

Recent Developments in the UK longevity market

Longevity 11
Lyon

Phil Simpson

9 September 2015



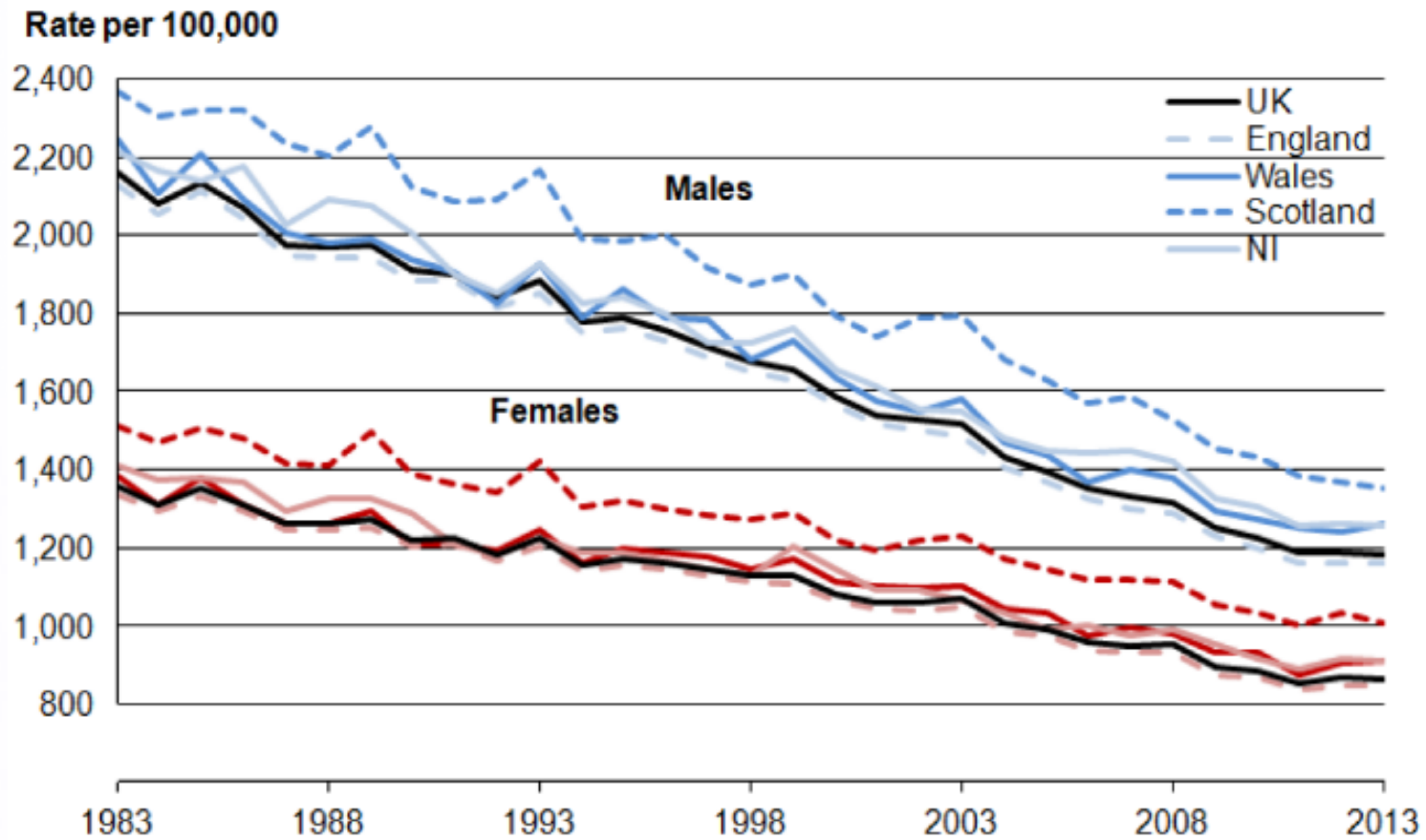
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Key features of UK longevity experience for an insurer

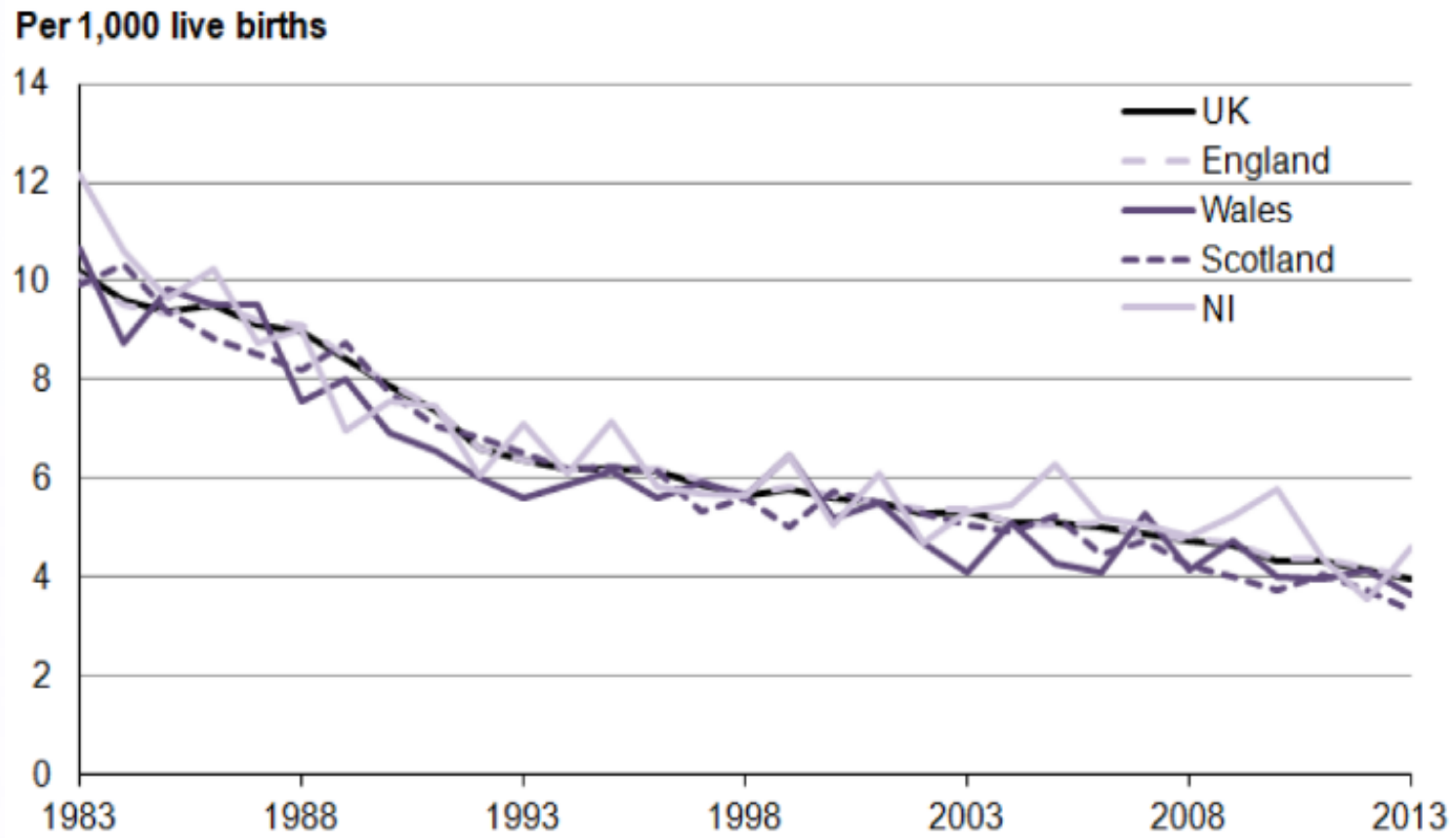
Mortality Trends in the last 30 years

Age Standardised Mortality Rates UK



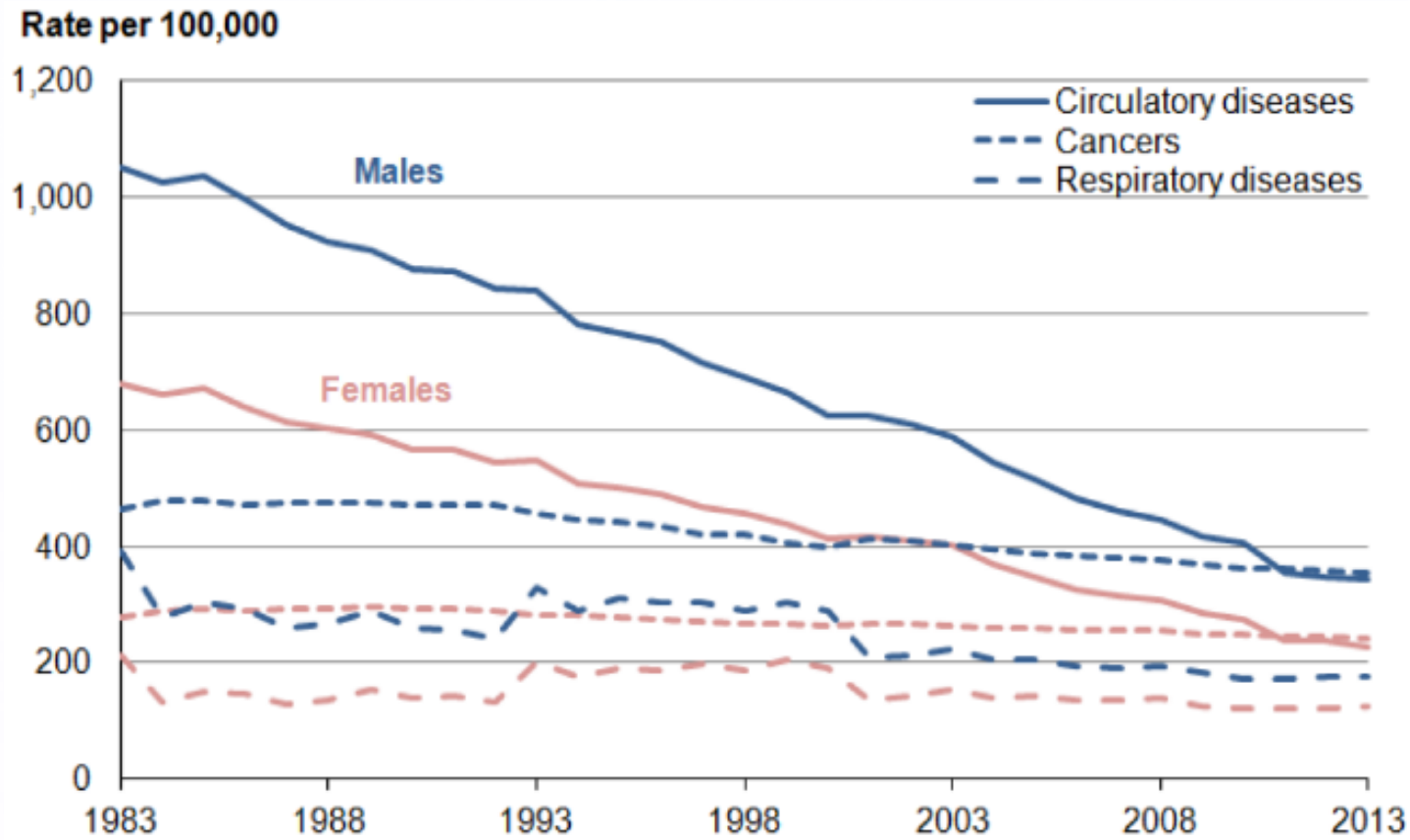
Source: ONS

Infant Mortality Rate UK



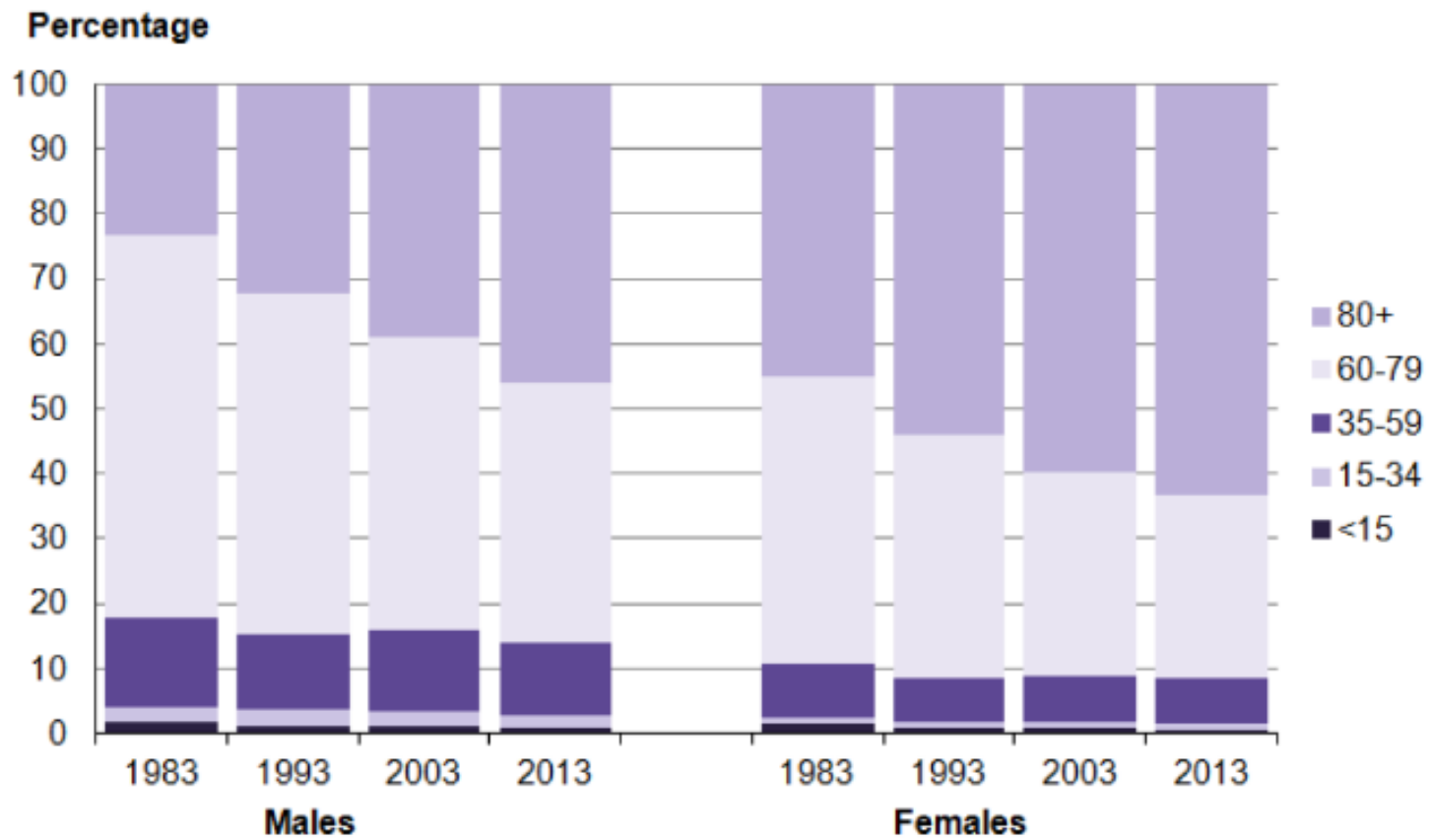
Source: ONS

Age Standardised Mortality Rates UK By Broad Disease Group



Source: ONS

Distribution of UK Deaths by Age Group



Source: ONS

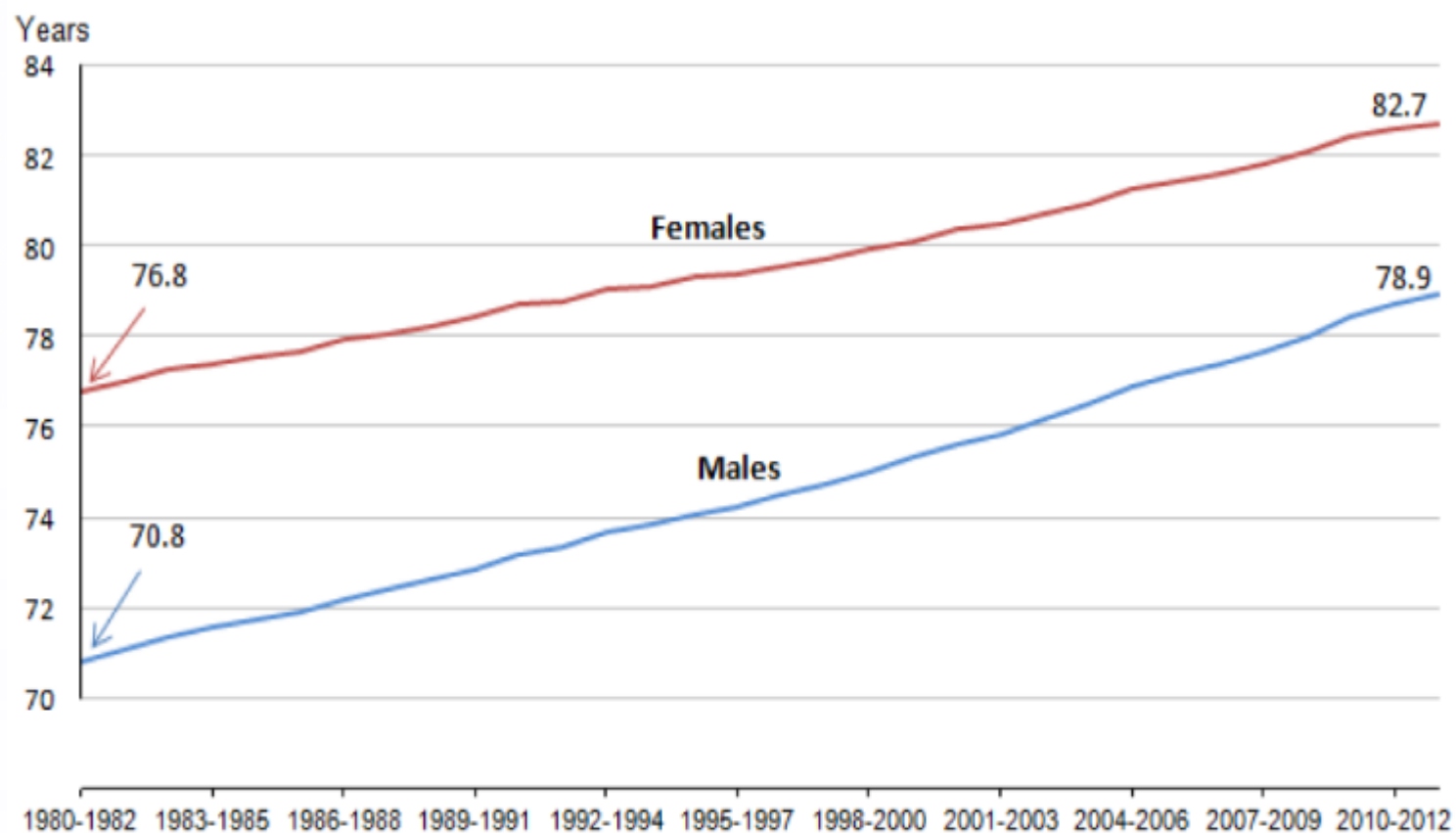
Summary of Mortality Trends

- Continuous relatively constant decline in male and female mortality rates
- Some suggestion in recent years that the decline might be slowing down
- Decline speed across all ages with considerable variation between the UK's constituent parts
- Decline in deaths from circulatory diseases is the most significant disease based contributor to improvement
- The proportion of deaths at age 80 or more has increased from around 30% to well over 50%

Key features of UK longevity experience for an insurer

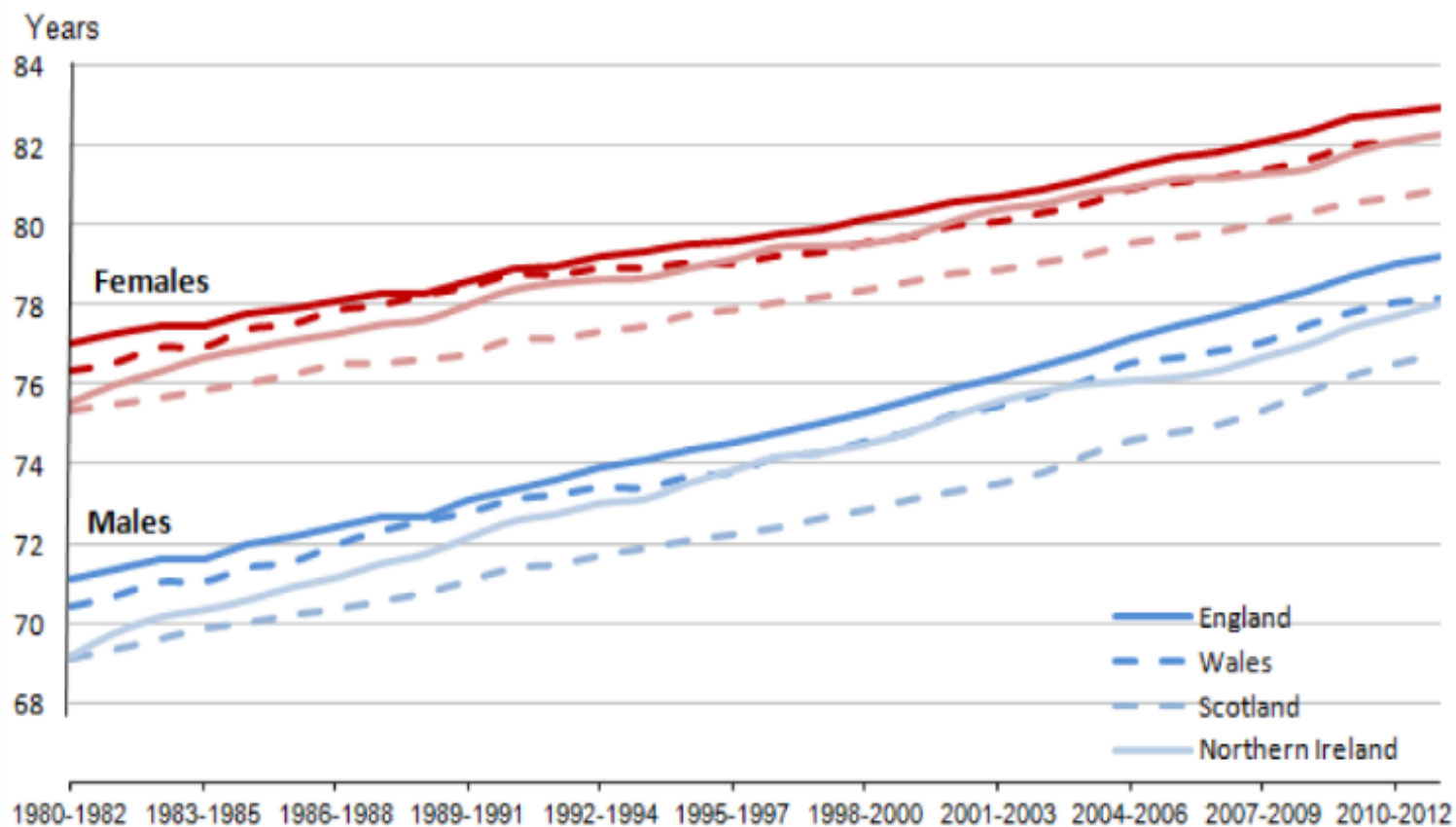
Expectation of Life

UK Period Life Expectancy at Birth



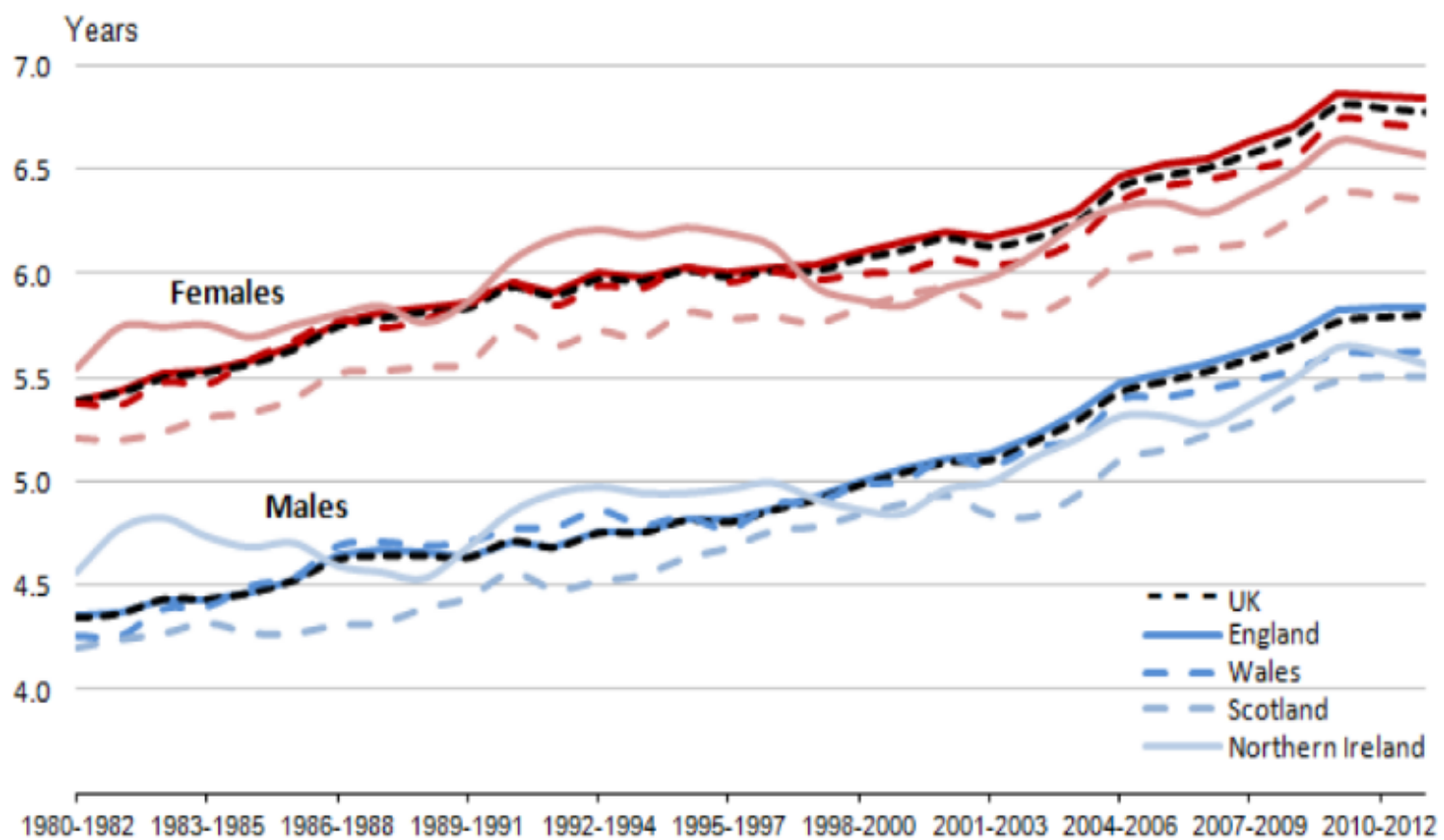
Source: ONS

UK Countries' Period Life Expectancy at Birth



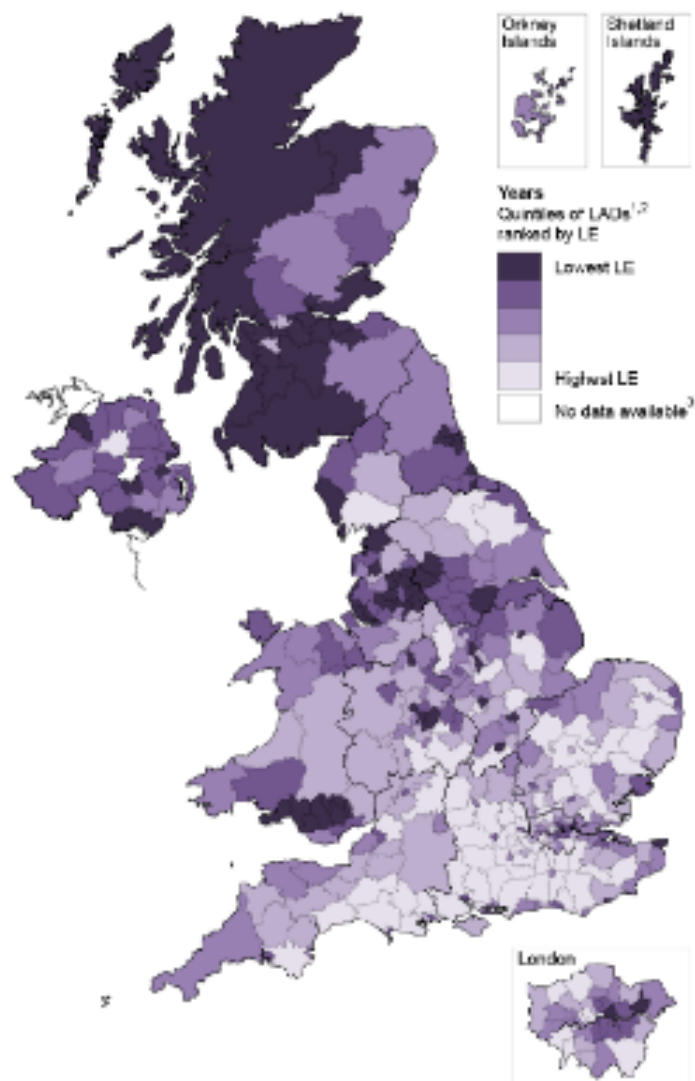
Source: ONS

UK Countries' Period Life Expectancy at age 85



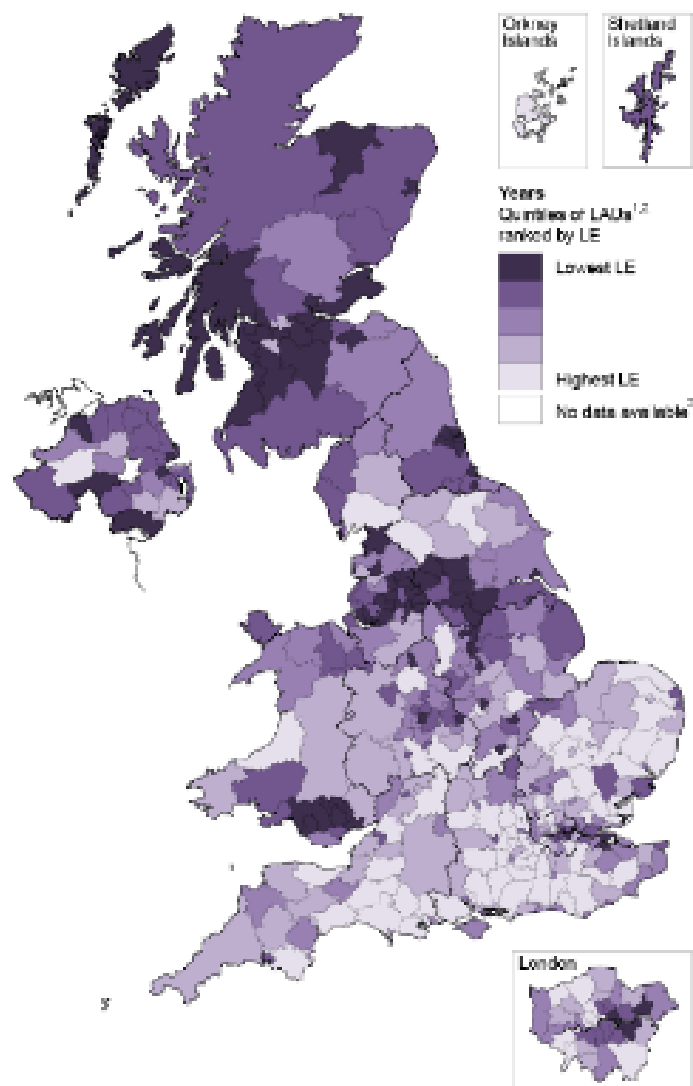
Source: ONS

Male Period Life Expectancy at birth



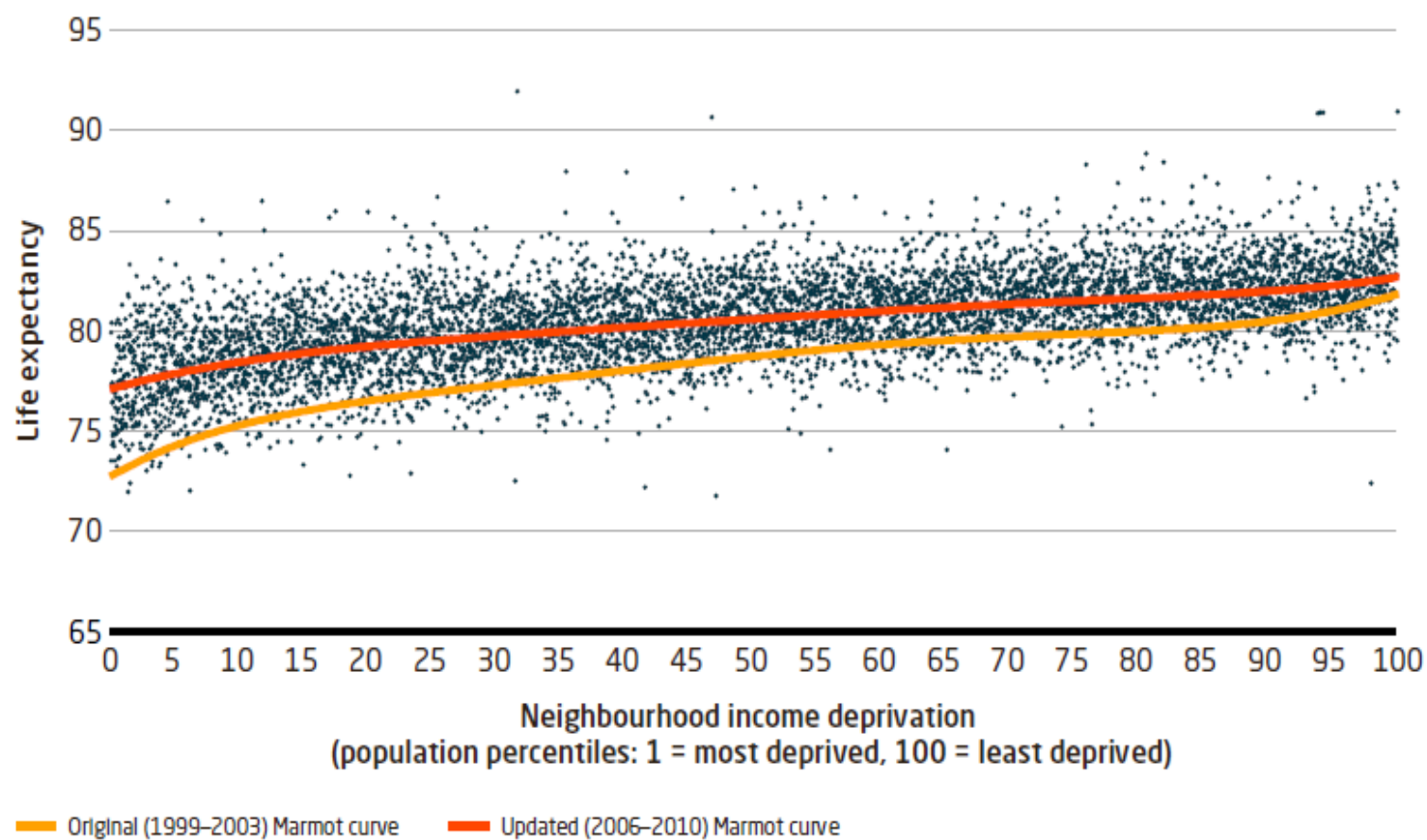
Source: ONS

Male Period Life Expectancy at age 65



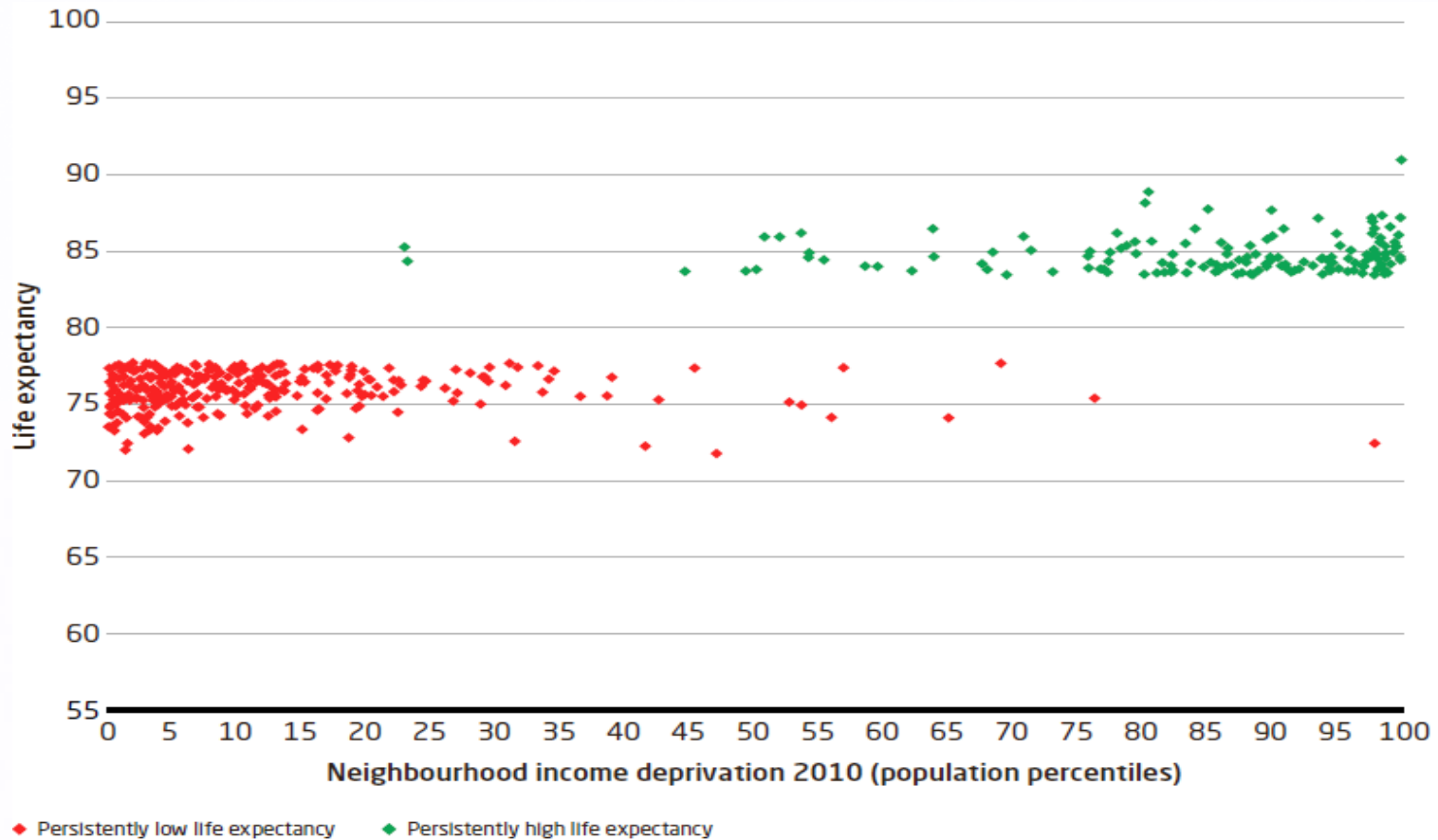
Source: ONS

Life Expectancy at Birth by Income Deprivation



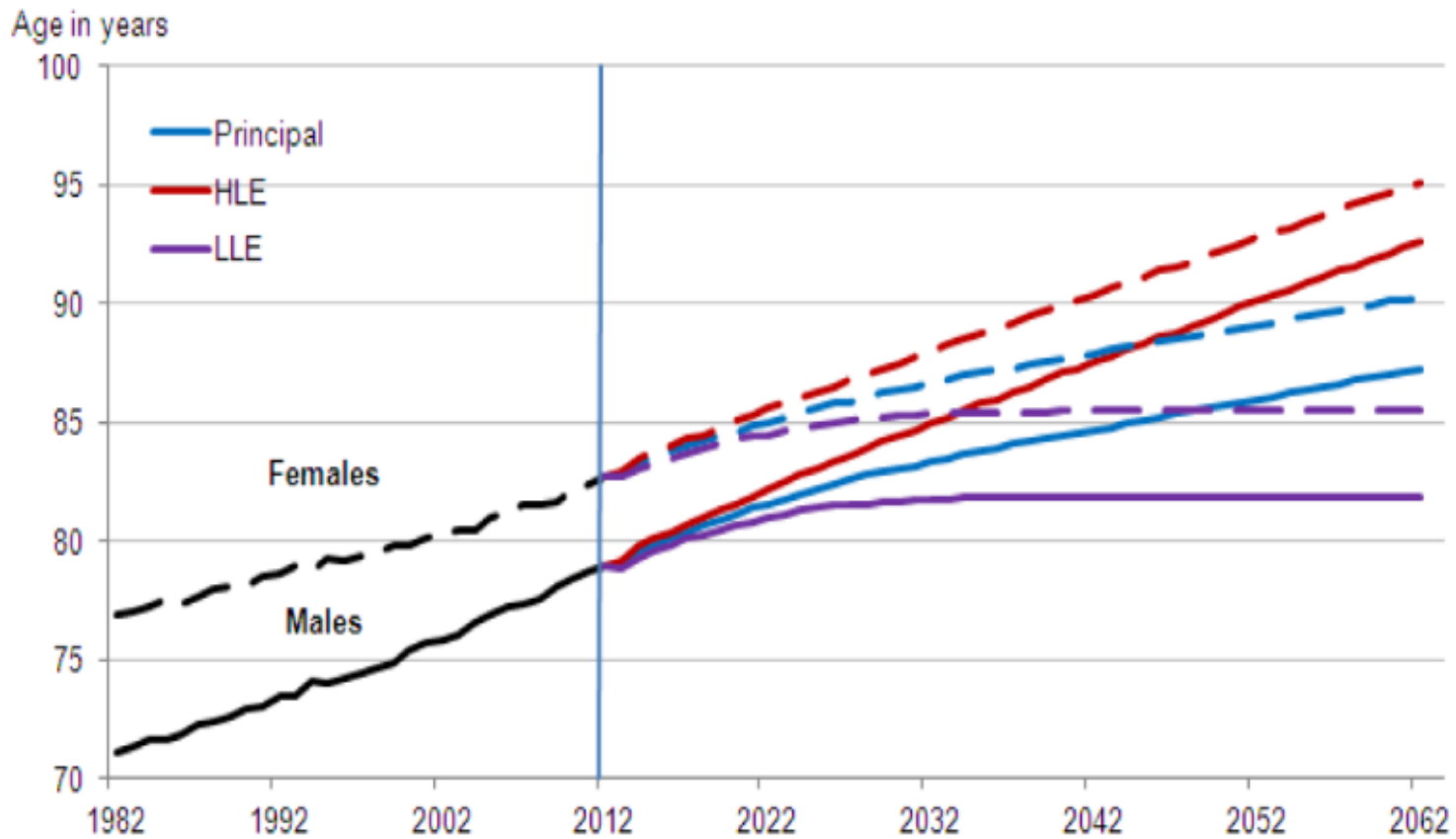
Source: The King's Fund

Persistency of High and Low Life Expectancy Areas



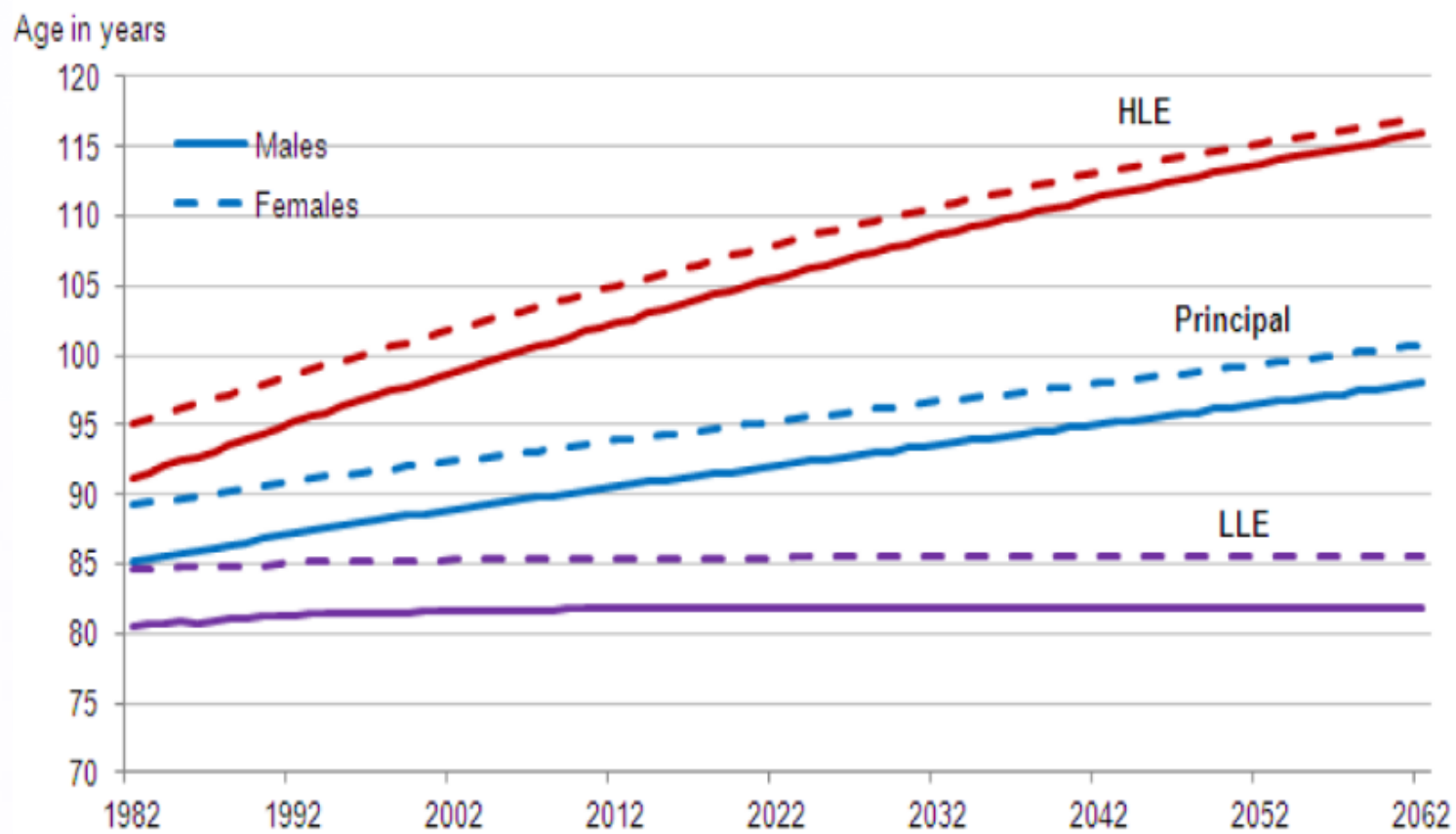
Source: The King's Fund

UK Period Life Expectancy at Birth



Source: ONS

UK Cohort Life Expectancy at Birth



Source: ONS

Conclusions

- Significant variation between UK constituent countries in age expectancy at birth and at old ages
- Within each constituent country there is also wide variability in life expectancy at birth and at old ages
- Areas of low and high life expectation are relatively stable over life expectation ages
- Areas of low and high life expectation have been relatively stable over time
- Central government projections of life expectancy are close to a continuation of the past thirty years' improvements, particularly for cohort life expectancies

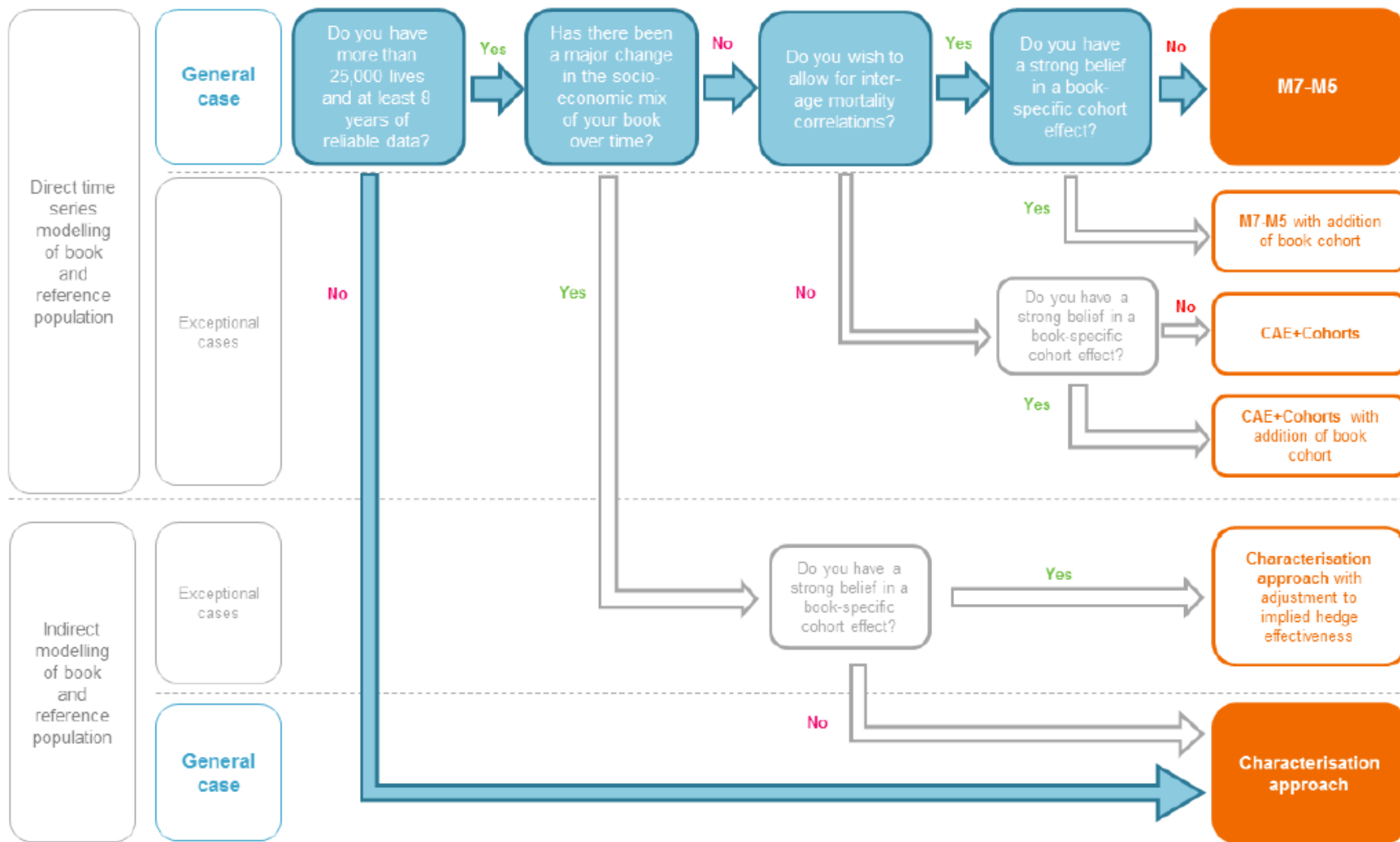
Recent Developments in UK longevity modelling

Longevity Basis Risk Modelling

Longevity Basis Risk (LBR) Background

- LBR arises as different populations or subpopulations will inevitably experience different longevity outcomes
- As shown in the previous slides UK population experience varies considerably with geographical location. Other proxies for the health of groups such as income deprivation or socio economic status would show similar heterogeneity
- LBR is important for hedging longevity risk
- Solvency II is increasing the focus on basis risk
- No well established methodology for estimating LBR
- UK Institute and Faculty of Actuaries and the Life and Longevity Markets Association commissioned research into developing a methodology for assessing LBR

Longevity Basis Risk Method Choice



Source: IFoA and LLMA



Longevity Basis Risk Conclusions

- Model selected needs to capture the mortality trends in the reference population and the population of the book to be hedged
- For books with a large number of lives the M7- M5 model based on the CBD model or in some situations the “CAE + cohorts” model, an extension of the Lee-Carter model
- The approach taken whether direct or indirect is primarily driven by whether the book is “self credible”
- Phase 2 will look at areas such as identifying and developing specific metrics for assessing LBR and quantification of potential capital savings

Recent Developments in UK longevity modelling

- Other current topics include:
 - Standard Formula or (Partial) Internal Model
 - Stochastic or causal model
 - Longevity in the ORSA
 - Complications of the Long Term Guarantees Package (Matching Adjustment, Volatility Adjustment, Transitional Measures etc.)
 - Future development and calibration of the Continuous Mortality Bureau's Mortality Projections Model

The UK Longevity Market

The Market is Highly Active

Major Corporate Pension Scheme Transactions* (1)

Date	Risk From	Risk To	Size	Deal Type
2015	AXA pension scheme	RGA	£2.8bn	Longevity swap
2015	Civil Aviation Authority	Rothsay Life	£1.6bn	Buy-in
2015	Lehman Brothers	Rothsay Life	£0.7bn	Buy-in (to become buyout)
2015	Bell Canada/RGA Canada	Sun Life Assurance Company	£3.3bn	Longevity swap
2015	Scottish Power	Abbey Life	£2bn	Longevity swap
2015	MNOPF	Pacific Life Re (via captive insurer)	£1.5bn	Longevity swap
2014	TRW UK Pension Scheme	Legal & General	£2.5bn	Buyout
2014	Interserve Pension Scheme	Aviva	£0.3bn	Buy-in
2014	Vestey Group	Rothsay Life	£0.5bn	Buyout
2014	BT	Prudential Financial (via captive insurer)	£16bn	Longevity swap
2014	Total	Pension Insurance Corporation	£1.6bn	Buy-in
2014	AstraZeneca	[Undisclosed]	£2.5bn	Longevity swap
2014	ICI Pension Fund	Legal and General. Prudential	£3bn	Buy-in
2014	Aviva	SCOR, Swiss Re, Munich Re	£5bn	Longevity swap
2013	NCR Pension Plan	Pension Insurance Corporation	£0.7bn	Buy-in
2013	Phillips Pension Fund	Rothsay Life	£0.5bn	Buy-in
2013	Carillion	Deutsche Bank	£1bn	Longevity swap
2013	InterContinental Hotels	Rothsay Life	£0.4bn	Buyout
2013	EMI	Pension Insurance Corporation	£1.5bn	Buyout
2013	BAE Systems	Legal & General	£2.7bn	Longevity swap
2013	Bentley	Abbey Life	£0.4bn	Longevity swap

*Summary of major Transactions > £300m

Major Corporate Pension Scheme Transactions* (2)

Date	Risk From	Risk To	Size	Deal Type
2012	MNOPF	Rothesay Life	£0.7bn	Buy-in
2012	Akzo Nobel (CPS) Pension Scheme	Swiss Re	£1.4bn	Longevity swap
2011	Turner & Newall	Legal & General	£1.1bn	Buy-in
2011	Uniq	Rothesay Life	£0.8bn	Buy-in
2011	ITV	Credit Suisse	£1.7bn	Longevity swap
2011	Rolls Royce	Deutsche Bank	£3bn	Longevity swap
2011	British Airways	Rothesay Life	£1.3bn	Longevity swap
2011	Turner & Newall	Legal & General	£1.1bn	Buy-in
2011	Pall	JP Morgan	£70m	Longevity swap
2011	Pilkington Glass	Legal & General / Hannover Re	£1bn	Longevity swap
2010	BMW	Abbey Life	£3bn	Longevity swap
2010	British Airways	Rothesay	£1.3bn	Buy-in

*Summary of major Transactions > £300m

Major Bulk Insured Annuity Transactions* (1)

Date	Risk From	Risk To	Size	Deal Type
2015	Zurich UK Life	Rothesay Life	£1.2bn	Reinsurance
2015	Legal & General	Prudential Financial	£1.9bn	Longevity swap
2015	Aegon	[Undisclosed]	Notional €6bn	[Undisclosed]
2015	Delta Lloyd	RGA	Notional €12bn	Longevity hedge
2015	Rothesay Life	Prudential Financial	£0.3bn	Reinsurance
2015	Pension Insurance Corporation	Prudential Financial	£1.6bn	Reinsurance
2014	Rothesay Life	Prudential Financial	£1bn	Reinsurance
2014	Rothesay Life	Pacific Life Re	£1bn	Reinsurance
2014	Pension Insurance Corporation	Hannover Re & RGA	£2bn	Reinsurance
2014	Legal & General Group	Prudential Financial	£1.35bn	Reinsurance
2014	Delta Lloyd	RGA	£9.6bn	Longevity swap
2014	Phoenix Life	Guardian Financial Services	£1.7bn	Part VII transfer**
2014	Phoenix Group	Phoenix Life	£0.9bn	Longevity swap
2014	MetLife UK	Rothesay Life	£3bn	Company purchase
2013	Pension Insurance Corporation	RGA & others	£1.4bn	Longevity swap
2013	Lucida	Legal & General	£1.4bn	Company purchase
2013	Abbey Life / Rothesay	Hannover Re	£1bn	Longevity swap
2013	Legal & General	Hannover Re	£2bn	Longevity swap

*Based on press releases only, excludes private transactions

Major Bulk Insured Annuity Transactions* (2)

Date	Risk From	Risk To	Size	Deal Type
2012	Pension Insurance Corporation	Munich Re	£0.3bn	Longevity swap
2012	Guardian Financial Services	RGA	£1.9bn	Longevity swap
2012	Phoenix	Guardian Financial Services	£5bn	Part VII transfer
2012	Aegon	Deutsche Bank	Notional €12bn	Longevity swap
2011	Legal & General	RGA	£0.4bn	Longevity swap
2011	Rothesay Life / Paternoster	Prudential Retirement	£0.5bn	Longevity swap
2011	Rothesay Life / Paternoster	RGA	£1.1bn	Longevity swap
2011	Legal & General	RGA	£0.4bn	Longevity swap
2010	Rothesay Life	PacLife Re	c£0.3bn	Longevity swap
2010	Paternoster	Rothesay Life	£2.8bn	Part VII transfer
2010	Swiss Re	Kortis	£0.05bn	Longevity bond
2009	Credit Suisse	PacLife Re	£0.3bn	Longevity swap
2009	Rothesay Life	PacLife Re	c£0.5bn	Longevity swap
2009	Aviva	RBS/Partner Re	c£0.5bn	Longevity swap
2008	Standard Life	Canada Life	£6.7bn	Reinsurance
2008	Rothesay Life	Prudential	£0.3bn	Reinsurance

*Based on press releases only, excludes private transactions,

Solvency II Driving Activity

FINANCIAL TIMES

26 August 2015

KEYWORD ALERT

Groups race to offload pension liabilities with insurer megadeals

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Surge in pension buy-outs expected in coming weeks

27 August 2015

State of the UK Longevity Market

- Low bond yields and equity market volatility has made pension scheme buyouts seem expensive
- Solvency II is likely to make deals with insurers more expensive in the future
- Insurers expect capital requirements under Solvency II to be higher than under current system, especially for new business
- Insurers seeking to reinsure significant volumes of longevity risk both via longevity swaps and asset based deals
- Capital market transactions, as opposed to reinsurance, remain few and far between. Many banks have effectively withdrawn from the longevity market
- Most deals are on an indemnity basis with few index based transactions

Contact Details



11 Old Jewry
London
EC2R 8DU
United Kingdom

Phil Simpson

Telephone: 020 7847 1543

Email: philip.simpson@milliman.com

