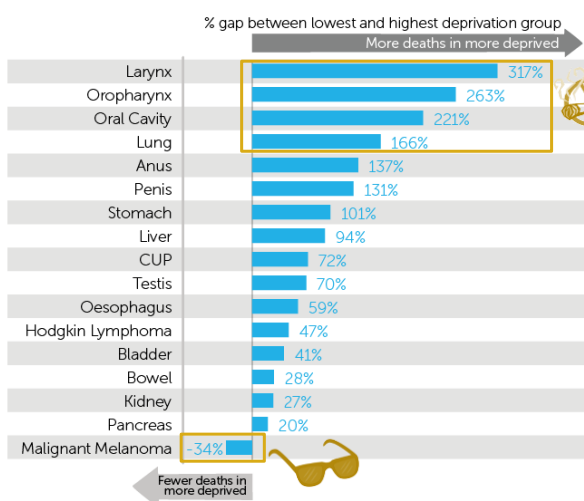
Does it make sense to segment projections by socio-economic class?

03 May 2017

advertise
 sponsorship
 Thought leadership
 Progress
 Community
 Seasonal Meetings
 Education
 Working parties
 Volunteering
 Research
 Shaping the future
 Networking
 Professional support
 Enterprise and risk
 Learned society
 Opportunity
 International profile
 Journals
 Support



Cancer mortality varies between SECs



Percentage Deprivation Gap in Age-Standardised Mortality Rates
(Males, England 2007-2011)



Does one trend fit all?

Industry Assumption:

New developments in the real world will trigger similar responses across SECs.

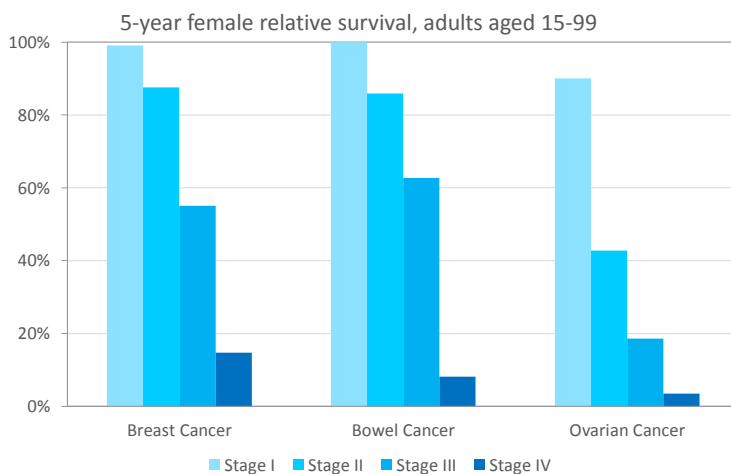


03 May 2017

15



Cancer survival rates vary



Early detection is strongly linked with higher survival rates

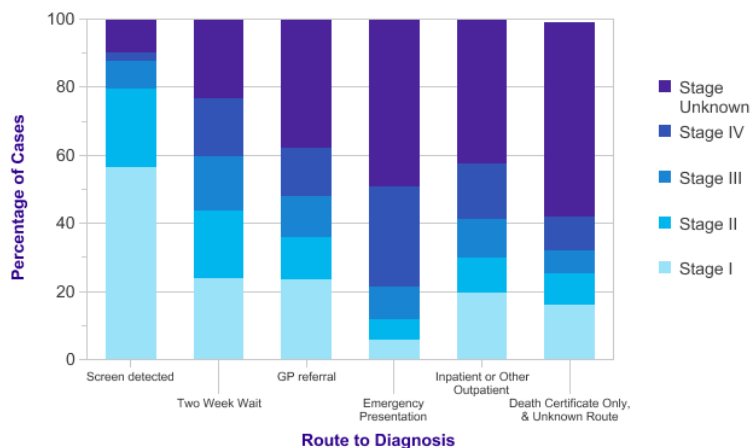


03 May 2017

16



Cancer screening



Screening is the most effective tool for catching cancer sooner



03 May 2017

17

GUT

Responses to screening programs vary by SEC

Bowel Cancer screening

- **2006**: screening using blood tests can reduce mortality by up to 25%.
- Screening uptake showed marked differences by SEC.
- **2015**: more invasive screening test (tiny camera) can reduce mortality by up to 43%.
- “People from poorer neighborhoods were less likely to take up the offer than those in affluent areas”

IMD quintile	Uptake of faecal occult blood test screening (%)
5 (most deprived)	41.7
4	50.1
3	55.5
2	59.6
1 (least deprived)	61.4



03 May 2017
Richard F A Logan et al. Gut doi:10.1136/gutjnl-2011-300843

18

Does one trend fit all?

Industry Assumption.

New developments in the real world will trigger similar responses across SECs.

REJECT?



03 May 2017

19

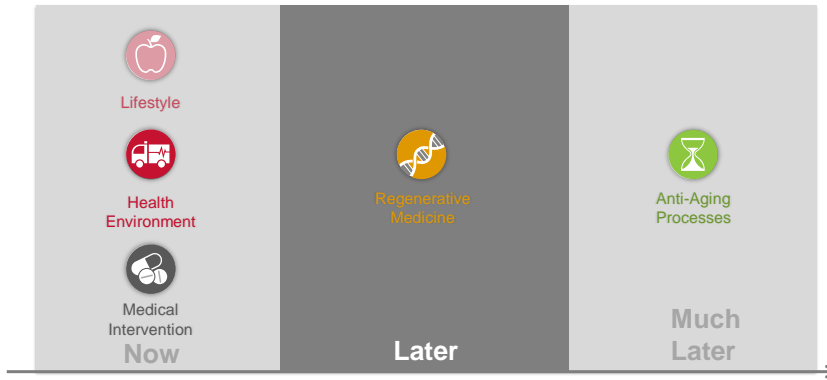


Institute and Faculty of Actuaries

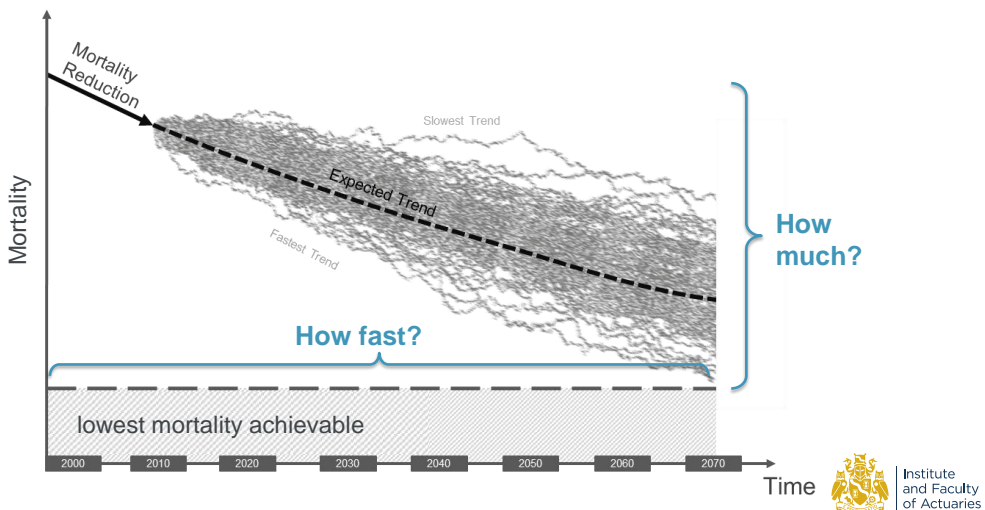
Building a segmented longevity trend model

03 May 2017
 advertise
 Sponsorship
 Thought leadership
 Progress
 Community
 Sessional Meetings
 Education
 Working parties
 Volunteering
 Research
 Shaping the future
 Networking
 Professional support
 Enterprise and risk
 Learned society
 Opportunity
 International profile
 Journals
 Support

What is driving the changes in mortality rates?



Medically informed projection constraints



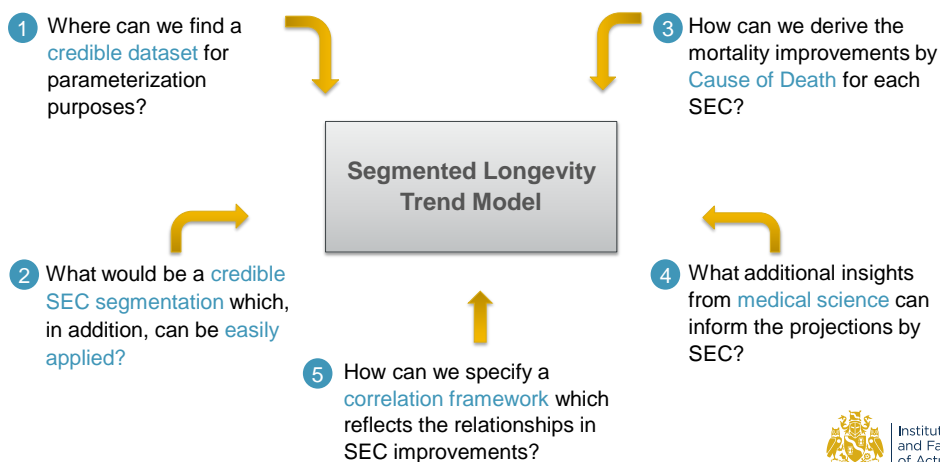
Quantifying lowest mortality: Lifestyle



03 May 2017

23

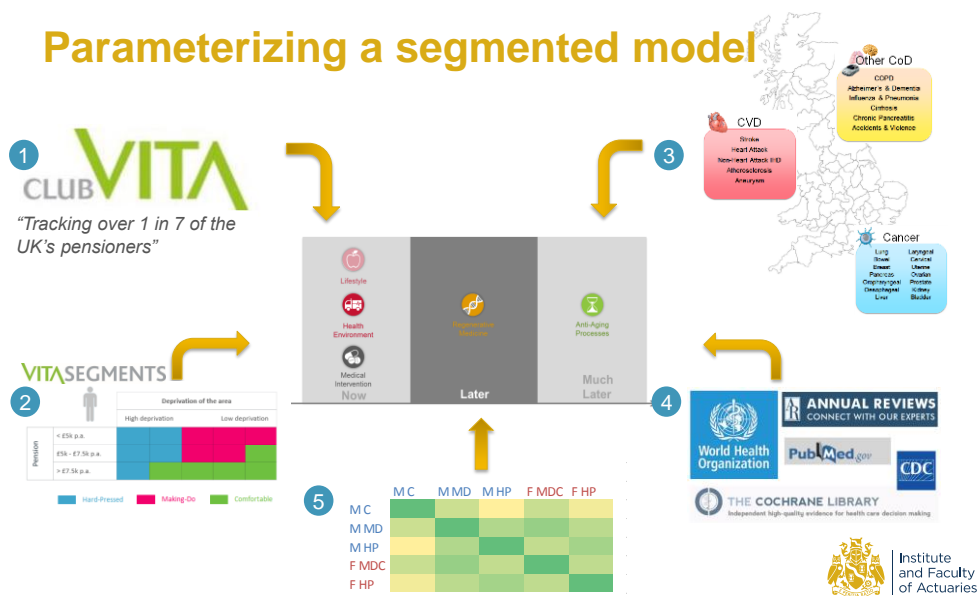
Parameterizing a segmented model



03 May 2017

24

Parameterizing a segmented model



03 May 2017

25



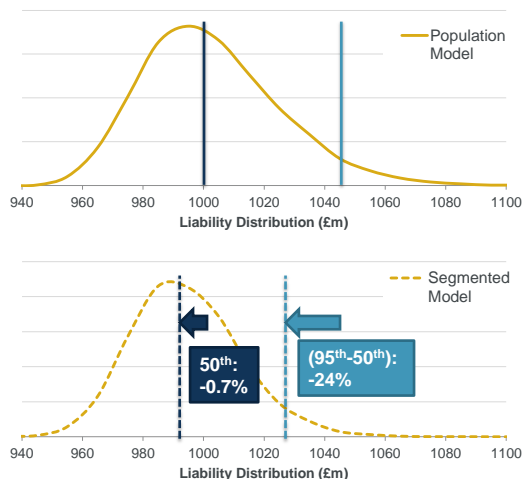
Institute and Faculty of Actuaries

What could trend segmentation mean for my business?

- Artisan
- Sponsorship
- Thought leadership
- Progress
- Community
- Sessional Meetings
- Education
- Working parties
- Volunteering
- Research
- Shaping the future
- Networking
- Professional support
- Enterprise and risk
- Learned society
- Opportunity
- International profile
- Journals
- Support

03 May 2017

Impact on Illustrative Book



Scenario: heterogeneous pool of annuity business, size £1bn

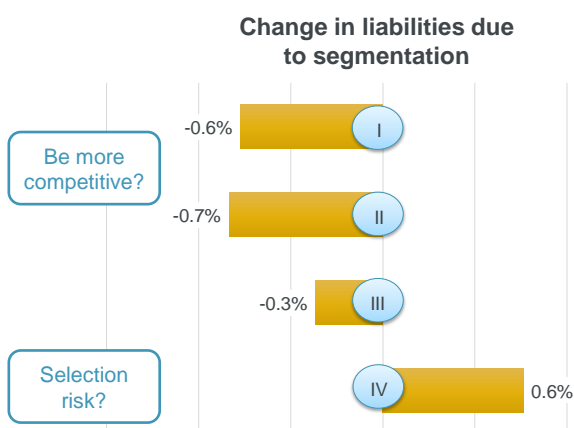
- 1 Reduced best estimate:
 - Better reflecting socio-economic composition of business
- 2 Reduced risk distribution:
 - Greater certainty in trends for some SECs
 - Reduced basis risk
 - Diversification across SECs



03 May 2017

27

Implications for New Business



Scenario: 4 identically-sized pension schemes

Segmented approach refines liability estimates:

- Better pricing
- Improved risk selection
- Enhanced competitiveness



28

Summary

One size does not fit all

Socio-economic differentiation offers commercial opportunities

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.