Live and let marry

The importance of spousal assumptions

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1 Data Sources for Spouse Information

2 Setting Proportion Married Assumptions

3 Modelling Approaches

4 Summary

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Spouse benefits in DB pension context

Who can be eligible for spouse benefits?

Named spouse vs. **Any** spouse

- In defined benefit pension context: "**Any** spouse definition" predominant
- Benefits paid to the spouse **legally married or in a civil partnership** with the scheme member as at the date of death
- Assumptions on **proportion married** and **age difference** (age of spouse) to be made

The importance of accuracy

Marital proportions and age difference – why do they matter?

- Present value impact
- Accuracy matters:
  - underpricing impacts profitability
  - over-pricing impacts competitiveness
- Risks:
  - anti-selection
  - impact of changes in portfolio composition over time

	Present Value impact*
Proportion married + 10%	**0.9% - 1.6%**
Age difference of female spouse increased by 1 year	**0.4% - 1.4%**

Small differences matter

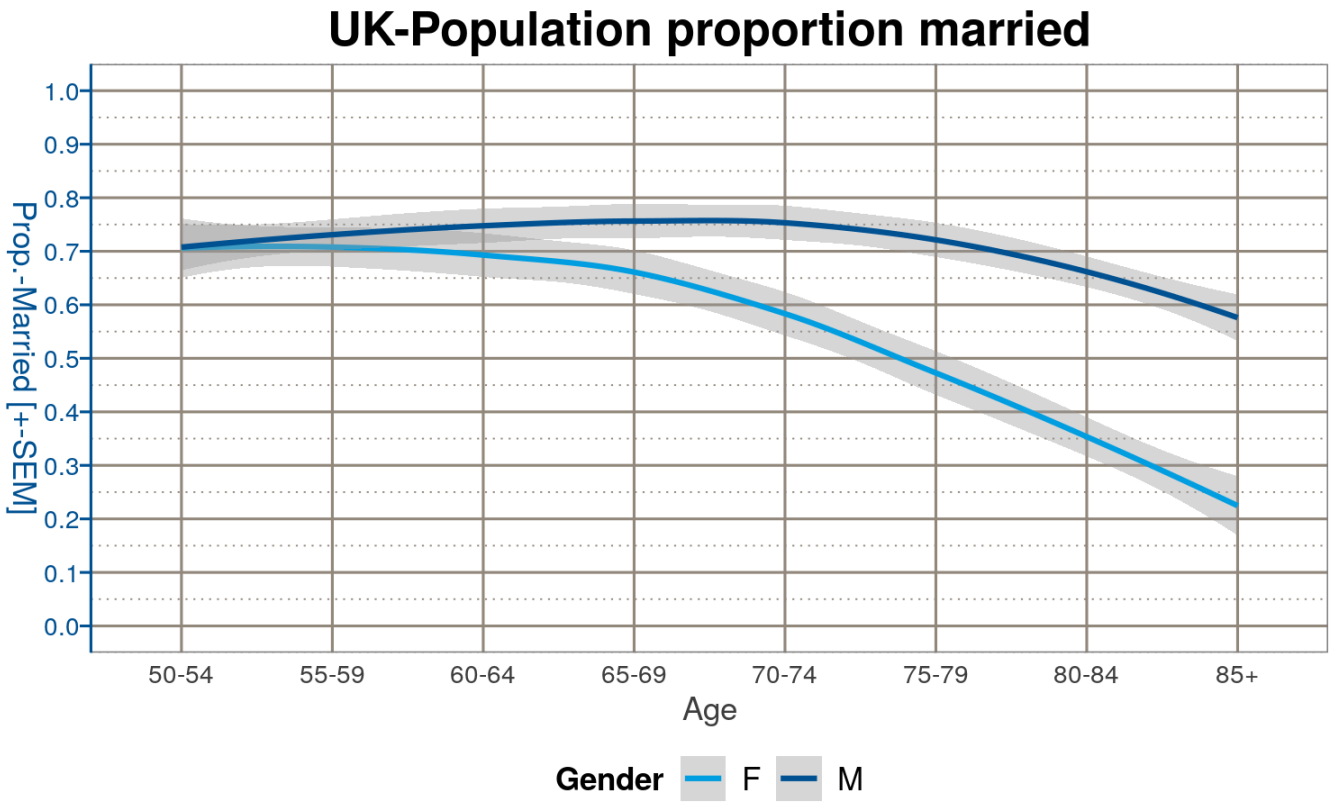
* depending on the composition of the scheme portfolio

Data sources for proportion married and age difference

	Pros	Cons
Population data	Good history over time, biggest data pool	General data, not considering scheme specifics
Electronic tracing data	Fast and reliable	Requires assumptions around categories and accuracy
Experience data	Relevant experience of the scheme	Potential bias – not the lives being priced
Write-out/Survey data	Most accurate way to assess current spouse information	Response bias, time, costs

Balance availability, accuracy, relevance and costs

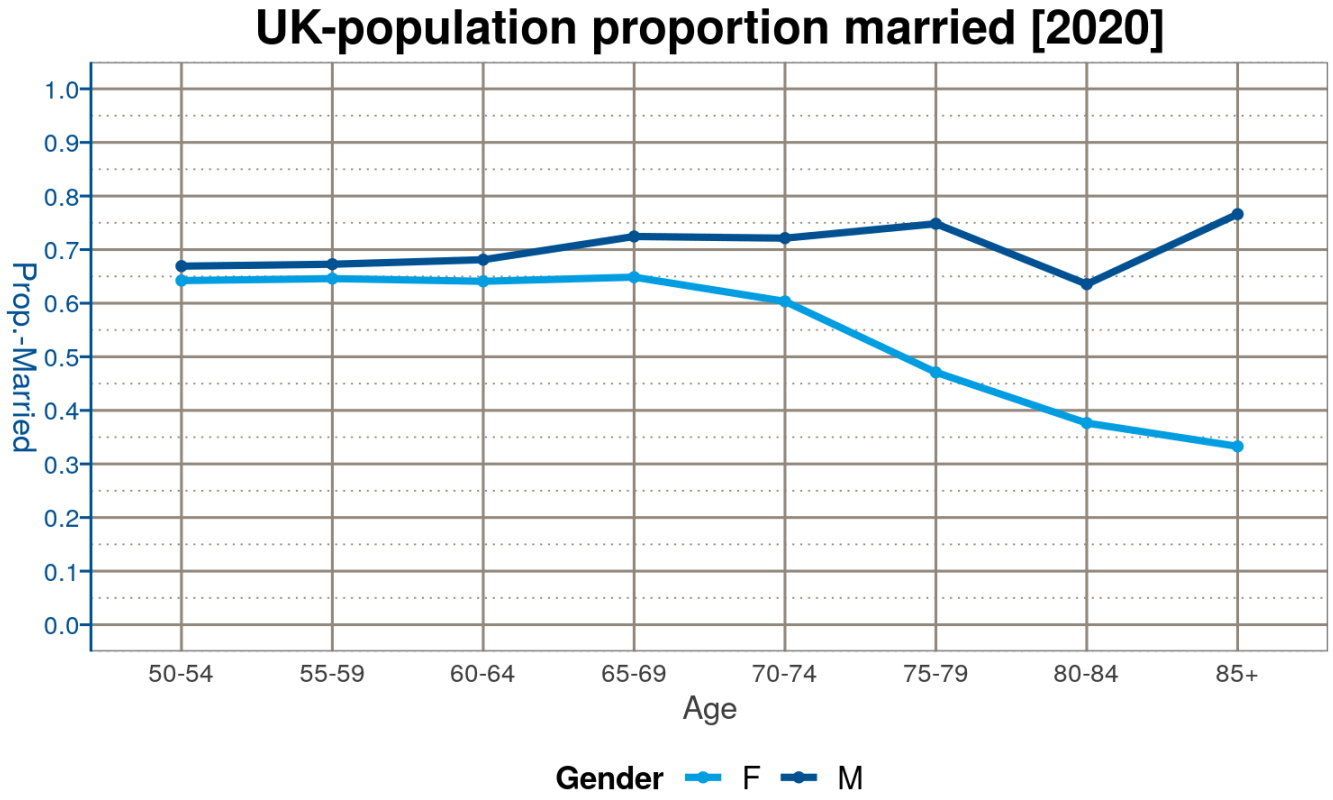
Available population data



Source: ONS 2002,2007,2012,2016,2020 + HR-calculations

Proportion married reduces as spouse's mortality increases

Population data variability

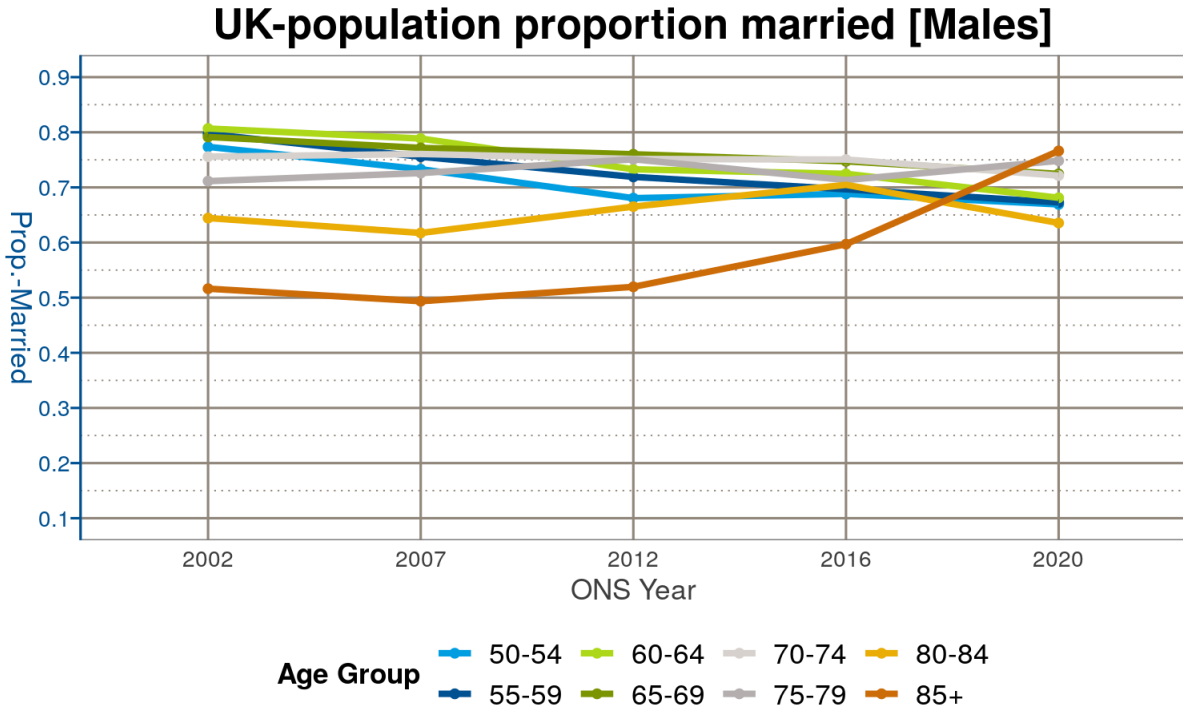


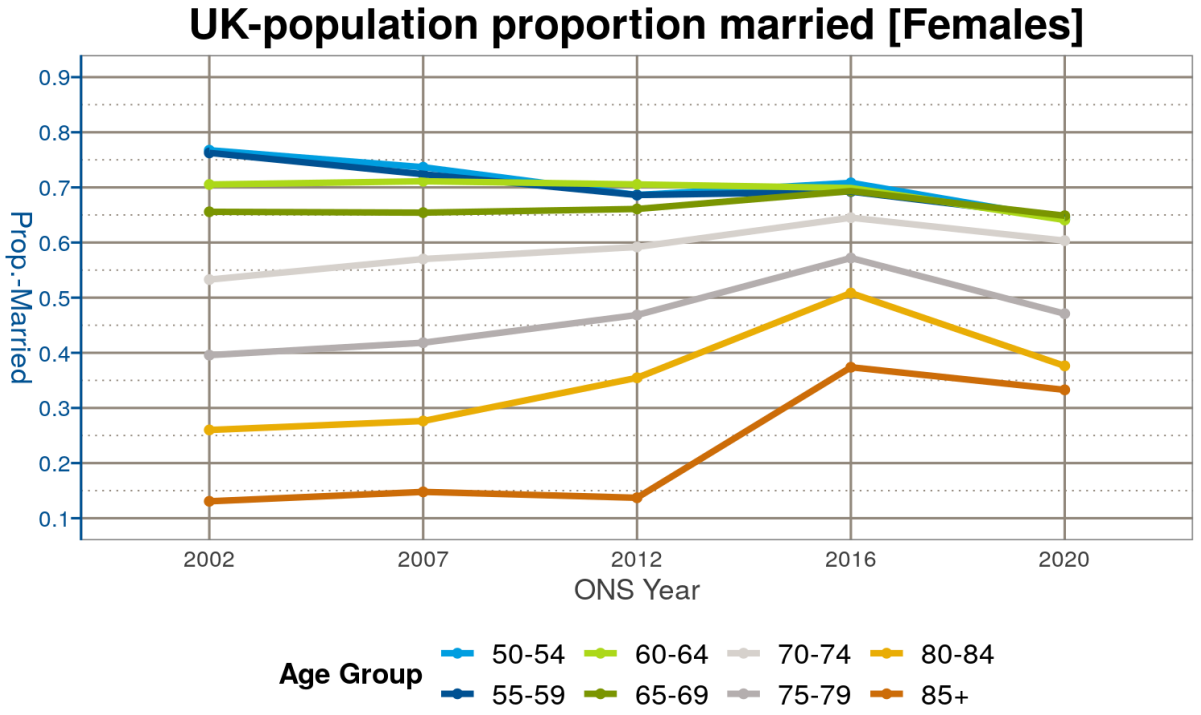
Source: ONS 2020 + HR-calculations

All estimates come with uncertainty!

Proportion married changes

Gender differences!



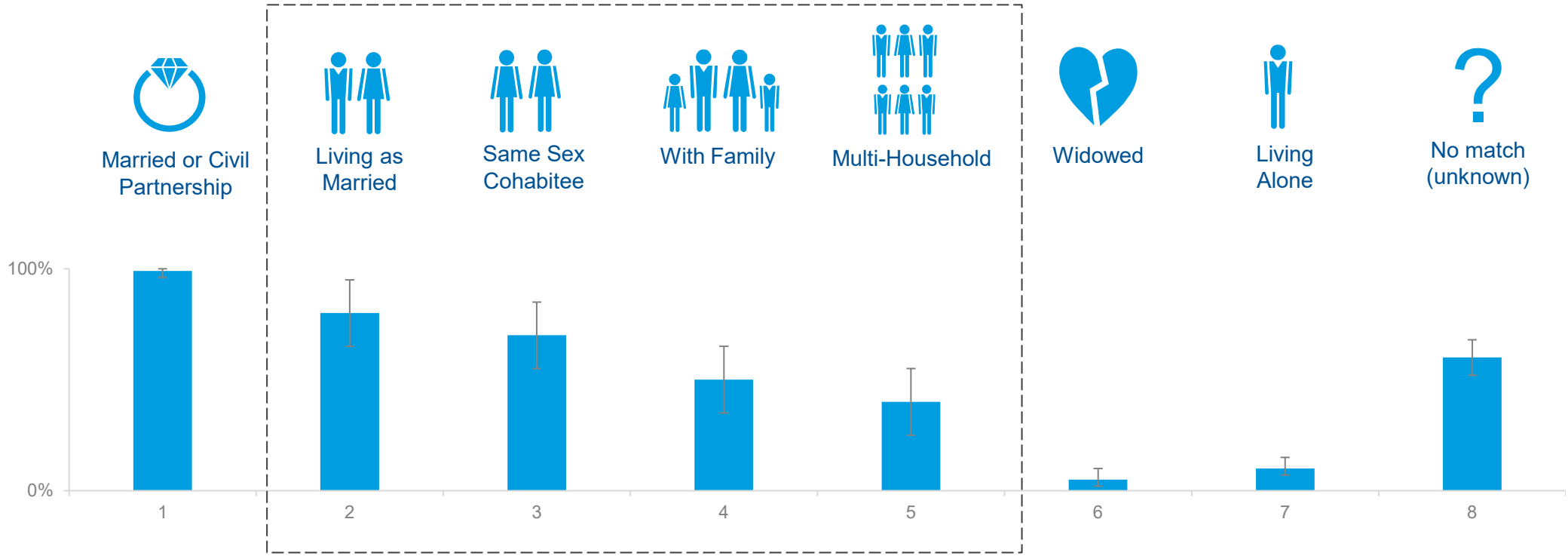


Source: ONS 2002,2007,2012,2016,2020 + HR-calculations

- **Declining proportion married rates at younger ages**
- **Increasing proportion married rates at higher ages**

Electronic tracing data

Electronic trace marital categories



Varying dependent probability and higher variance for cohabiting categories

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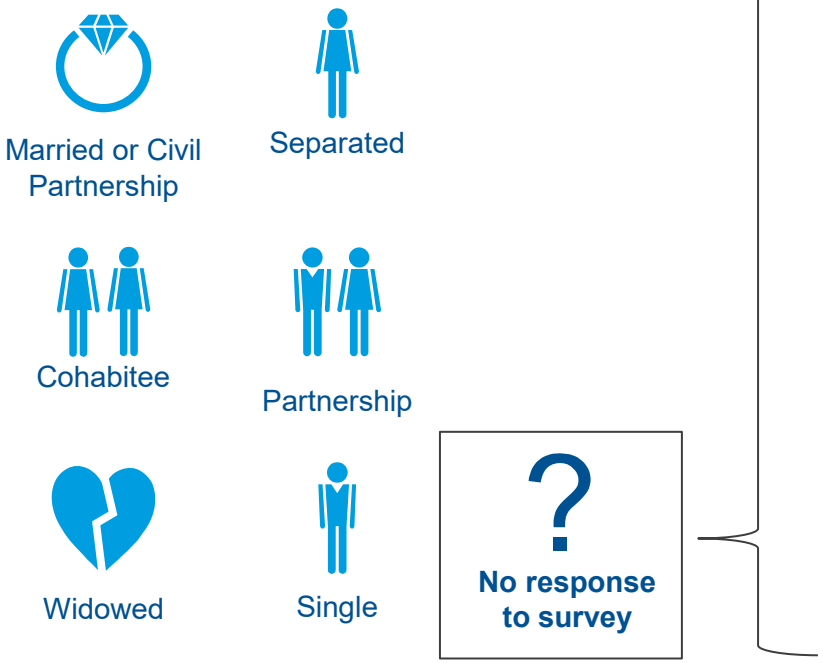
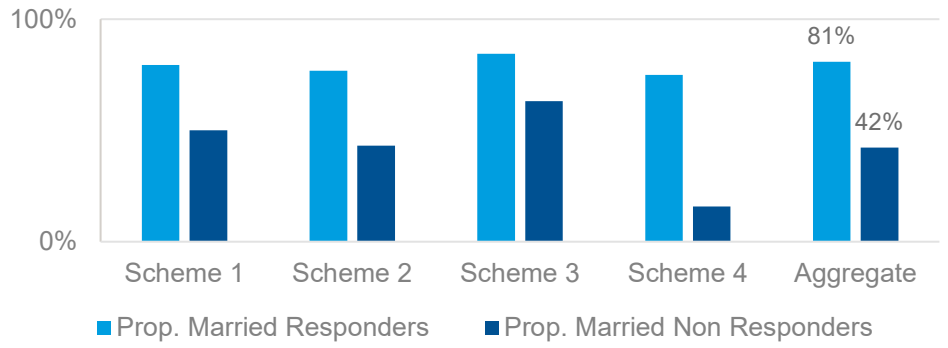
Write-Out/Survey Data

Responses to marital surveys





Non-respondent bias

P(married | respondent) > P(married | non-respondent)

Write-outs most accurate but non-respondent bias to be corrected

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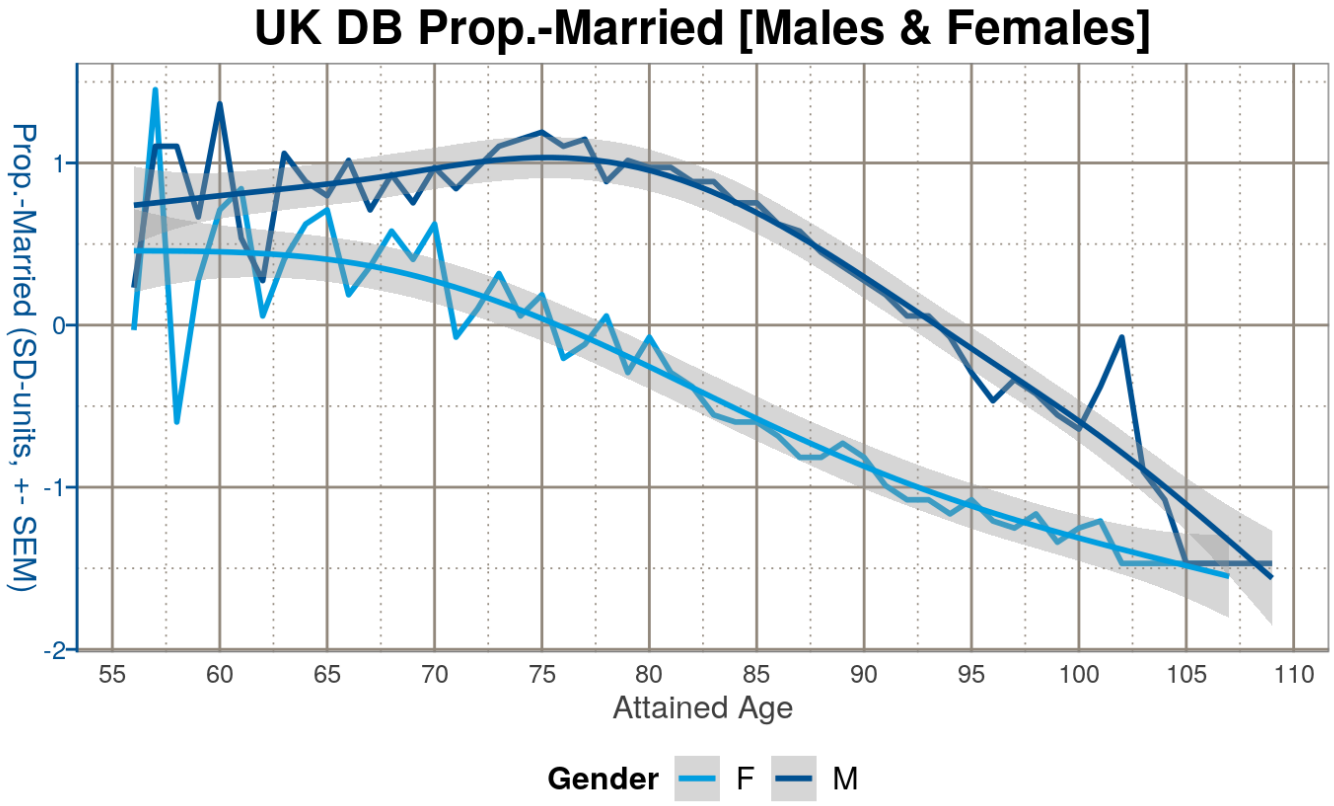
Proportion married and age difference

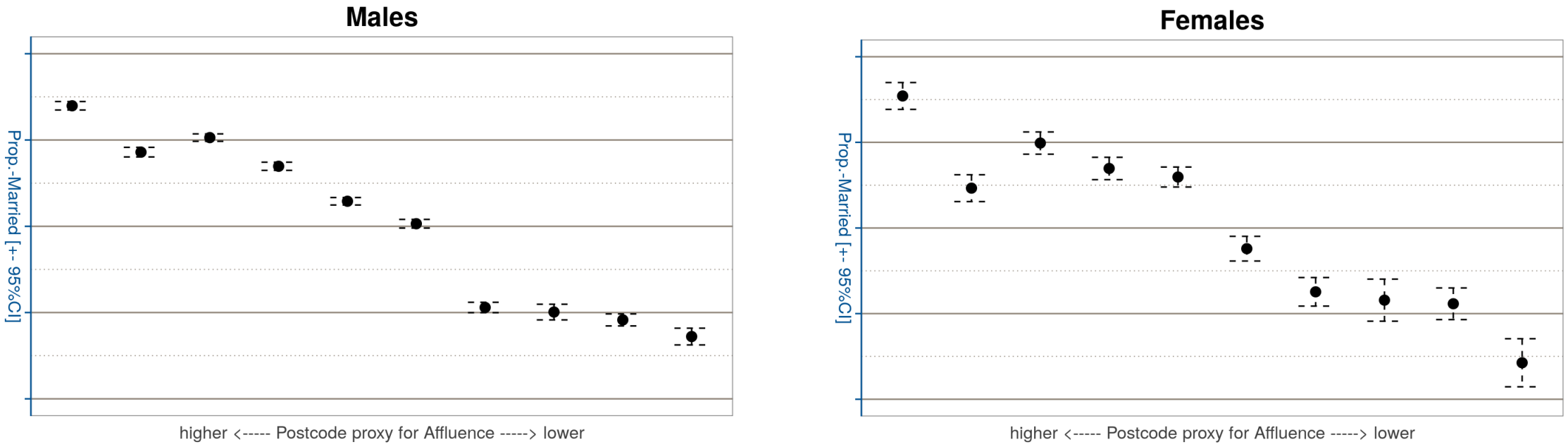
	Gender	Age	Socioeconomics	Wealth
Mortality	✓	✓	✓	✓
Proportion Married	✓	✓	?	?
Age Difference	✓	✓	?	?

Proportion Married by Gender and Age



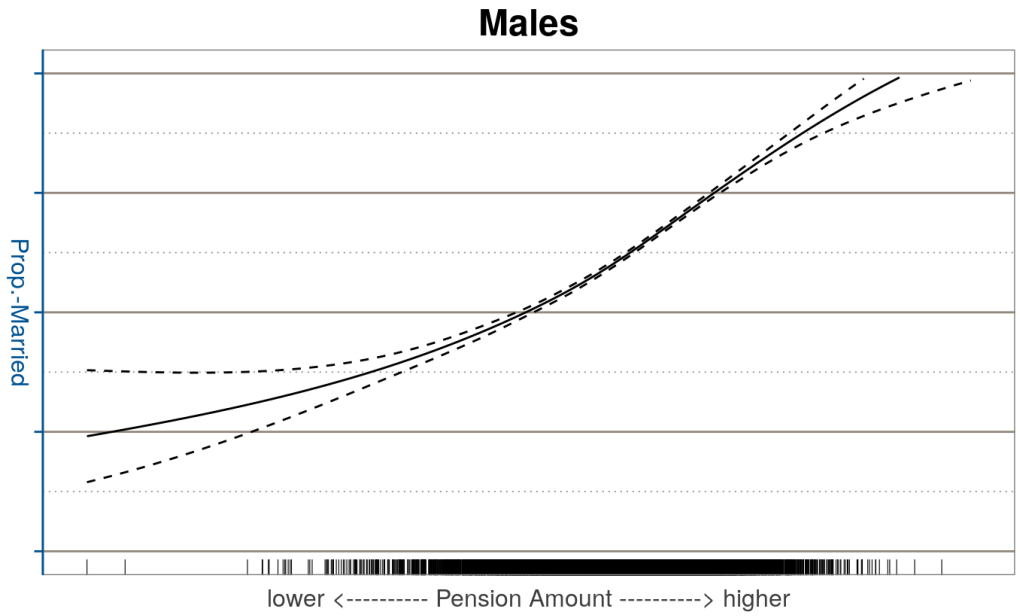
Portfolios can give reasonable estimates given sufficient portfolio size

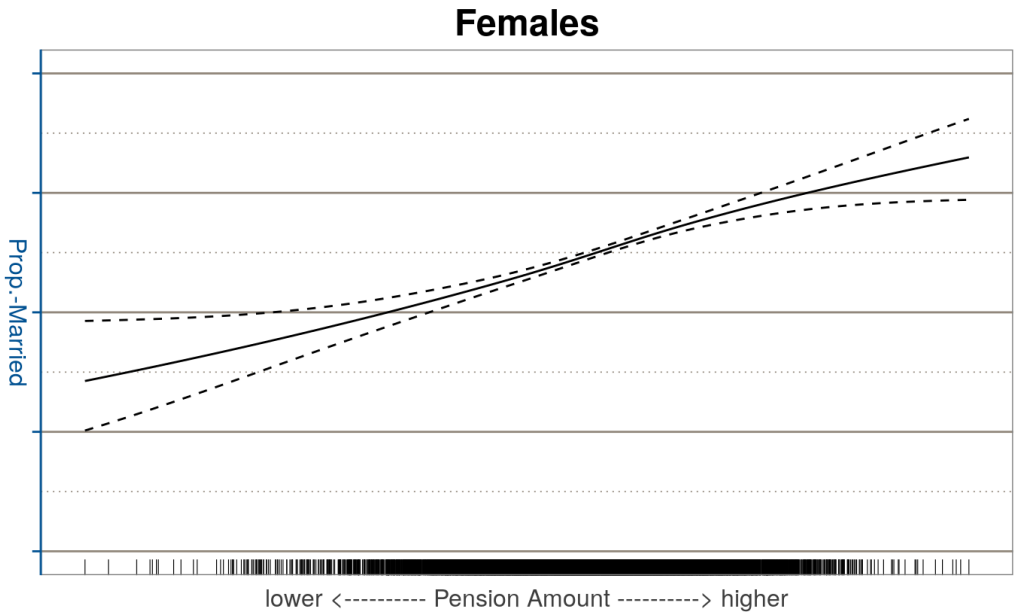
Socio-economic Profiles



Proportion married non-linearly dependent on socioeconomics

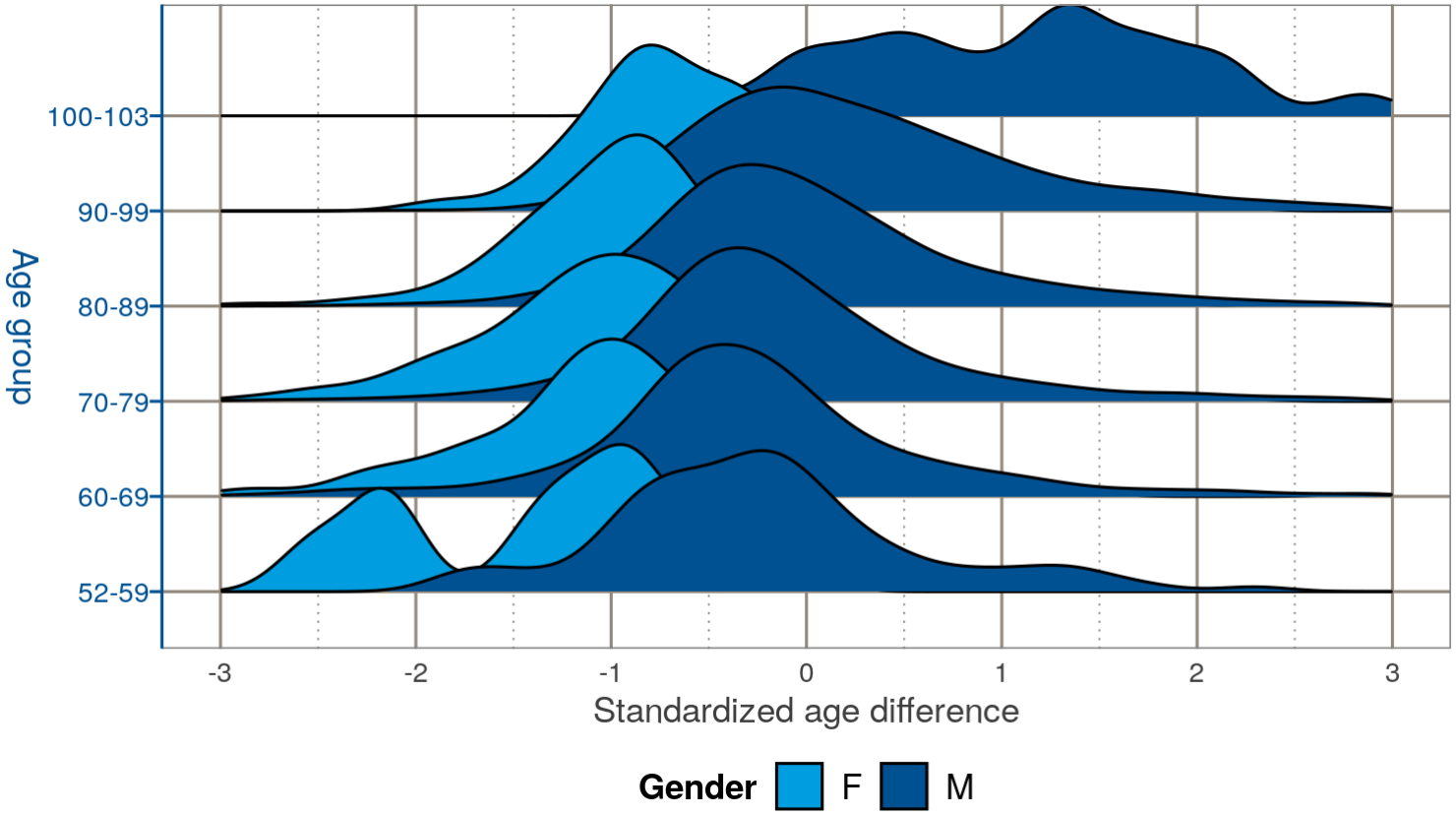
Wealth





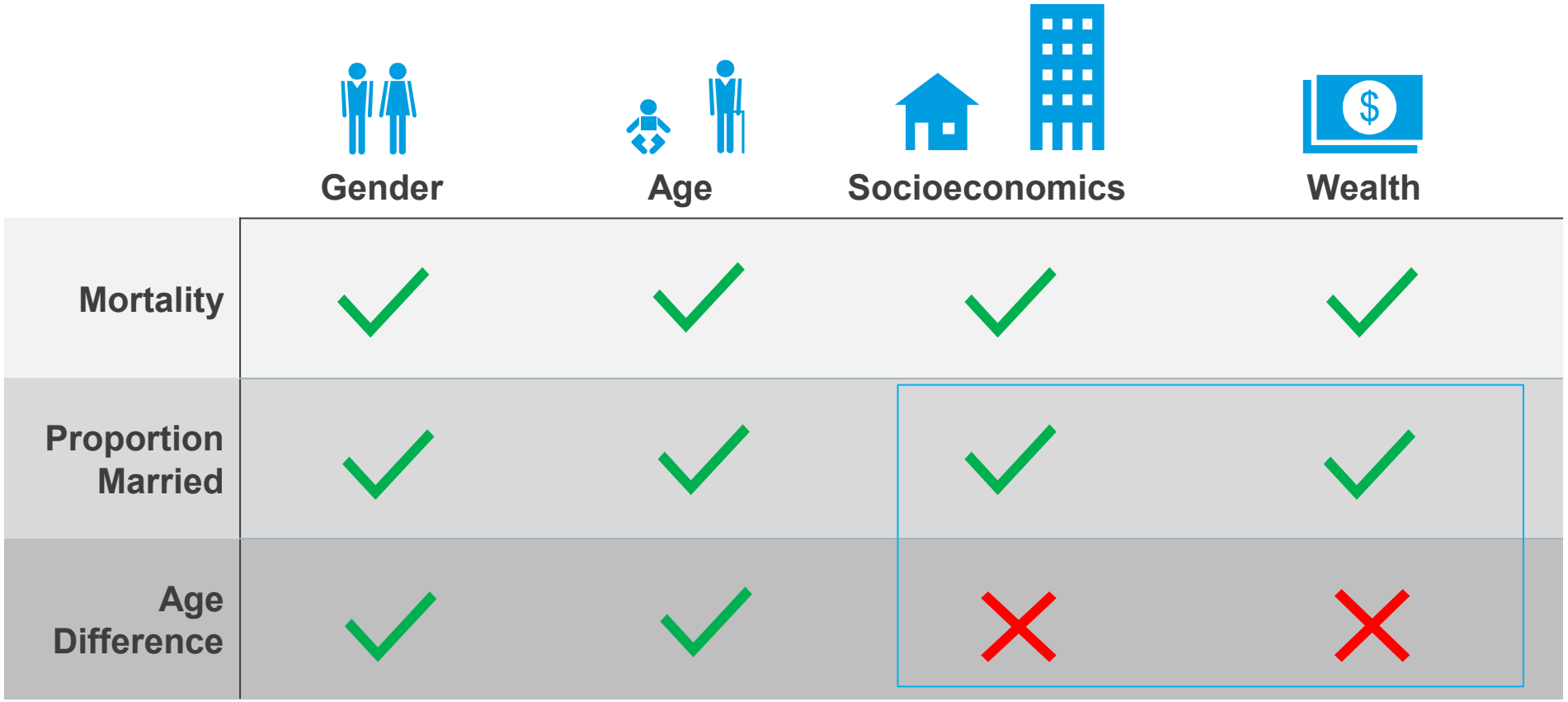
- **Strong effects of wealth interacting with Gender!**
- **Errors in assumptions can be very costly!**

Age difference



- **Broad distribution of age-differences!**
- **Computations with representative agents or standard approaches will not work!**

Proportion married and age difference



Key takeaways

Richer people more likely to be married

- 70% vs 45%
- But don‘t have younger spouses

Pensioners in better neighbourhoods more likely to have a spouse

- 10 % to 15 % point differential in subset of a selected DB pension portfolio

Dependants age more slowly than pensioners

- Older people die with younger spouses

Non-responders in survey less likely to be married than average

- 42% vs 81% in subset of our own portfolio

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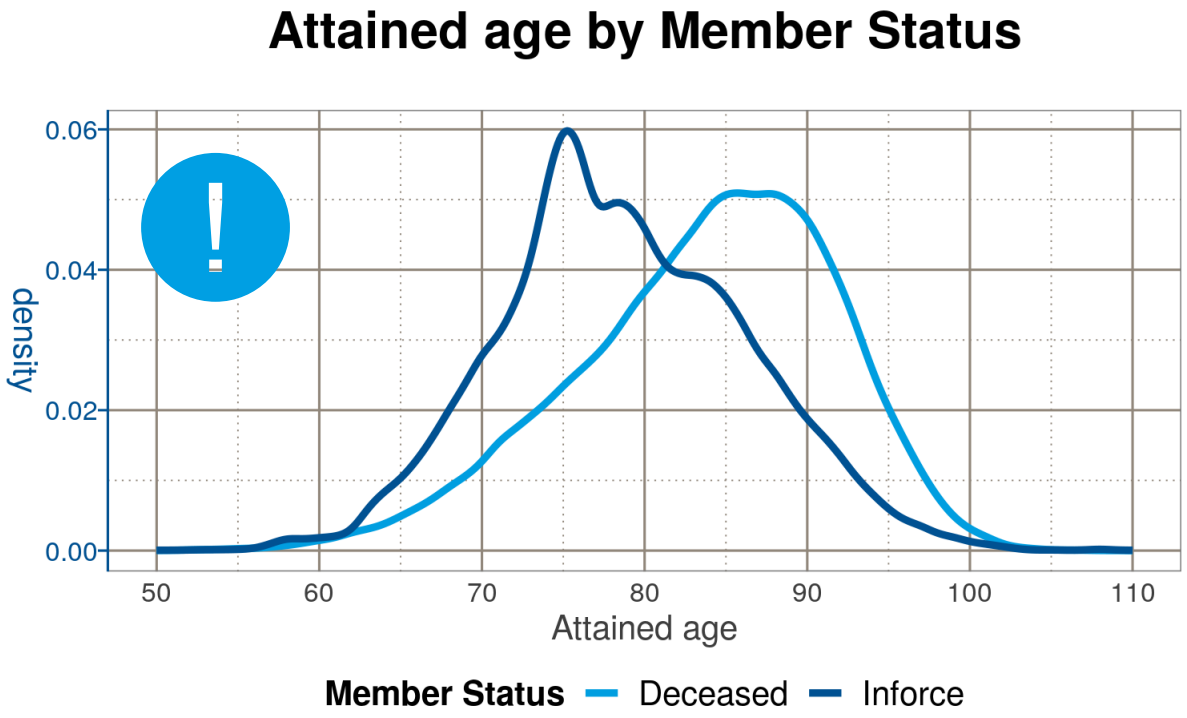
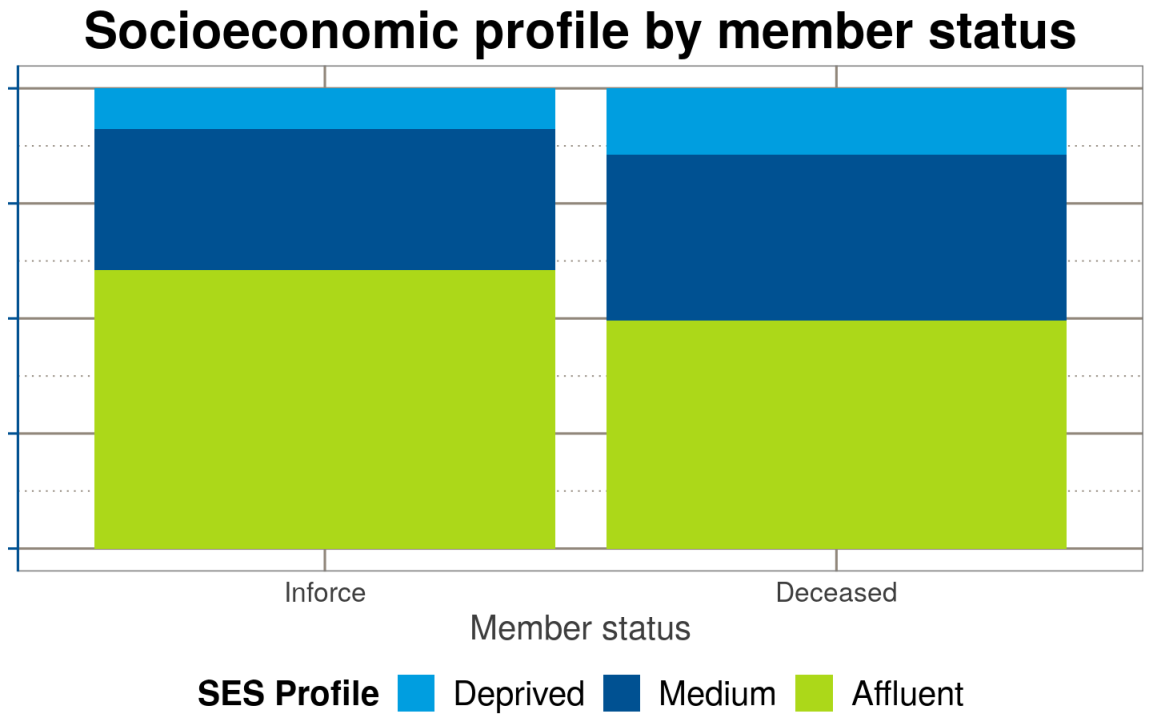
Modelling Approaches

Modelling with proportion married at Death	Modelling with proportion married at Treaty Inception
Proportion married rates and age differences are **given as a table and change by age**	Proportion married rates and age differences are **set at treaty inception and change only with spouse mortality**
Source for rates and age difference: **observed death data**	Source for rates and age difference: **write-out, tracing or ONS data**
At each age, the whole spouse's benefit cashflow needs to be calculated with the probability of the first life's death	$PM_t = PM_0 * {}_tp_y$
modelling rather complex	**modelling simple**

Using death data for in-force data





Deceased and current members differ in terms of age profile and socio-economic profile!

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Accuracy of marital assumptions increasingly important

- Underestimating negatively impacts profitability
- Overestimating negatively impacts competitiveness

Different sources for marital information available to be used for any spouse benefits

- Selection of data source a trade-off between availability, accuracy, relevance and costs

Risk factors: Age, Gender, Socio-economics and Wealth

- Socio-economics and wealth important for proportion married, but not for age difference

Two modelling approaches

- using proportion married and age difference **at death**
- using proportion married and age difference **at inception**