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

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Motivation

- Average lifetimes have increased over the past century but individuals' forecasts of their own longevity have not kept up
- On average individuals tend to underestimate their expected lifetimes
    - People tend to be too pessimistic, underestimating expected lifetimes by 4-5 years on average (Perozek, 2008; Wu et. al., 2015)
    - Younger cohorts and women tend to underestimate more than older cohorts and men (Elder, 2013; Kutu-Koc & Kalwij, 2013)
    - Framing effect ("live to" or "die by") is important (Payne et. al., 2013)
- This has economic consequences
    - Retiring too early, saving too little and not annuitise enough (Bateman et. al., 2014; Khan et. al., 2014)

Motivation

- Improvements to retirement welfare and support for sustainable public policies depend on individuals holding unbiased estimates of their lifetimes
- What can be done to help people improve their forecasts?
    - If all they need is up-to-date information about life expectancy, then well-timed education program might be enough
    - If we give people systematic or idiosyncratic information about their life expectancy, will they update their survival expectations consistently with the news?

Aims

- Can we help people update their subjective survival expectation (SSE) or subjective life expectancy (SLE) by providing them with objective information about their longevity prospects?
    - Life expectancy of same sex peers (systematic)
    - same-sex parent/grandparent's lifetime relative to the average for their cohorts (idiosyncratic)
- What impacts do "live to" or "die by" framing and personal characteristics including demographics and health factors have on holding optimistic or pessimistic or accurate survival prospects?
- To provide guidance for regulated information provision to help people form more accurate subjective expectations of longevity

Experimental survey design

- Two-country experimental survey in Australia and the Netherlands
  - Conducted in 2014-2015
  - representative sample of 2,178 Australians and 2,095 Dutch aged 18+
- Three stages to the survey, for each respondent:
  1. Asked survival experience and causes of death of their same sex parent and/or grandparents
  2. Allocated to the “live to” or “die by” frame
  3. Assigned to one of the 4 treatment groups to elicit subjective survival probabilities and median life expectancy with confidence intervals
- Followed by a comprehensive set of questions on demographics, health and socioeconomic characteristics

Survey design – new information

Treatment group	No information	Peer information	Ancestor information	Both
1	✓			
2	✓	✓		
3	✓		✓	
4	✓	✓	✓	✓

- Depending on assignment to the above treatment groups, respondents repeated the subjective survival task with different new information provided

Survey design – SSP task

- Subjective survival probability (SSP) task
  - Target ages: 75, 80, 85, 90, 95 and 100
  - Assign values on scale 0 (“no chance at all”) to 10 (“absolute certainty”) prospects of survival at each target age
  - “Live to” and “die by” framing & wording
- Answer confidence interval questions around median life expectancy
  - Question: “to what age do you think you will live?”
  - 90% sure you will live to X age
  - Equal likely you will live longer and shorter than Y age (median life expectancy)
  - 90% sure you will not live to Z age

Example of SSP task

Please give your answer on a scale of 0 to 10, where 0 means "no chance at all" and 10 means "absolutely certain".

	0	1	2	3	4	5	6	7	8	9	10	Do not want to say	Do not know
How likely do you think it is that you will live to the age of **75** or older?	○	○	○	○	○	○	○	○	○	○	○	○	○
How likely do you think it is that you will live to the age of **80** or older?	○	○	○	○	○	○	○	○	○	○	○	○	○
How likely do you think it is that you will live to the age of **85** or older?	○	○	○	○	○	○	○	○	○	○	○	○	○
How likely do you think it is that you will live to the age of **90** or older?	○	○	○	○	○	○	○	○	○	○	○	○	○
How likely do you think it is that you will live to the age of **95** or older?	○	○	○	○	○	○	○	○	○	○	○	○	○
How likely do you think it is that you will live to the age of **100** or older?	○	○	○	○	○	○	○	○	○	○	○	○	○

Respondents are randomly shown either “live to” or “die by” wording

Example of SSP task

To what age do you think you will live?

I am 90% sure that I will live to age...

Please select your answer ▾

I think it is equally likely that I will live longer or shorter than age...

Please select your answer ▾

I am 90% sure that I will not live to age...

Please select your answer ▾

Respondents are randomly shown either “live to” or “die by” wording

Samples – Australia & Netherlands

	Australia	Netherlands
Male	50%	52%
Average age	45.07	53.58
Partner	61%	77%
Number of children	0.74	0.67
Employed	54%	52%
Retired	20%	26%
Poor health	10%	4%
Ever smoked	28%	29%
Alcohol	15%	3%
Depressed	25%	0.04
Numeracy (out of 3)	1.46	1.57
Higher education	75%	62%
Parent alive	60%	43%
N	2178	2123

Optimistic & pessimistic expectations

- **Research question:** what factors drive respondents to hold optimistic or pessimistic or correct survival prospects?
- Pre-treatment sample
- Compare the SSPs with each country's life tables to determine if the SSPs are:
  - Accurate – same as actuarial survival probabilities
  - Optimistic – greater than actuarial survival probabilities
  - Pessimistic – less than actuarial survival probabilities

Optimistic & pessimistic expectations

	Australia						Netherlands					
	Live to frame											
Target age	75	80	85	90	95	100	75	80	85	90	95	100
Optimistic	40%	47%	56%	63%	63%	67%	36%	42%	45%	55%	52%	51%
Pessimistic	41%	39%	33%	30%	27%	0%	41%	42%	40%	31%	28%	0%
Correct	20%	14%	10%	7%	10%	33%	23%	16%	14%	13%	20%	49%
	Die by frame											
Target age	75	80	85	90	95	100	75	80	85	90	95	100
Optimistic	15%	16%	20%	28%	35%	49%	23%	20%	22%	31%	30%	35%
Pessimistic	75%	74%	71%	58%	50%	0%	64%	66%	64%	53%	39%	0%
Correct	10%	9%	9%	14%	16%	51%	13%	14%	13%	16%	31%	65%

What factors influence whether people are correct optimistic or pessimistic?

Multinomial logit model

$$P(y_i = optimistic|X_i) = \frac{exp(x_i\beta_1)}{1 + exp(x_i\beta_1) + exp(x_i\beta_2)}$$

$$P(y_i = pessimistic|X_i) = \frac{exp(x_i\beta_2)}{1 + exp(x_i\beta_1) + exp(x_i\beta_2)}$$

$$P(y_i = accurate|X_i) = \frac{1}{1 + exp(x_i\beta_1) + exp(x_i\beta_2)}$$

- Respondent i, β are the parameters for the alternatives
- Dependent variable is categorical: optimistic, pessimistic & accurate (base case)
- x_i are explanatory variables which include male, age, partnered, employed, retired, number of children, poor health (self assessed), smoker, alcohol consumption, depressed , parents alive, die by frame

Australian results: pre-treatment sample

Target ages	75	85	95	MLE	75	85	95	MLE
	Optimistic				Pessimistic			
Male	0.157***	0.140***	0.126***	0.102***	-0.174***	-0.140***	-0.150***	-0.093***
Poor health	-0.086*	-0.170***	-0.232***	-0.126***	0.166***	0.203***	0.243***	0.152***
Ever smoked	-0.075**	-0.113***	0.012	-0.085***	0.146***	0.087***	0.012	0.091***
Alcohol	0.109***	0.06	-0.031	-0.037	-0.05	0.027	-0.005	0.057
Depressed	-0.022	-0.057*	-0.060*	-0.064**	0.053*	0.096***	0.051*	0.076***
Numeracy	-0.031***	-0.040***	-0.056***	-0.009	0.002	0.040***	0.033***	0.012
Higher education	0.078**	0.045*	0.050*	0.013	-0.069**	-0.047*	-0.016	-0.005
Parents alive	0.118***	0.108***	0.085**	0.036	-0.132***	-0.109***	-0.078**	-0.045
Die by frame	-0.244***	-0.361***	-0.286***	-0.057***	0.317***	0.373***	0.217***	0.062***
N	1345	1551	1695	1857	1345	1551	1695	1857

Note: We also controlled for age, partner, employed, retired & number of children
* denotes 10% level of significance, ** denotes 5% level of significance & *** denotes 1% level of significance

Dutch results: pre-treatment sample

Target age	75	85	95	MLE	75	85	95	MLE
	Optimistic				Pessimistic			
Male	0.166***	0.254***	0.097***	0.093***	-0.093***	-0.286***	-0.070***	-0.082***
Poor health	-0.007	-0.096	-0.113*	0.062	0.105	0.253***	0.149***	0.411
Ever smoked	-0.025	-0.082**	-0.107***	-0.059	0.045	0.097***	0.117***	0.073*
Alcohol	-0.085	0.033	0.004	0.143	0.049	-0.082	0.047	0.342
Depressed	-0.122	-0.175**	0.023	-0.092	0.134*	0.088	-0.083	0.09
Numeracy	-0.014	-0.009	-0.003	0.014	-0.01	0.014	-0.033***	-0.012
Higher education	0.004	-0.021	-0.009	-0.013	-0.048	0.043	-0.016	0
Parents alive	0.102***	0.053	0.067*	-0.013	-0.100**	-0.100***	-0.100***	0.016
Die by frame	-0.136***	-0.225***	-0.221***	0.004	0.221***	0.249***	0.091***	0.005
N	1345	1551	1695	1857	1047	1339	1485	1295

Note: We also controlled for age, partner, employed, retired & number of children
* denotes 10% level of significance, ** denotes 5% level of significance & *** denotes 1% level of significance

Extra information on peer, ancestor, peer + ancestor survival vs no information

- **Research question:** does giving extra information to respondents narrow the gap between subjective survival expectations and actuarial probabilities?
- Compare the SSPs and median life expectancy with each country's life tables to determine the size of the gap:
    - How far away is the subjective survival probability from the actuarial one?

Does extra information on peer, ancestor, both survival improve accuracy of estimates?

Random effects model

$$y_{ij} = \beta_0 + \beta_1 treat\_peer_{ij} + \beta_2 treat\_ancestor_{ij} + \beta_3 treat\_both_{ij} + \mathrm{X}'_{ij}\beta + \alpha_i + \epsilon_{ij}$$

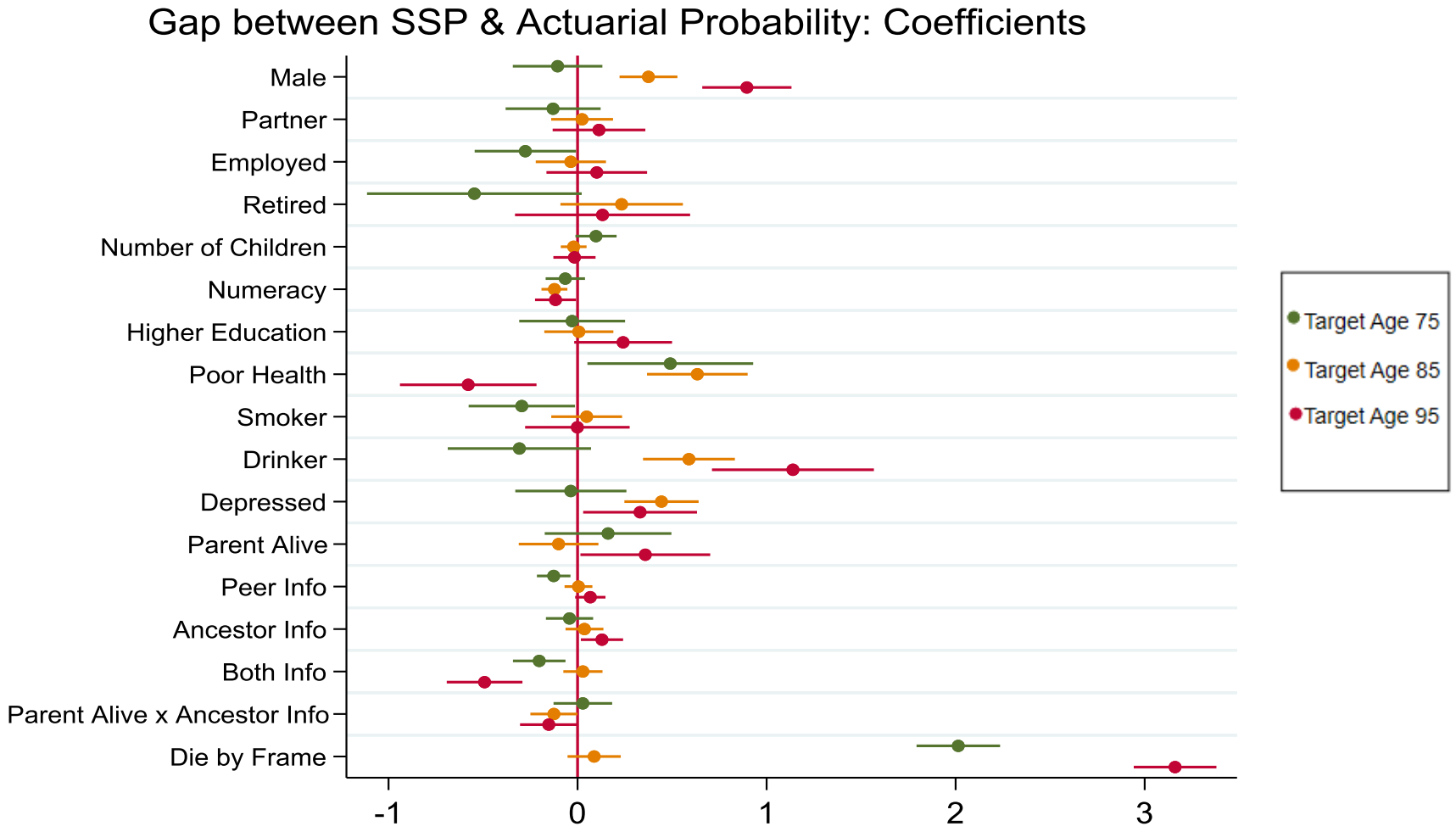
- Respondent i, SSE task j
- Dependent variable: y_{ij} = Gap between SSP(SLE) and actuarial estimates
- Variables of interest:
  - $treat\_peer_{ij}$= 1 if peer survival information is shown
  - $treat\_ancestor_{ij}$= 1 if ancestor survival information is shown
  - $treat\_both_{ij}$= 1 if peer & ancestor survival information is shown

X'_{ij} = Other covariates controlled for include:

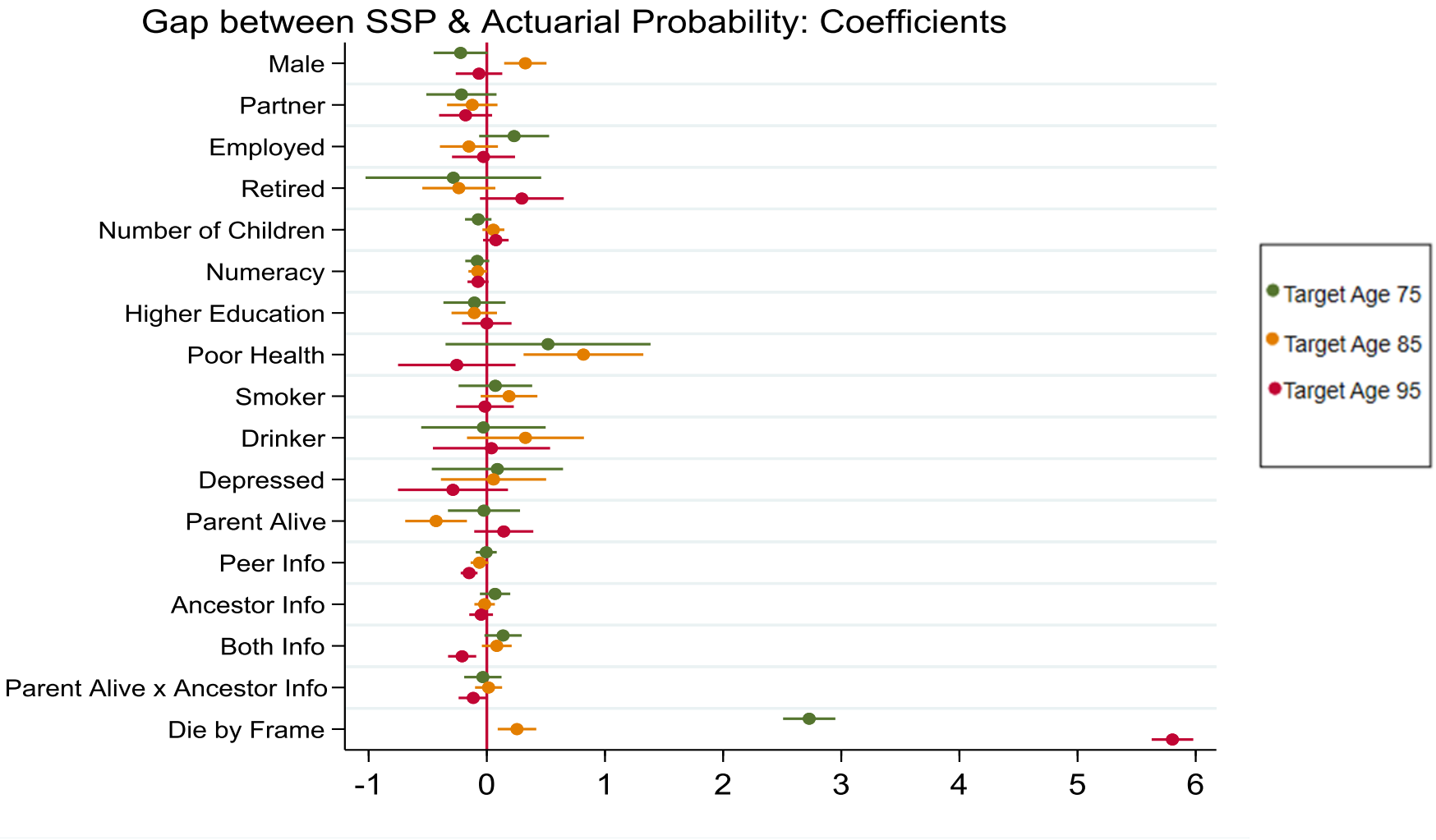
  - Male, age groups, have partner, number of children, employed, retired, numeracy, higher education, poor health (self-assessed), smoker, alcohol consumption, depressed, parent alive, die by frame (vs live to frame)

- α_i= unobserved effect, ϵ_{ij}= error term

Australian results: all treatment groups



Dutch results: all treatment groups



Conclusions & implications

Providing extra information on peer AND ancestor life expectancies has greater impact in shifting expectations in the right direction

- Peer information - reduces the gap at younger target age and median life expectancy age
- Ancestor information – only reduces the gap in median life expectancy
- Peer and ancestor information – reduces the gap for SSPs and median life expectancy

Key differences between the Australian and Dutch results

- New information treatments only works at older target age and median life expectancy for the Netherlands

Conclusions & implications

All information treatments significant for subjective median age of survival

- The task seems to be easier to understand when respondents are asked about to what age they will live to rather than eliciting probability to target ages

Numeracy reduces the gap between subjective survival probabilities (or life expectancies) and actuarial estimates

- Suggesting that the information formats tested work best for those with good numeracy skills
- Could indicate that other information formats could be required for the less numerate

Conclusions & implications

Live to/die by framing effects very strong

- Die by framing is associated with pessimism and less likely to revise in appropriate direction following treatment

The proposed information formats are cognitively challenging for those without adequate numeracy skills

- Also induce pessimism by highlighting individual's mortality

Information formats which elicit more optimistic expectations are more likely to support people's plans to work longer, insure against longevity and decumulate more slowly

Thank you

For more information on this presentation, or the Macquarie University Centre for the Health Economy (MUCHE), please contact:

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