



Institute for  
Fiscal Studies

## Modelling work, health, care and income in the older population: The IFS retirement simulator (RetSim)

Andrew Hood

Presentation at the European Meeting of the International Microsimulation  
Association, 24<sup>th</sup> October 2014

# Motivation

- Increasing longevity and post-war baby boom means that the English population aged 65+ is growing quickly
  - projected 22% increase between 2012 and 2022, from 17% to 20% of overall population
- How will tomorrow's pensioners look different from today's?
  - answer this question using a dynamic microsimulation model
  - static microsimulation would ignore potentially important cohort effects eg. changing private pension entitlements
- Model mortality, health, care, labour supply, disability benefits
  - interesting in themselves, and inputs to net income projections using IFS's static microsimulation model, TAXBEN

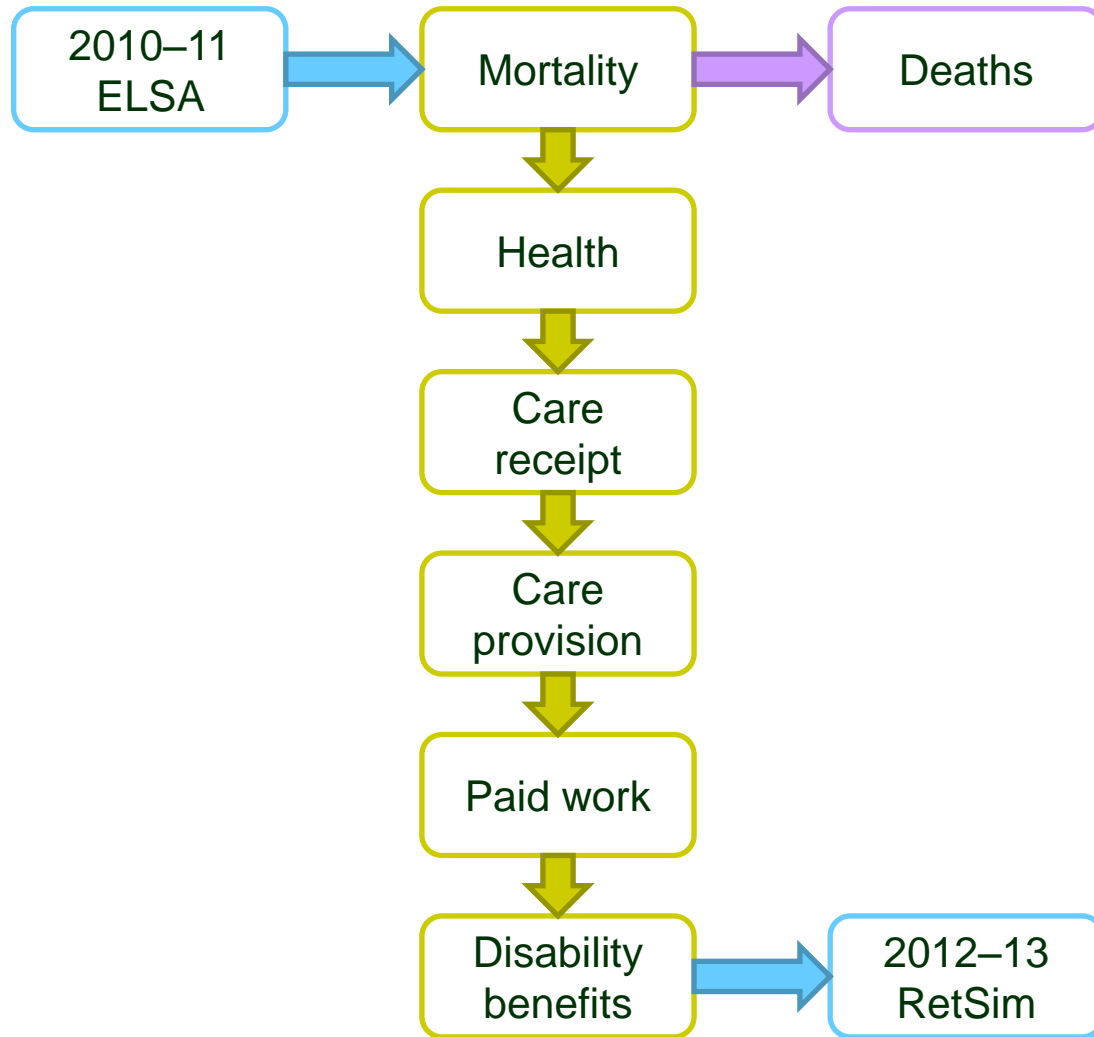
# Data and methodology

- English Longitudinal Study of Ageing (ELSA): 2002-03 to 2010-11
  - representative panel of 52+ population (born 1958 or earlier)
  - around 10,000 respondents per wave, in 7,000 households
  - biennial survey, so we model two-year transitions
- Examine relationships between outcomes and characteristics over time
  - formalise these relationships in regression models
- Simulate circumstances through to 2022–23
  - start with people aged 52+ in 2010–11
  - look at outputs for people aged 65+ through to 2022–23

## Example: mortality

- Run probit regression of probability of dying in next two years on large number of characteristics observed in ELSA data
  - including age, sex, couple status, health, early diagnosis of certain diseases, smoker status, receipt of disability benefits
- Predict mortality probabilities for simulated individuals on the basis of the coefficients from this regression
- Calibrate probabilities to match age-sex averages from official mortality projections
  - allows the model to account for improving life expectancy

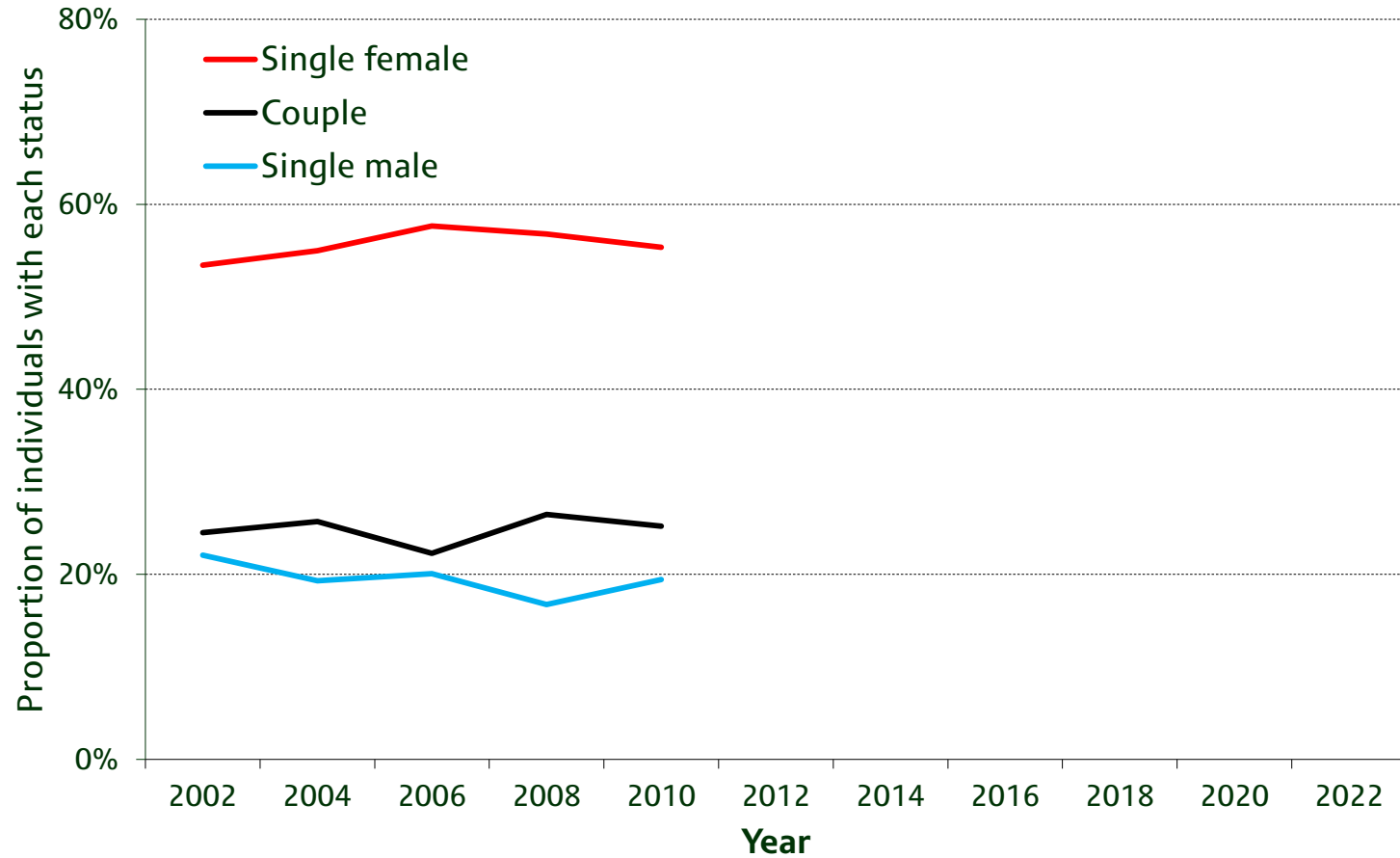
# The structure of RetSim



## 3 headline results

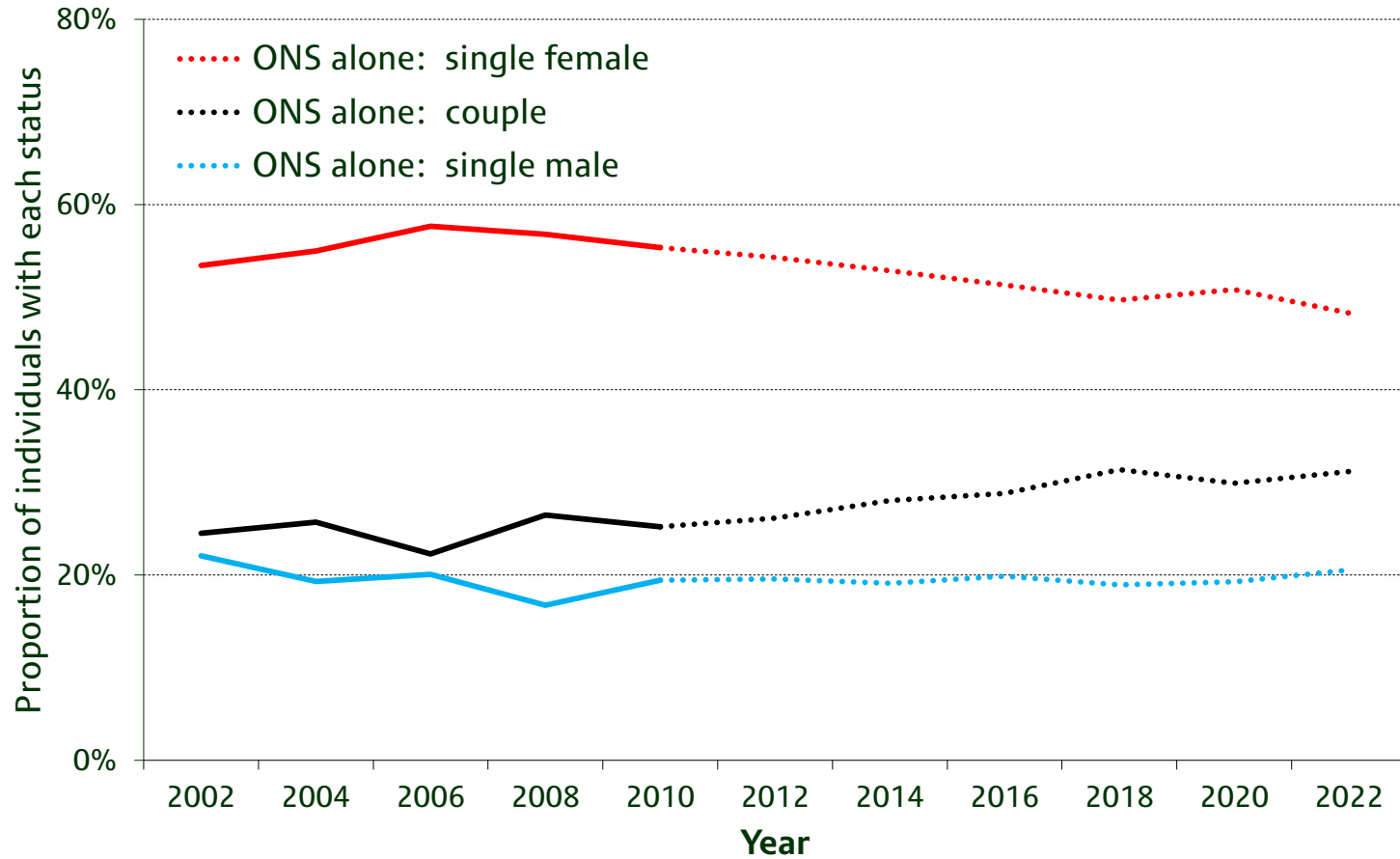
1. Older people will be much more likely to live in couples in future

# Family type (85+)



Source: Figure 3.5

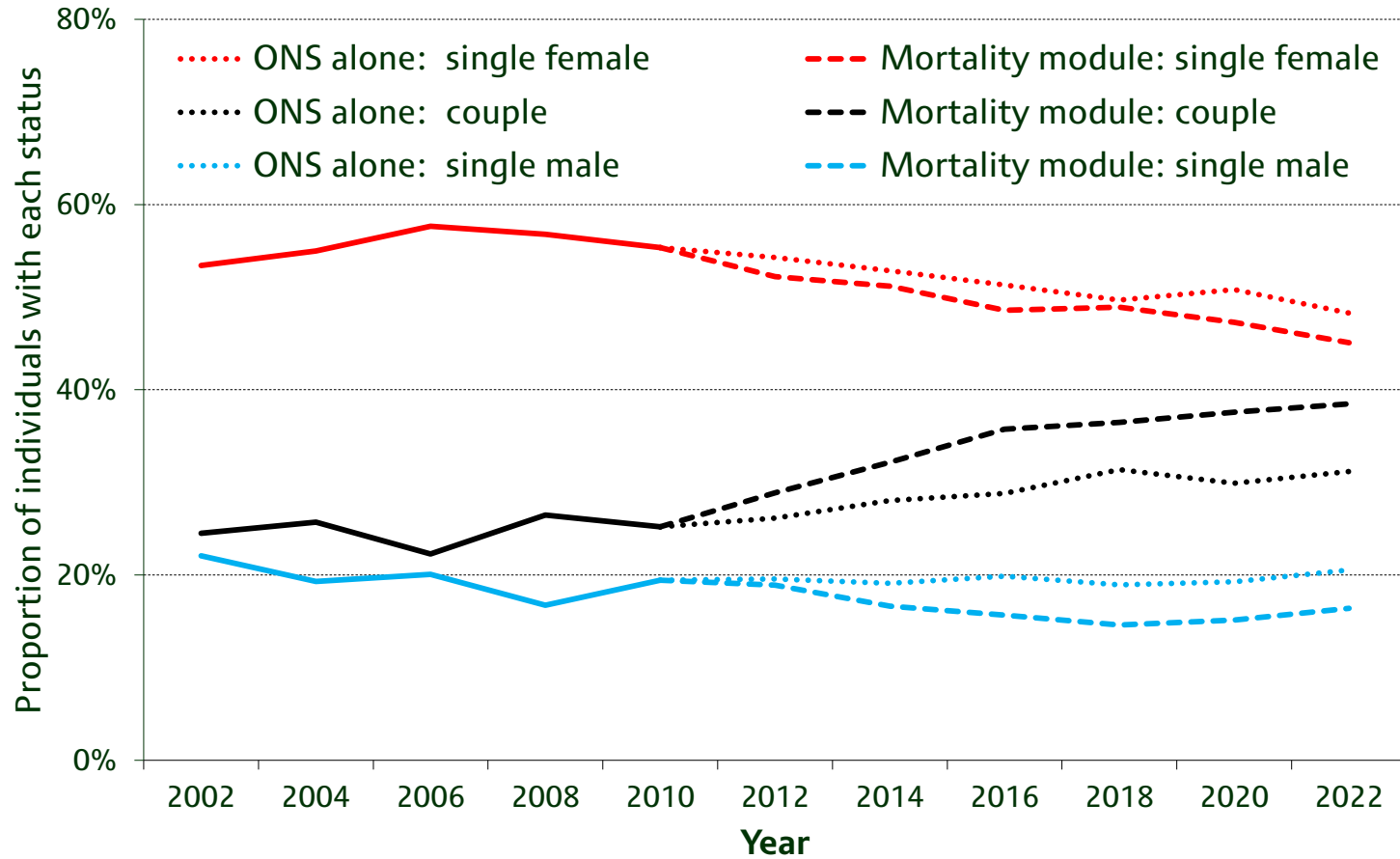
# Family type (85+)



Source: Figure 3.5



# Family type (85+)

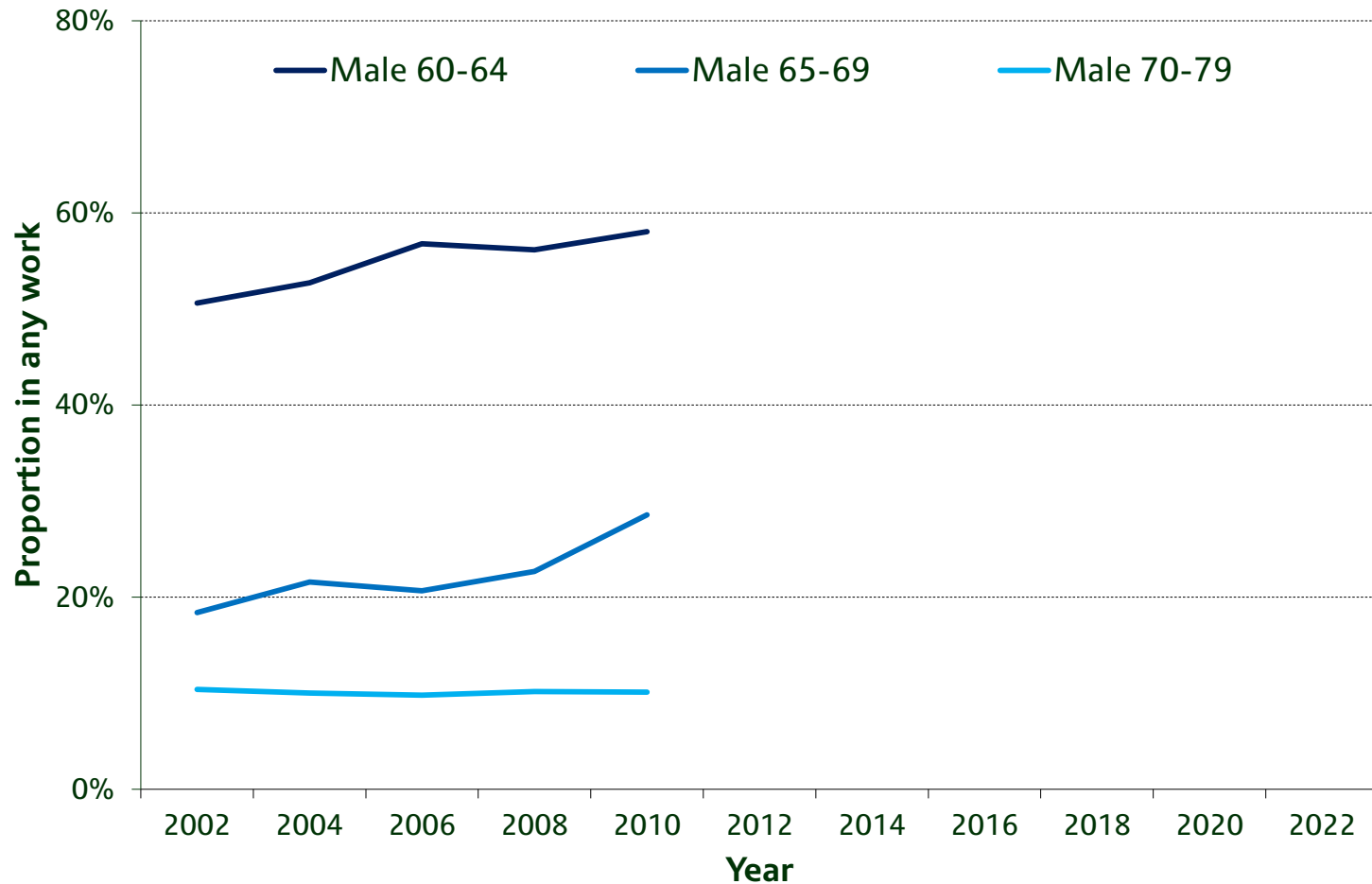


Source: Figure 3.5

## 3 headline results

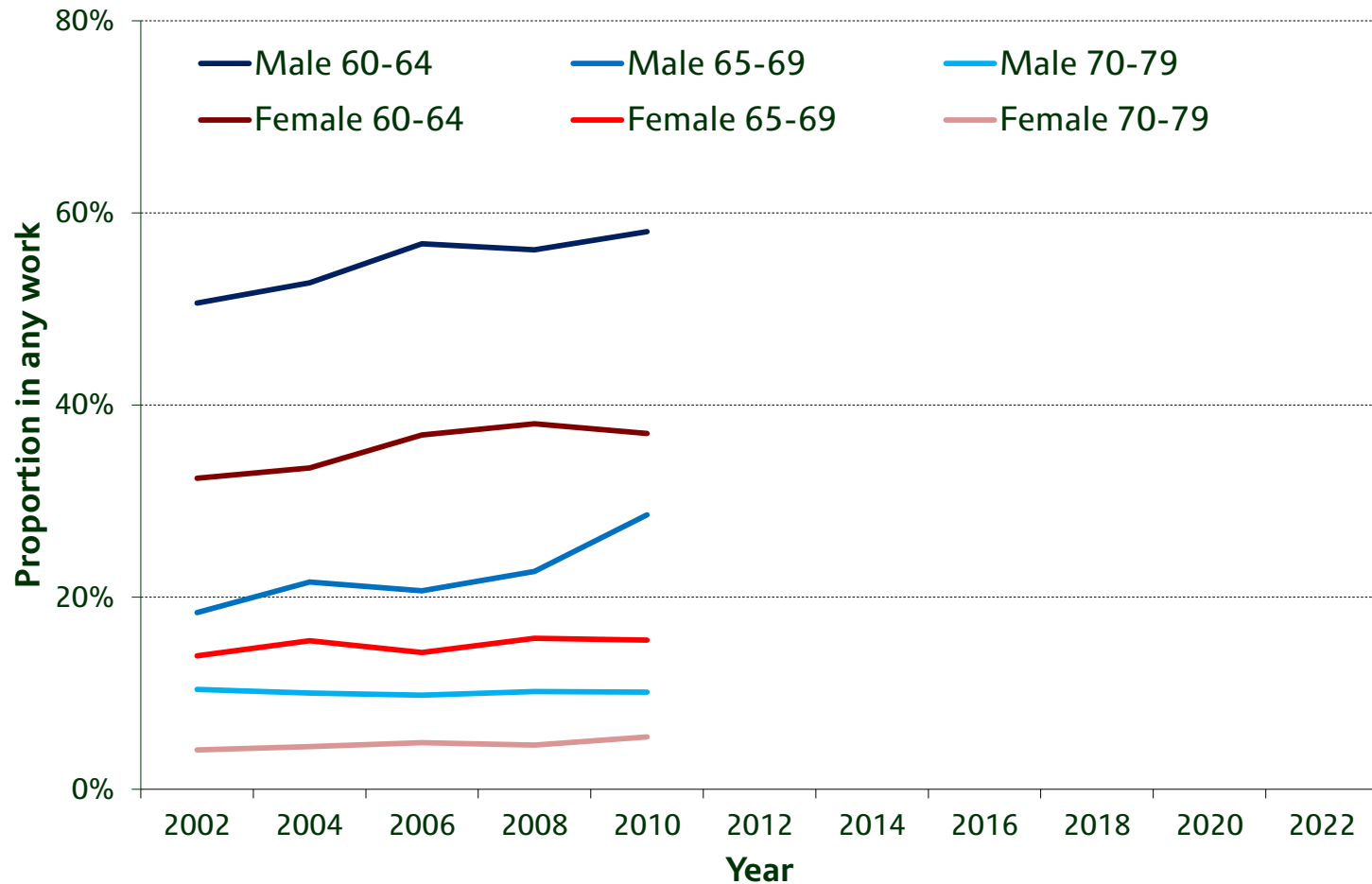
1. Older people will be much more likely to live in couples in future
  - 25% of people aged 85+ lived in couples in 2010-11, rising to 38% of people in 2022-23
  - partly explained by increases in life expectancy, but also lower mortality rates in couples
2. Dramatic increase in employment among women in their 60s

# People in paid work: ELSA data



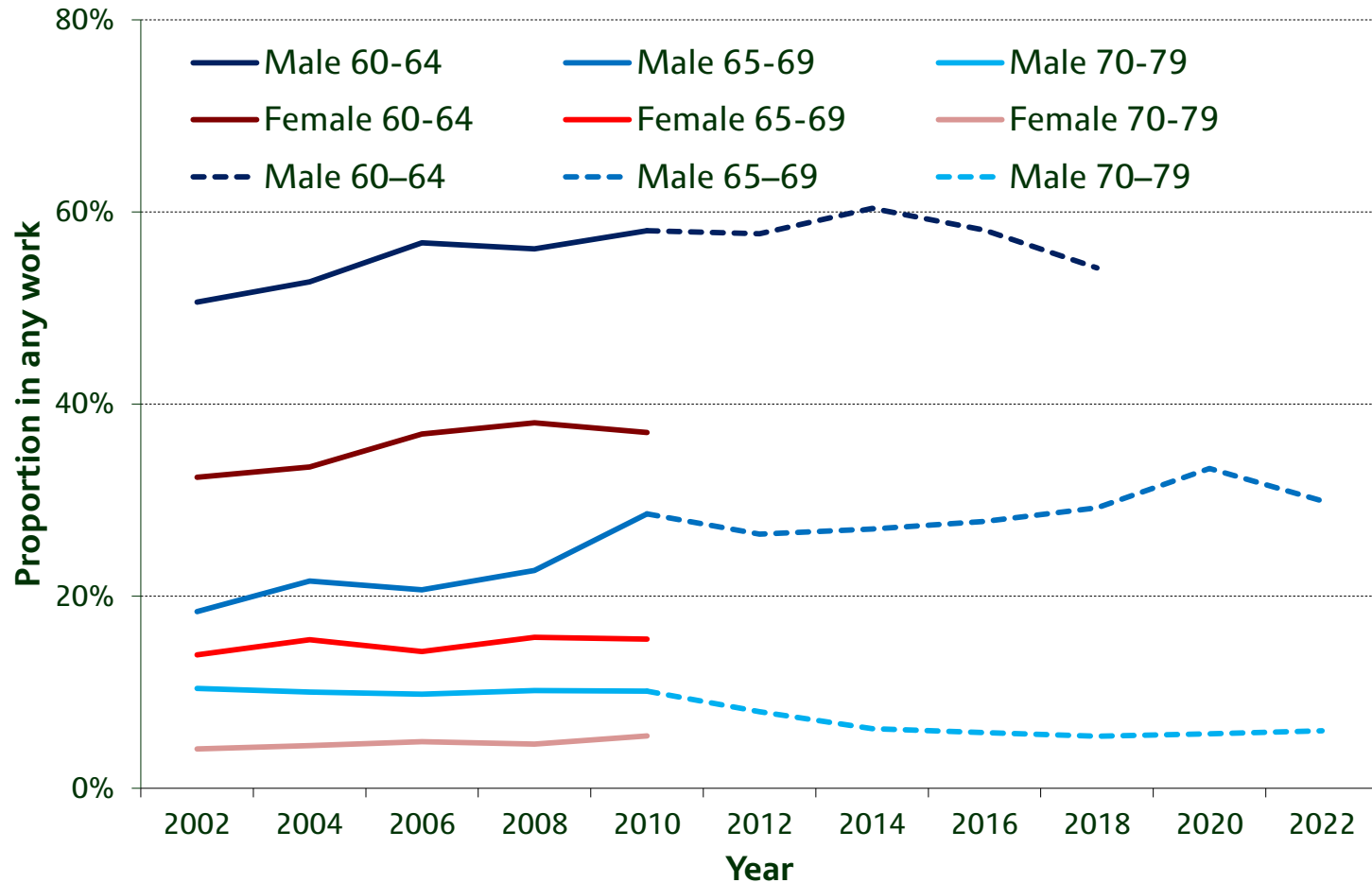
Source: Figure 3.10

# People in paid work: ELSA data



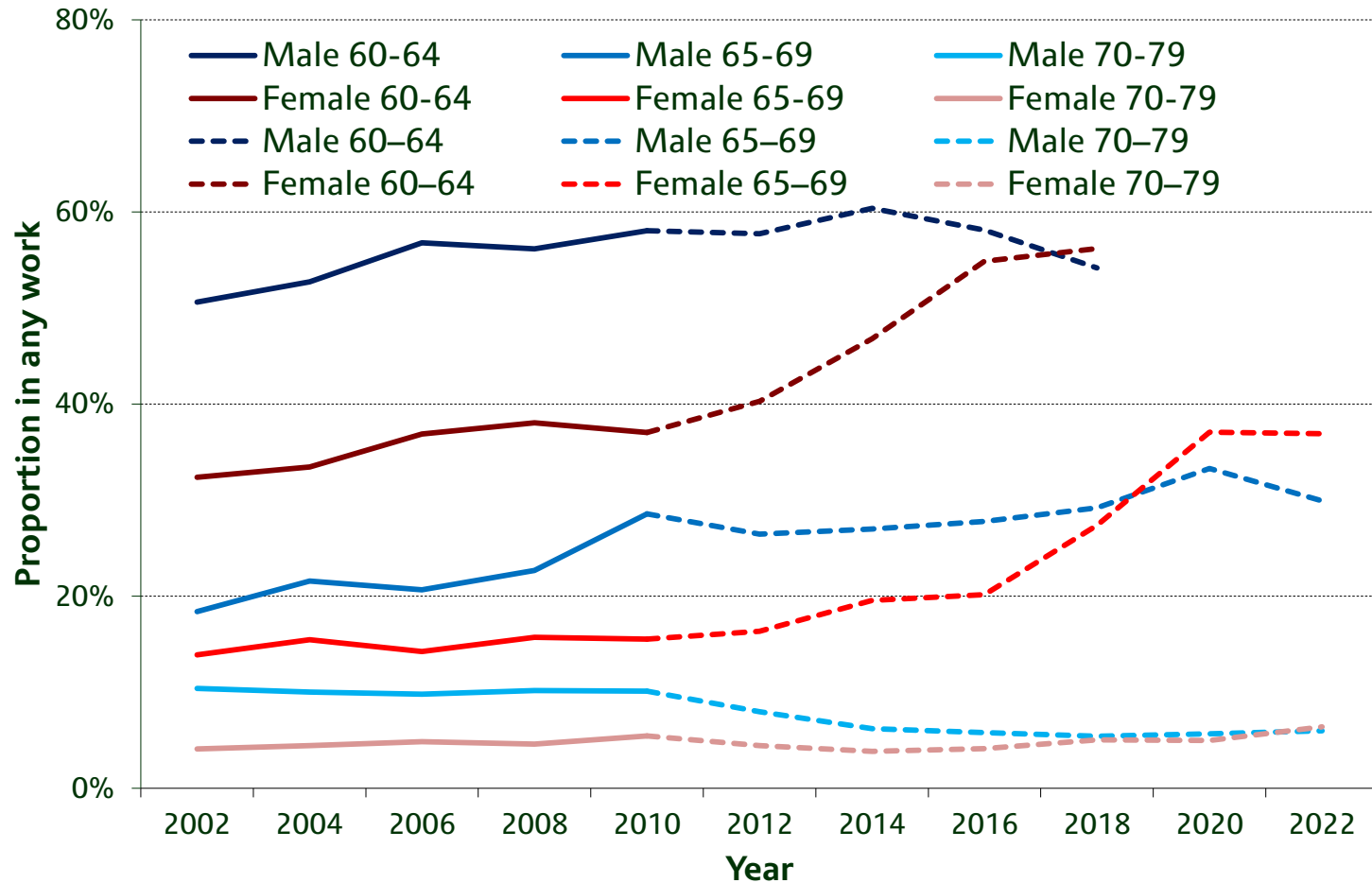
Source: Figure 3.10

# People in paid work: projections



Source: Figure 3.10

# People in paid work: projections

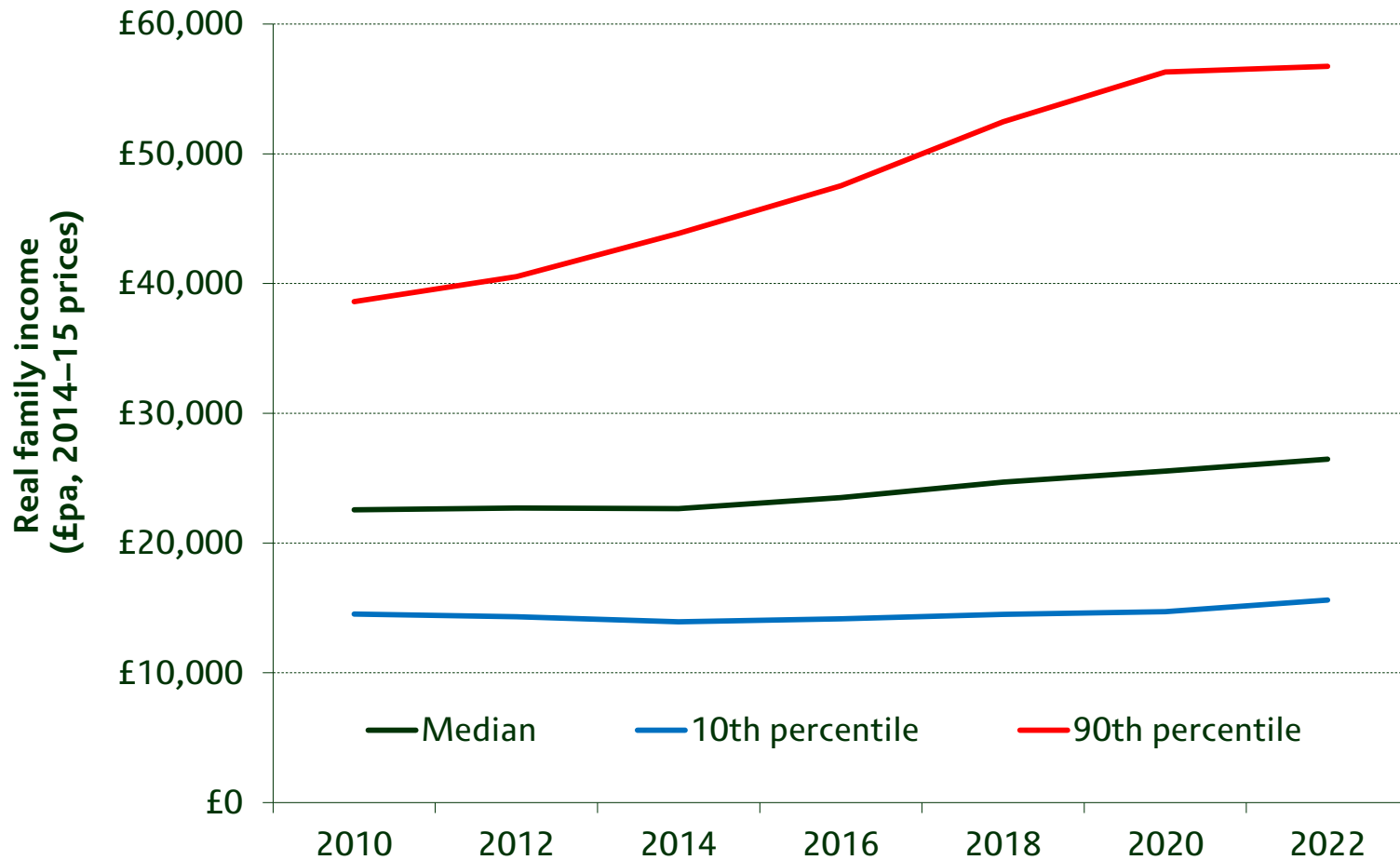


Source: Figure 3.10

## 3 headline results

1. Older people will be much more likely to live in couples in future
  - 25% of people aged 85+ lived in couples in 2010-11, rising to 38% of people in 2022-23
  - partly explained by increases in life expectancy, but also lower mortality rates in couples
2. Dramatic increase in employment among women in their 60s
  - from 16% in 2010-11 to 37% in 2022-23
  - driven by improving health and rising state pension age (60 to 66)
3. Rising income inequality among the 65+ population

# Equivalised family income projections: 65+ population



Source: Figure 5.1, Emmerson, Heald and Hood (2014)

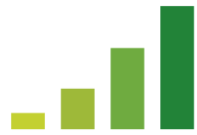


## 3 headline results

1. Older people will be much more likely to live in couples in future
  - 25% of people aged 85+ lived in couples in 2010-11, rising to 38% of people in 2022-23
  - partly explained by increases in life expectancy, but also lower mortality rates in couples
2. Dramatic increase in employment among women in their 60s
  - from 16% in 2010-11 to 37% in 2022-23
  - driven by improving health and rising state pension age (60 to 66)
3. Rising income inequality among the 65+ population
  - over 3% per year real income growth at the 90<sup>th</sup> percentile, less than 1% at the 10<sup>th</sup> percentile
  - earnings and private pensions growing faster than state support

# References

- Browne et. al. “Modelling work, health, care and income in the older population” provides description of our methodology
  - <http://www.ifs.org.uk/publications/7253>
- Emmerson, Heald and Hood “The changing face of retirement” details our results for the English 65+ population through to 2022
  - <http://www.ifs.org.uk/publications/7251>



Institute for  
Fiscal Studies

## Modelling work, health, care and income in the older population: The IFS retirement simulator (RetSim)

Andrew Hood

Presentation at the European Meeting of the International Microsimulation  
Association, 24<sup>th</sup> October 2014

# HEALTH

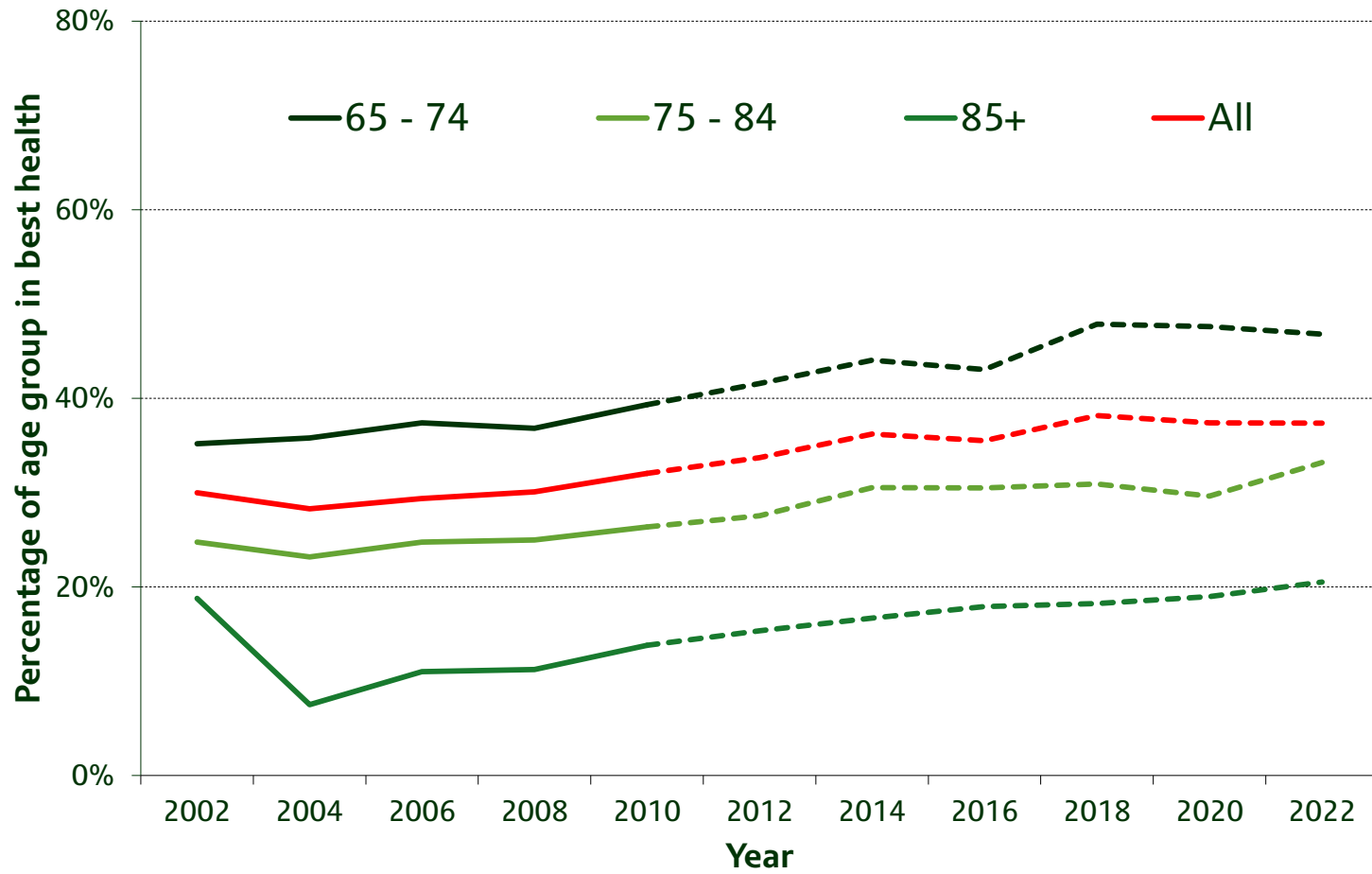
# Measuring health

- Objective health index
- Counts reported health problems
  - mobility
  - eyesight and hearing
  - continence
  - mental health
- Groups people into five health categories
- Not equally sized groups

# Modelling health

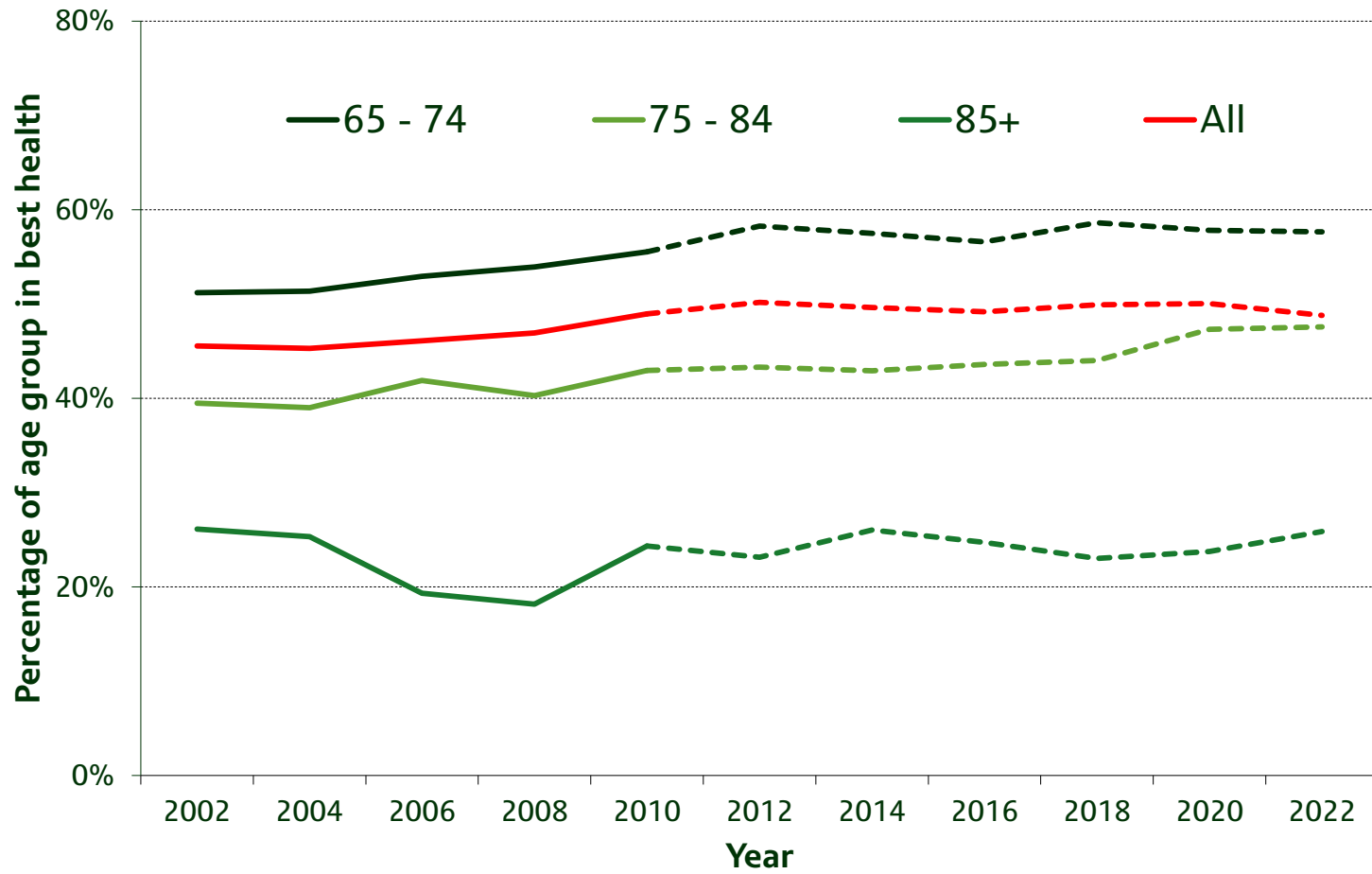
- Use ordered probit to model transitions between the five health categories
- Explanatory variables include:
  - demographics (age, sex, couple status, region)
  - lagged health, early diagnosis of certain diseases, smoker status, measure of childhood health
  - care receipt, work status, education, socioeconomic class, income and wealth quintiles

# Trends in health (women)



Source: Figure 3.7

# Trends in health (men)



Source: Figure 3.6



# Health: results

- Health is poorer among older people
- The proportion of women in the best health increases by around 7% within each age group between 2010-11 and 2022-23
- The improving health of women drives a lot of our results
- Men report better health than women
- Improvements in health for men are more modest
  - 5ppts for 75-84 year olds, 2ppts for 65-74 and 85+

# CARE RECEIPT AND PROVISION

# Modelling the receipt and provision of care

- Split care receipt between formal (from a professional) and informal (from a family member or friend)
  - use multinomial probit with three outcomes
- Split care provision by intensity (whether fewer than or at least 35 hours per week)
  - again use multinomial probit with three outcomes
- Explanatory variables include:
  - lagged care provision and receipt, age, sex, couple status, whether has children, health, partner's health, wealth and income quintiles, receipt of disability benefits

# Care provision in 2010

- Likelihood of providing care decreases with age:
  - about 20% of people aged 65+ provide care in 2010
  - 25% of 65-74 year old men and 16% of 85+ men
  - 19% of 65 to 74 year old women and 4% of 85+ women
- Most care is provided by people in couples:
  - 32% of men in couples and 3% of single men
  - 26% of women in couples and 6% of single women
- In couples, men report giving more care than women
- Among single people, women report giving more care than men

# Care projections: 2010 to 2022

- Improvements in life expectancy mean:
  - Some less healthy men will live longer and need care from their wives
  - Some less healthy women will live longer and need care from their husbands
  - More people in couples in later life means a shift from formal to informal care for the oldest women

Providing care: age 85+			Receiving care: women 85+		
	2010	2022		2010	2022
<b>Men</b>	16%	21%	<b>Informal</b>	30%	31%
<b>Women</b>	4%	7%	<b>Formal</b>	35%	32%
			<b>Any</b>	65%	63%

# Care projections: 2010 to 2022

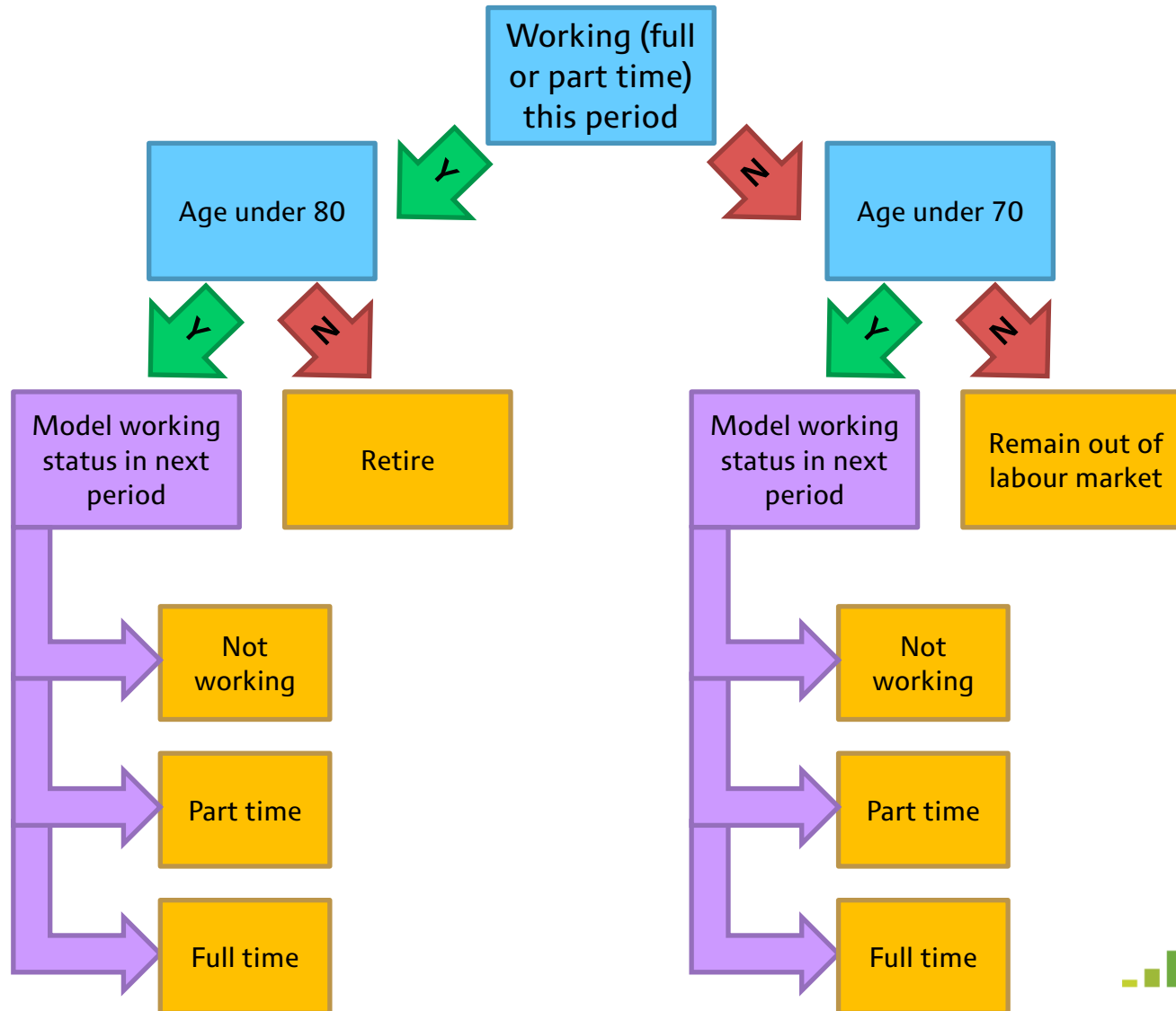
- Improvements in female health mean:
  - More women will be well enough to provide care
  - Fewer women will need care, especially at younger ages

Providing care: women		
	2010	2022
<b>65-74</b>	19%	21%
<b>75-84</b>	15%	17%
<b>85+</b>	4%	7%

Receiving care: women		
	2010	2022
<b>65-74</b>	29%	24%
<b>75-84</b>	43%	40%
<b>85+</b>	65%	63%

# LABOUR SUPPLY

# Labour supply decisions flowchart





# Labour supply modelling

- 3 multinomial logits (one for each current working status)
- Explanatory variables include:
  - Demographics (age polynomials, sex, couple status, region, below state pension and pension scheme retirement age)
  - Socioeconomic indicators (deprivation, education, socioeconomic status, time since last worked, ever self employed in survey data)
  - Financial indicators (baseline wealth and income quintiles, home ownership, has a mortgage, pension scheme membership, “potential” full time wages, disability benefit receipt)
  - Health and care (diagnosis of conditions before age 50, health level, health change since last period, receipt or provision of care)
  - Partner variables (partner’s care receipt, health level, working status, “potential” full time wages, and whether partner below SPA)
  - Sex-interacted versions of all variables

# Estimating “potential” wages

- As far as possible, use wages they reported in the data
  - up to age 54, apply 2% p.a. real wage growth
- Where necessary, convert between full and part time wages using sex and education specific factors estimated from the data
- Where no wages are reported, match wages from another person
  - technical paper contains details of matching model
- Same process used to get actual wages for income projections

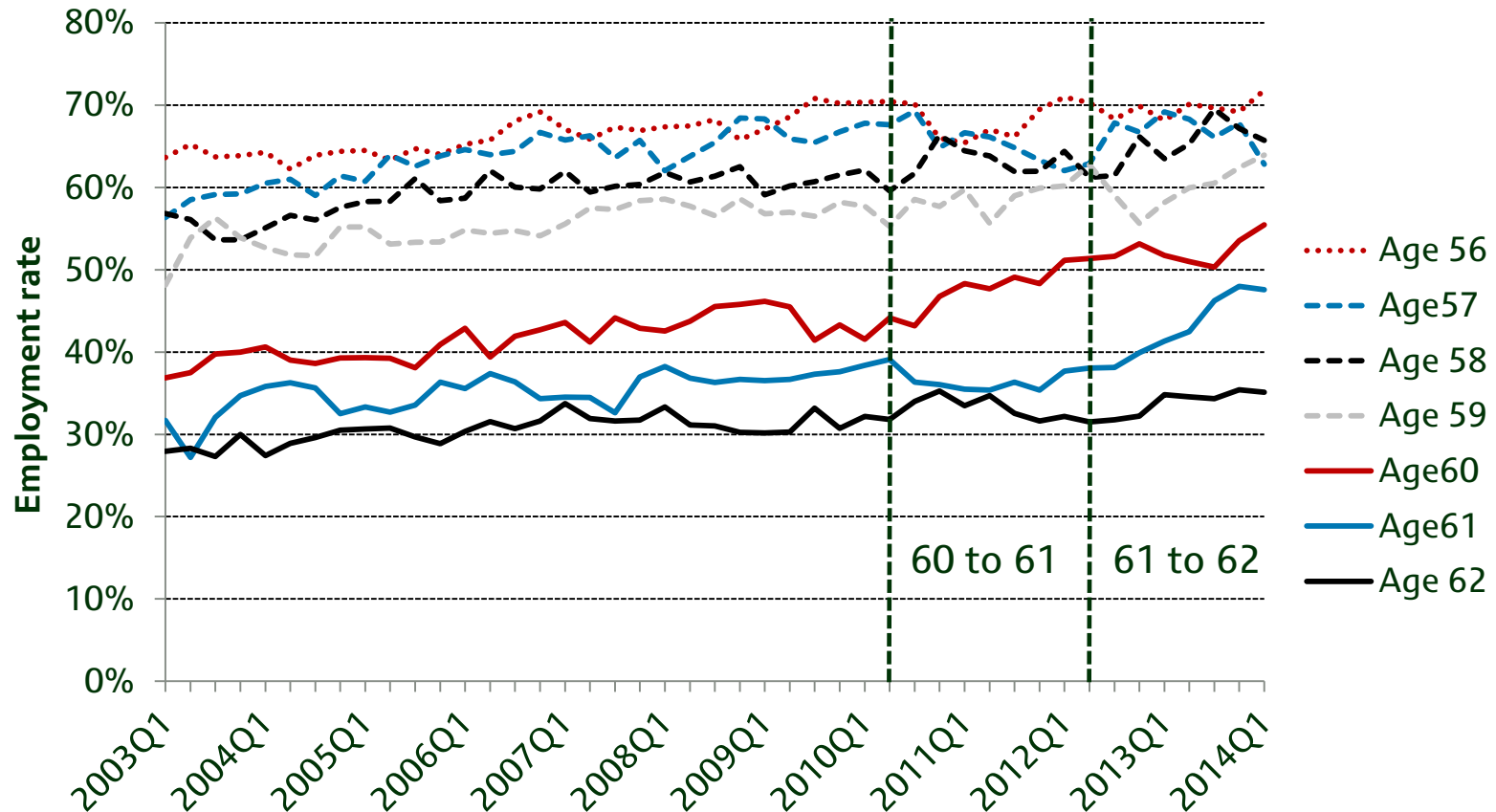
# What factors affect movement out of work? (1)

- Age
  - unsurprisingly older individuals are more likely to leave work
- Health
  - those in the worst health up to 24ppts less likely to stay in full-time work than those in the best health
- Care giving
  - providing high-intensity care (35+ hours a week) makes individuals over 15ppts less likely to stay in full-time work

## What factors affect movement out of work? (2)

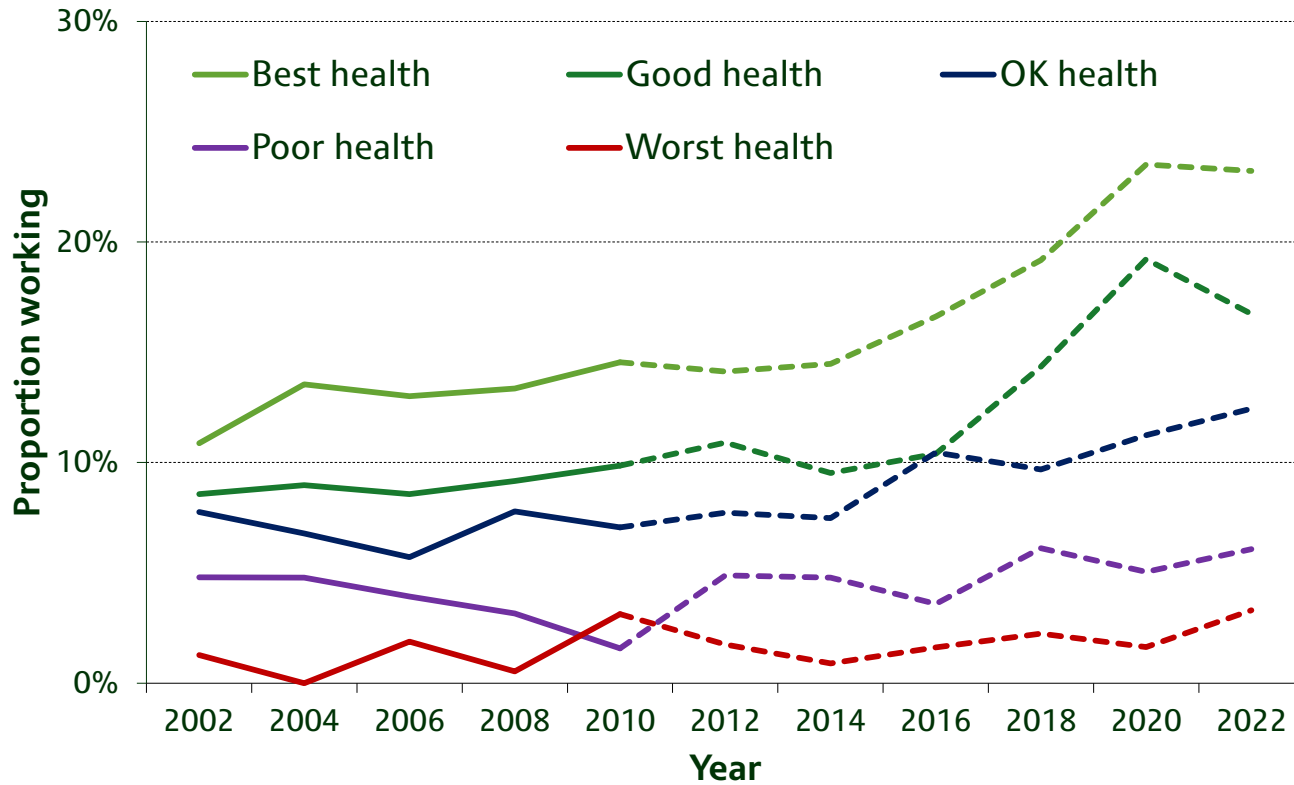
- Earnings
  - those with higher earnings significantly more likely to stay in work
- State Pension Age
  - both sexes 12ppts less likely to leave work if below their SPA
- DB pension scheme membership
  - men 12ppts more likely to leave work if part of a DB scheme (women 3ppts more likely), but effect only present for individuals over normal retirement age
- DC pension scheme membership
  - men 6ppts more likely to stay in full-time work if in DC scheme (women 2ppts more likely)
- Having a mortgage
  - both sexes 5ppts less likely to leave work if have outstanding mortgage

# Effect of increase in female SPA from 60 to 62



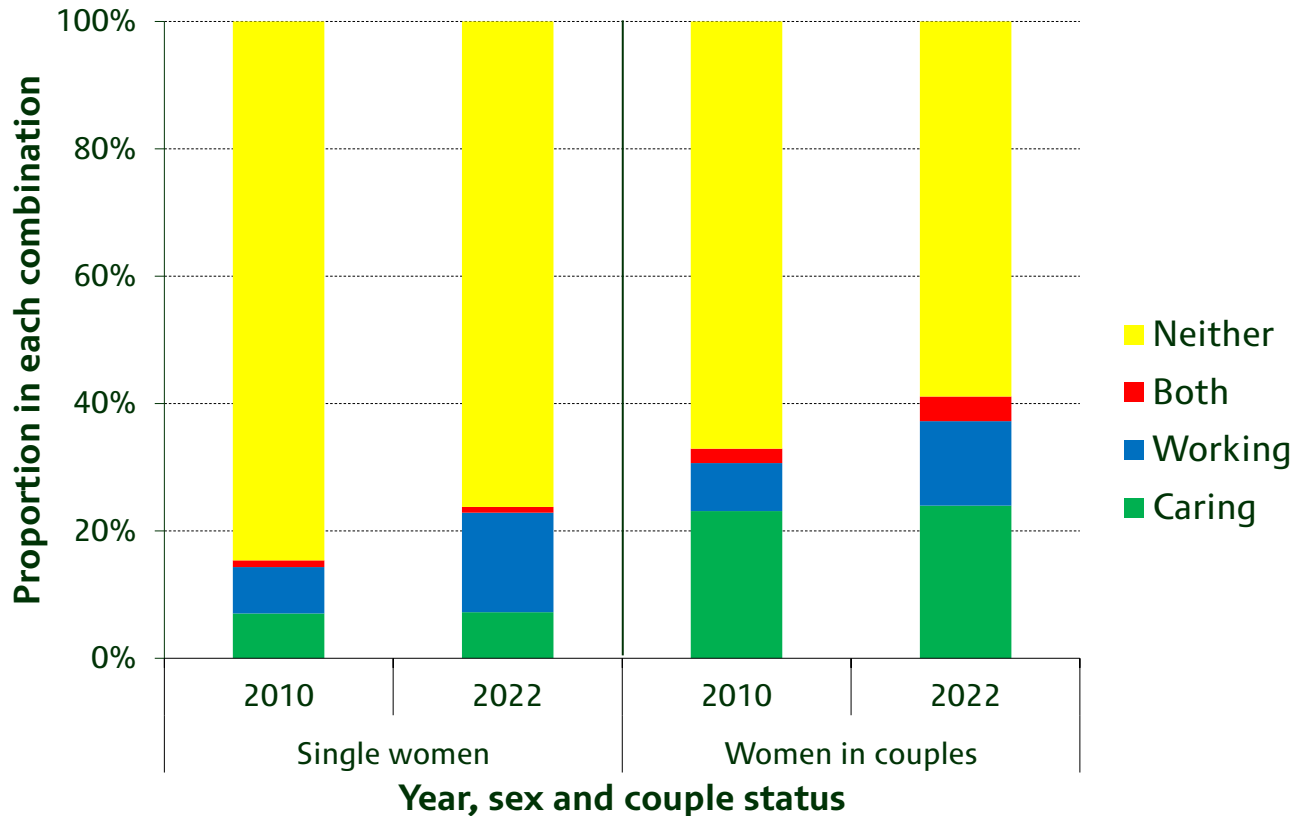
Source: Figure 2.1 from Cribb, Emmerson and Tetlow, *Labour supply effects of increasing the female state pension in the UK from age 60 to 62*

# Women in paid work by health status



Source: Figure 3.19

# Work and care provision among women 65+



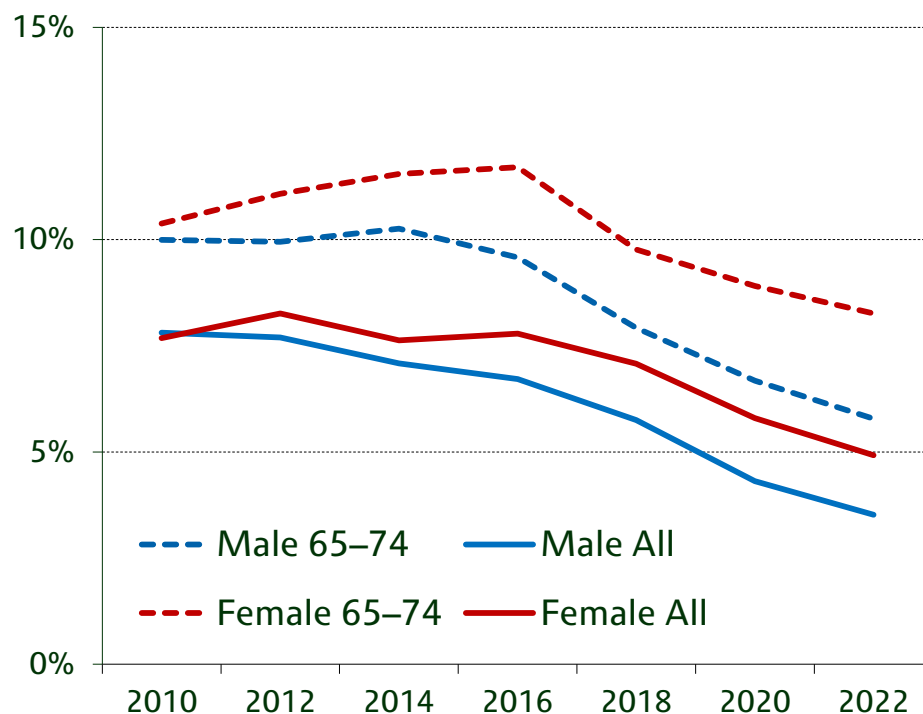
Source: Figure 3.17

# DISABILITY BENEFIT RECEIPT



# Disability living allowance (and PIP)

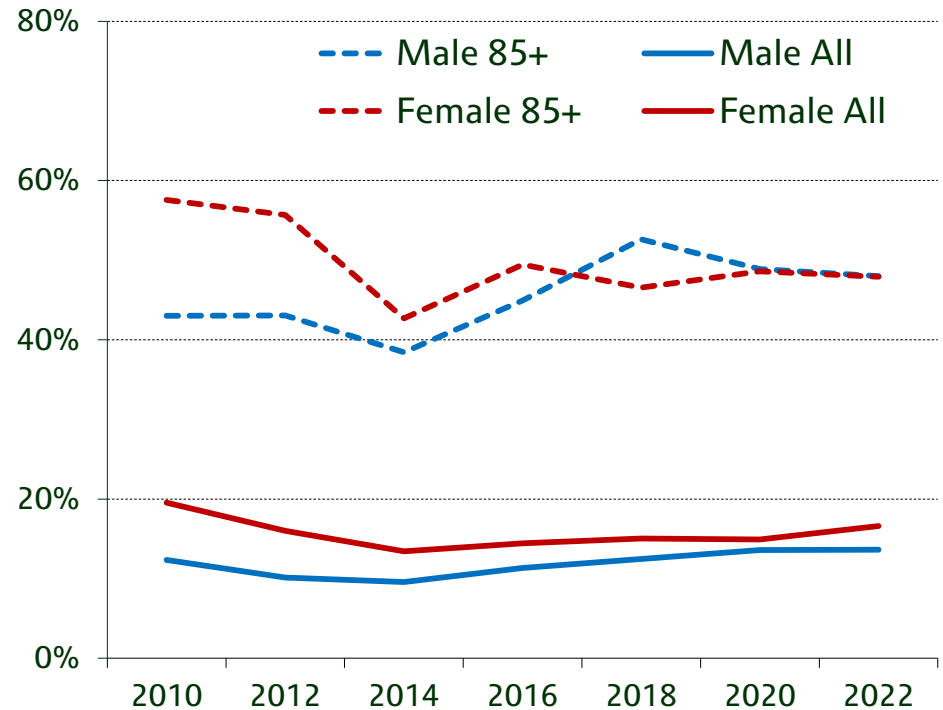
- Women are more likely to receive DLA than men
- Older people are less likely to receive DLA than younger people
- DLA receipt falls:
  - health improves
  - more people in work
  - effects of the reform to PIP



Source: Figures 3.14 & 3.15

# Attendance allowance

- Again, more women than men claim
- Almost 60% of 85+ women and over 40% of 85+ men claim in 2010
- About 50% of 85+ people of both sexes claim in 2022
- Claimant rates for women fall as health improves



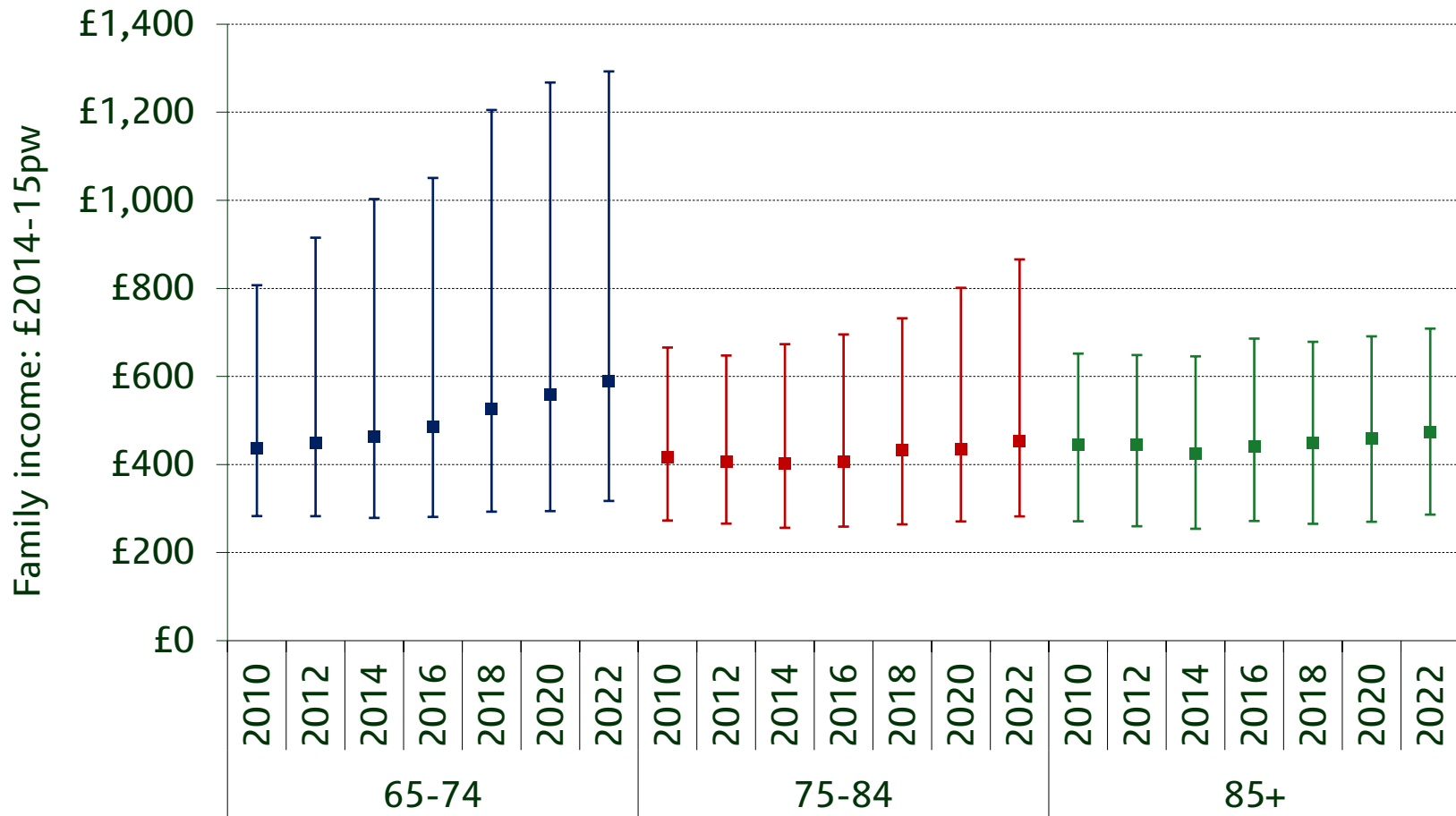
Source: Figure 3.16

# NET INCOMES AND POVERTY

# Calculating net incomes

- Given gross incomes, we can use the IFS tax and benefit model, TAXBEN, to calculate net incomes (after taxes and benefits)
- We incorporate all reforms announced up to and including Budget 2014
  - eg. Universal Credit, transferable tax allowance for married couples
- Then use normal uprating rules to create future tax and benefit systems

# Net family incomes by age: 65+ population



Source: Figure 5.2

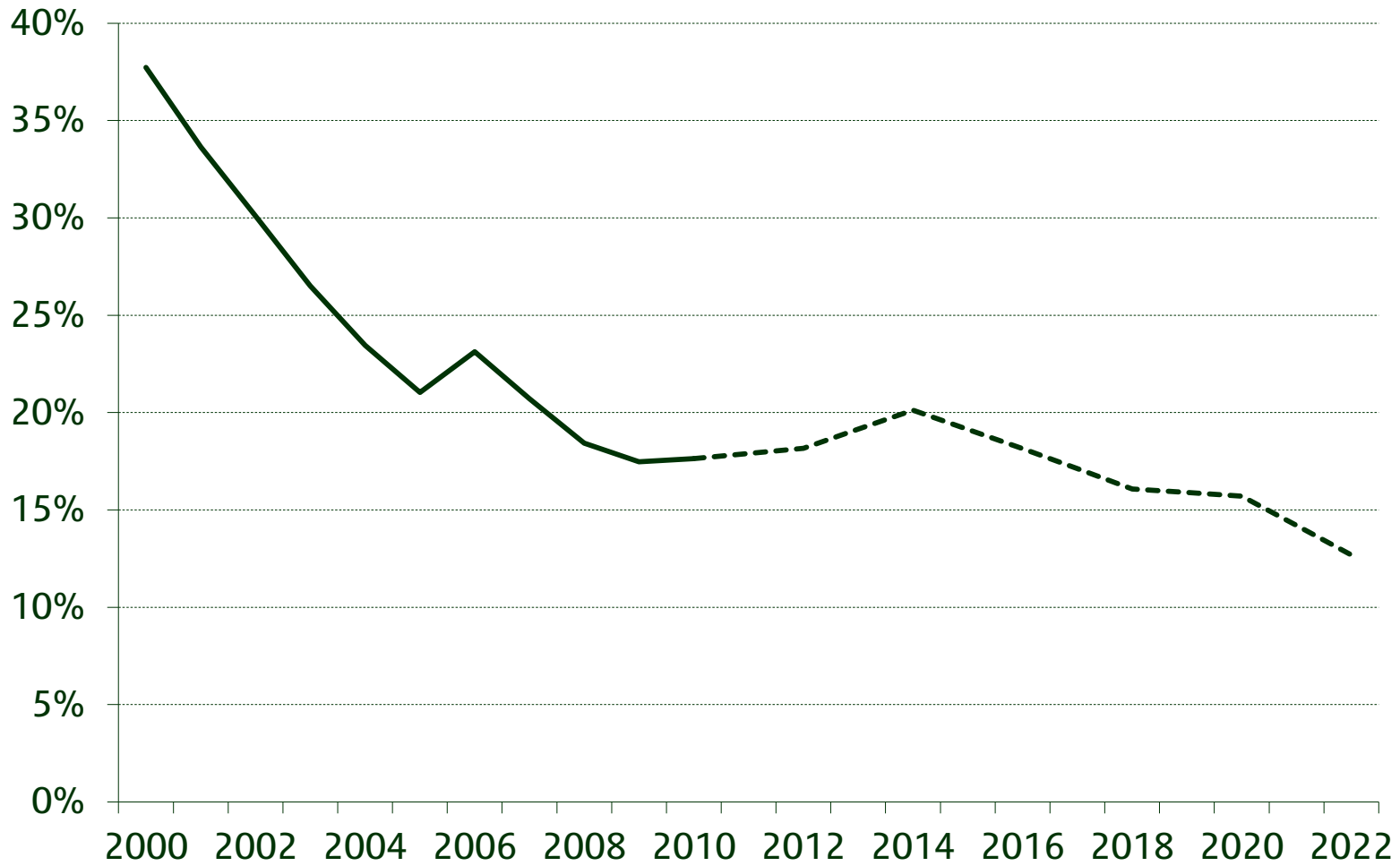
# Net family income projections: 65+ population

- Slow growth in median income from 2010–11 to 2014–15, then return to average of 2% per year until 2022–23
  - compared to 2.8% per year in the 2000s
- Incomes rise by more than 3% per year towards the top of the distribution, but by less than 1% towards the bottom
  - leads to increase in income inequality among 65 and over population
  - driven by growing importance of earnings
- 3% per year income growth for 65-74s from 2014–15 to 2022–23
  - compared to 1.6% per year for 75+ population
  - reversal of past trends – again explained by importance of earnings

# Calculating income poverty

- We project *absolute* income poverty among 65+ population
  - absolute poverty compares incomes to poverty line fixed in real terms
  - relative poverty would require projections for whole population median income
- We choose our poverty line to match official statistics
  - 17.6% poverty rate in 2010–11 among 65+ population
  - in 2010–11, poverty line is £280 for couples (£190 for single people)
- Adjust that poverty line for forecast changes in prices using CPI
  - Official statistics currently use RPI, but now thought to overstate inflation

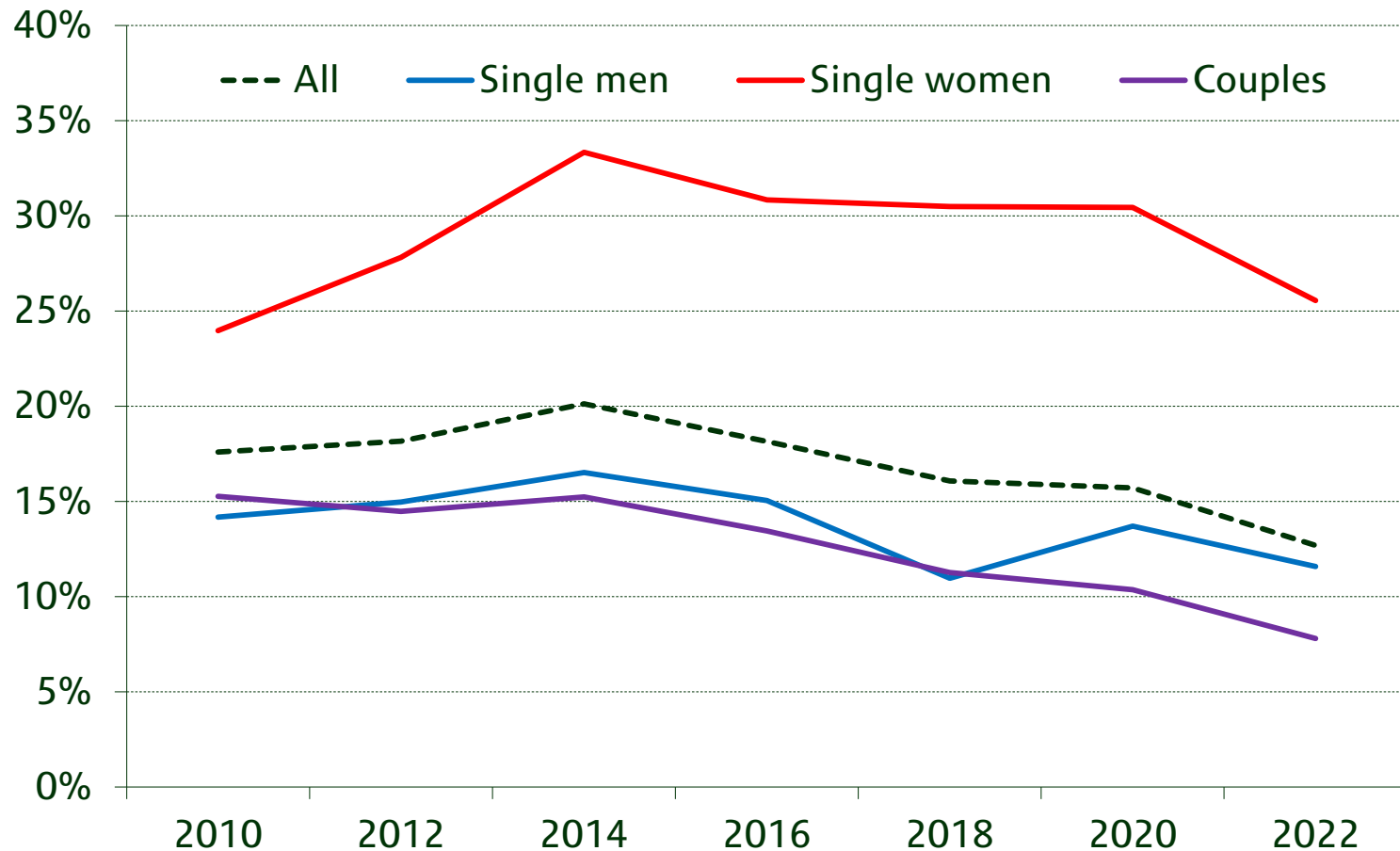
# Absolute income poverty: 65+ population



Source: Figure 5.4



# Absolute income poverty by family type: 65+ population



Source: Figure 5.5

# Absolute income poverty projections: 65+ population

- Absolute poverty projected to fall from 20.1% in 2014–15 to 12.7% in 2022–23
  - around a third of 2000–01 level
- Particularly sharp decline in absolute poverty among couples
  - from over 15% in 2010–11 to less than 10% in 2022–23
- But poverty among single women projected to increase
  - does not reflect women falling into poverty, rather increasing adverse selection into this group