



Institute  
and Faculty  
of Actuaries

# THE SCOTLAND EFFECT: IS THERE ONE AND WHY DOES IT MATTER?

Susan Hanlon FFA



20 March 2018

# AS YOU ALL KNOW...

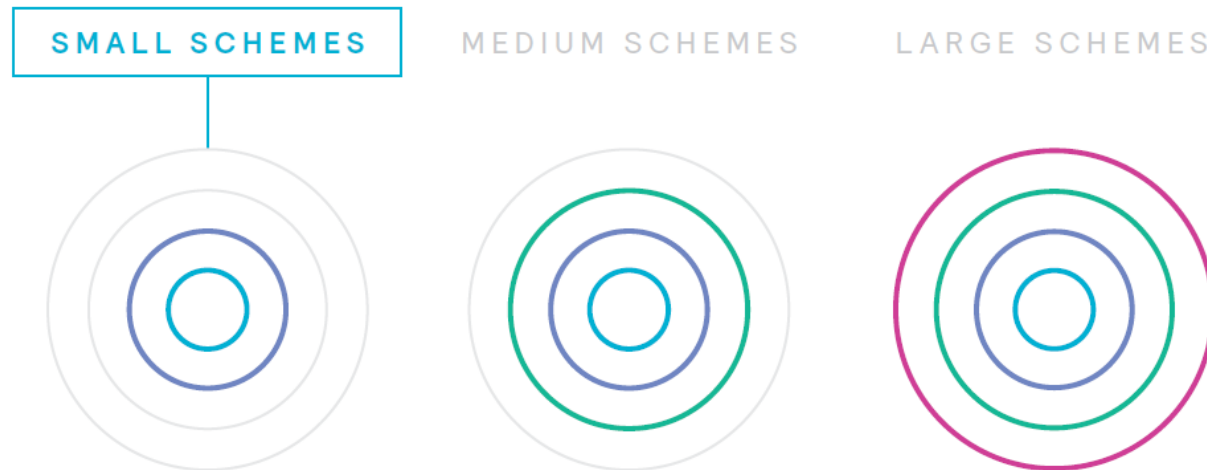
## Prudence

- Fundamental to technical provisions
- Negotiated between funding parties – not specified by the Regulator
- Still need a best estimate starting point

## Data

- Almost no underwriting data available
- Direct experience data limited for all but the largest of schemes.

## Typical approaches

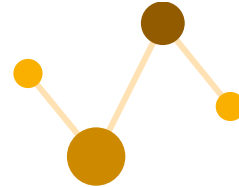


# THE SCOTLAND EFFECT

## IS THERE ONE AND WHY DOES IT MATTER?



NATIONAL  
STATISTICS



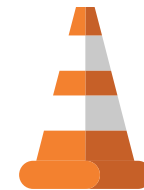
MERCER  
MODEL



WHAT ARE THE  
CAUSES?



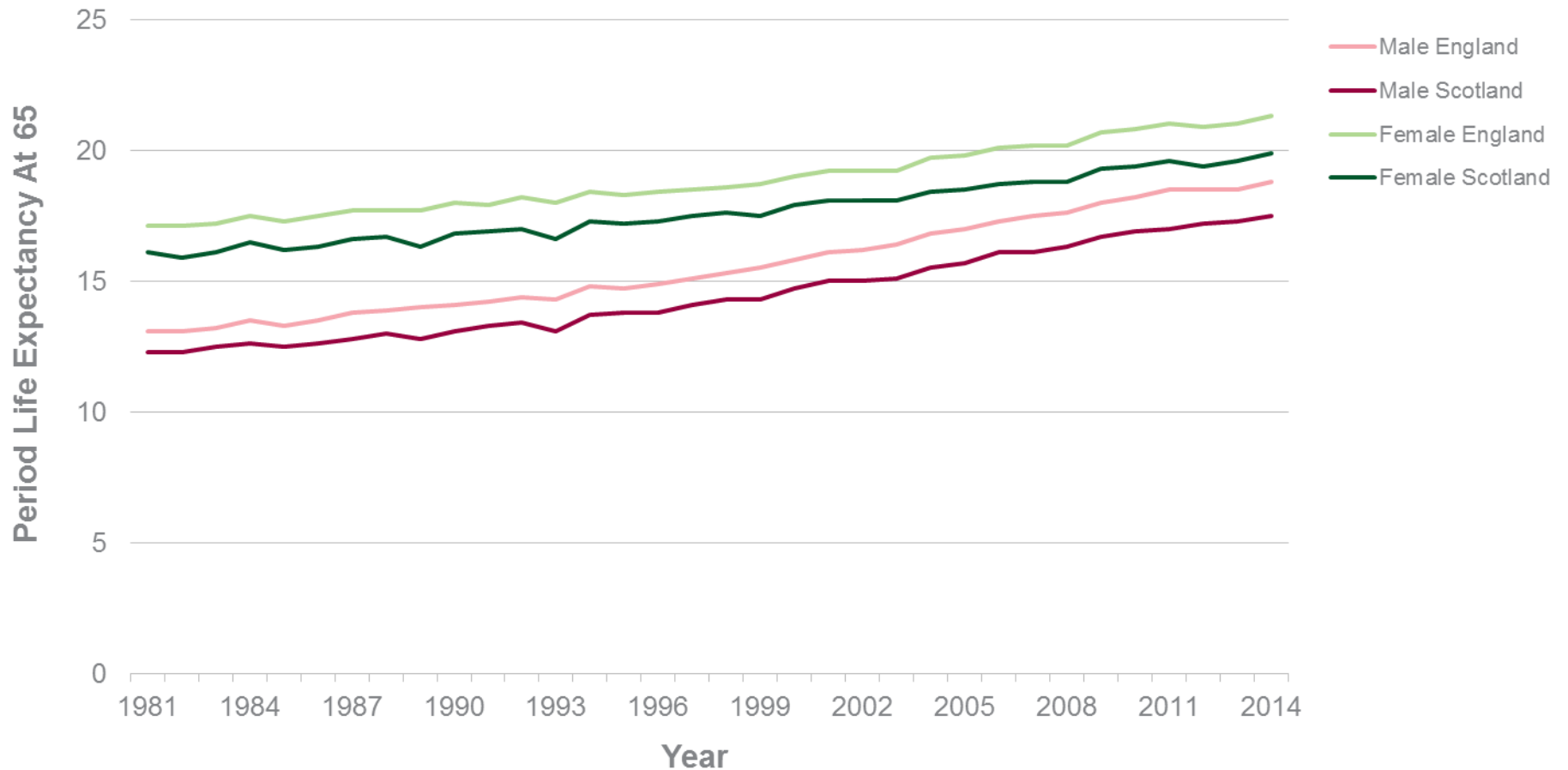
WILL THE EFFECT  
PERSIST?



SO WHAT?

# THE SCOTLAND EFFECT IS THERE ONE? NATIONAL STATISTICS

## LIFE EXPECTANCY AT 65



Source: Office for National Statistics, 2014-based principal projections

# THE SCOTLAND EFFECT

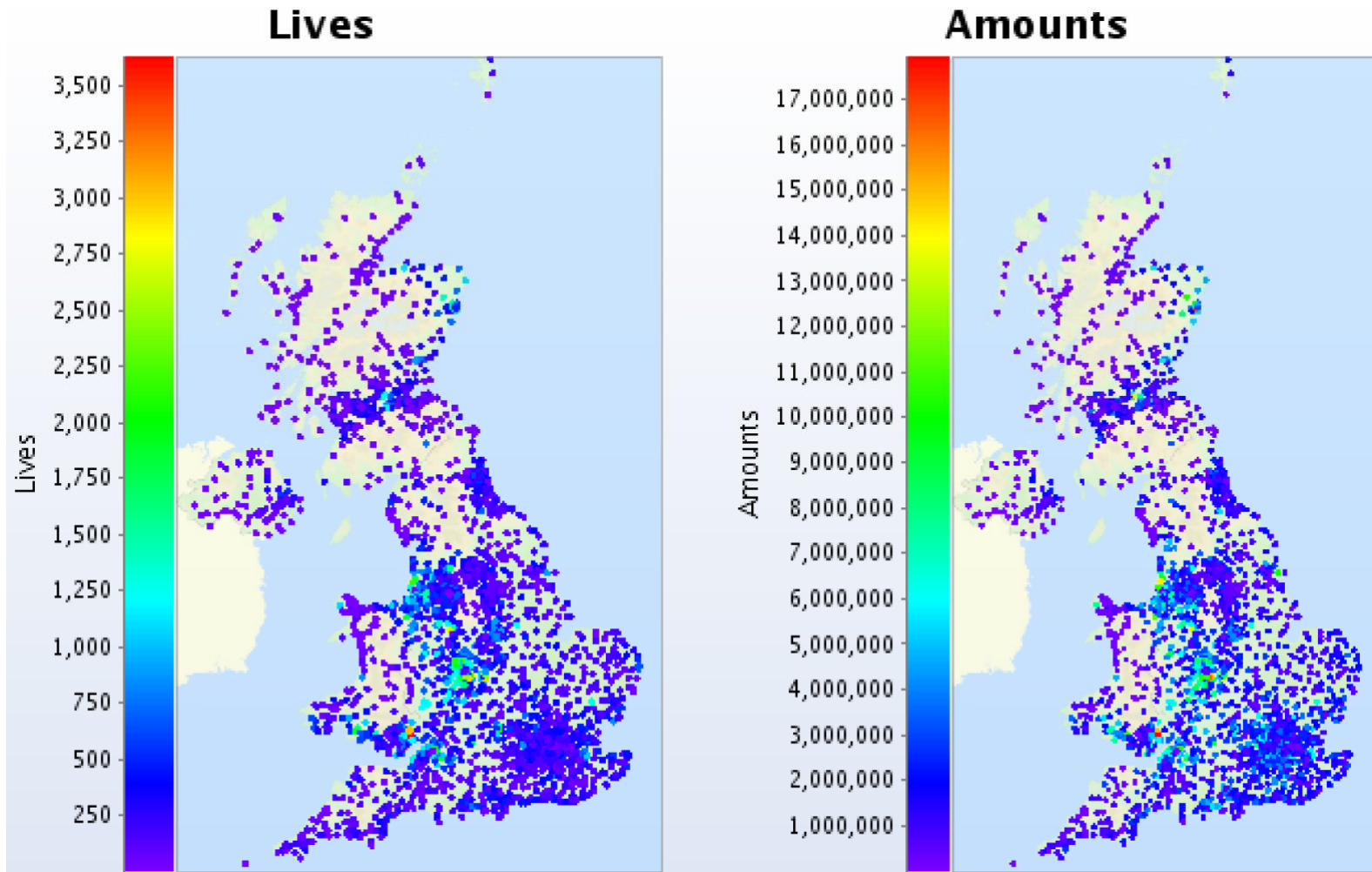
## IS THERE ONE? MERCER MORTALITY MODEL

- 1 million records
- More than 4 million life-years of experience
- 15 years' data
- Good spread across both public and private sector clients
- 95% of records had a valid UK postcode



# THE SCOTLAND EFFECT

## IS THERE ONE? MERCER MORTALITY MODEL



# THE SCOTLAND EFFECT

## IS THERE ONE? MERCER MORTALITY MODEL

$$\mu_{x,y} = \frac{e^{\epsilon} + e^{\alpha + \beta x + \delta(y-2000)}}{1 + e^{\alpha + \beta x + \delta(y-2000)}}$$

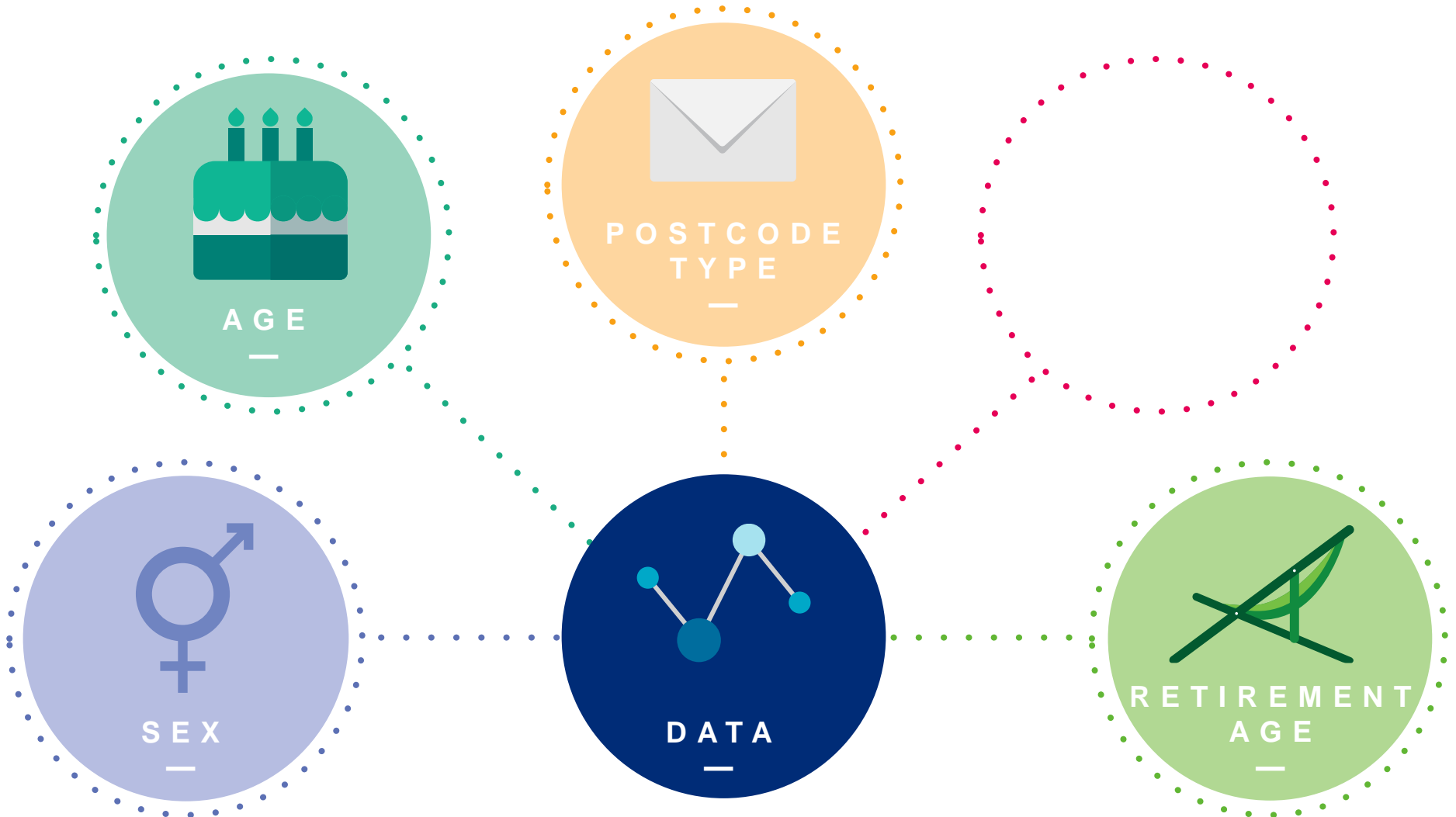
$$\alpha_i = \sum_j z_{i,j} \alpha_j$$

$$\beta_i = \sum_j z_{i,j} \beta_j$$



# THE SCOTLAND EFFECT

## IS THERE ONE? MERCER MORTALITY MODEL





# THE SCOTLAND EFFECT

## IS THERE ONE? MERCER MORTALITY MODEL



### LOCATION

- Accessibility
- Rurality
- Urbanisation
- Islands

### FINANCIAL MEASURES

- Credit behaviour
- Bad debt
- Shareholdings
- Directorships

### SOCIO-ECONOMICS AND CONSUMPTION

- Occupation
- Industry
- Employment status
- Qualifications
- Socio-economic status
- Cars and transport
- Product and media

### DEMOGRAPHICS

- Household demographics
- Population movement
- Health
- Background & beliefs

### PROPERTY CHARACTERISTICS

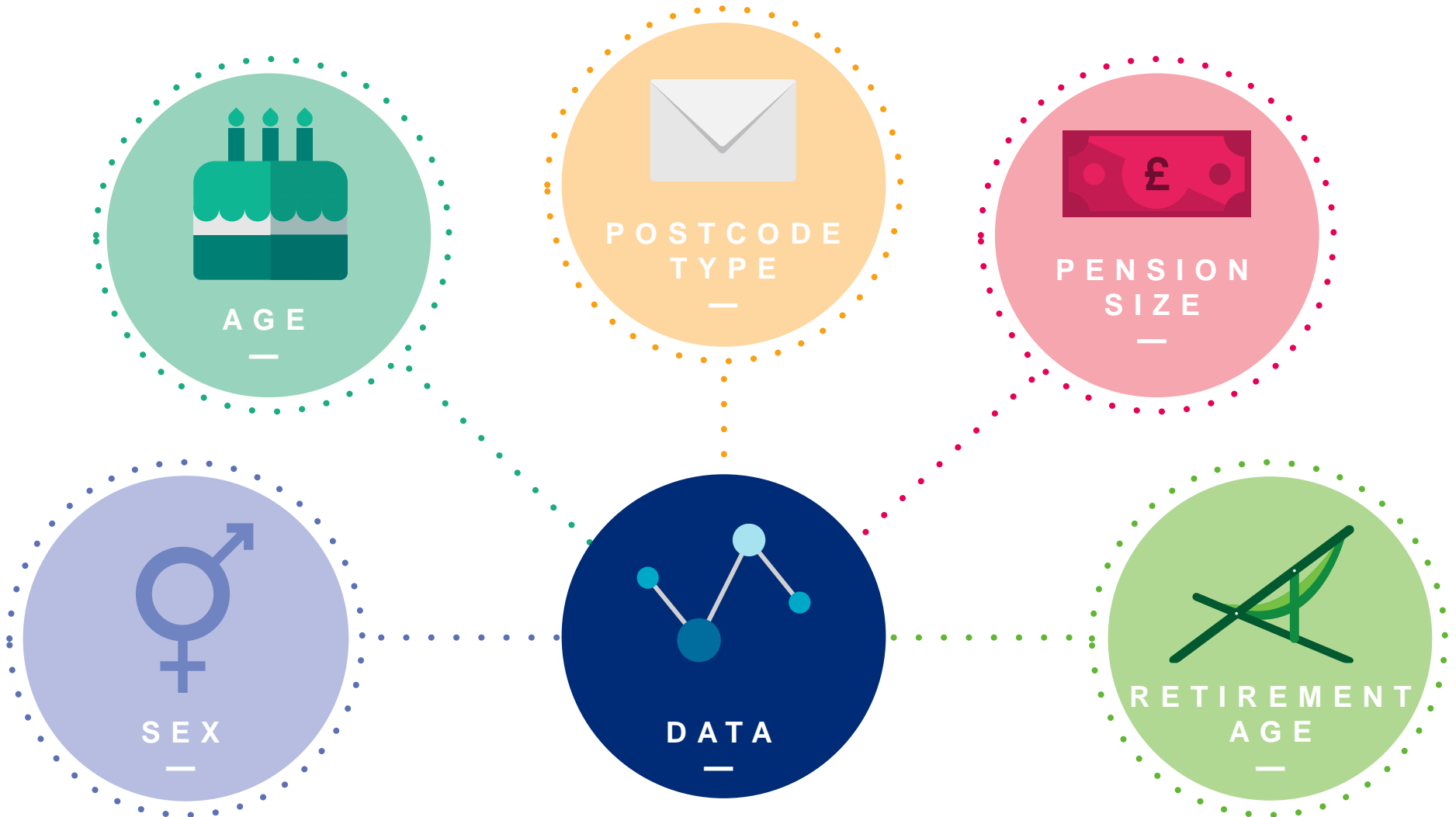
- Building
- Tenure
- Amenities
- Second residences
- Housing age

### PROPERTY VALUE

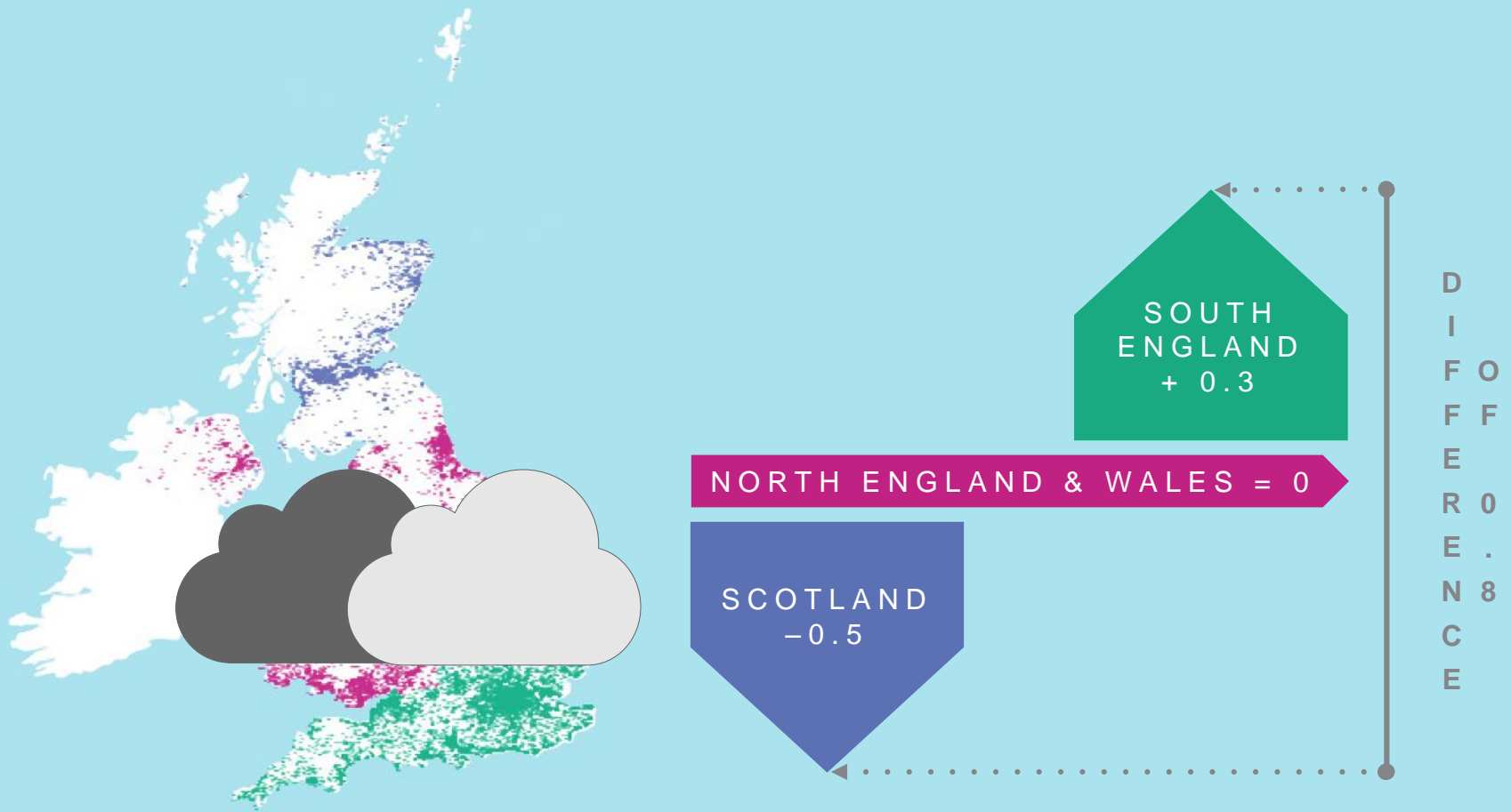
- Property sales
- Property value
- Council tax band

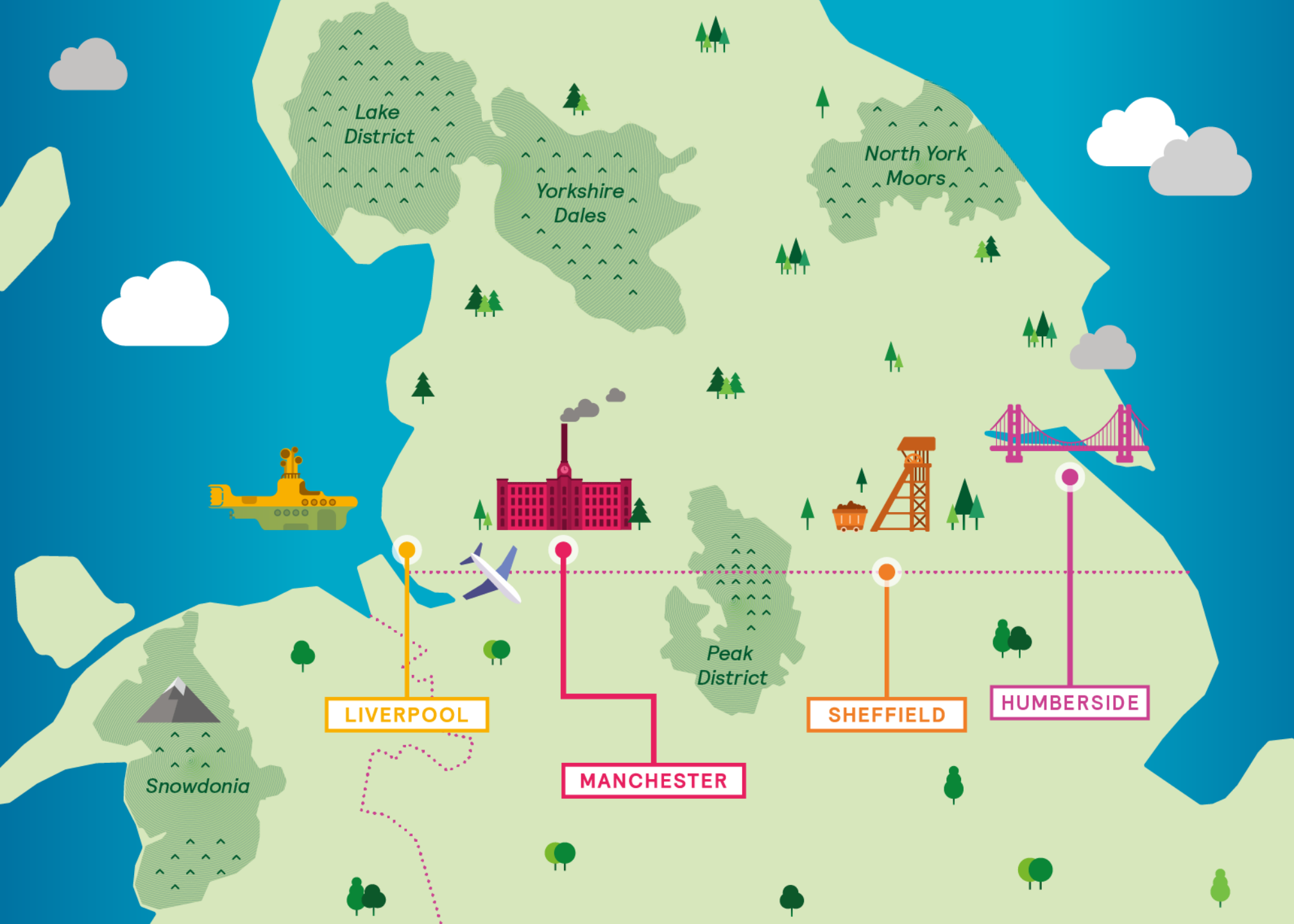
# THE SCOTLAND EFFECT

## IS THERE ONE? MERCER MORTALITY MODEL



# THE SCOTLAND EFFECT IS THERE ONE? MERCER MORTALITY MODEL





LIVERPOOL

MANCHESTER

SHEFFIELD

HUMBERSIDE

Lake District

Yorkshire Dales

North York Moors

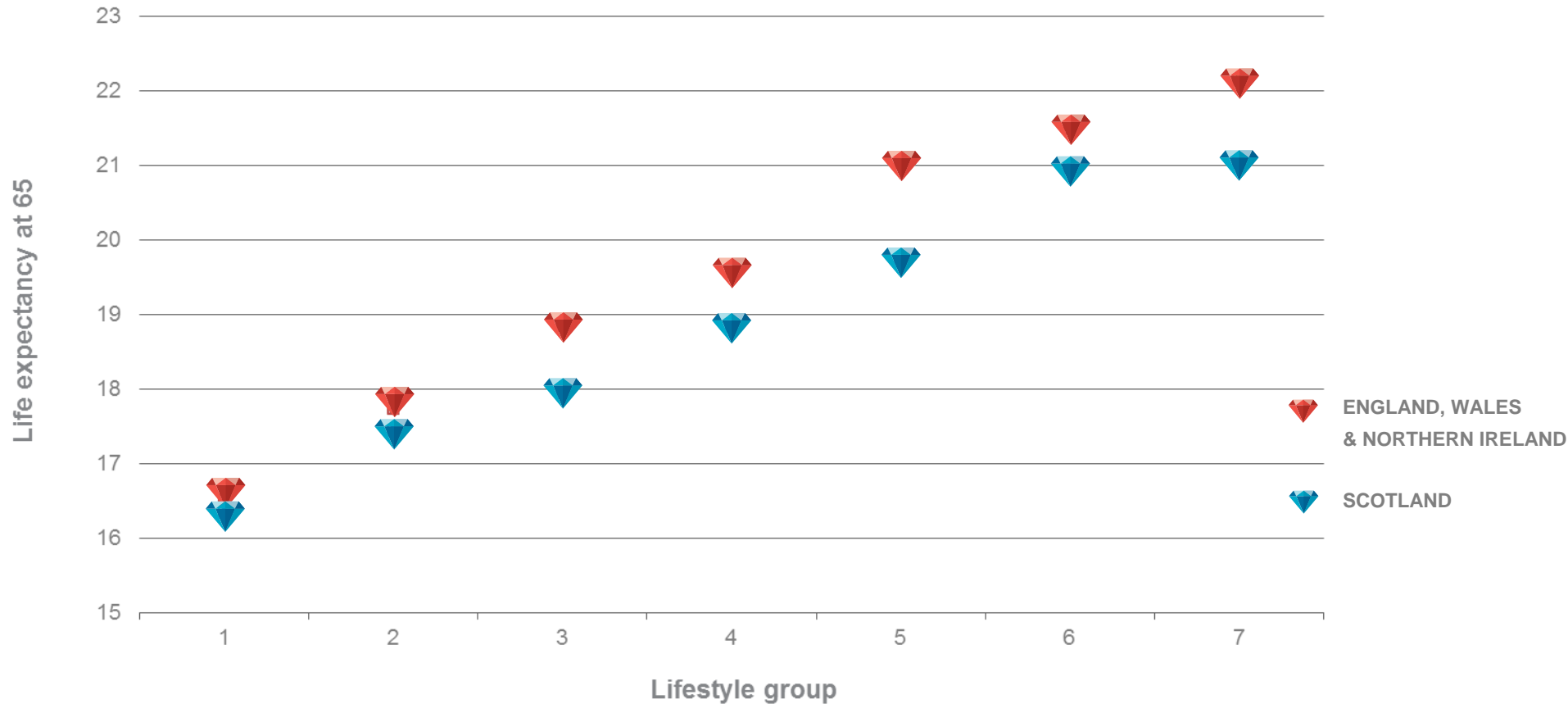
Peak District

Snowdonia

# THE SCOTLAND EFFECT

## IS THERE ONE? MERCER MORTALITY MODEL

### COMPARATIVE LIFE EXPECTANCIES AT 65 FOR SCOTLAND AND THE REST OF THE UK



# THE SCOTLAND EFFECT

## WHAT ARE THE CAUSES? DIET



# THE SCOTLAND EFFECT

## WHAT ARE THE CAUSES? ALCOHOL



# THE SCOTLAND EFFECT

## WHAT ARE THE CAUSES? SMOKING





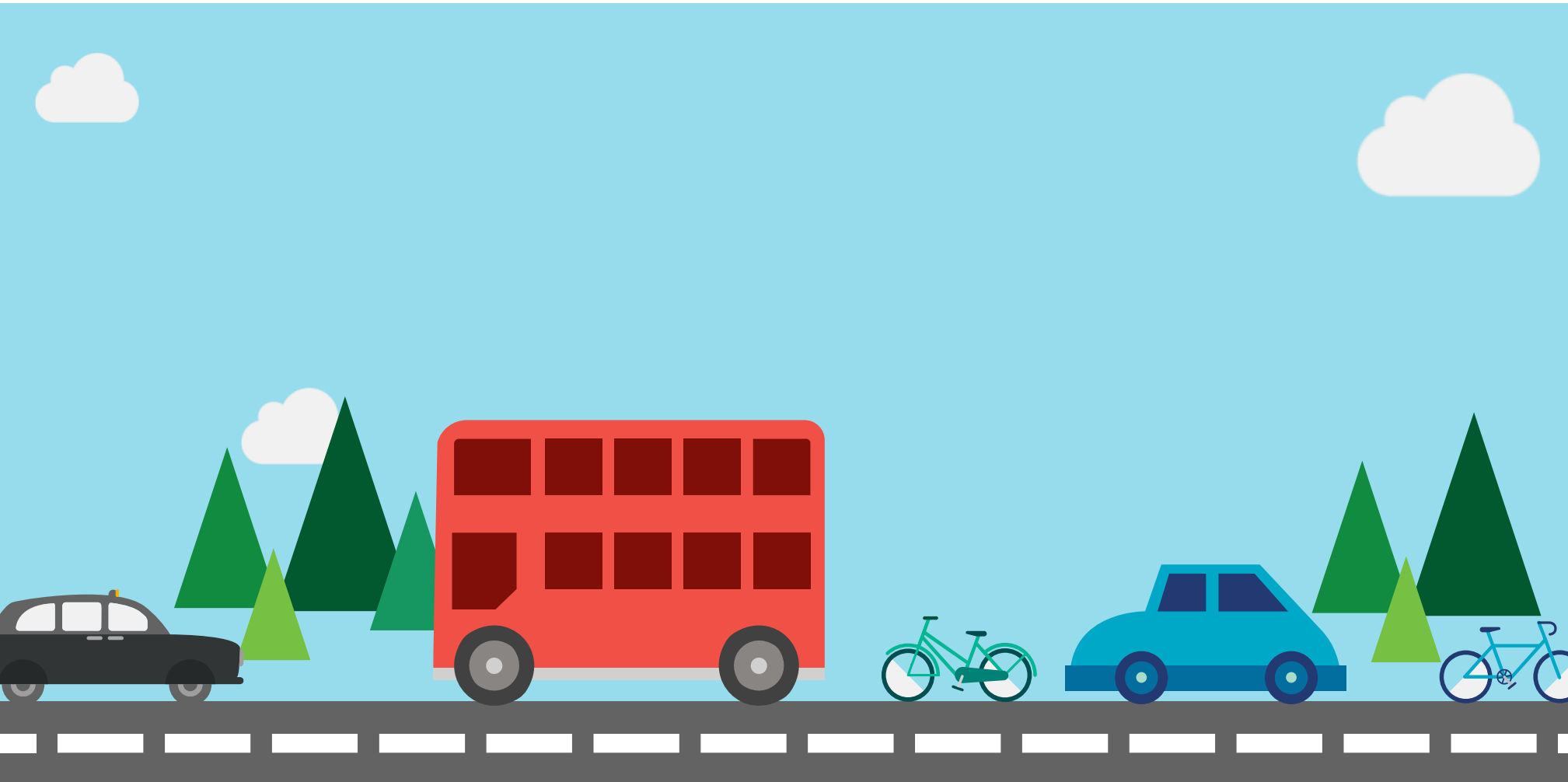
# THE SCOTLAND EFFECT

## WHAT ARE THE CAUSES? WEATHER



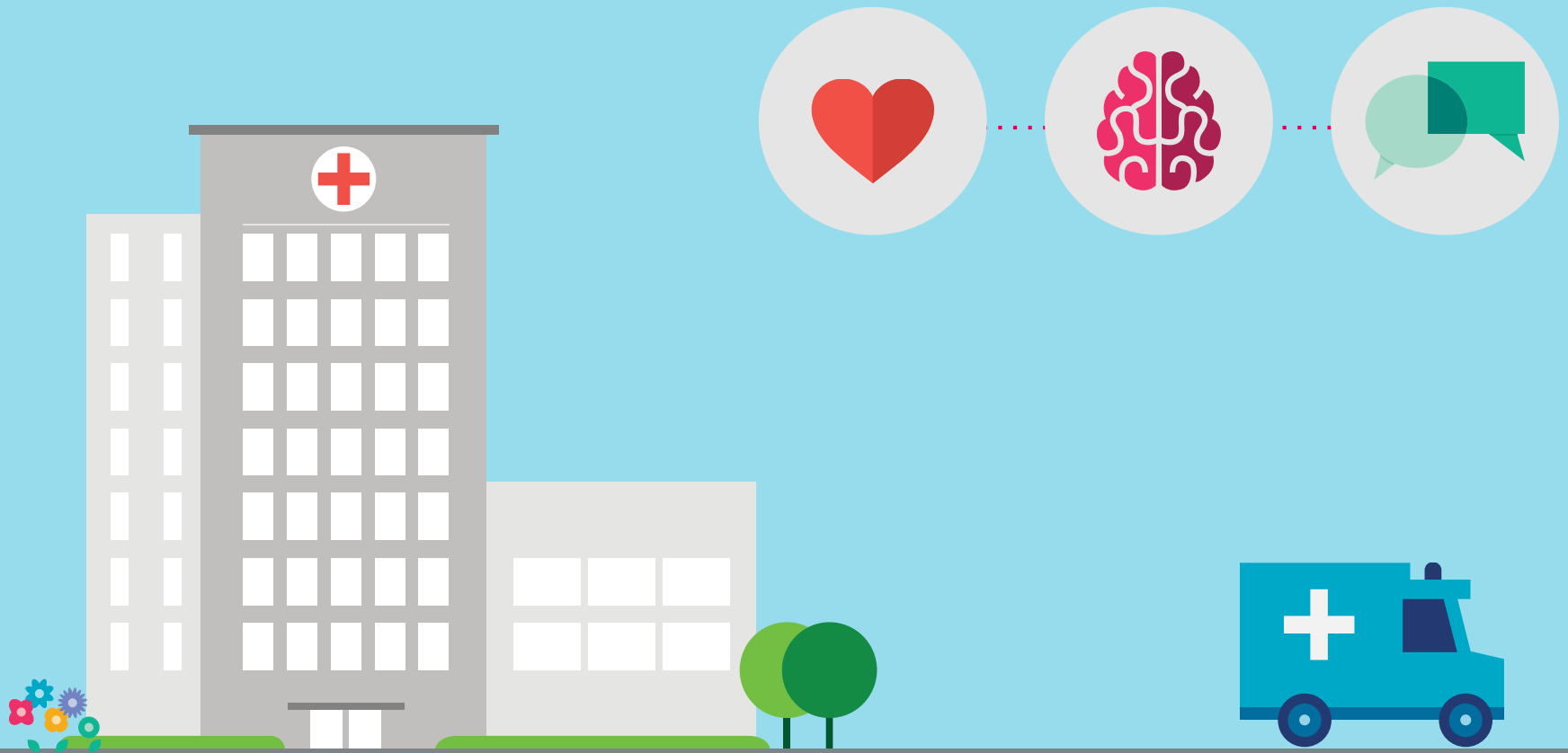
# THE SCOTLAND EFFECT

## WHAT ARE THE CAUSES? TRAFFIC ACCIDENTS



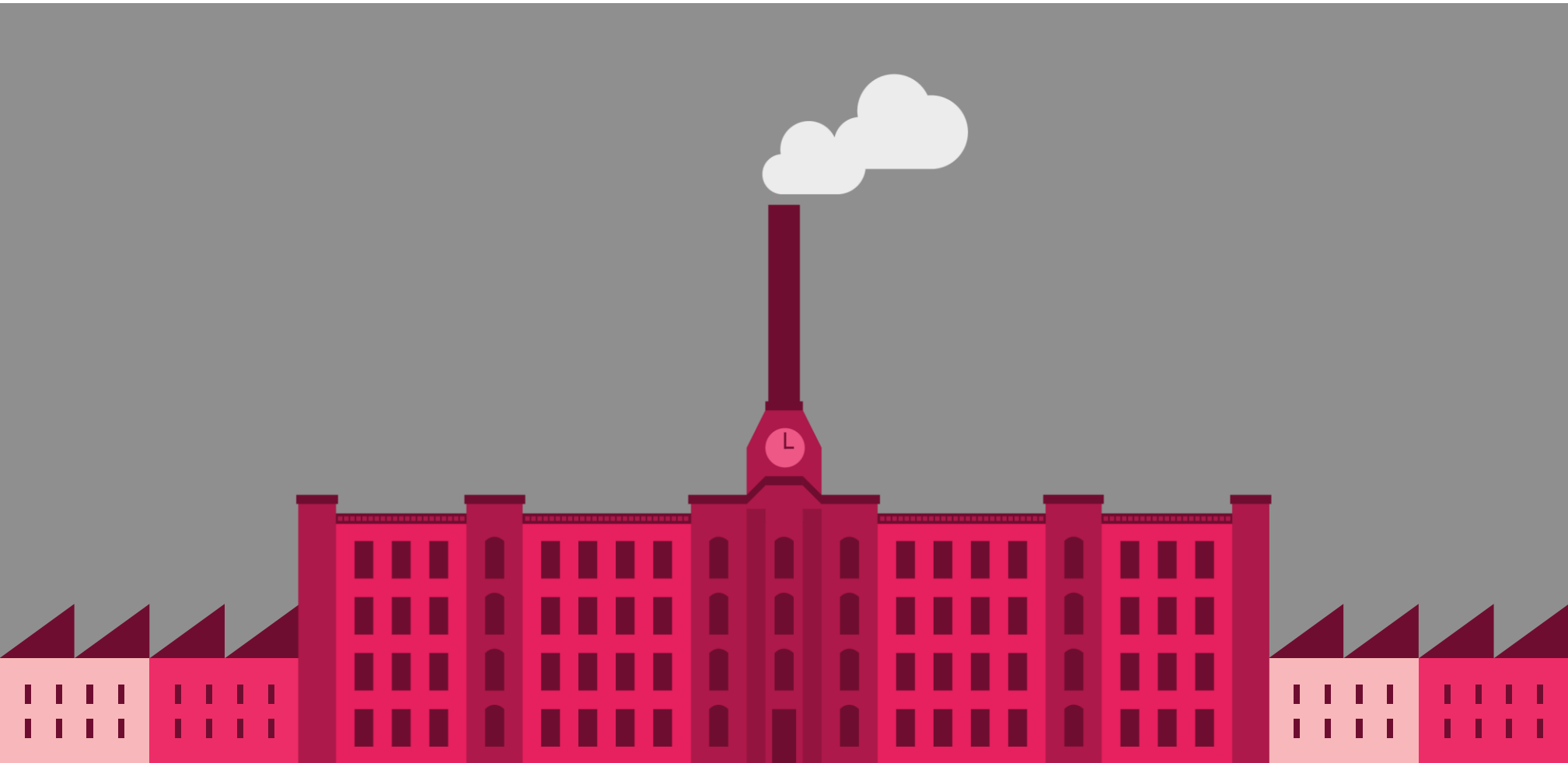
# THE SCOTLAND EFFECT

## WHAT ARE THE CAUSES? MENTAL HEALTH



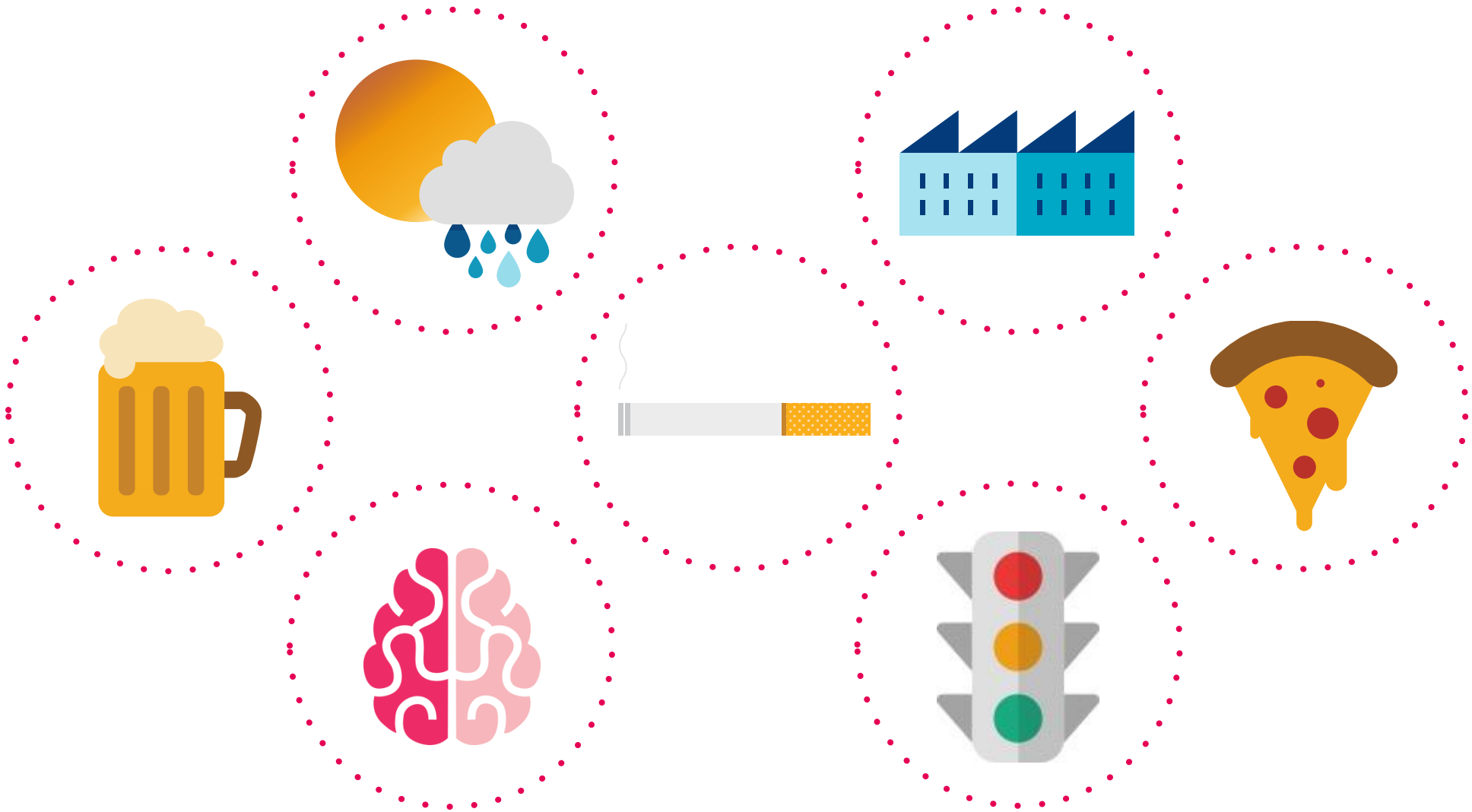
# THE SCOTLAND EFFECT

## WHAT ARE THE CAUSES? DEINDUSTRIALISATION



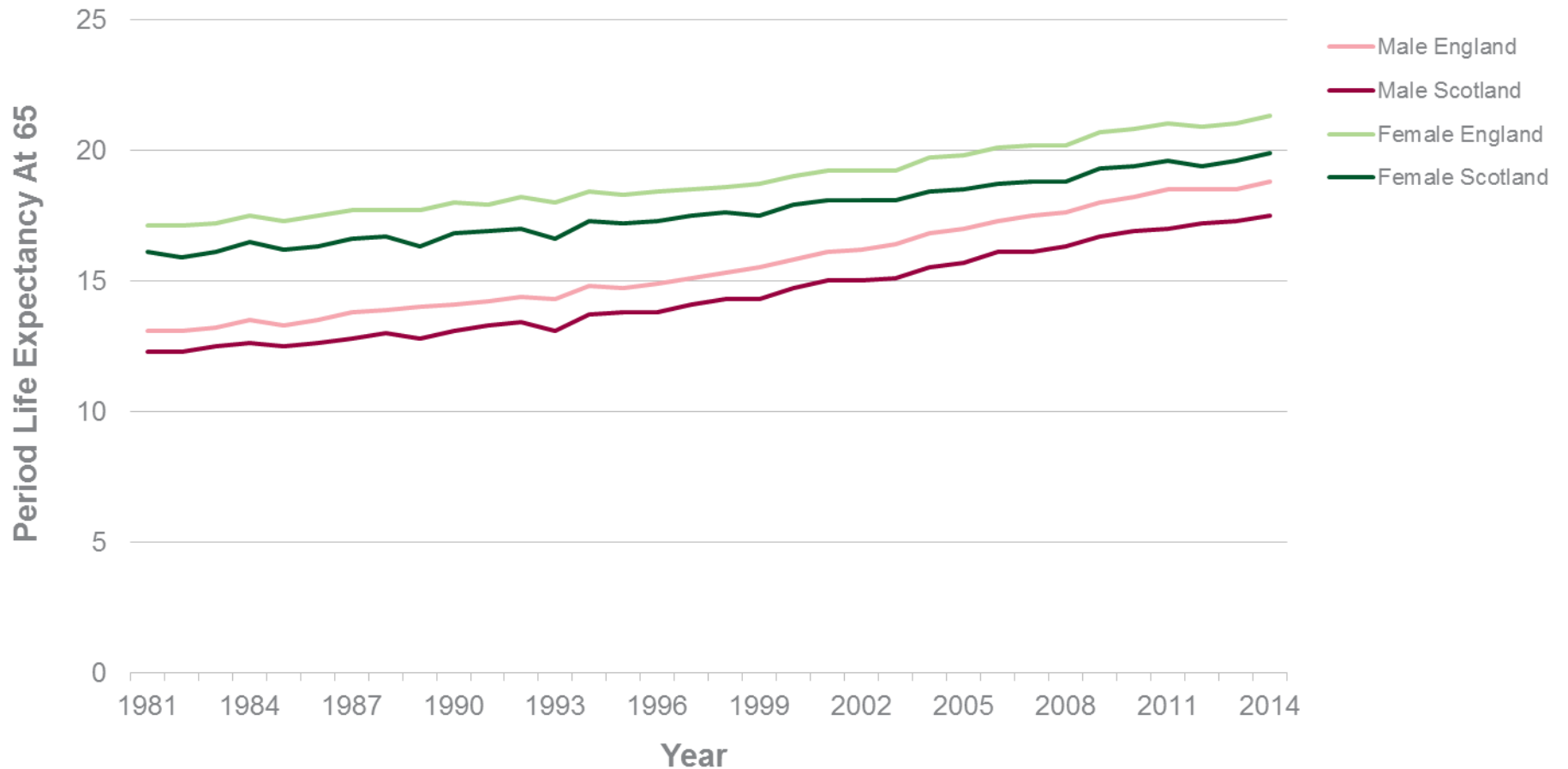
# THE SCOTLAND EFFECT

## WHAT ARE THE CAUSES?



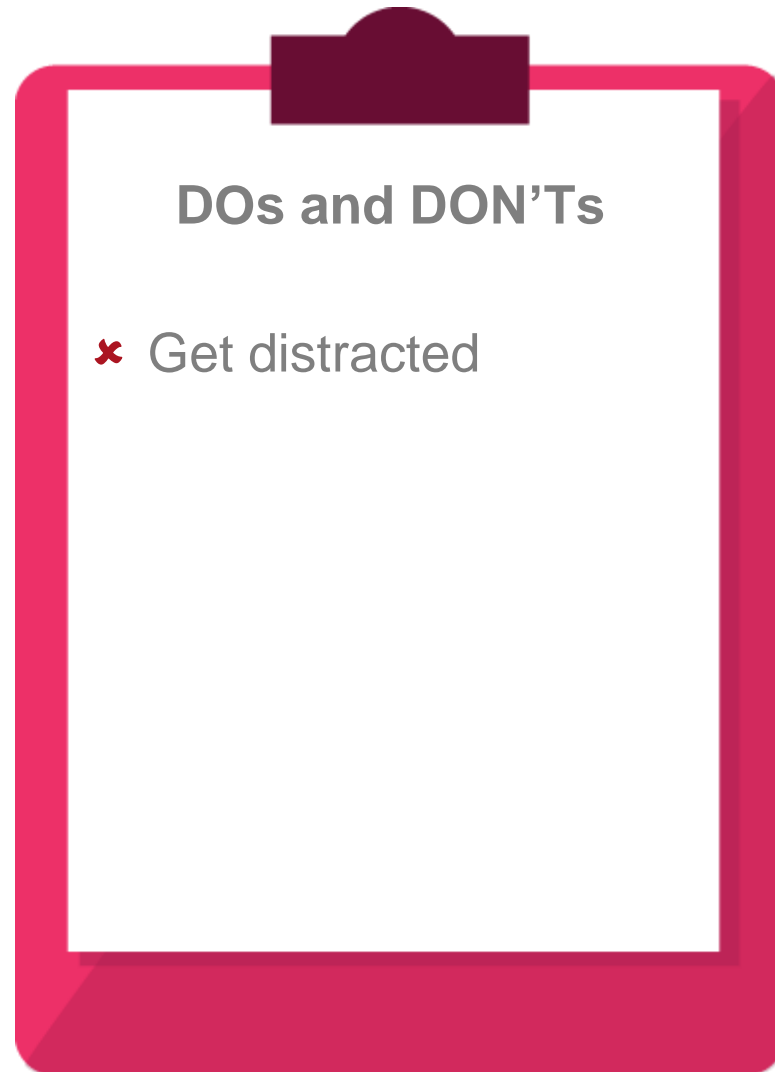
# THE SCOTLAND EFFECT WILL IT PERSIST?

## LIFE EXPECTANCY AT 65



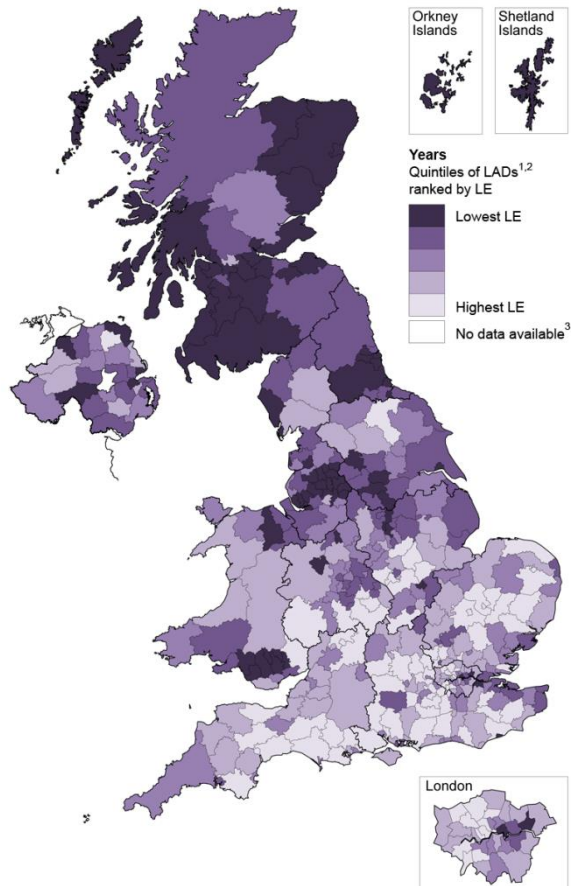
# THE SCOTLAND EFFECT

## SO WHAT?



# THE SCOTLAND EFFECT SO WHAT?

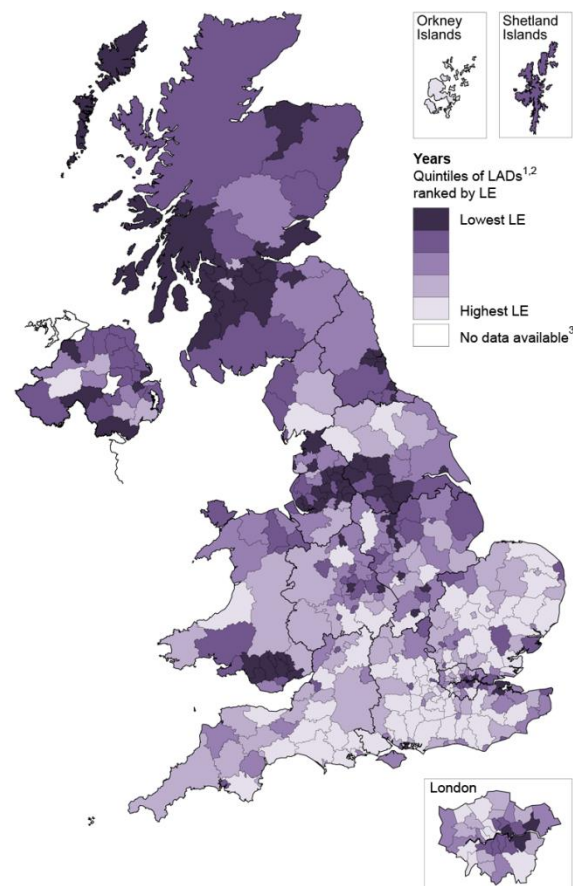
## MALES



1 Local authority districts (LADs) include unitary authorities, London boroughs, metropolitan districts and non-metropolitan districts in England and Wales, council areas in Scotland and district council areas in Northern Ireland.  
2 Each quintile comprises 81 LADs with the exception of the quintile with the lowest life expectancy, which has 80.  
3 Life expectancy figures are not available for City of London or Isles of Scilly because of small numbers of deaths and populations.

Source: Office for National Statistics  
Contains National Statistics data © Crown copyright and database right 2014  
Contains Ordnance Survey data © Crown copyright and database right 2014

## FEMALES



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Source:



Independent Review of the State Pension Age

**Smoothing  
the Transition**

Final Report  
March 2017



# THE SCOTLAND EFFECT

## SO WHAT?



### DOs and DON'Ts

- ✗ Get distracted
- ✓ Consider other factors
- ✗ Ignore it
- ✓ Assess the impact

# Questions

# Comments

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