

*An investigation into the suitability of  
using the SHARE and ELSA databases for  
the creation of long term care projection  
models*

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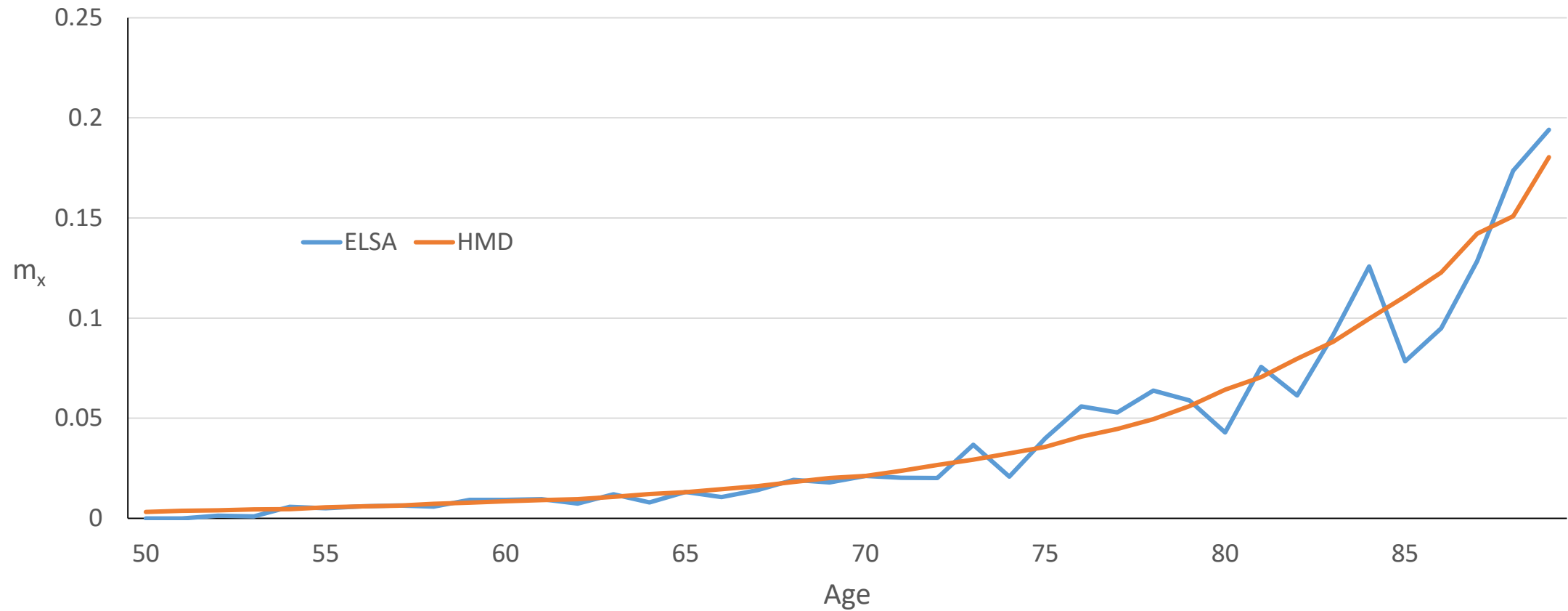
# Outline of talk

- ELSA mortality
- ELSA ADL transitions
- ELSA disability annuity rates
- SHARE mortality and ADLs

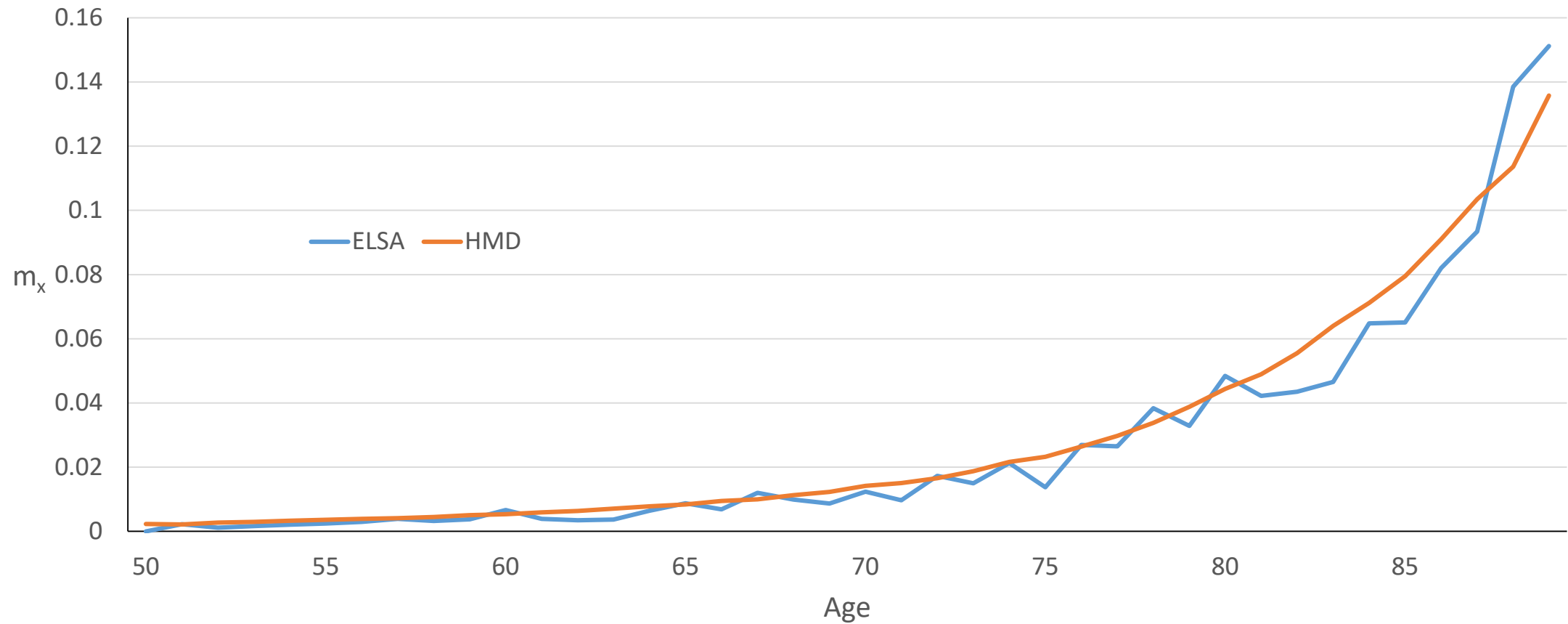
# ELSA database

- The English Longitudinal Study of Ageing (ELSA) is a unique and rich resource of information on the dynamics of health, social, wellbeing and economic circumstances in the English population aged 50 and older.
- Established in 2002, the original sample was drawn from households that had previously responded to the [Health Survey for England \(HSE\)](#) between 1998 and 2001.
- The same group of respondents have been interviewed at two-yearly interviews, known as 'waves', to measure changes in their health, economic and social circumstances. Younger age groups are replaced or refreshed to retain the panel.

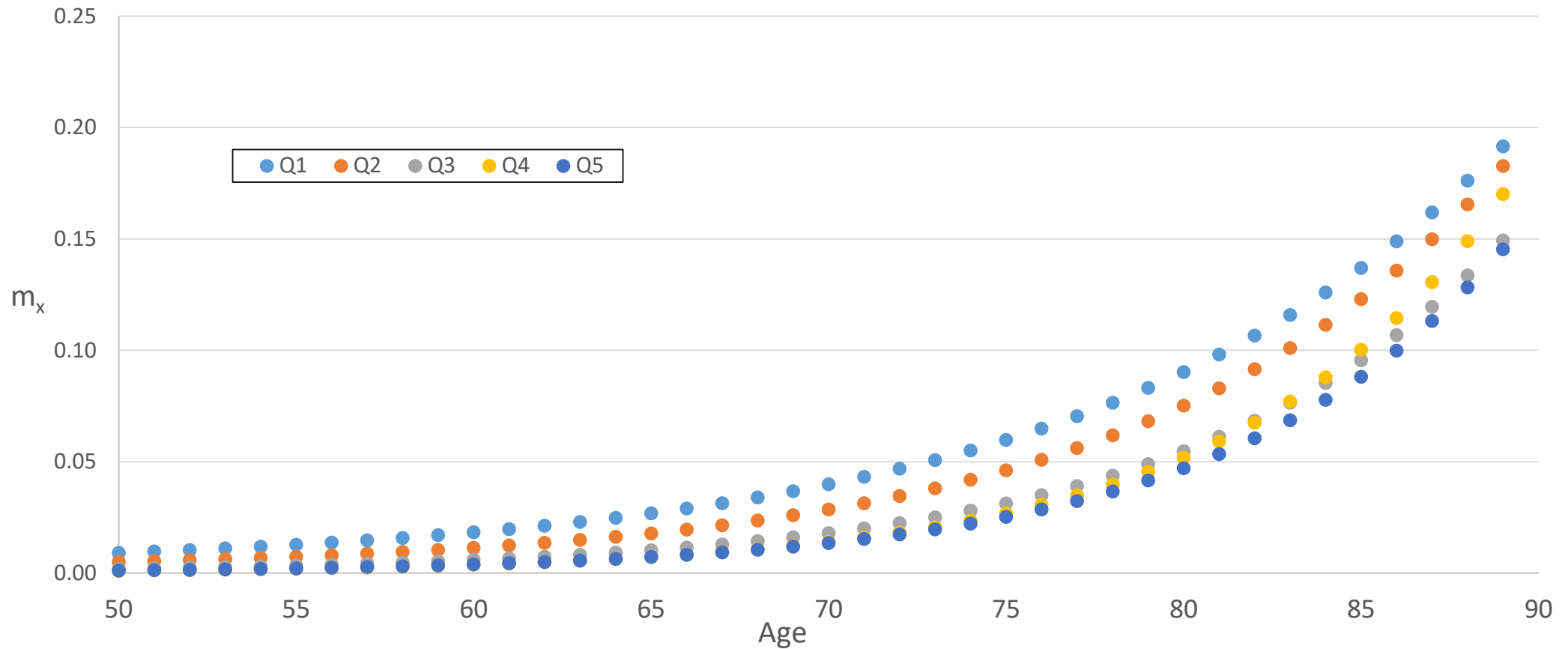
# ELSA vs HMD (2009) – Male mortality rates



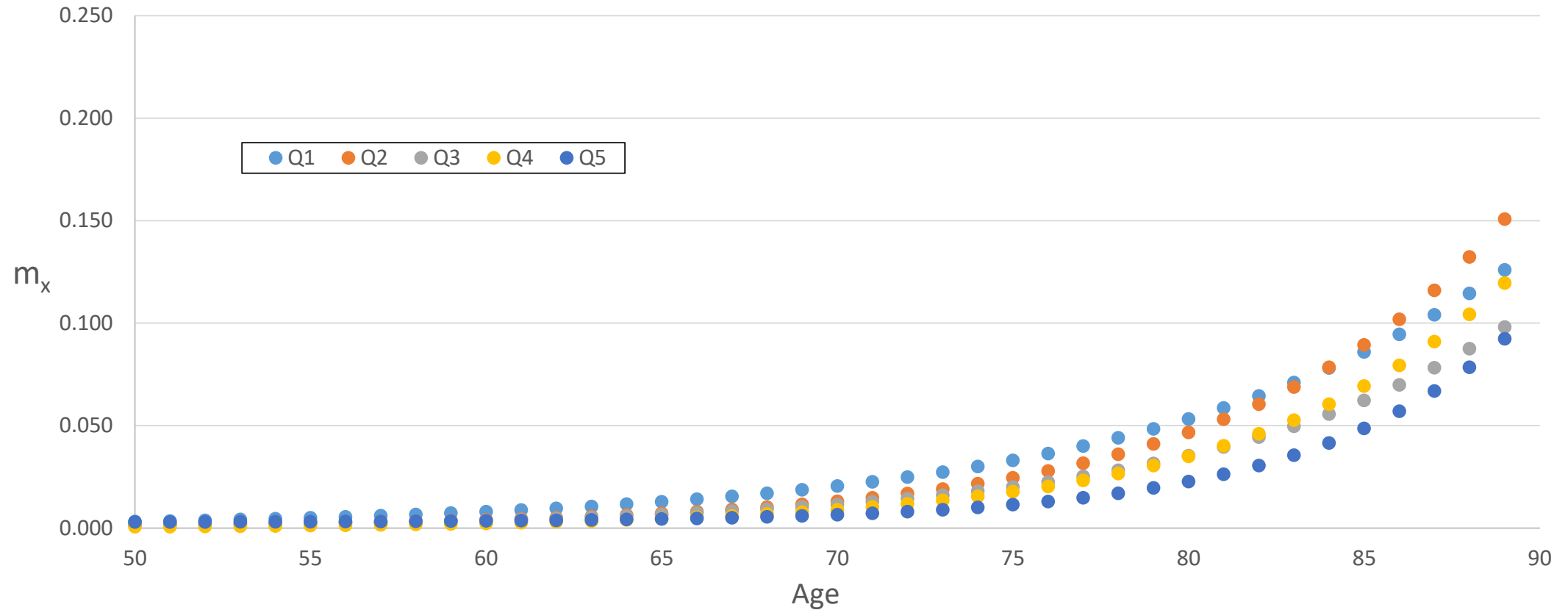
# ELSA vs HMD (2009) – Female mortality rates



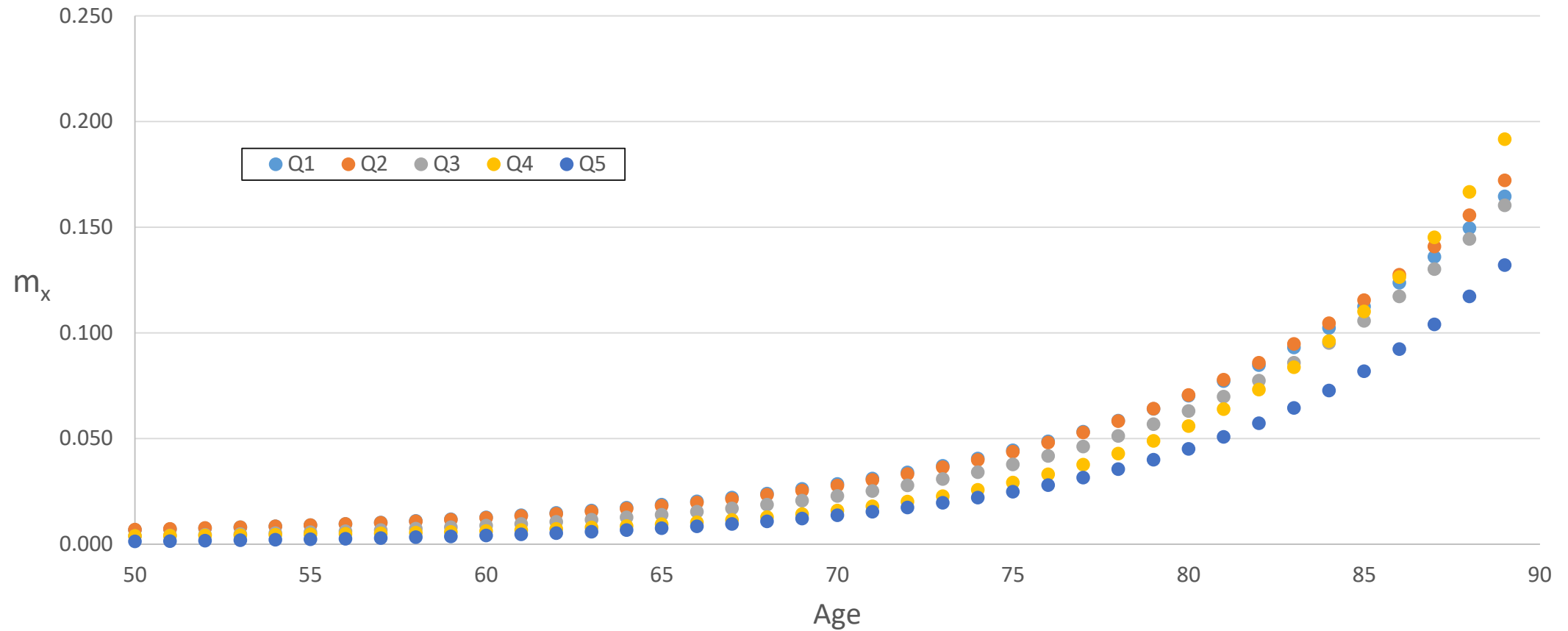
# Fitted $m_x$ , English males, quintiles of wealth



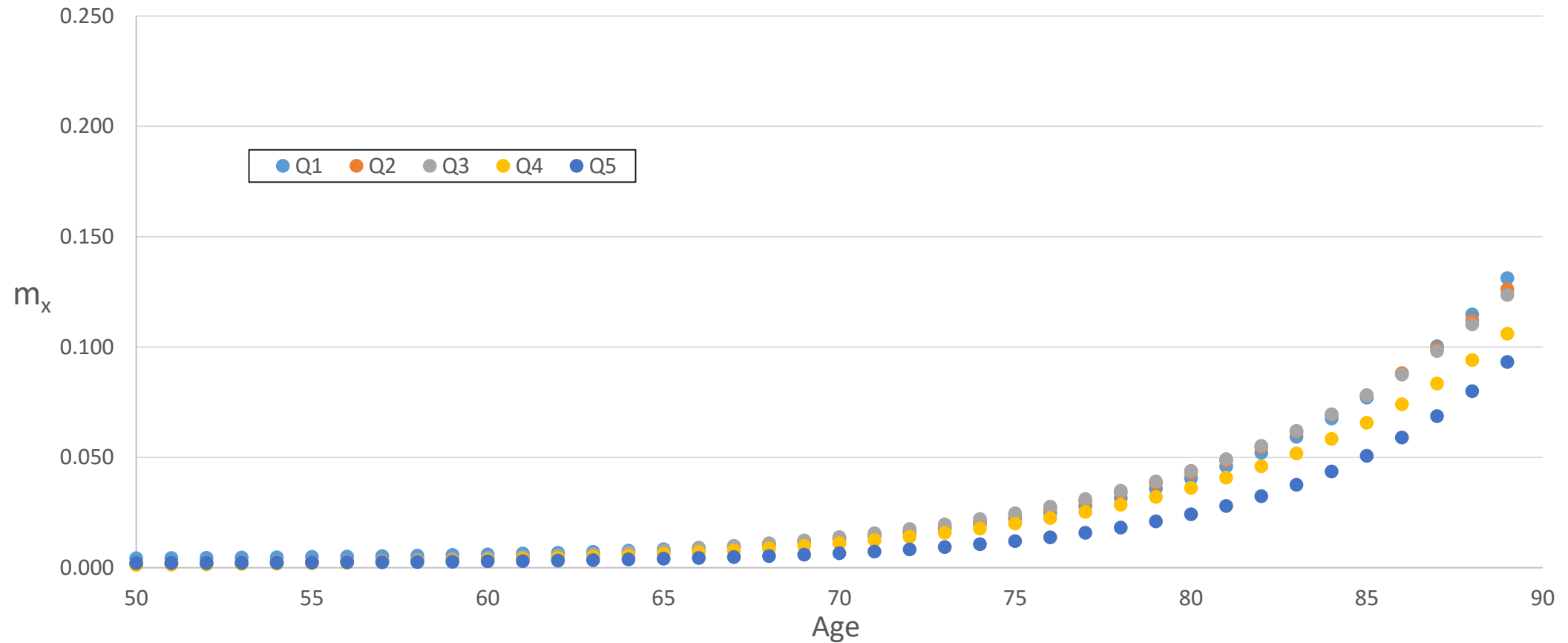
# Fitted $m_x$ , English females, quintiles of wealth



# Fitted $m_x$ , English males, quintiles of income



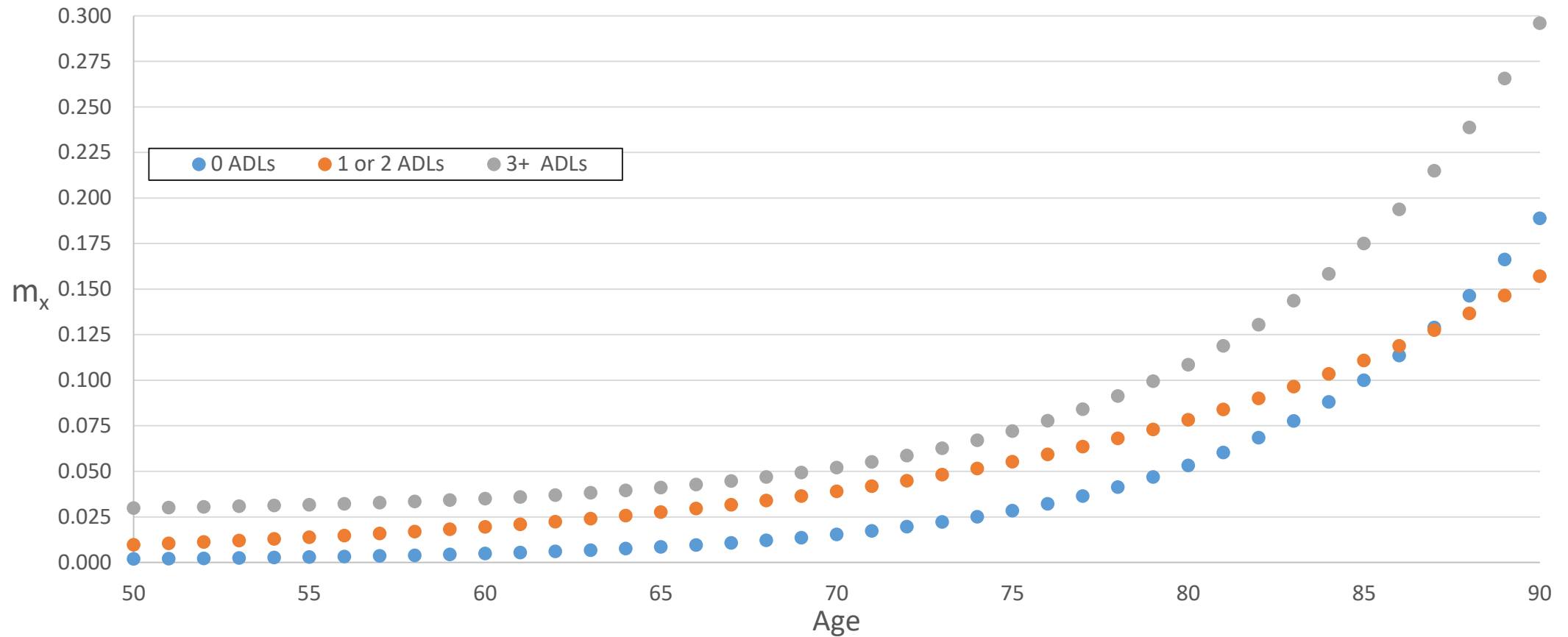
# Fitted $m_x$ , English females, quintiles of income



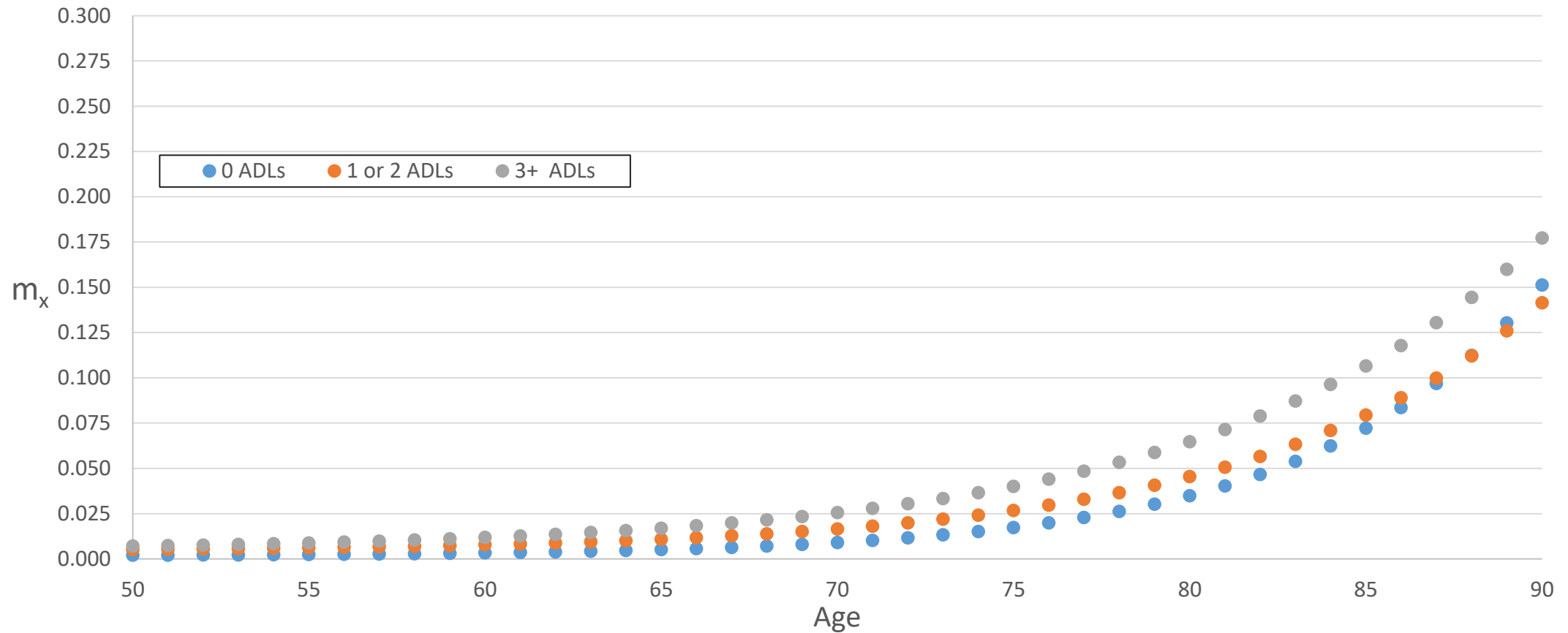
# ADL groupings

- 6 ADLs – washing, dressing, mobility, toileting, feeding and transferring (e.g. chair to a bed)
- Due to data restrictions, lives are grouped by
  - 0 ADLs
  - 1 & 2 ADLs
  - 3 to 6 ADLs

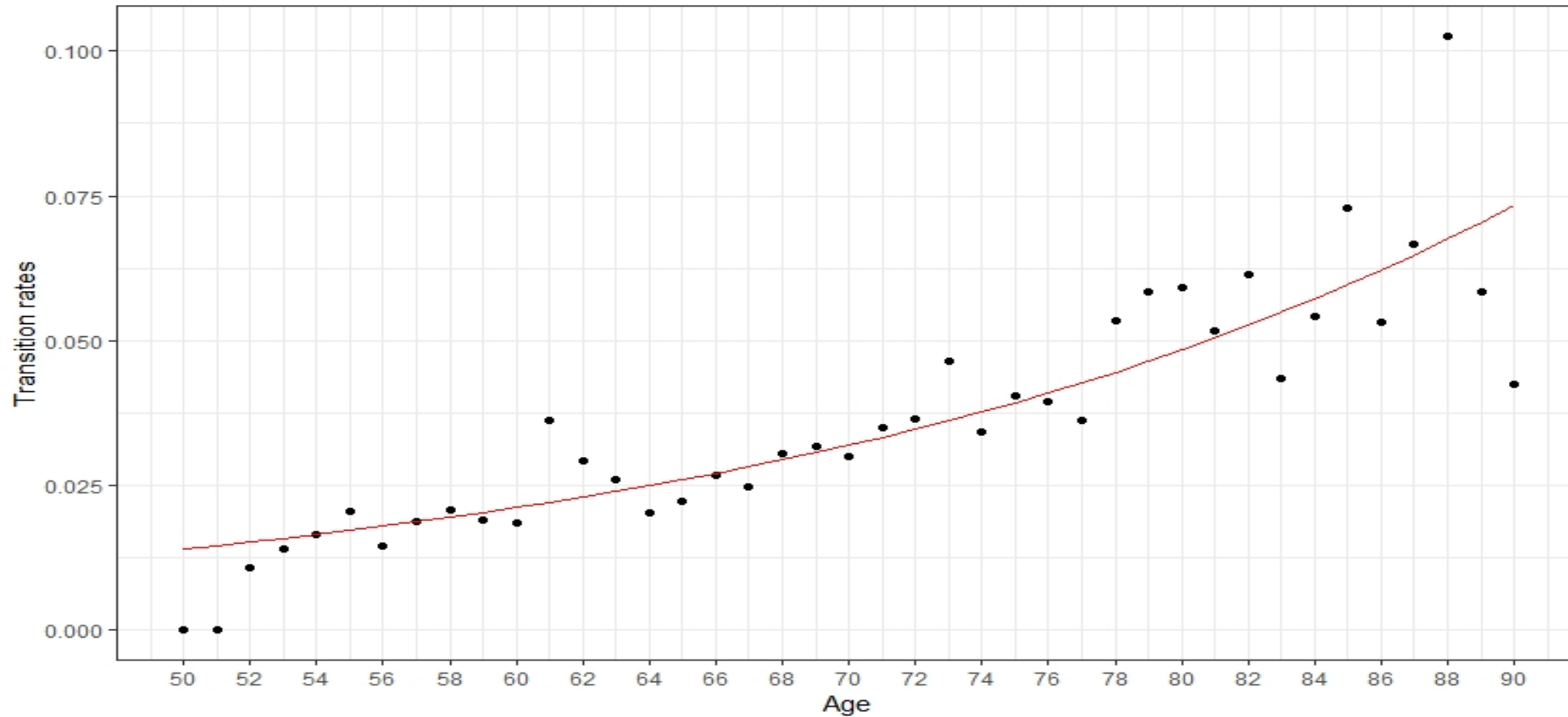
# Fitted $m_x$ , English males, ADL groupings



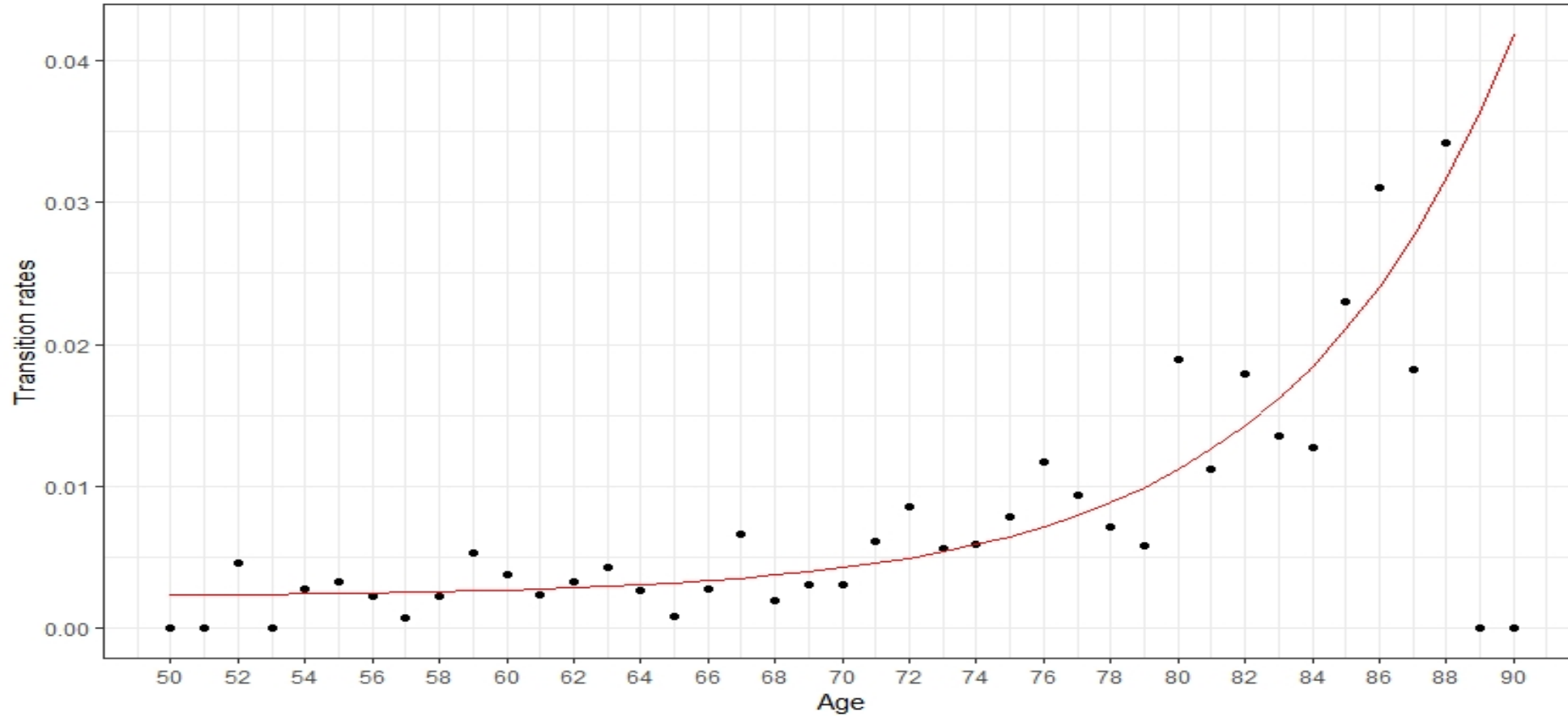
# Fitted $m_x$ , English females, ADL groupings



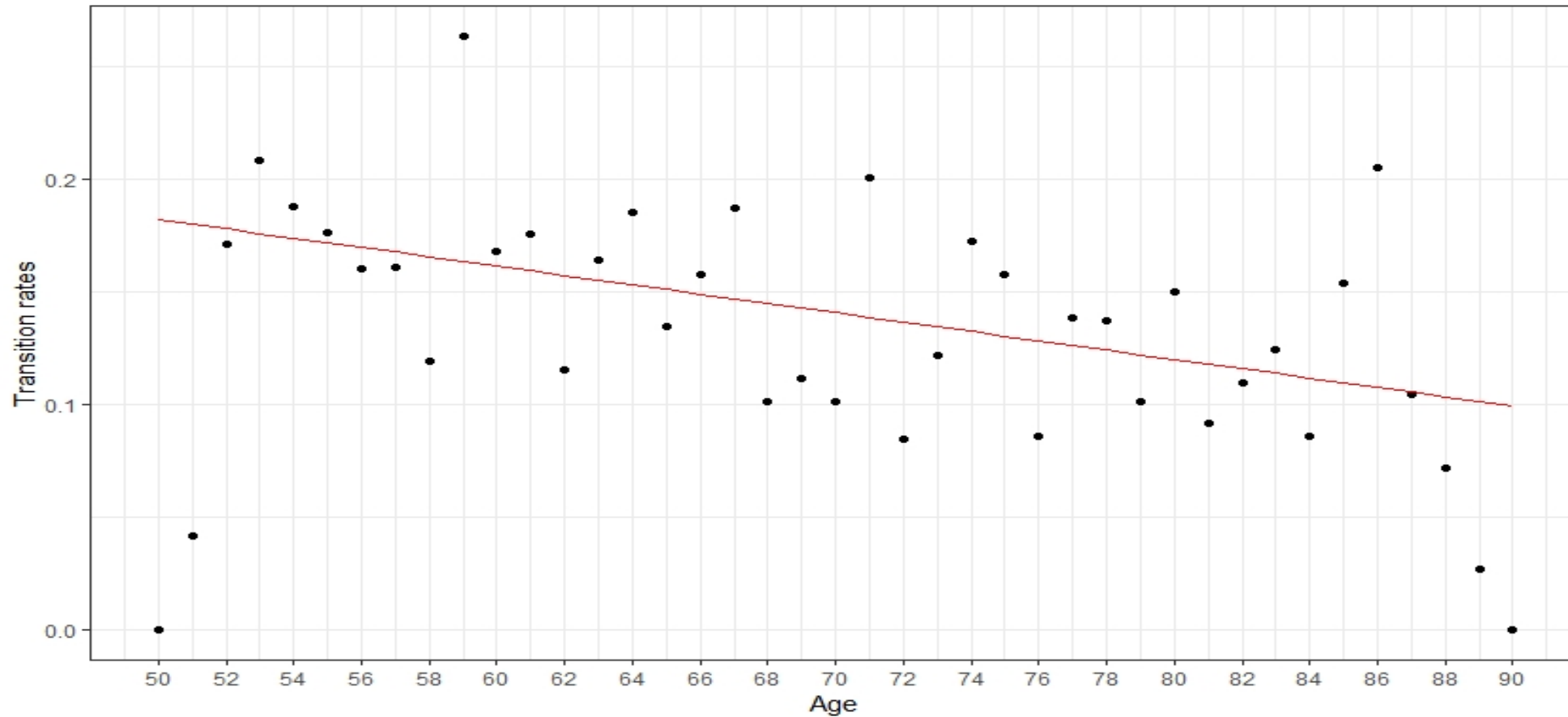
# Raw and fitted transition rates, males, state 0 to (1 & 2)



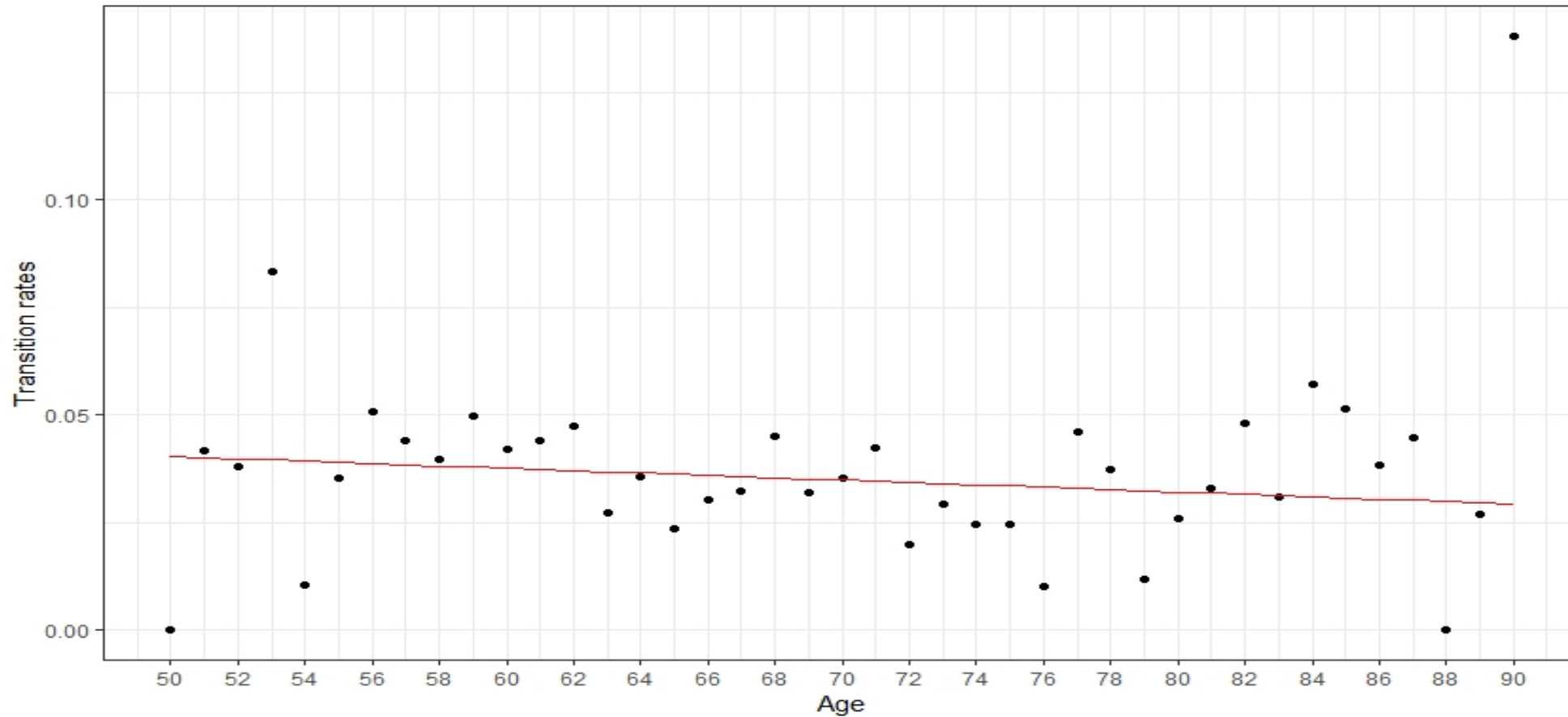
# Raw and fitted transition rates, males, state 0 to (3 to 6)



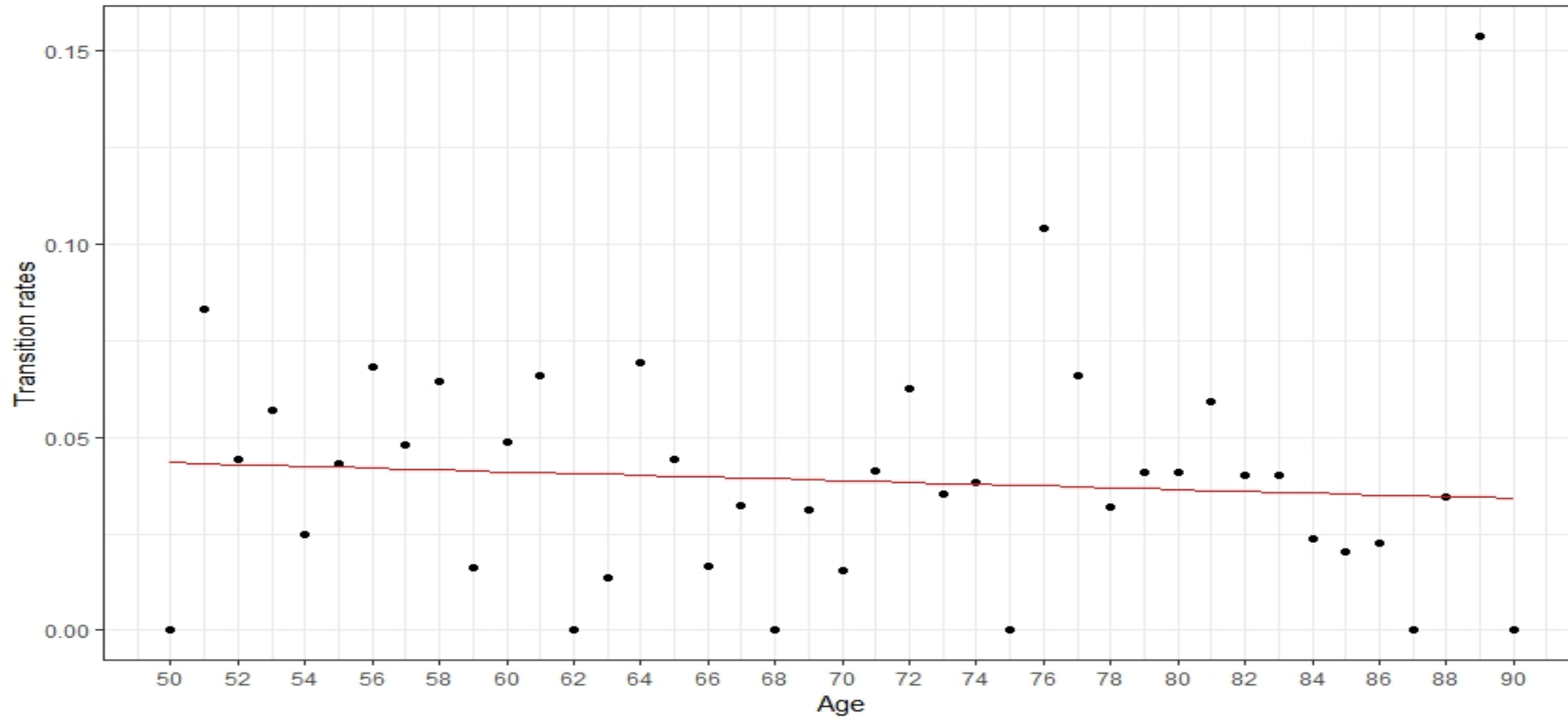
# Raw and fitted transition rates, males, state (1 & 2) to 0



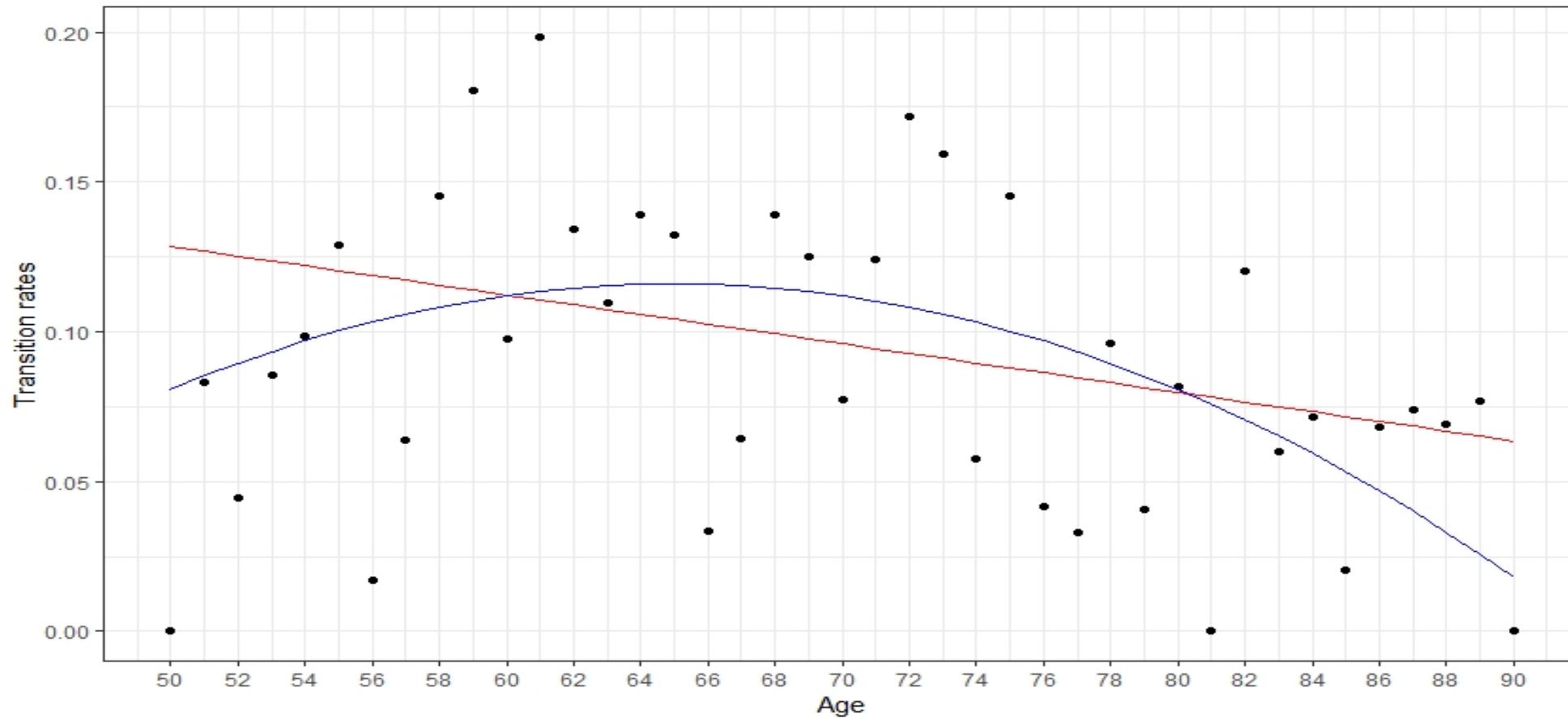
# Raw and fitted transition rates, males, state (1 & 2) to (3 to 6)



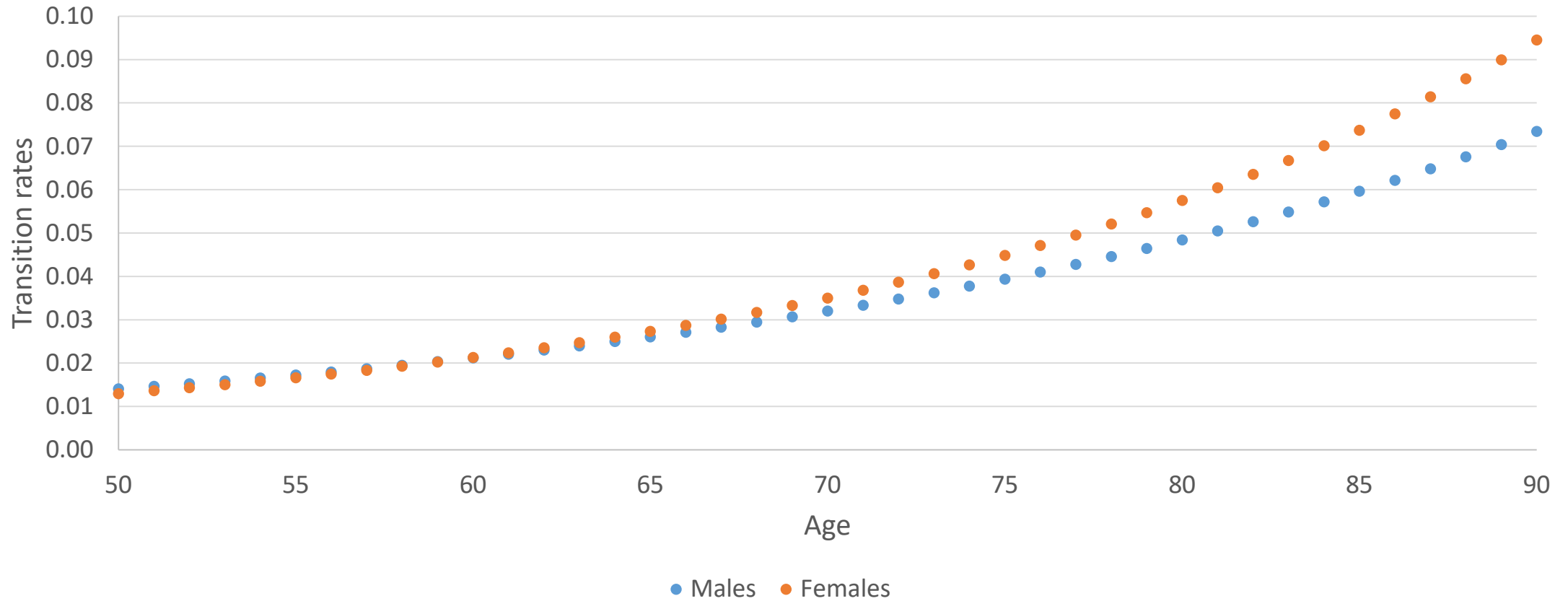
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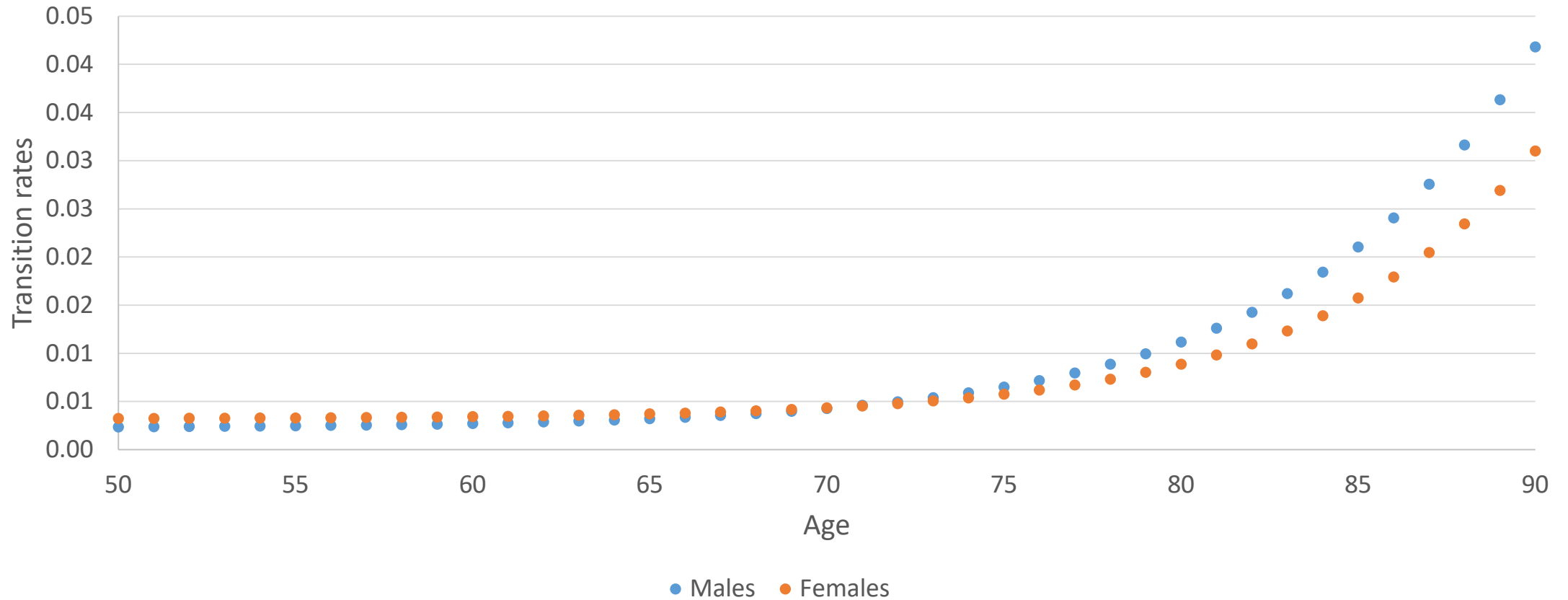
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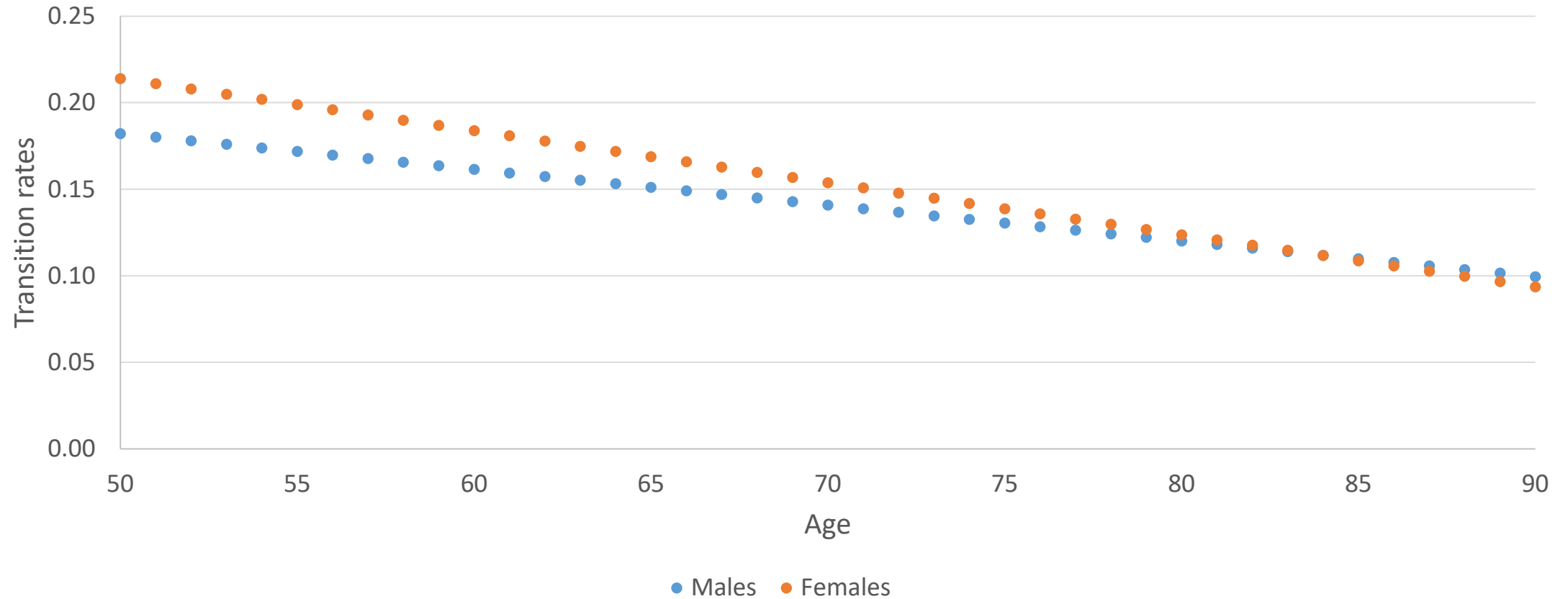
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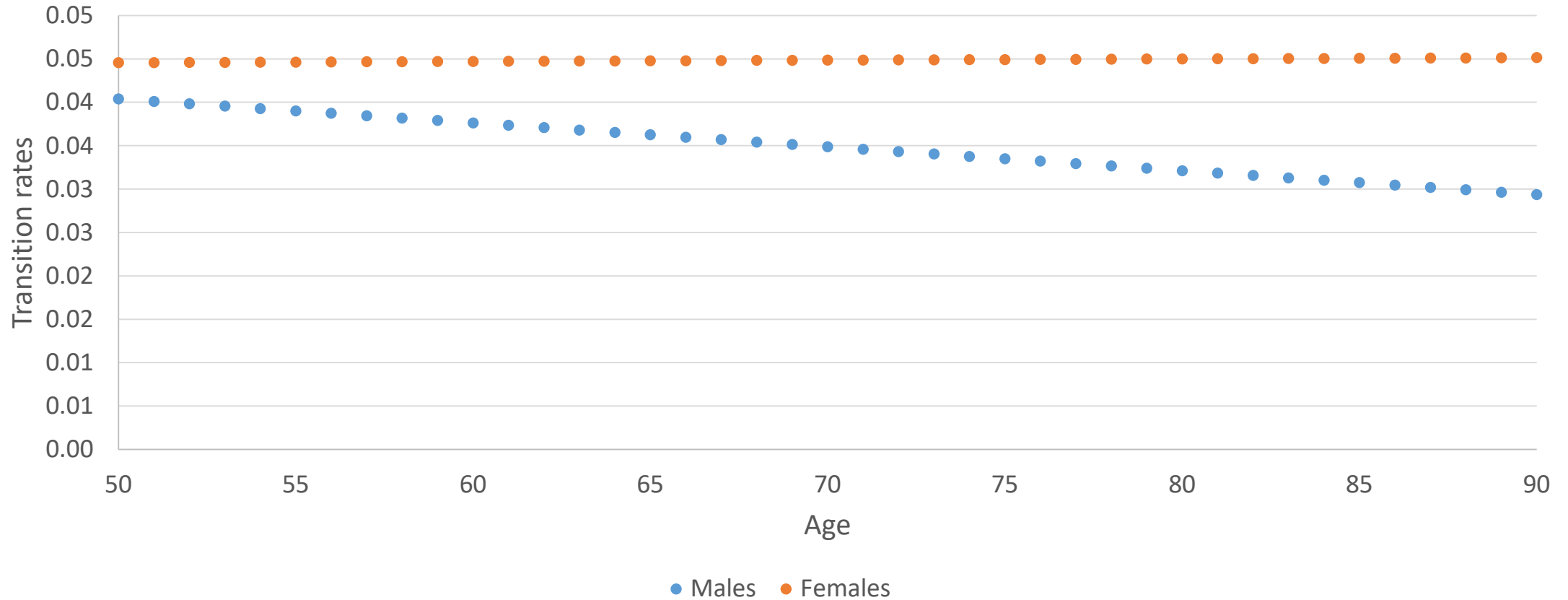
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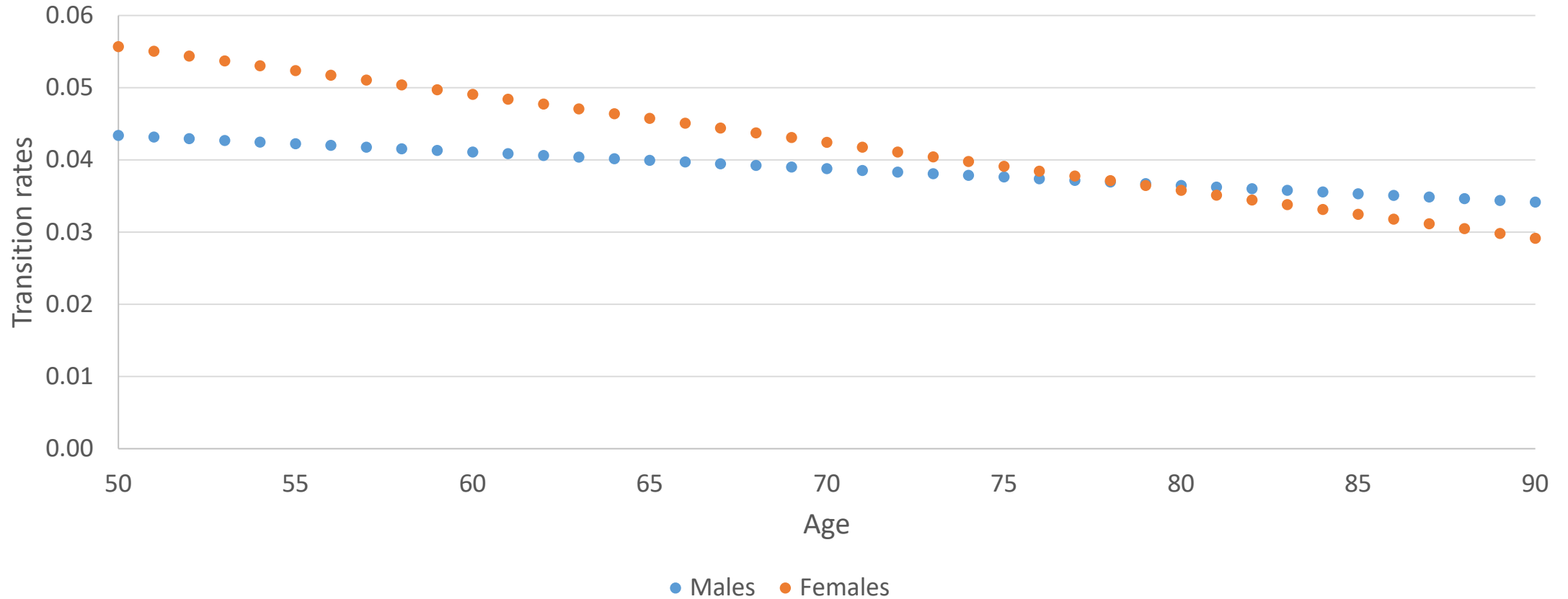
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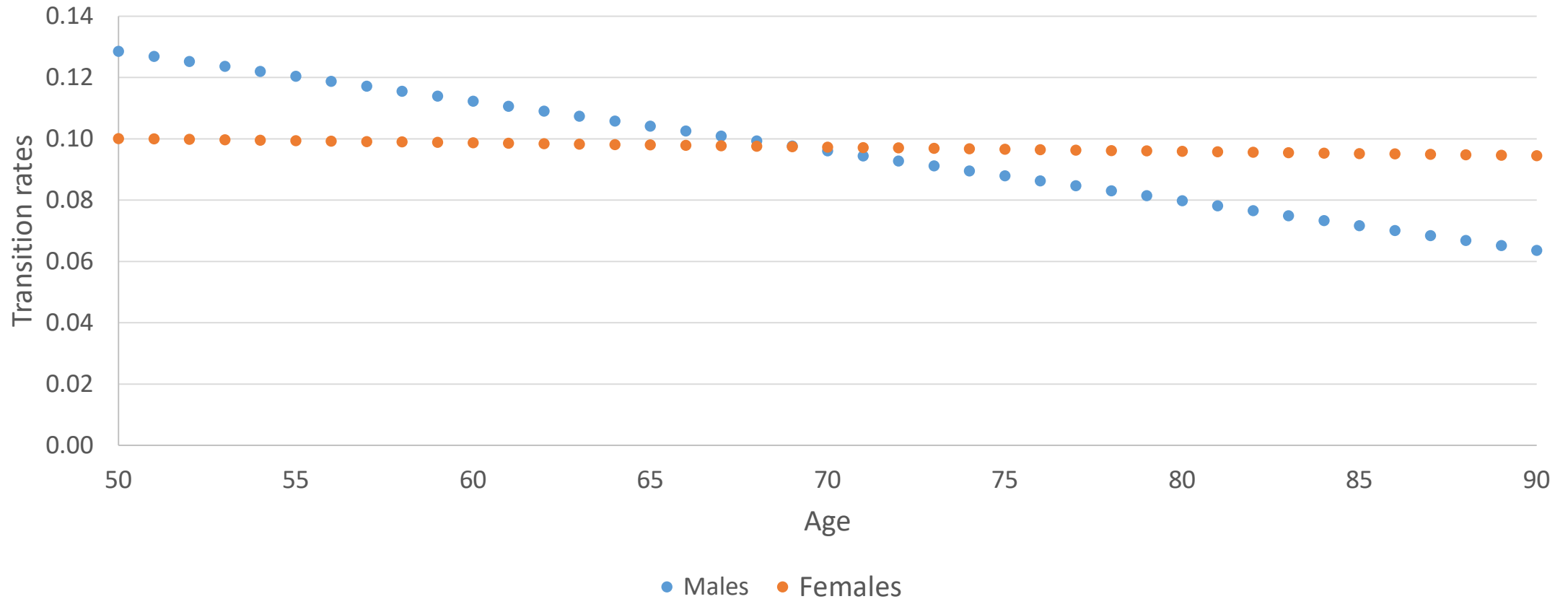
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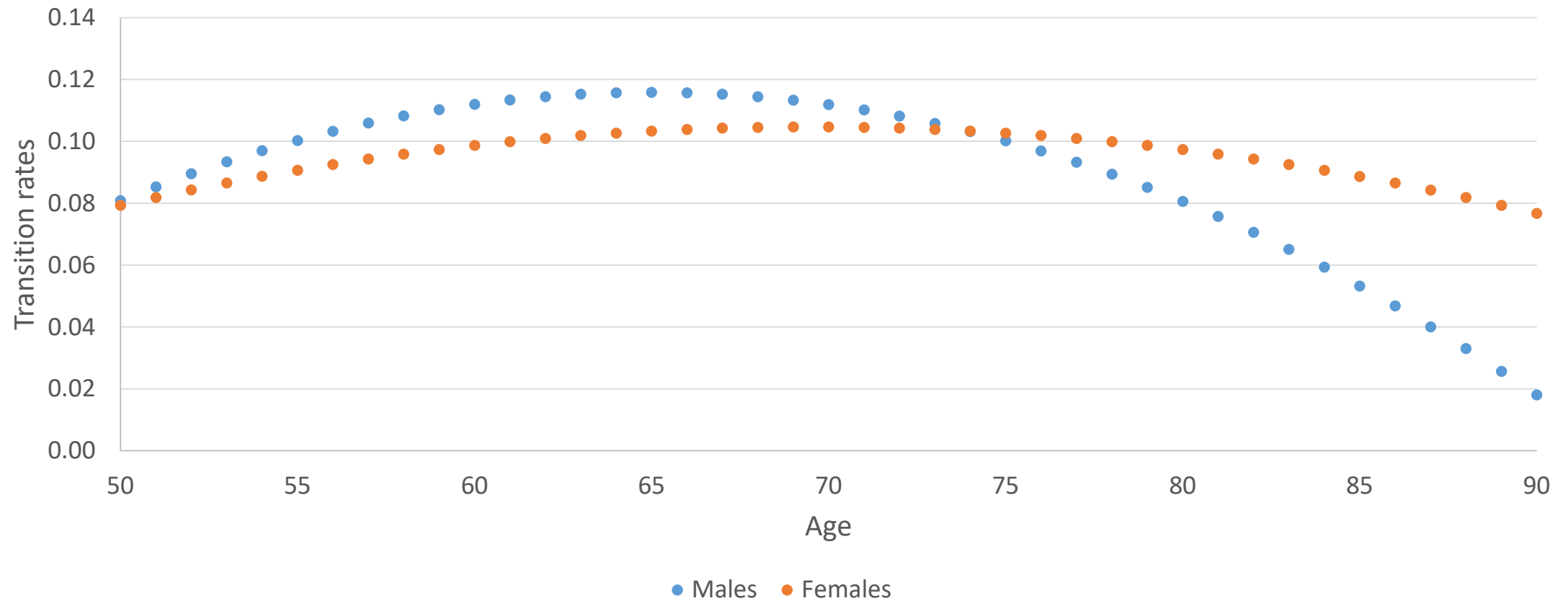
# Fitted transition rates, males, state (3 to 6) to 0



# Fitted transition rates, males, state (3 to 6) to (1 & 2) – linear model



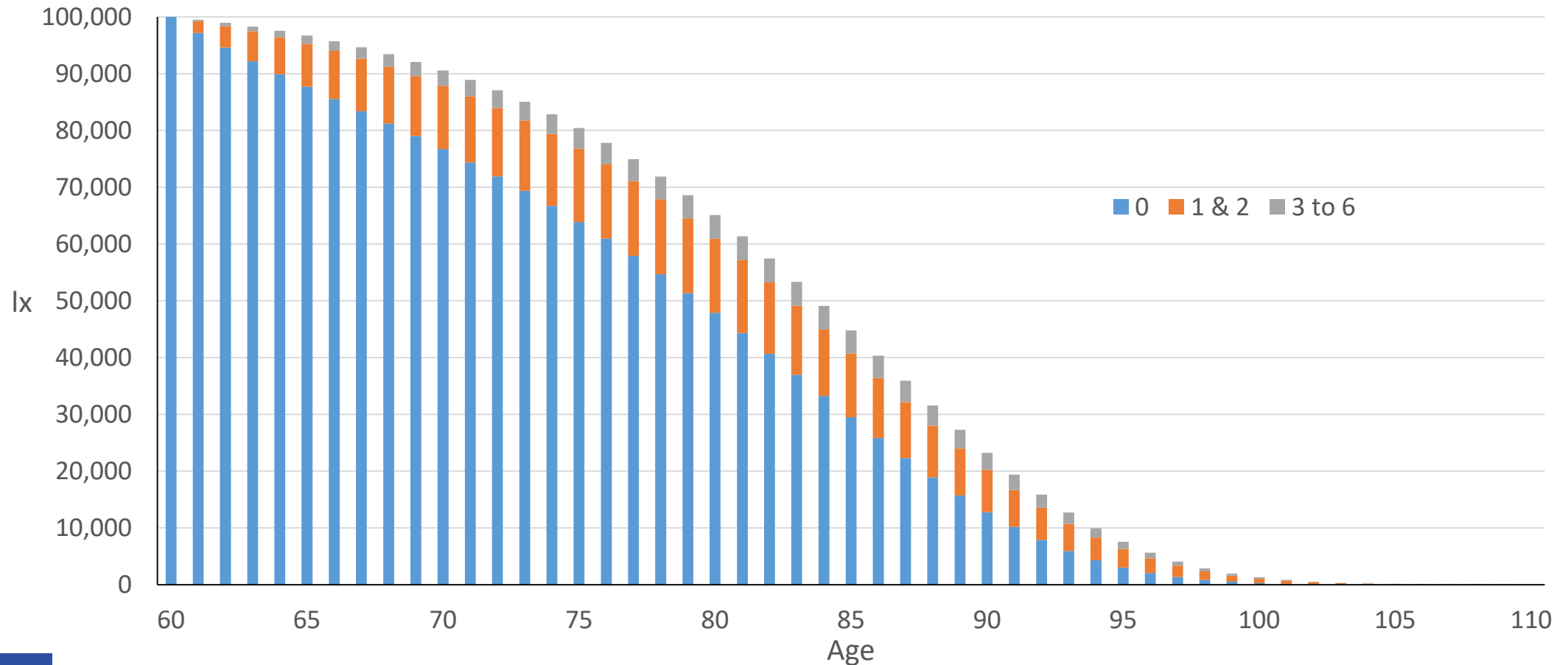
# Fitted transition rates, males, state (3 to 6) to (1 & 2) – quadratic model



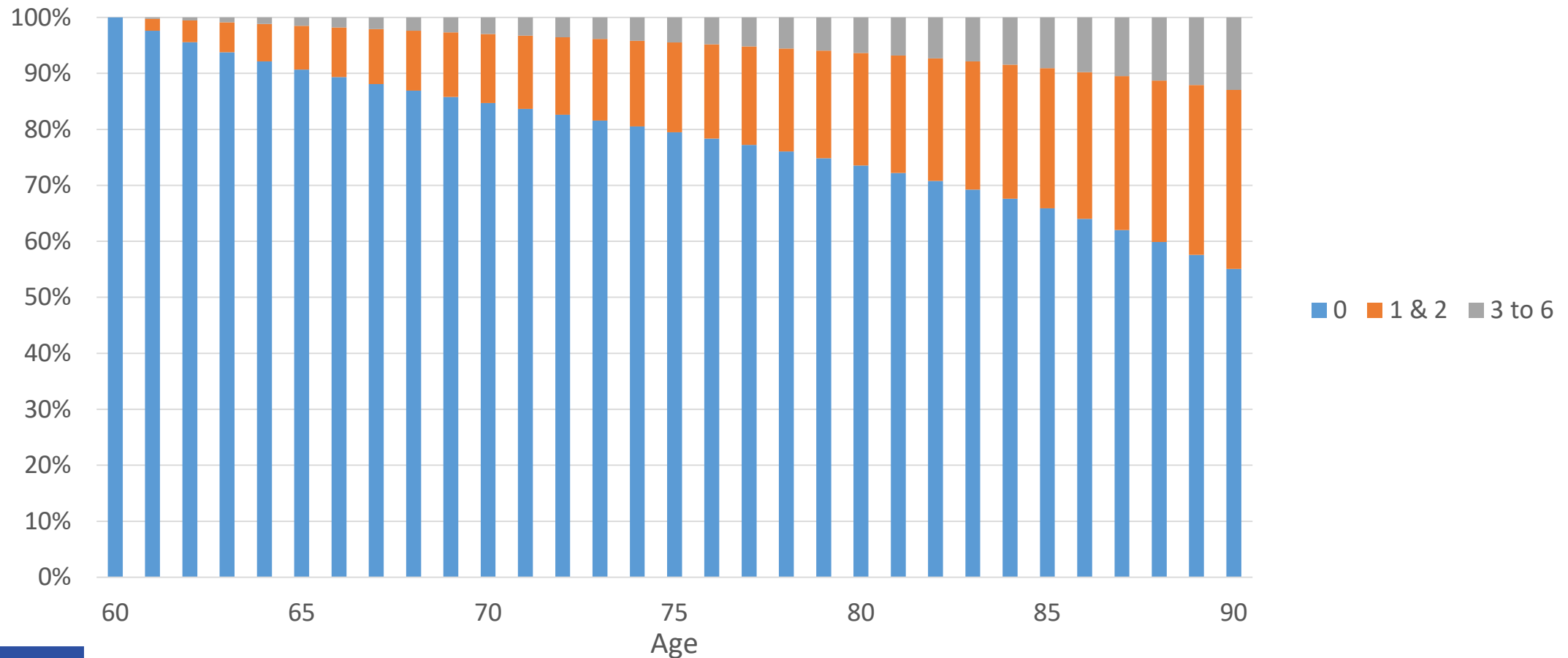
# Pricing a disability-linked annuity

- Single premium policy sold to individual in State 0
- Benefits:
  - £10k p.a. while in States 1 & 2
  - £20k p.a. while in States 3 to 6
- Requires a life table which can be created from the fitted transition probabilities

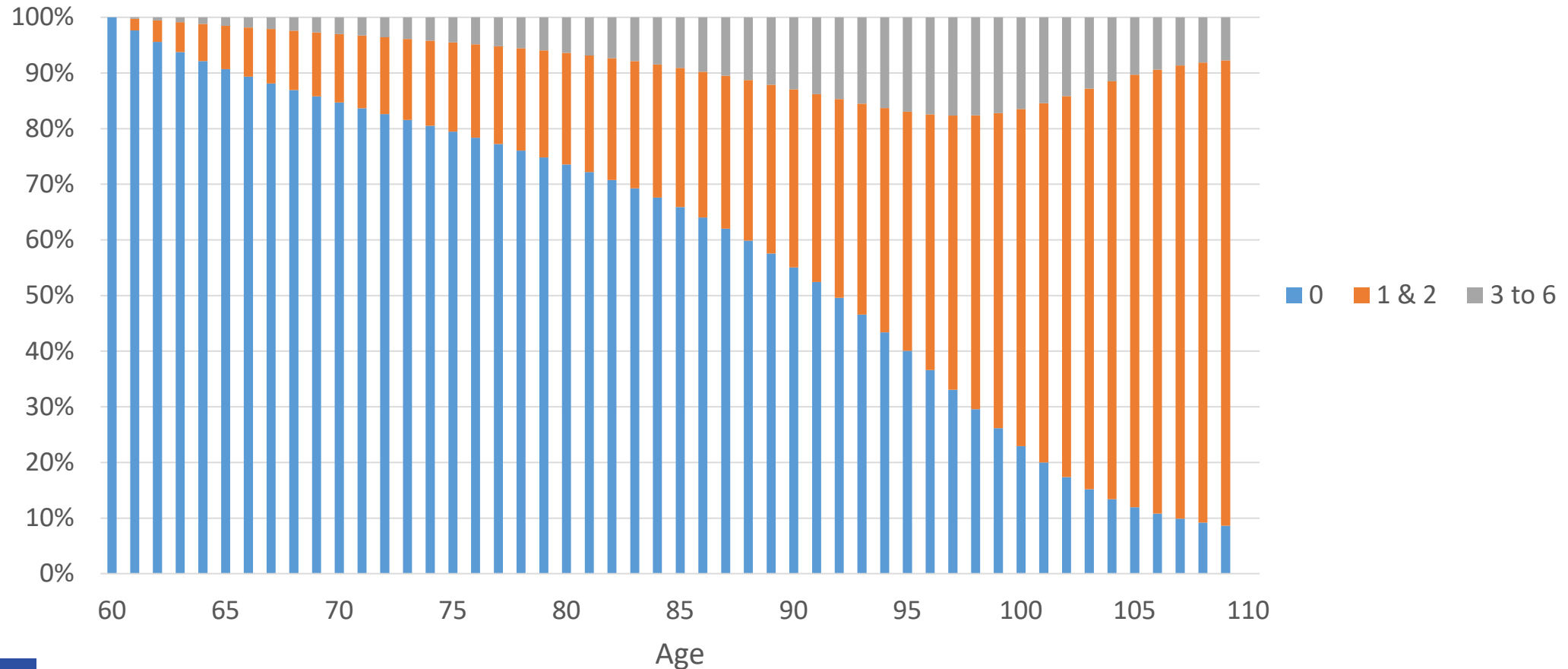
# Survival curve for healthy males, aged 60, based on ELSA fitted transitions



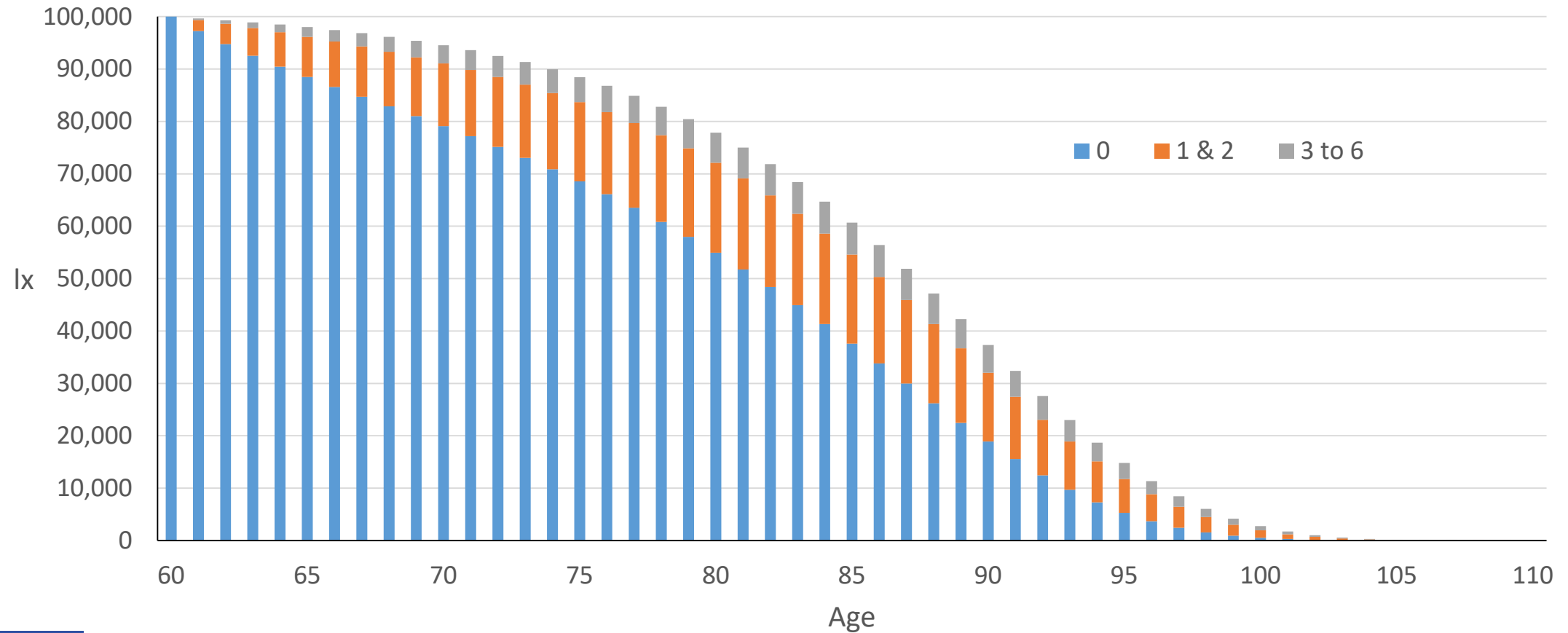
# Distribution of ADLs for males, by age, based on previous survival curve



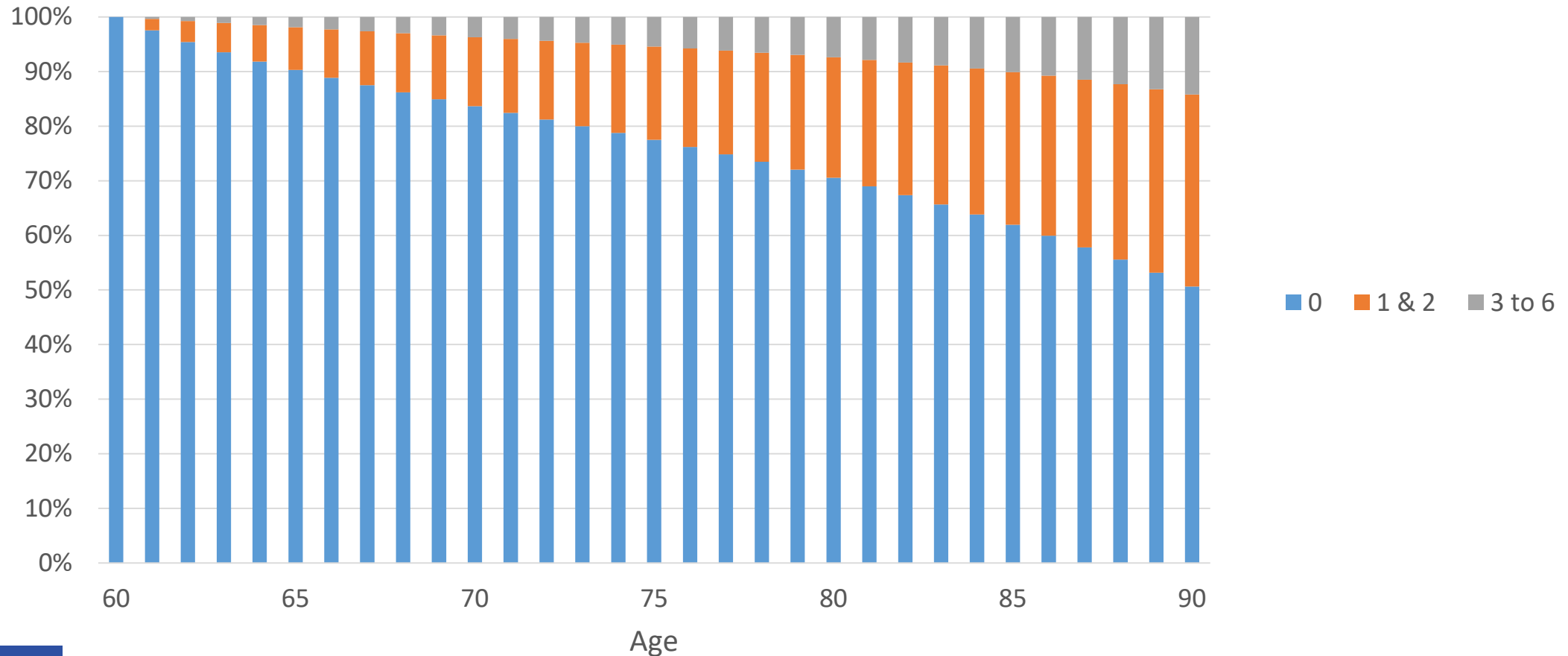
# Distribution of ADLs for males, by age, based on previous survival curve



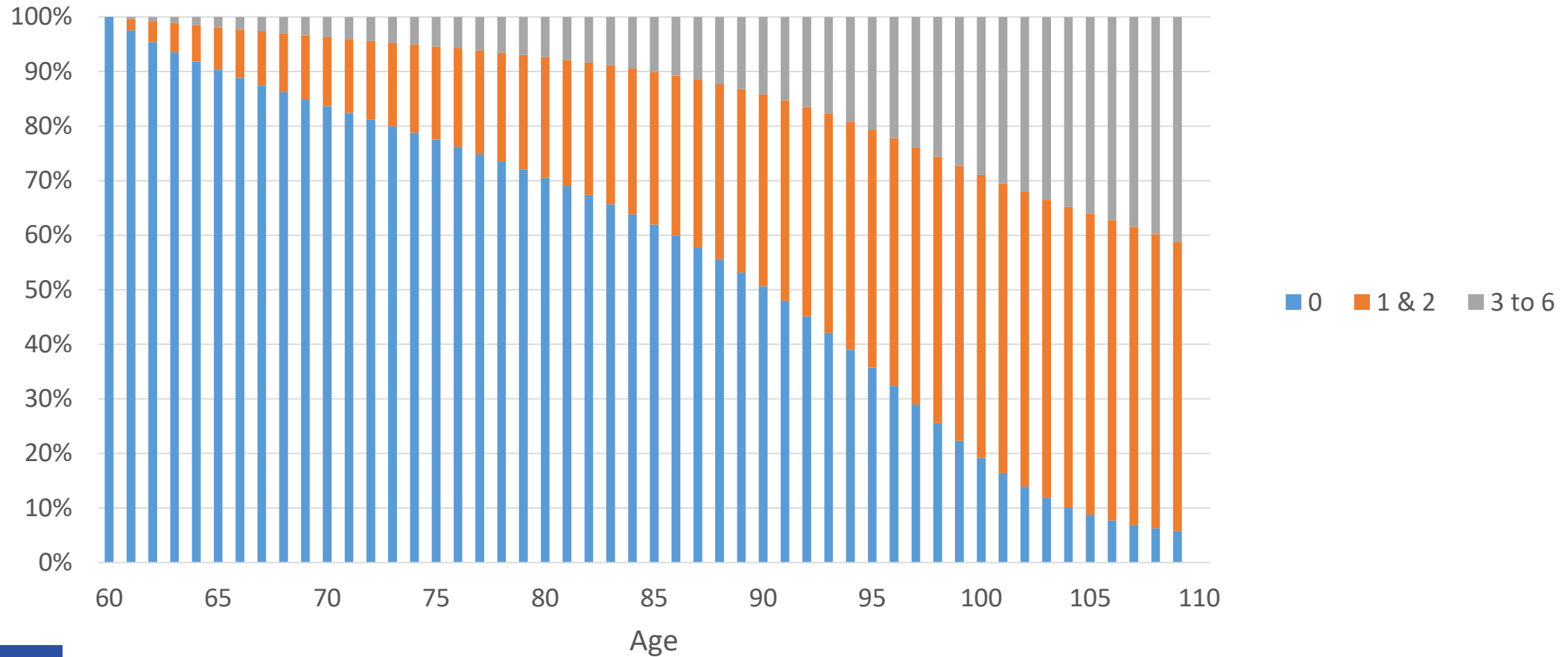
# Survival curve for healthy females, aged 60, based on ELSA fitted transitions



# Distribution of ADLs for females, by age, based on previous survival curve



# Distribution of ADLs for females, by age, based on previous survival curve



Single premium when in State 0 for sample ages for disability-linked annuity paying £10k p.a. when in States 1 & 2 and £20k p.a. when in States 3 to 6 - Males

Age	Interest Rate (p.a.)		
	2%	4%	6%
60	37,710	26,928	19,872
65	34,892	26,054	19,959
70	31,351	24,444	19,434
75	27,259	22,152	18,262
80	22,863	19,316	16,488

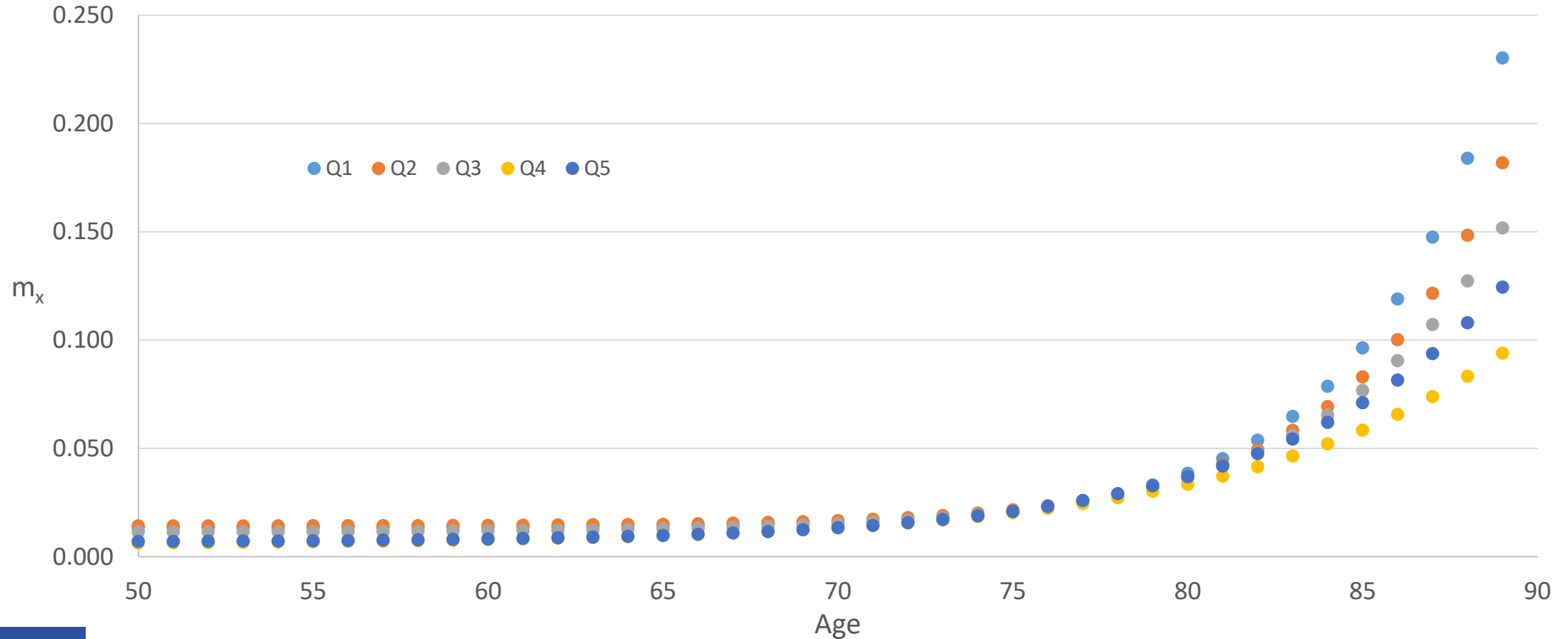
Single premium when in State 0 for sample ages for disability-linked annuity paying £10k p.a. when in States 1 & 2 and £20k p.a. when in States 3 to 6 - Females

Age	Interest Rate (p.a.)		
	2%	4%	6%
60	51,090	35,375	25,397
65	48,128	34,998	26,176
70	43,731	33,346	25,977
75	38,002	30,325	24,584
80	31,325	26,090	21,976

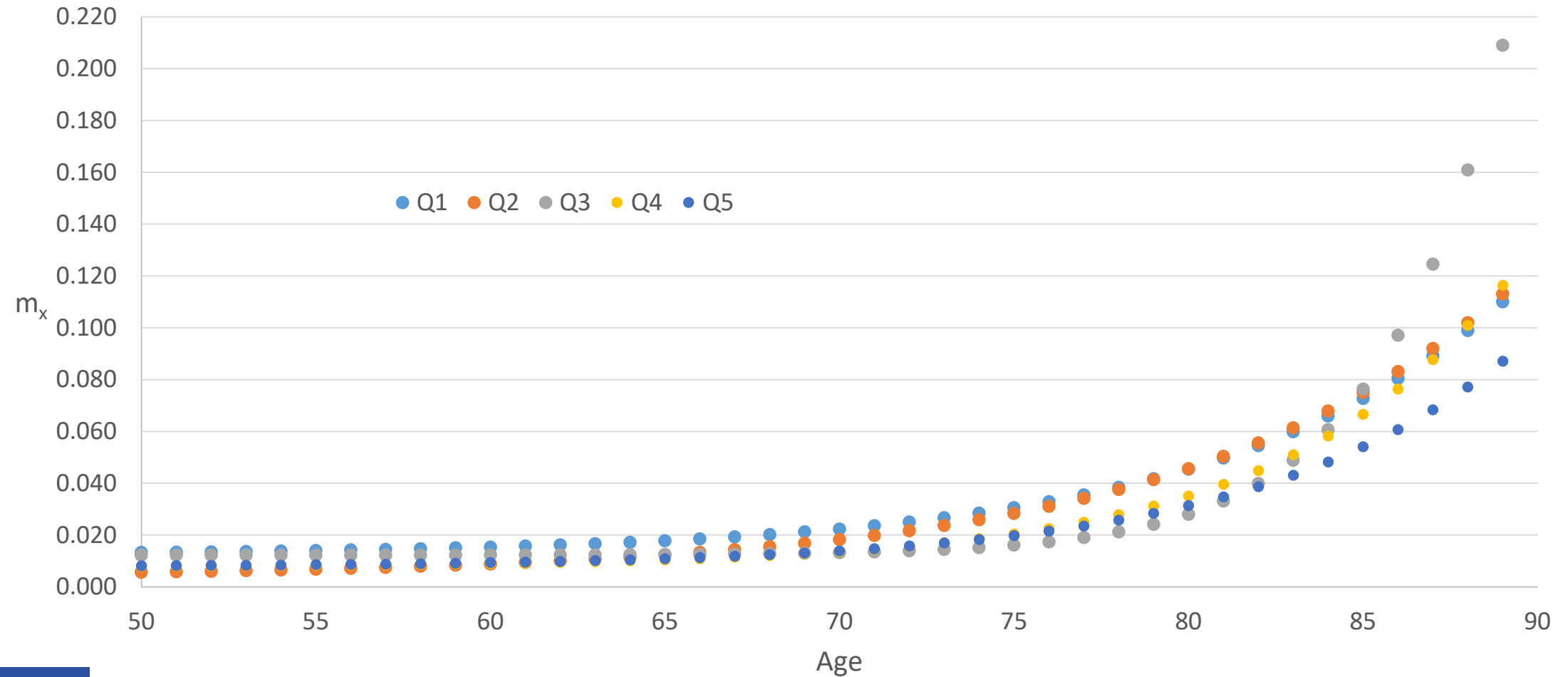
# SHARE database

- The Survey of Health, Ageing and Retirement in Europe (SHARE) is a multidisciplinary and cross-national panel database of micro data on health, socio-economic status and social and family networks of about 140,000 individuals aged 50 or older (around 380,000 interviews).
- SHARE covers 27 European countries and Israel

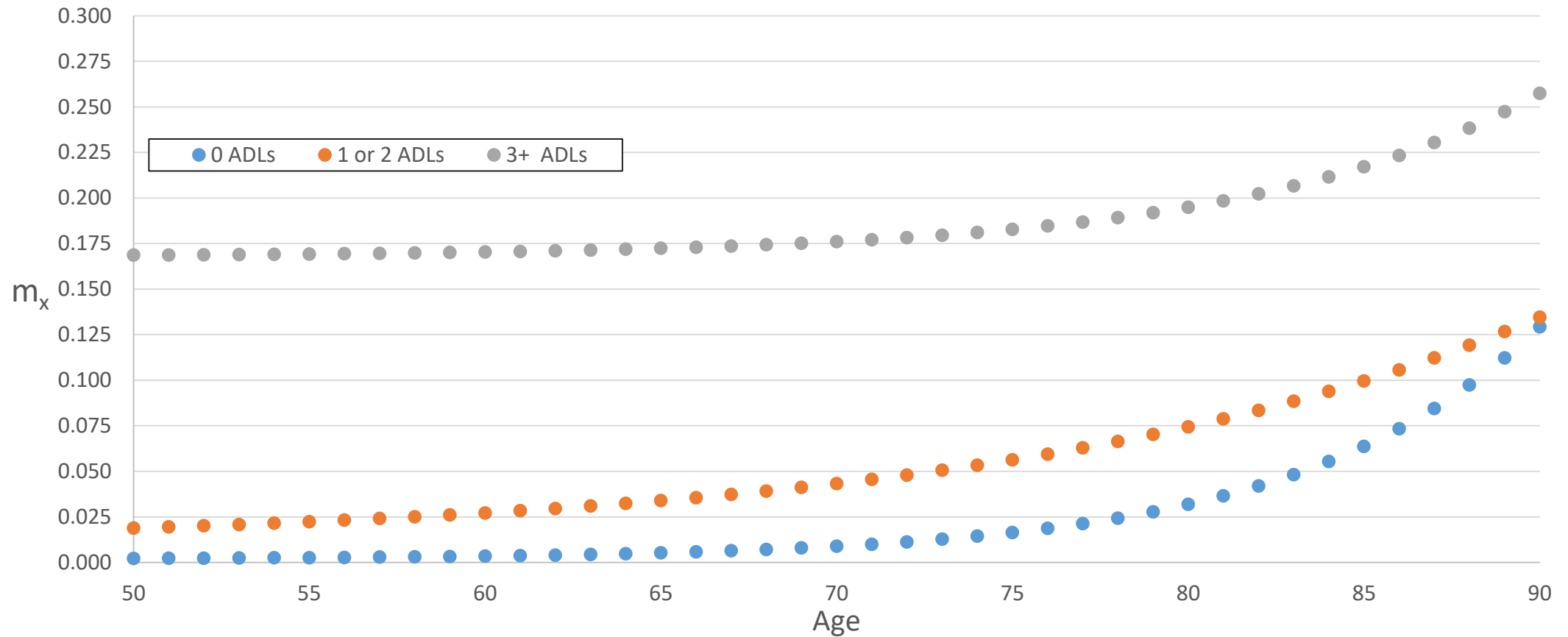
# Fitted $m_x$ , Swedish females, quintiles of wealth



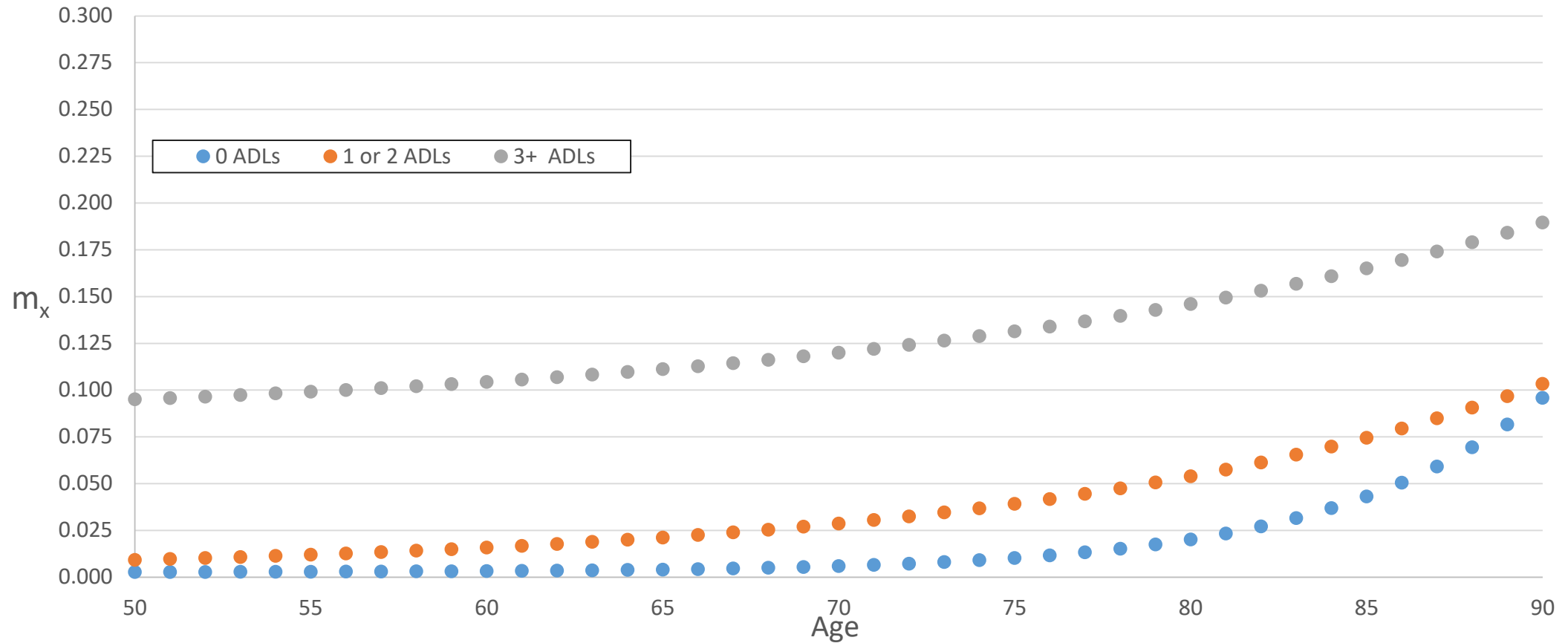
# Fitted $m_x$ , Italian males, quintiles of wealth



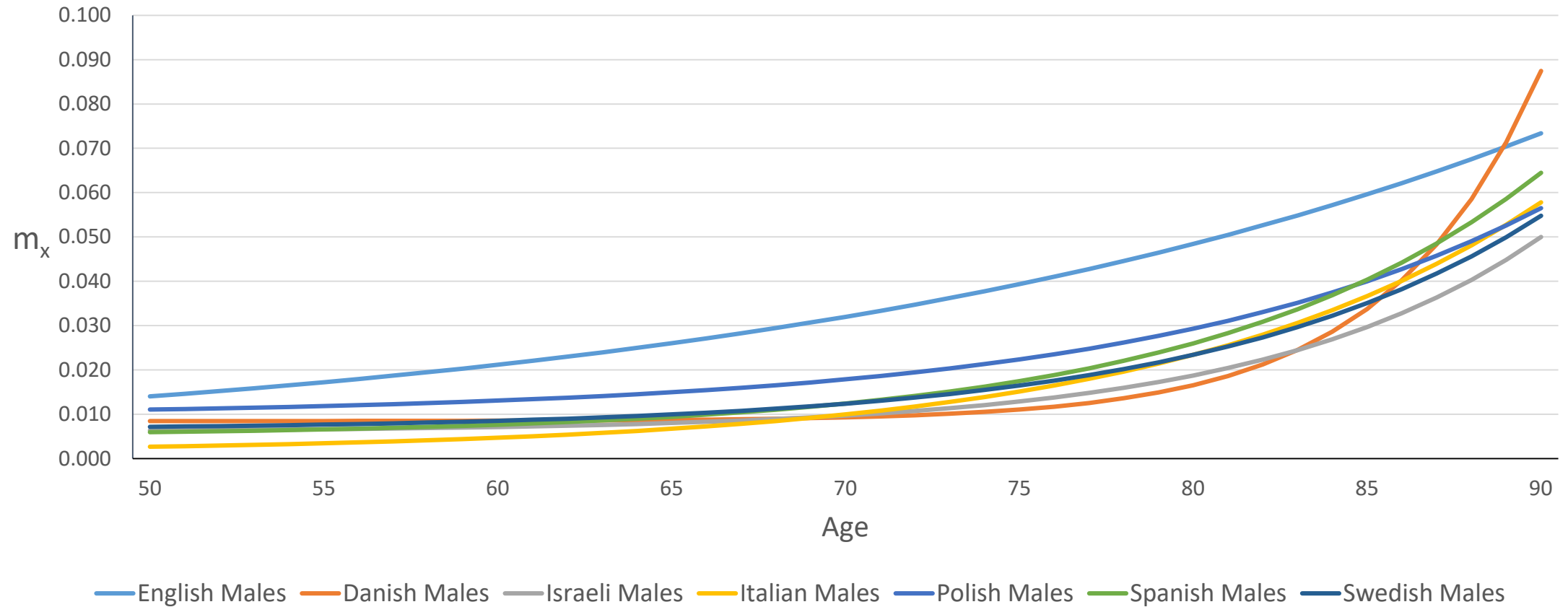
# Fitted $m_x$ , Swedish Males, ADL groupings



# Fitted $m_x$ , Swedish Females, ADL groupings



# Transition from 0 to 1 or 2 ADLs, International Comparison



# International Comparison of ADL Distribution According to Dataset for Males at Ages 60 and 75

	Age 60				Age 75		
	0 ADLs	1 or 2 ADLs	3+ ADLs		0 ADLs	1 or 2 ADLs	3+ ADLs
England	86.4%	9.5%	4.1%		74.8%	19.8%	5.4%
Denmark	94.1%	5.3%	0.6%		88.5%	8.8%	2.7%
Israel	93.2%	4.6%	2.2%		84.2%	7.1%	8.7%
Italy	95.7%	2.5%	1.7%		90.6%	6.5%	2.9%
Poland	90.7%	6.7%	2.6%		82.9%	11.7%	5.4%
Spain	94.8%	3.9%	1.3%		90.5%	4.6%	4.9%
Sweden	94.2%	4.7%	1.0%		89.3%	8.0%	2.6%

# Conclusions

- ELSA appears to under-represent the more disabled population
- This could be due to:
  - Transitions to disabled states being lower than reality
  - Mortality from these states being higher than reality
- Early analysis of SHARE indicates that mortality is under-reported, and so is the population with ADLs
- The quality of the SHARE data varies from country to country
- This would seem to have major implications for analysis of health states in later life

# Next steps

- Incorporate more recent waves for both ELSA and SHARE
- Impute the health and mortality for censored data

Thank you for listening!

