

Family, friends and framing: A cross-country study of subjective survival expectations

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Subjective expectations matter...

- **Longer lifetimes** have “profound economic consequences for individuals as they engage in lifecycle planning, and for economies as the average age of their population rises” (James Poterba, Ely Lecture 2014).
- **Subjective survival probabilities (SSPs)** help explain economic decisions.
 - predict actual survival;
 - explain retirement plans, savings, and annuitisation;
 - correlate with income, education, gender and health.

... but people underestimate their chances of survival

- Middle aged people **underestimate** life expectancy by **4-5 years**;
- **Women** more pessimistic;
- **Younger** more pessimistic;
- Less pessimistic about living to **very old ages**;
- “**Live to**” framing \Rightarrow more optimism than “**die by**”
- International finding: the Netherlands, Germany, Australia, UK

Can mistakes be corrected?

Individuals who underestimate their lifetimes are likely to:

- retire too early;
- save too little;
- not annuitise enough;
- resist increases in regulated pension and preservation ages.

What can be done to help people improve their forecasts?

Is basic information enough to correct subjective expectations?

What is behind the “live to” and “die by” framing effect?

We conduct a large-scale, international choice experiment

We conduct an online choice experiment in the Netherlands and Australia to study:

- 1 How subjective survival expectations are updated;
- 2 How subjective survival expectations affect attitudes to pension ages and savings.

We add to the literature on

- **SSPs** and other biased subjective expectations (stock returns, retirement dates etc) (e.g., Smith et al., 2001; Hurd and McGarry, 2002; Hurd, 2009; Rohwedder and Delavande, 2011; Kutlu-Koc and Kalwij, 2013)
- **Financial literacy** (e.g., Lusardi and Mitchell, 2011; Lusardi and Mitchell, 2014; Gaudecker and Von, 2014)
- Ineffectiveness of **financial education** (Fernandes et al., 2014)
- Difficult **communication of risk information** (e.g., Spiegelhalter et al., 2011; Payne et al., 2013; Bateman et al., 2015)...
- **Low statistical literacy** (Galesic and Garcia-Retamero, 2010; Cokely et al., 2012).

Context: Why the Netherlands and Australia?

Demographic similarities:

- Pop.: NL 17m; AUS 22m
- GDP/capita: NL \$52K; AUS \$62K;
- LE at birth in 2013: NL 81 yrs; AUS 83 yrs;
- Financial literacy: NL 46% correct; AUS 43% correct

Pension system differences:

- First pillar:
 - NL universal; AUS means-tested;
 - both around 30% of av. earnings
- Second pillar: NL DB; AUS DC
- Decumulation: NL annuity; AUS no mandatory annuity

The experiment - 1 - Structure

- 1 DNB Household Survey for NL; online panel in AUS
- 2 Sample 2000 people: 16+ yrs (NL); 18+ yrs (AUS)
- 3 Collect data on survival of same-sex parent or grandparent
- 4 Sort to “live to”/“die by”
- 5 Assign to 3 information conditions or control
- 6 Collect SSPs + information condition \Rightarrow collect SSPs again
- 7 Measure numeracy
- 8 Collect opinions on retirement policy and savings

The experiment - 2 - Probabilities and confidence intervals

Collect Subjective Survival Probabilities

- Target age probability assignment:

How likely do you think it is that you will live to (die by) the age of 75, (80, ..., 100)?

Scale 0 (no chance at all) to 10 (absolutely certain)

- Confidence interval around median survival:

- *I am 90% sure that I will live to (not die by) ...*
- *I think it is equally likely that I will live longer or shorter than age ...*
- *I am 90% sure that I will not live to (die by) ...*

The experiment - 3 - new information on survival

- 1 Cohort information (systematic longevity)
On average, women (men) born the same year as you have an x in 10 chance of living to age 75; a y in 10 chance of living to age 85 and a z in 10 chance of living to age 95.
- 2 Ancestor information (idiosyncratic longevity)
Compared with other women (men) born at the same time, your mother (father, grandmother, grandfather) lived x years longer(shorter) than average.
- 3 Cohort information + Ancestor information

SSPs & CIs \Rightarrow Information \Rightarrow SSPs & CIs

Table: Information treatments and sample sizes

| | NL | AUS | | NL | AUS |
|-------------------|-------|-------|-----------------|-----|-----|
| No treatment | 2,095 | 2,178 | Cohort survival | 727 | 545 |
| Ancestor survival | 725 | 544 | Both survival | 671 | 544 |
| Total | 2,095 | 2,178 | | | |

Initial SSPs - NL

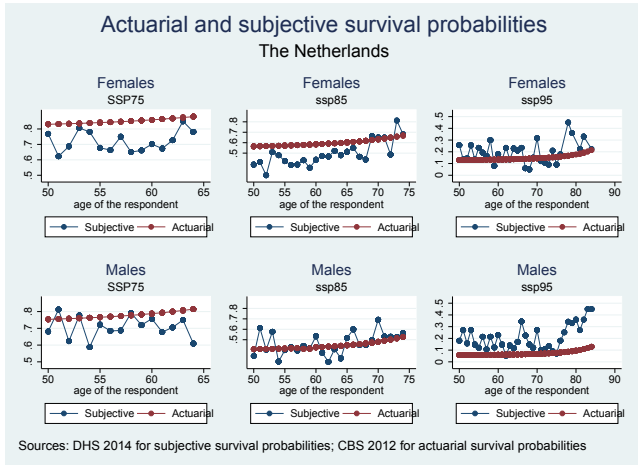


Figure: Survival probabilities to reach several target ages - Actuarial vs. subjective.

Initial SSPs - AUS

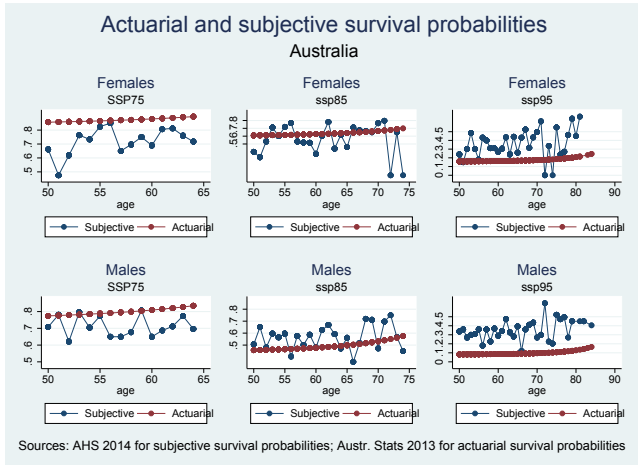


Figure: Survival probabilities to reach several target ages - Actuarial vs. subjective.

Table: Summary Statistics: Subjective Survival Probabilities

| Variables | Mean and (Std. Dev.) | | | | | |
|----------------------------|----------------------|-----------------|-----------------|------------------|------------------|------------------|
| | Full Sample | NL Males | Females | Full Sample | AUS Males | Female |
| <i>"live to" condition</i> | | | | | | |
| SSP to Age 75 | 7.55 (1.95) | 7.45 (1.90) | 7.67 (2.00) | 7.49 (2.36) | 7.64 (2.44) | 7.37 (2.29) |
| SSP to Age 85 | 5.18 (2.46) | 5.13 (2.44) | 5.23 (2.48) | 5.99 (2.89) | 6.09 (2.89) | 5.90 (2.88) |
| SSP to Age 95 | 2.27 (2.18) | 2.31 (2.13) | 2.22 (2.24) | 3.78 (3.09) | 3.97 (3.19) | 3.63 (2.99) |
| Median lifetime (SML) | 78.25 (9.40) | 78.73 (8.98) | 77.68 (9.87) | 74.08 (16.58) | 72.22 (18.69) | 75.97 (13.90) |
| <i>"die by" condition</i> | | | | | | |
| SSP to Age 75 | 6.29 (2.29) | 6.32 (2.29) | 6.26 (2.30) | 5.28 (2.93) | 5.12 (3.18) | 5.44 (2.65) |
| SSP to Age 85 | 3.75 (2.41) | 3.90 (2.49) | 3.59 (2.32) | 3.46 (2.67) | 3.45 (2.80) | 3.47 (2.53) |
| SSP to Age 95 | 1.50 (2.06) | 1.72 (2.32) | 1.24 (1.69) | 1.88 (2.55) | 1.93 (2.70) | 1.84 (2.39) |
| Median lifetime (SML) | 78.07 (8.92) | 78.98 (8.96) | 77.01 (8.78) | 72.17 (16.65) | 70.97 (17.86) | 73.45 (15.17) |

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SSPs and framing effects

- SSPs more pessimistic in “die by” frame;
- Framing effects stronger for younger subjects
- Framing stronger for AUS than NL
- Australians more optimistic about older age survival
- Women more pessimistic about older age survival than men
- Younger age subjects more pessimistic than older age

Table: Revisions to SSPs under information conditions, NL

| | SSP75 | SSP80 | SSP85 | SSP90 | SSP95 | SSP100 |
|-------------------------|---------------|-------------|-------------|-------------|-------------|-------------|
| | Live to frame | | | | | |
| None (control) | 7.48 | 6.31 | 5.05 | 3.52 | 2.21 | 1.24 |
| Cohort only | 7.27 | 6.03 | 4.78 | 3.17 | 1.93 | 1.01 |
| Difference from control | 0.21 | 0.28 | 0.27 | 0.34 | 0.28 | 0.23 |
| p-value | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| N.Obs. | 370 | 429 | 460 | 475 | 487 | 490 |
| None (control) | 7.58 | 6.54 | 5.22 | 3.63 | 2.24 | 1.20 |
| Ancestor only | 7.42 | 6.31 | 5.00 | 3.42 | 2.04 | 1.00 |
| Difference from control | 0.16 | 0.23 | 0.22 | 0.21 | 0.20 | 0.20 |
| p-value | 0.012 | 0.001 | 0.001 | 0.002 | 0.000 | 0.000 |
| N.Obs. | 253 | 310 | 336 | 347 | 357 | 359 |
| None (control) | 7.65 | 6.66 | 5.21 | 3.48 | 2.08 | 1.10 |
| Cohort and ancestor | 7.36 | 6.36 | 4.93 | 3.14 | 1.84 | 0.88 |
| Difference from control | 0.29 | 0.30 | 0.28 | 0.34 | 0.24 | 0.22 |
| p-value | 0.042 | 0.004 | 0.019 | 0.002 | 0.008 | 0.001 |
| N.Obs. | 82 | 107 | 116 | 122 | 125 | 124 |

We find:

- 1 Strongly significant differences in SSPs across conditions for all target ages in the “live to” frame;
- 2 Respondents are **more optimistic** in the no-treatment scenario, and then become **more pessimistic**;
- 3 Conditional on gender: Males significant downward revisions;
Females mostly insignificant downward revisions;
- 4 No significant differences across conditions in the “die by” frame

Table: Revisions to SSPs under information conditions, AUS

| | SSP75 | SSP80 | SSP85 | SSP90 | SSP95 | SSP100 |
|-------------------------|---------------|-------------|-------------|-------------|-------------|-------------|
| | Live to frame | | | | | |
| None (control) | 7.63 | 7.05 | 6.08 | 4.96 | 3.79 | 2.71 |
| Cohort only | 7.81 | 7.03 | 6.12 | 4.83 | 3.77 | 2.69 |
| Difference from control | -0.18 | 0.02 | -0.04 | 0.13 | 0.02 | 0.02 |
| p-value | 0.001 | 0.387 | 0.302 | 0.069 | 0.382 | 0.377 |
| N.Obs. | 249 | 264 | 275 | 289 | 284 | 283 |
| None (control) | 7.33 | 6.60 | 5.65 | 4.49 | 3.35 | 2.12 |
| Ancestor only | 7.33 | 6.55 | 5.65 | 4.36 | 3.29 | 2.15 |
| Difference from control | 0.00 | 0.05 | 0.00 | 0.13 | 0.06 | -0.03 |
| p-value | 0.478 | 0.200 | 0.462 | 0.044 | 0.186 | 0.293 |
| N.Obs. | 252 | 283 | 294 | 309 | 313 | 310 |
| None (control) | 7.67 | 7.06 | 6.11 | 4.96 | 3.75 | 2.53 |
| Cohort and ancestor | 7.99 | 7.05 | 6.07 | 4.70 | 3.65 | 2.56 |
| Difference from control | -0.32 | 0.01 | 0.04 | 0.26 | 0.10 | -0.03 |
| p-value | 0.002 | 0.435 | 0.321 | 0.005 | 0.139 | 0.342 |
| N.Obs. | 170 | 190 | 196 | 204 | 202 | 201 |

We find:

- 1 A few significant differences in SSPs across conditions in the “live to” frame;
- 2 Respondents are **more optimistic** after cohort information; no change after ancestor information
- 3 **Males** small downward revisions; **Females** significant upwards revisions age 75; downwards age 90;
- 4 Some significant downward revisions in the “die by” frame

Some low numeracy people were confused by information.

Numeracy results:

- 56% NL (62% AUS) Q1 correct; 54% (48%) Q2 correct; 43% (36%) Q3 correct.
- 37% (32%) all correct.
- Some subjects confused by information: gave valid answered untreated but DK/Refuse after info.
- 68 (32) in the "live to" frame and 90 (44) in the "die by" frame. Total 158 confused respondents.
- More likely **older** (NL) and **low numeracy score** (AUS and NL)

Do subjective expectations affect attitudes to policy and savings intentions?

- *The age when people can start receiving the age pension should rise with average life expectancy.*
- *The government should give people the choice to take their retirement savings any way they like, as an annuity, pension, or lump sum.*
- *If I knew that I was going to live 10 years longer than I expect to now, I would save more than I do now.*

All variables are coded -9 (Do not know) -8 (Do not want to say it) 1 (Disagree) 2 (Neither agree nor disagree) 3 (Agree).

Table: Relevance of alternative issues - NL and AUS

| | Most relevant | | Least relevant | |
|--------------------------------------|---------------|-------|----------------|-------|
| | NL | AUS | NL | AUS |
| Youth unemployment | 53.36 | 39.85 | 7.86 | 15.24 |
| Paid parental leave | 7.30 | 15.28 | 43.00 | 56.10 |
| Age pension eligibility age | 21.33 | 39.66 | 17.61 | 13.63 |
| Health care | 86.48 | 77.96 | 1.17 | 7.02 |
| Regulation of retirement income | 19.78 | 23.64 | 21.47 | 22.45 |
| Clean energy policy | 28.54 | 28.05 | 25.10 | 29.01 |
| Marijuana tourism (NL) | 3.48 | | 49.12 | |
| Regulating problem gambling (AUS) | | 5.78 | | 54.40 |
| Cycle ways in urban areas | 3.53 | 5.55 | 66.55 | 65.65 |
| Terrorism and international security | 50.44 | 7.81 | 6.49 | 14.32 |
| Immigration | 16.67 | 22.81 | 32.78 | 22.13 |

Attitudes to pension age related to income and numeracy + SSP

Table: Marginal effects of covariates on agreement with increasing pension age

| NL | No info | Cohort | Ancestor | Cohort & ancestor |
|------------------------|----------------|---------------|-----------------|------------------------------|
| <i>SSP75</i> | 0.006** | 0.009** | 0.005 | 0.004 |
| <i>SSP100</i> | -0.002 | -0.003 | -0.001 | 0.000 |
| <i>Numerate</i> | 0.084*** | 0.070* | 0.064** | 0.186*** |
| <i>Income</i> | 0.024*** | 0.025** | 0.039*** | 0.029 |
| <i>Female</i> | -0.029 | -0.052 | -0.035 | 0.072 |
| <i>Children</i> | -0.018 | -0.019 | -0.034** | -0.005 |
| <i>Age</i> | 0.000 | -0.013 | -0.002 | -0.008 |
| <i>Age²</i> | 0.000 | 0.000 | 0.000 | 0.000 |
| <i>Confused</i> | -0.013 | 0.033 | 0.051 | 0.129 |
| <i>Liveframe</i> | -0.050** | -0.044 | -0.057 | 0.023 |
| AUS | No info | Cohort | Ancestor | Cohort & ancestor |
| <i>SSP75</i> | 0.001 | 0.001 | 0.006 | -0.001 |
| <i>SSP100</i> | 0.008*** | 0.003 | -0.002 | 0.004 |
| <i>Numerate</i> | 0.03 | -0.039 | 0.074** | 0.005 |
| <i>Income</i> | 0.009** | 0.014*** | 0.012** | 0.020*** |
| <i>Female</i> | -0.169 | -0.154*** | -0.124*** | -0.094** |
| <i>Children</i> | 0.016 | 0.028* | -0.037** | -0.032* |
| <i>Age</i> | -0.006 | -0.006 | -0.016* | -0.003 |
| <i>Age²</i> | 0.000 | 0.000 | 0.000 | -0.000 |
| <i>Confused</i> | -0.023 | 0.103 | -0.153 | -0.066 |
| <i>Liveframe</i> | -0.000 | 0.039 | -0.050 | -0.028 |

Attitudes to savings reflects longevity insurance policies

Table: Marginal effects of covariates on agreement with increased saving

| NL | No info | Cohort | Ancestor | Cohort & ancestor |
|------------------------|----------------|---------------|-----------------|------------------------------|
| <i>SSP75</i> | 0.004* | 0.002 | 0.004 | 0.001 |
| <i>SSP100</i> | 0.002 | 0.003 | 0.001 | 0.004 |
| <i>Numerate</i> | -0.084*** | -0.025 | -0.065*** | -0.030 |
| <i>Income</i> | 0.009 | 0.009 | 0.004 | 0.002 |
| <i>Female</i> | -0.044** | -0.054** | -0.066*** | -0.036 |
| <i>Children</i> | -0.021** | -0.022* | -0.026*** | -0.013 |
| <i>Age</i> | 0.001 | 0.001 | -0.001 | 0.021 |
| <i>Age²</i> | 0.000 | 0.000 | 0.000 | 0.000 |
| <i>Confused</i> | 0.001 | 0.108 | 0.019 | 0.060 |
| <i>Liveframe</i> | -0.010 | 0.002 | -0.004 | -0.050 |
| AUS | No info | Cohort | Ancestor | Cohort & ancestor |
| <i>SSP75</i> | 0.006** | 0.008** | 0.009** | 0.015*** |
| <i>SSP100</i> | 0.002 | 0.001 | 0.002 | 0.001 |
| <i>Numerate</i> | -0.069*** | -0.053 | -0.082*** | -0.016 |
| <i>Income</i> | 0.000 | -0.003 | 0.004 | -0.007 |
| <i>Female</i> | -0.040* | -0.006 | -0.007 | -0.030 |
| <i>Children</i> | 0.001 | -0.008 | 0.026 | 0.008 |
| <i>Age</i> | -0.006 | -0.001 | -0.013 | 0.003 |
| <i>Age²</i> | 0.000 | 0.000 | 0.000 | -0.000 |
| <i>Confused</i> | -0.026 | 0.066 | 0.004 | 0.170 |
| <i>Liveframe</i> | -0.034 | 0.006 | -0.081 | -0.090* |

Concluding remarks

- Offering cohort or family information about life expectancy can have unintended consequences, adding to pessimism or creating confusion.
- This may be a “mortality salience” response - avoiding thinking about death.
- Simple education programs unrelated to an immediate decisions are not likely to be effective.
- Framing effects are sensitive to mode of collection and context: different outcomes by country, by SSP versus Confidence interval
- Subjective expectations do matter to attitudes
- Regulators trying to educate the public about longevity and the consequent need for delayed retirement or pension ages need alternative strategies.