Eliciting Individuals' Financial Decision-Making Approaches with Verbal Protocols

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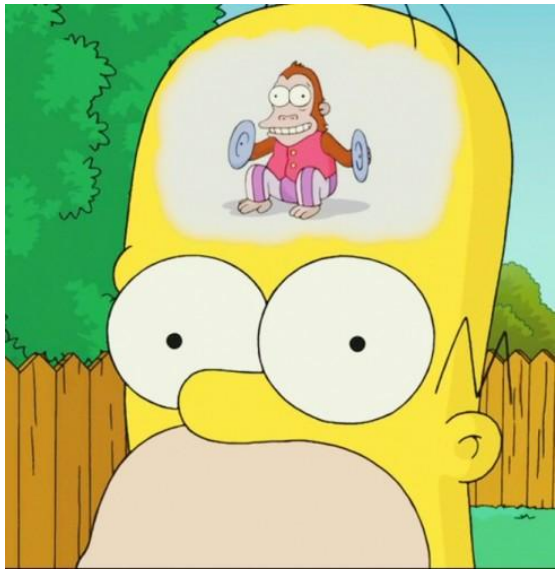
Motivation

- Vast evidence that humans are not computers
- (many) People use shortcuts, heuristics, guestimates when making financial decisions
- But what exactly are they doing?



Motivation

- We test various models
  - Do they explain behavioral data?
  - Which model is more consistent with the data?

- Relate factors to decision-making (literacy, numeracy, …)

- But are we testing the “right” models?

Motivation

- Our approach
  - Simply ask people what they do
  - To come closer to the true decision-making approach

- Why do we want to know?
  - New approaches, heuristics, … we did not know about?
  - Better understand financial decisions
  - Design nudges etc. that can directly feed into approaches uncovered

Preview of results

- When valuing an annuity some people
  - Guess (50%+)
  - Uses math, similar to an actuary (40%)

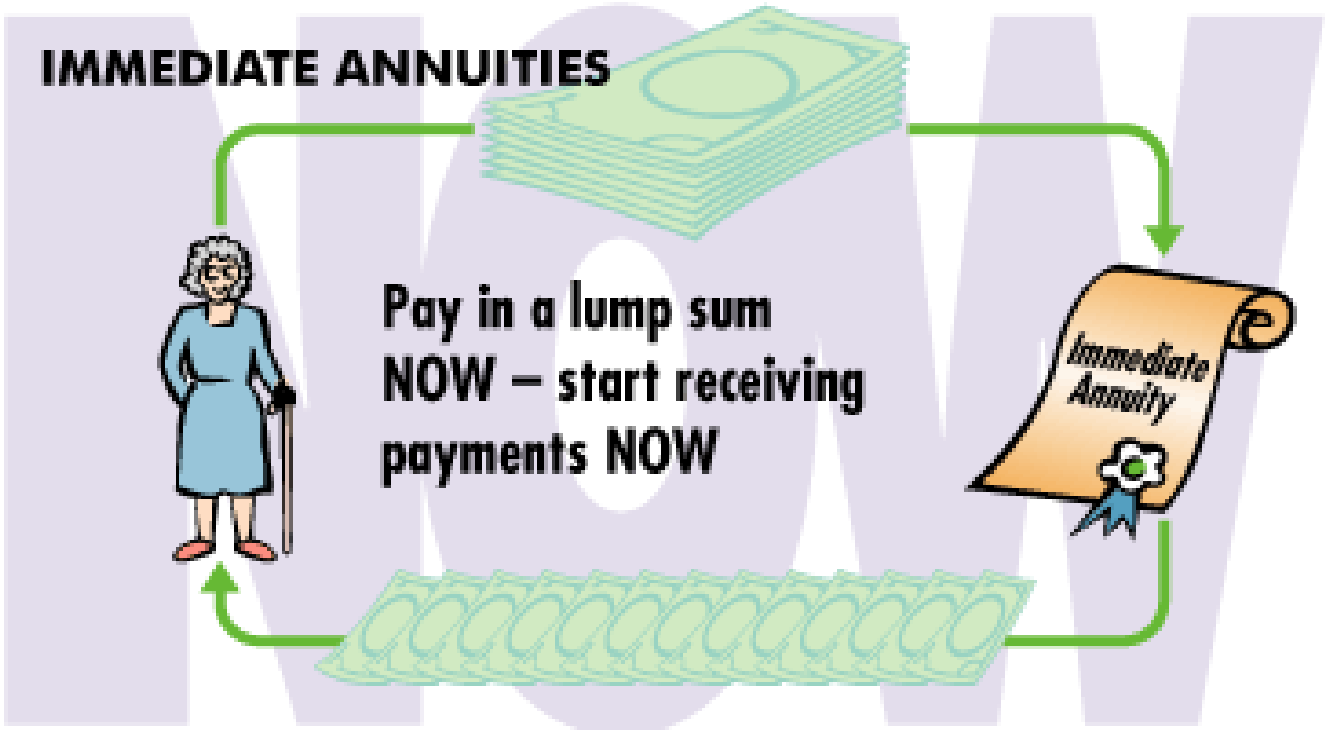
- Responses are meaningful *in sample* – using math
  - Correlates with numeracy, literacy
  - Predicts valuation results and precision
  - Explains puzzling results in earlier literature

- Responses are meaningful *out of sample*
  - Priming intervention that feeds into “the formula”
    - Change peoples’ valuation of an annuity
    - And increases intentions to buy an annuity

Agenda

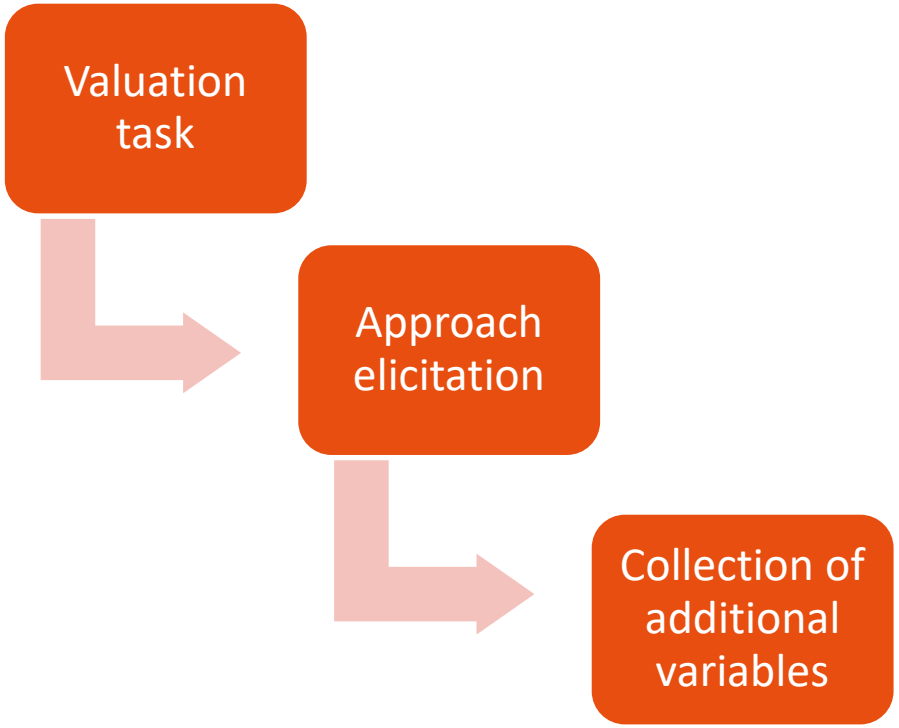
- Study 1: Eliciting what people do
- Study 2: Design and test of priming intervention

What is an annuity?



- Payments, as long as annuitant lives
  - e.g., each month

Study 1: What do people do?



- Numeracy, fin. literacy
- Valuation inputs (life expectancy, interest rate)
- Demographics

Valuation task – Lump-sum condition

Please answer the following question to the best of your ability.

If someone is aged 65 and has saved $500,000,

how much of a lifetime payout per month do you think s/he will get from retirement at age 65 onward?

(That is, s/he will get a fixed payout every month for as long as s/he lives; such payout products are also called life annuities).

To come up with your answer, you may use as much time as you deem necessary.

Answer $ per month:

Valuation task - Payout condition

Numbers based on current U.S. market rates

Please answer the following question to the best of your ability.

How much do you think someone needs to have saved at age 65 to get a lifetime payout of $2,800 per month from retirement at age 65 onward?

(That is, s/he will get a fixed payout every month for as long as s/he lives; such payout products are also called life annuities).

To come up with your answer, you may use as much time as you deem necessary.

Answer $ of savings:

Approach elicitation

Please tell us how you came up with your answer.

It is very important to us that you report all of your thoughts that emerged when coming up with your answer.

We want to understand how you personally did it.

- Based on think-aloud or type-aloud verbal protocol method
- Coded by two RA's after the experiment

Participants - Qualtrics audience

U.S., 45-60 years old

	Condition								
	Full sample (N=229)			Payout given (N=117)			Lump-Sum given (N=112)		
Variable	Mean	Median	Std.	Mean	Median	Std.	Mean	Median	Std.
Age (years)	52.03	52.00	4.38	52.21	53.00	4.48	51.85	52.00	4.28
Gender (1=female)	0.77	1.00	0.42	0.79	1.00	0.41	0.74	1.00	0.44
Education high (>median)	0.36	0.00	0.48	0.41	0.00	0.49	0.31	0.00	0.47
Savings high (>median)	0.41	0.00	0.49	0.42	0.00	0.50	0.41	0.00	0.49
Income high (>median)	0.47	0.00	0.50	0.46	0.00	0.50	0.48	0.00	0.50
Risk tolerance (1-10)	5.66	6.00	2.40	5.59	6.00	2.43	5.73	5.00	2.37
Time preference (1-10)	6.30	6.00	2.35	6.49	7.00	2.43	6.10	6.00	2.26
Survey duration (seconds)	897.70	695.00	688.34	875.19	717.00	538.10	921.21	669.00	818.25
Text lenght (characters)	68.63	40.00	75.36	73.25	49.00	77.78	63.80	34.50	72.79
Subj. Numeracy (1-6)	3.73	4.00	1.51	3.78	4.00	1.44	3.68	3.75	1.59
Obj. Numeracy (1-8)	2.52	2.00	1.69	2.58	2.00	1.71	2.46	2.00	1.68
Financial Literacy (1-5)	2.61	3.00	1.44	2.61	3.00	1.48	2.62	3.00	1.40
Exp. years to live 65+, male	17.93	15.00	8.85	17.60	17.00	7.68	18.27	15.00	9.94
Exp. years to live 65+, female	21.59	20.00	9.05	20.99	20.00	7.92	22.21	20.00	10.09
Interest rate on 10 year T-Bond (%)	1.55	1.00	1.64	1.47	1.00	1.73	1.63	1.25	1.53

Publicly available numbers: 18-19.2 (men), 20.6-21.6 (women), 2.73%

What do participants say they do?

- *educated guess*
- *I'm not sure*
- *2800 x12=33600 so I figure you will live 15 years which equals 504000*
- *Estimated living to age 85, I roughed it to $3000 a month and multiplied it by 12 months. And then roughed my answer by multiplying 20 years and put in a little more to my answer*
- *I used a calculator*
- *I divided the amount by the age*
- *500000 ÷ 20 years*
- *…*

What do participants say they do?

Panel A: Full Sample Statistics					
General Approach	Fraction %	Approach according to first survey question	Fraction %	Approach according to second survey question	Fraction %
Guessing	49.34	Number popped up	8.73		
		Guessing	40.61		
Calculation	41.92	Calculation	41.92	Rule 10	2.18
				Rule 10 and adjustments	2.62
				Rule 12	14.85
				Rule 12 and adjustments	6.99
				No option fits	15.28
Other	8.74	Using the internet	1.75		
		No option fits	6.99		

- No significant differences between conditions
- No discounting or compounding (based on text)

Rule 12

- Actuaries $$P = (A \cdot 12) \sum_{t=0}^{T-x-1} \frac{{}_tp_x}{(1+r)^t}$$

- If interest rate is 0

$$P = (A \cdot 12) \sum_{t=0}^{T-x-1} {}_tp_x$$
$$= (A \cdot 12) \cdot life\ expectancy\ at\ age\ x$$

- If
  - Interest rate is 0
  - And one uses the correct estimate for life expect.

- Rule 12 is as good as an actuary can do

Do participants do what they say?

Who uses math

	(1) Calculated	(2) Calculated	(3) Calculated	(4) Calculated	(5) Calculated
Age	-0.012*	-0.016**	-0.012	-0.014**	-0.016**
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Gender	-0.029	0.005	0.007	-0.006	0.023
	(0.076)	(0.073)	(0.077)	(0.076)	(0.074)
Education high	0.103	0.020	0.083	0.089	0.018
	(0.068)	(0.068)	(0.068)	(0.068)	(0.068)
Income high	0.017	-0.007	0.010	-0.002	-0.010
	(0.079)	(0.075)	(0.078)	(0.078)	(0.075)
Savings high	0.083	0.060	0.061	0.071	0.049
	(0.081)	(0.077)	(0.081)	(0.081)	(0.078)
Risk tolerance	0.000	-0.007	0.001	-0.002	-0.006
	(0.015)	(0.014)	(0.015)	(0.015)	(0.014)
Time preference	0.011	-0.000	0.006	0.010	-0.001
	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)
Lump-sum condition	-0.042	-0.046	-0.038	-0.043	-0.043
	(0.064)	(0.061)	(0.063)	(0.064)	(0.061)
Subj. Numeracy		0.104***			0.095***
		(0.020)			(0.022)
Obj. Numeracy			0.049**		0.023
			(0.019)		(0.022)
Financial Literacy				0.049**	0.007
				(0.023)	(0.026)
Observations	229	229	229	229	229
Pseudo R-squared	0.0363	0.105	0.0561	0.0508	0.110

Results – does math help?

Market annuity rate (annual payout / lump-sum) = 6.7%

		Condition: payout given			
Variable		All participants	No calculation	Any calculation	Division rule
Annuity rate	Mean	45.64	58.27	29.85	21.47
	Median	0.11	0.22	0.07	0.06
	Std	208.70	258.27	122.08	98.65
Correct ± 2%	Fraction	0.19	0.15	0.23	0.33
Observations		117	65	52	33
		Condition: lump-sum given			
		All participants	No calculation	Any calculation	Division rule
Annuity rate	Mean	1.16	1.84	0.11	0.09
	Median	0.05	0.04	0.05	0.05
	Std	11.33	14.54	0.20	0.18
Correct ± 2%	Fraction	0.35	0.29	0.43	0.46
Observations		112	68	44	28

Are they using the formula?

	(1) Annuity rate	(2) Annuity rate	(3) Annuity rate	(4) Annuity rate
Lump-sum condition	-1.674***	-1.713***	-1.663***	-1.555***
	(0.278)	(0.279)	(0.280)	(0.281)
Subj. Numeracy	-0.182*	-0.121	-0.153	-0.140
	(0.102)	(0.108)	(0.112)	(0.111)
Obj. Numeracy	-0.107	-0.095	-0.111	-0.084
	(0.098)	(0.101)	(0.101)	(0.102)
Financial Literacy	-0.206*	-0.172	-0.168	-0.194
	(0.117)	(0.118)	(0.118)	(0.118)
Exp. years to live 65+, female			-0.005	0.022
			(0.016)	(0.019)
Interest rate on 10 year T-Bond (%)			-0.138	-0.140
			(0.089)	(0.107)
Calculated			0.337	2.039**
			(0.302)	(0.787)
Calculated x exp. years to life 65+				-0.082**
				(0.035)
Calculated x interest rate				0.041
				(0.190)
Demographic Controls	NO	YES	YES	YES
Constant	0.064	1.326	1.744	0.757
	(0.420)	(1.797)	(1.869)	(1.909)
Observations	229	229	229	229
Adjusted R-squared	0.178	0.189	0.194	0.208

Robustness checks

- Experimental demand effects – no
  - We counterbalanced the text prompt: same screen as task vs. following screen
  - Checks on: task duration, valuation results, text length, % said they calculated

Out of sample test

- Study 2: Design and test of a priming intervention

Idea

- Twofold
  - Can we use the knowledge on approaches to design an intervention that increases annuity demand?
  - Causal test for approach used?

Dilemma (lump-sum given)

PRIME

- Given the formula $P = (A \cdot 12) \cdot life\ expectancy\ at\ age\ x$
  - No prime: on average too low annuity rates ("bad product") → don't bother about it (e.g., go to a website)
  - Low prime → higher annuity rates → more interest → but bad surprise when seeing market rates
  - High prime → lower annuity rates → less interest → don't bother about it

- How about
  - High prime → lower annuity rates & market rate feedback → positive surprise → more interest
  - "Create a positive surprise"

Design

- As in Study 1
  - Questionnaire
  - Target audience characteristics …
- But
  - Annuity demand question after valuation (& feedback) part
  - No text elicitation part (only self-coding)
  - 4 lump-sum conditions

Control	**Control & Feedback**
Prime	**Prime & Feedback**

The prime

Please answer the following question to the best of your ability.

If someone is aged 65 and has saved $500,000,

*how much of a lifetime payout **per month** do you think s/he will get from retirement at age 65 onward?*

That is, s/he will get a fixed payout every month for as long as s/he lives.

Such payout products are also called life annuities.

Note, 25 percent of the U.S. population live up to age 90 (that is another 25 years after age 65).

To come up with your answer, you may use as much time as you deem necessary.

Answer **$ per month**:

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Feedback

You estimated that a person aged 65 will receive a lifetime payout of $3500 per month if s/he has saved $500,000.

Currently, U.S. insurance companies offer lifetime payouts of about $2800 per month for a person that has saved $ 500,000.

Hypotheses

- H1: Compared to a control condition without a prime, priming subjects with in an annuity valuation task with a higher number than actual life expectancy will results in lower estimated annuity rates.

- H2: Giving feedback on market annuity rates increases annuity demand.

- H3: Compared to a control group with no prime given, the effect of giving feedback on annuity demand is stronger when subjects are primed with a higher number than actual life expectancy.

Results – Manipulation check & H1

- Support for H1 (all differences sig @ 1%)

		Treatment	
Variable		Control	Prime
N		108	116
expected years to live 65+, male	mean	16.84	20.20
expected years to live 65+, female	mean	20.10	24.28
annuity rate	mean	0.08	0.06
annuity rate	median	0.05	0.04

Results –H2

- Support for H2 (all differences sig @ 1%)

		Treatment	
Variable		No Feedback	Feedback
N		113	111
Annuity Demand	mean	3.42	4.24

Results –H3

- Support for H3
  - Diff. in control: sig @ 10%
  - Diff. in prime: sig @ 1%

	No Feedback	Feedback	Diff
Control	3.49	4.19	0.70
Prime	3.34	4.29	0.95

Summary

- It’s not rocket science to elicit approaches in financial decision-making directly
- Results help to understand behavior
- Can be extended to larger samples
- Direct implications for interventions

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