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Whose Algorithm Says So: The Relationships Between Type of Firm, Perceptions of Trust and Expertise, and the Acceptance of Financial Robo-Advice

Carlos J.S. Lourenço[1,3]

Benedict G.C. Dellaert[2,3]

Bas Donkers[2,3]

[1]ISEG & SOCIUS/CSG, University of Lisbon
[2]Erasmus University Rotterdam
[3]NETSPAR

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robo-advice and robo-advisors: a product-matching marketing perspective

- since early 2010s: widespread automated interactive financial advice, namely on retirement and pension planning
- by 2025 robots expected to manage $16 T (€14.7 MM) assets (Deloitte 2016)
- average time on smartphones (in US) approx. 5 hours/day and increasing
- attractive for the industry
  - digital/automated marketing allows lowering costs
  - and thus coming up with a new complementary – and cheaper – sales channel


THE WALL STREET JOURNAL.

The Best Online Tools for Retirement Planning and Living

Apps and Websites Offer Help With Budgeting, Social Security, Lifestyle Planning and Other Essentials


ROBO-ADVICE FOR PENSIONS


OECD

FINANCIAL TIMES

Algorithms step into pensions 'advice gap'

Digital services offer savers cheaper deals


TIME stamped

The Best Robo-Advisors of June 2024

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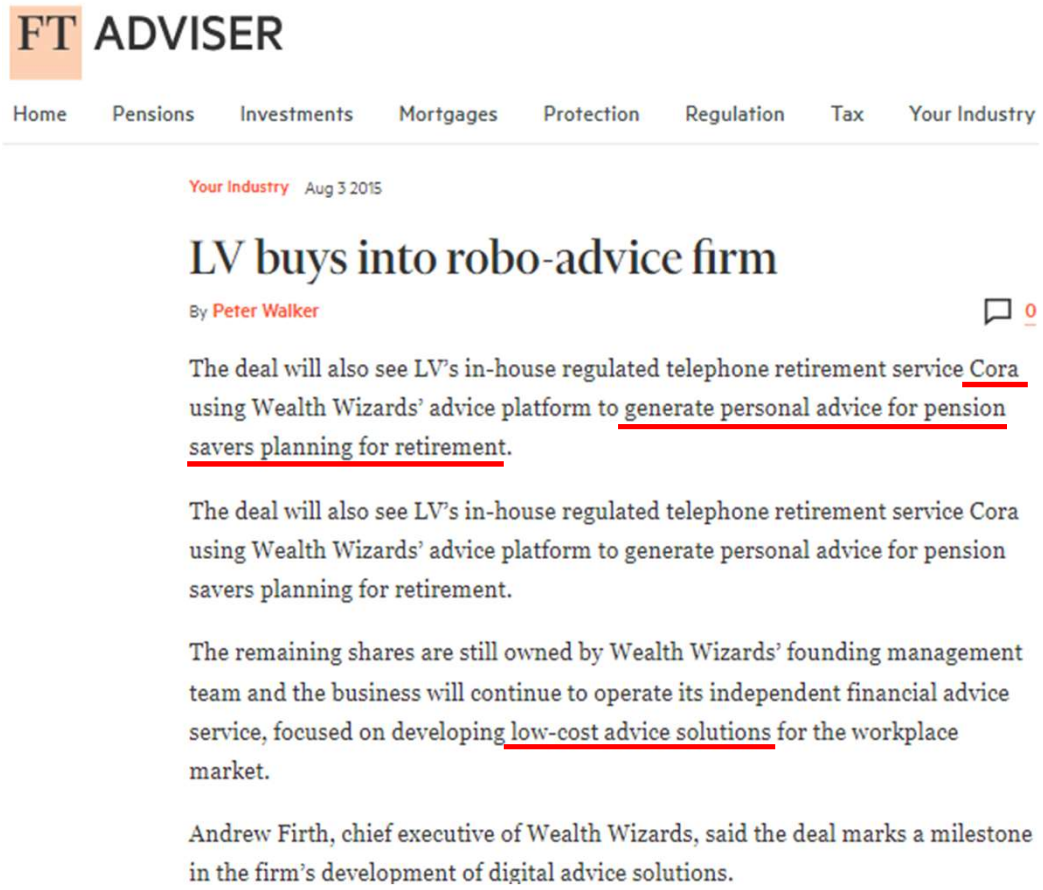
Cora

- **private**
- by insurer and pension provider Liverpool Victoria (UK)
- robot marketed as “much faster than a human advisor”
- **profit oriented**



FT ADVISER

Home Pensions Investments Mortgages Protection Regulation Tax Your Industry

Your Industry Aug 3 2015

LV buys into robo-advice firm

By Peter Walker 0

The deal will also see LV’s in-house regulated telephone retirement service Cora using Wealth Wizards’ advice platform to generate personal advice for pension savers planning for retirement.

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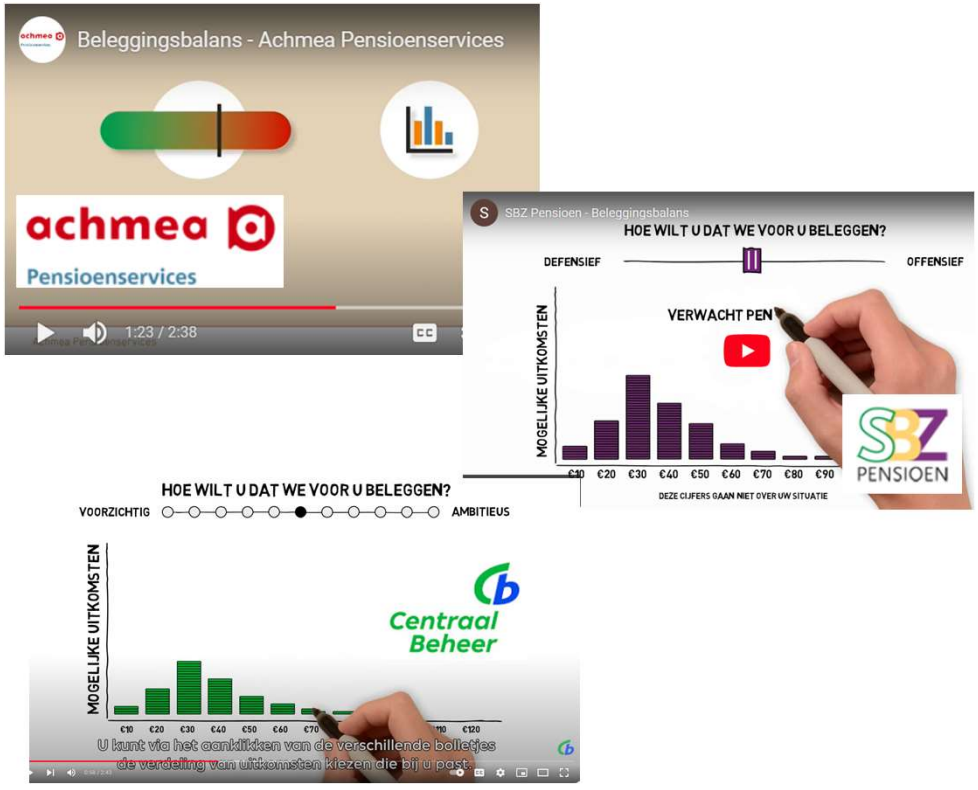
The remaining shares are still owned by Wealth Wizards’ founding management team and the business will continue to operate its independent financial advice service, focused on developing low-cost advice solutions for the workplace market.

Andrew Firth, chief executive of Wealth Wizards, said the deal marks a milestone in the firm’s development of digital advice solutions.

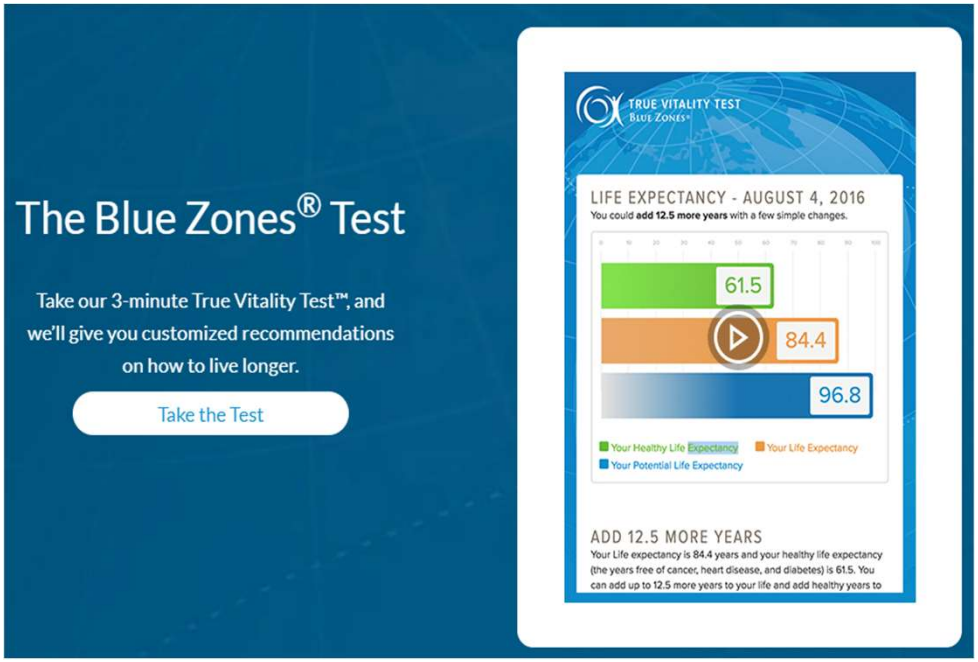
Investment Balance

- **private**
- by financial services provider Centraal Beheer (NL)
- similar to Achmea's and SBZ's



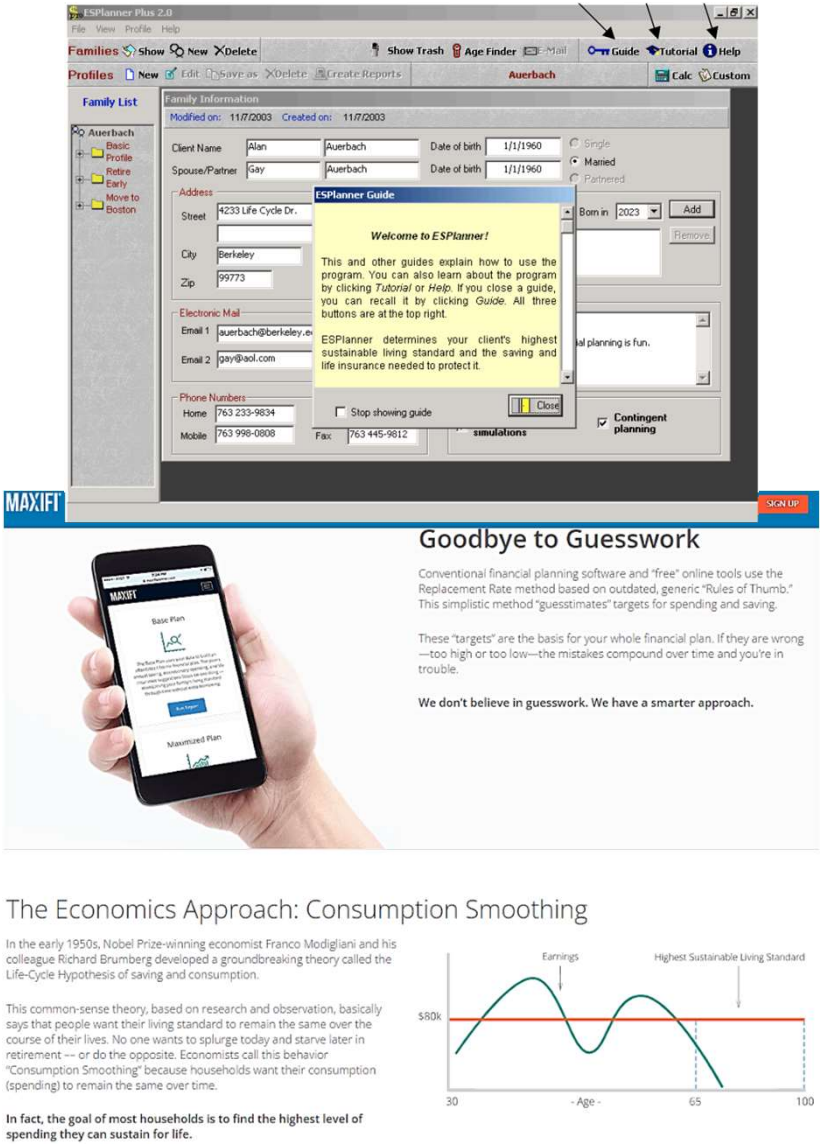
Blue Zone

- **public or state-sponsored**
- developed with the University of Minnesota School of Public Health
- (healthy-)life expectancy algorithm
- customized recommendations
- **non-profit oriented**



ESPlanner (now MaxiFi)

- **public or state-sponsored**
- developed by Boston University economics Prof. Laurence Kotlikoff
- “robo-optimizing” lifetime financial planning tool
- since 1999
- **non-profit oriented (initially)**



in theory, it shouldn’t matter

- upon receiving the same input information…
- personalized recommendations generated by automated tools of different organizations *should* be the same
- and thus, *should* be equally accepted by consumers

however…

- egocentric discounting
  - irrationally overweight own opinion relative to that of an unbiased advisor
    (Harvey and Fischer 1997; Yaniv and Kleinberger 2000; for a review see Bonaccio and Dalal 2006)

- algorithm aversion
  - irrationally discount unbiased advice generated by computer algorithms
    (e.g., Dietvorst et al., 2015, Goodwin et al., 2013)

- principle-agent problem on the background
  - incentives of advisor (“agent”) may not align with those of advisee (“principal”)
  - underscoring firms’ ability to elicit proper individual risk preferences
    (Donkers, Lourenço, and Dellaert 2012)

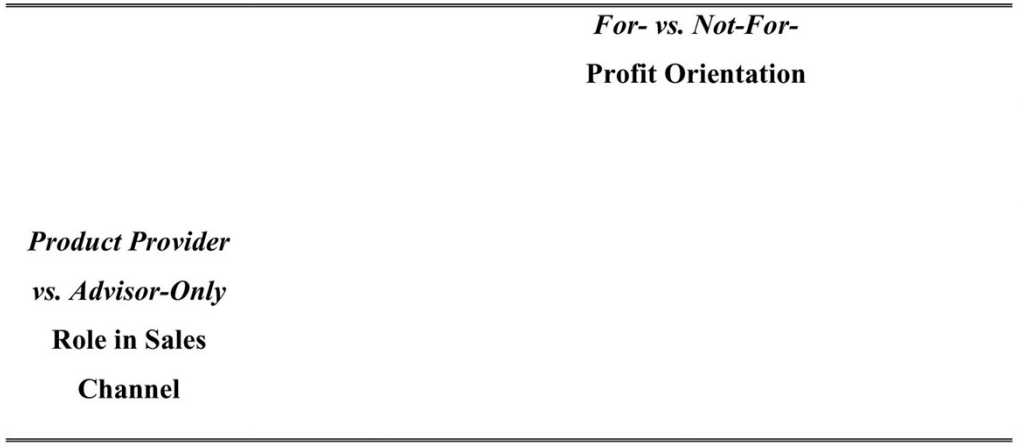
which raises at least two main (research) questions

- does the type of firm providing robo-advice affect advice acceptance?
- if so, which advisor firms are best suited to provide automated pension advice, i.e., whose advice is most accepted?
  - what are the underlying drivers of the different acceptance rates between these firms?
  - and how do they play a role?

in our study we propose

- to use firm characteristics that signal consumers different incentives to provide advice and how (un)aligned they may be with those of consumers

- to focus on two such firm characteristics and thus study four types of firms:
  - for- vs. not-for-profit orientation
  - product provider vs. advisor-only role in the sales channel



in our study we propose

- only the four types of firms were made explicit
  - manipulation check was conducted on a separate online study (N=201)
  - **profit orientation:** insurers & commercial comparison websites > pension funds & information websites of the government
  - **product providers:** insurers & pension funds > commercial comparison websites & information websites of the government

		***For- vs. Not-For-* Profit Orientation**	
		For- Profit	*Not-For-* Profit
***Product Provider vs. Advisor-Only* Role in Sales Channel**	Product Provider	INSURANCE FIRM	PENSION FUND
	Advice-Only	PRIVATELY-OWNED COMPARISON WEBSITE	GOVERNMENT-SPONSORED COMPARISON WEBSITE

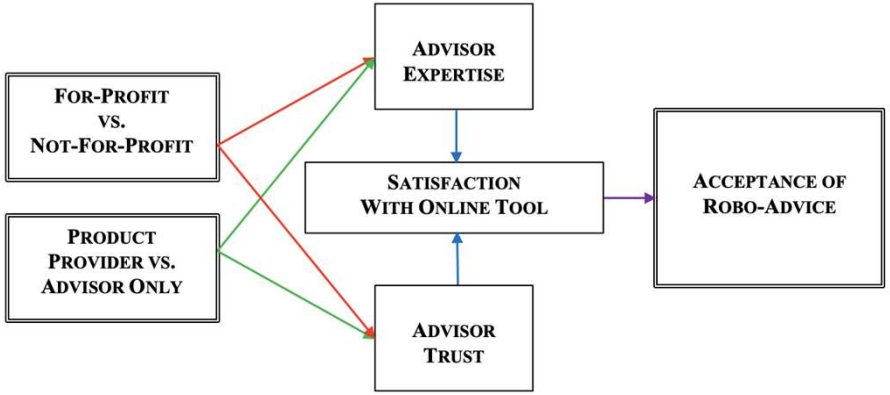
in our study we propose

- to look at how the different types of advisor firms are perceived to be
  - trustworthy
    (e.g., Sniezek and Van Swol 2001; cf. Prahl and Van Swol 2017)
  - experts
    (e.g., Sniezek, Schrah, and Dalal 2004; cf. Prahl and Van Swol 2017)

- because
  - looking after and following an advice implies a shared responsibility for the outcomes
    (Harvey and Fischer 1997)
  - professional advice isn't considered manipulative or invasive but a means to improve participants' decisions
    (Schrah, Dalal, and Sniezek 2006; Yaniv 2004)

in our study we propose

- a sequentially mediated process by which a firm's profit orientation & role in the sales channel
  - through their effect on consumer perceptions of a firm's expertise and trustworthiness
  - which, in turn, affect the consumer's satisfaction using the automated algorithm/robot
- determine the acceptance of the robo-advice



3 challenges: how to control for and compare to the “no-advice” case?

- we design four (explicit) advice treatments and an (implicit) no advice treatment
  - consumer gives herself the advice that the firm would have communicated
  - firm is only facilitating the use of the algorithm on which the consumer herself generates the advice
- allows testing baseline effect of automated firm-advice

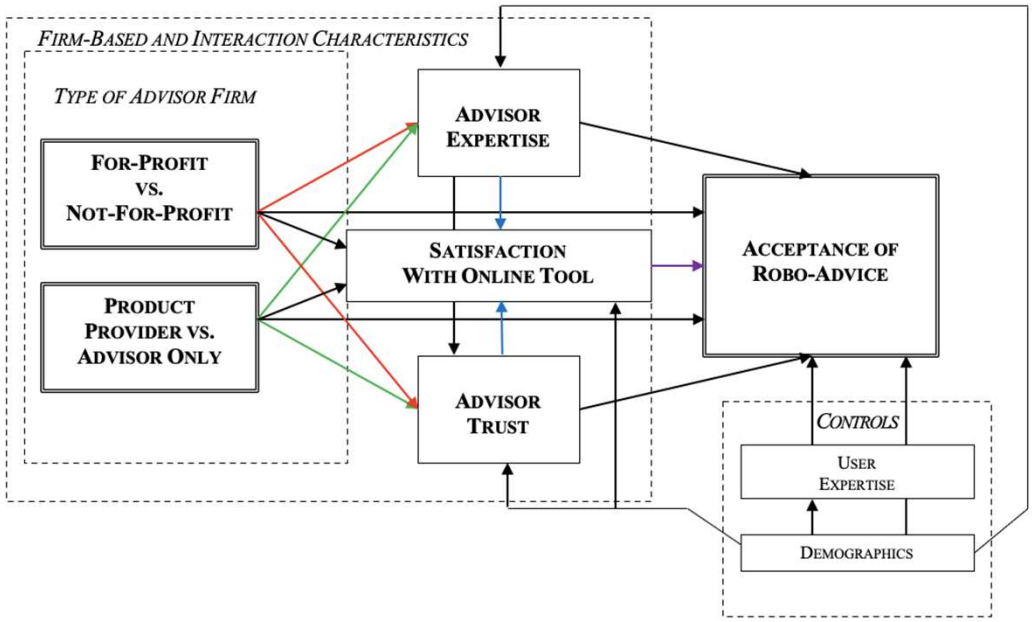
“the firm has created a new retirement simulator, and you will have to indicate when you want to retire and how much risk you want to take with your pension investments and then the firm will give you appropriate advice about your pension investments based on your preferences”

“the firm has created a new retirement simulator that you can use to help yourself make your choice and choose when you want to retire and how much risk you want to take with your pension investments and then try out various options and decide for yourself which one suits you best”

3 challenges: how to test web of relationships?

- we use an econometric structural equation model (SEM) that estimates conceptualized relationships simultaneously
  (Iacobucci, 2008, Zhao et al., 2010)

- a SEM model handles estimation uncertainty jointly and efficiently

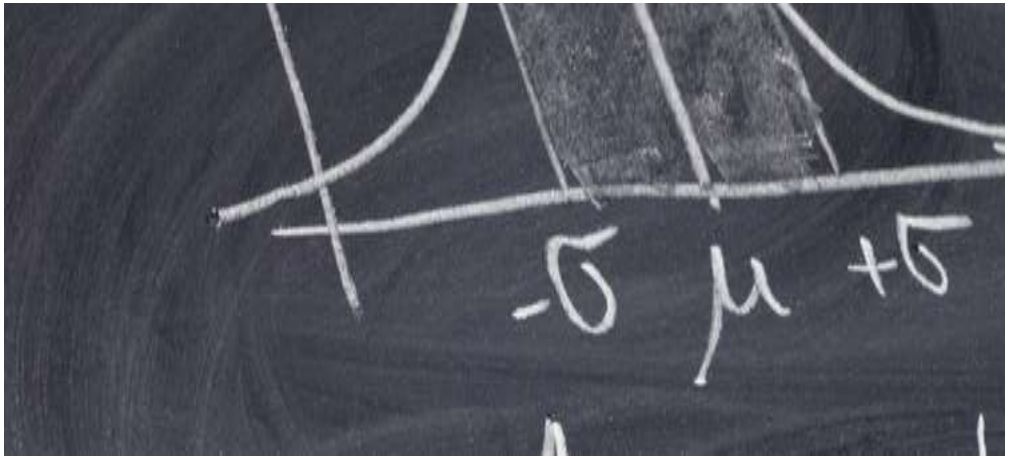


3 challenges: what automated algorithm to use to generate unbiased individual advice?

- we developed the ‘pension builder’ robot and algorithm
- based on sound economics and previous research
  (Goldstein and Sharpe 2000; Goldstein et al. 2008)
- users learn & experience risk-return tradeoffs interactively on a graphical online interface
- risk represented as frequencies (2 in 100) rather than percentages (2%), which improves understanding of probabilities
  (Fagerlin, Zikmund-Fisher, and Ubel 2011)
- pretested in several rounds with employees at Netspar partner organizations and novices

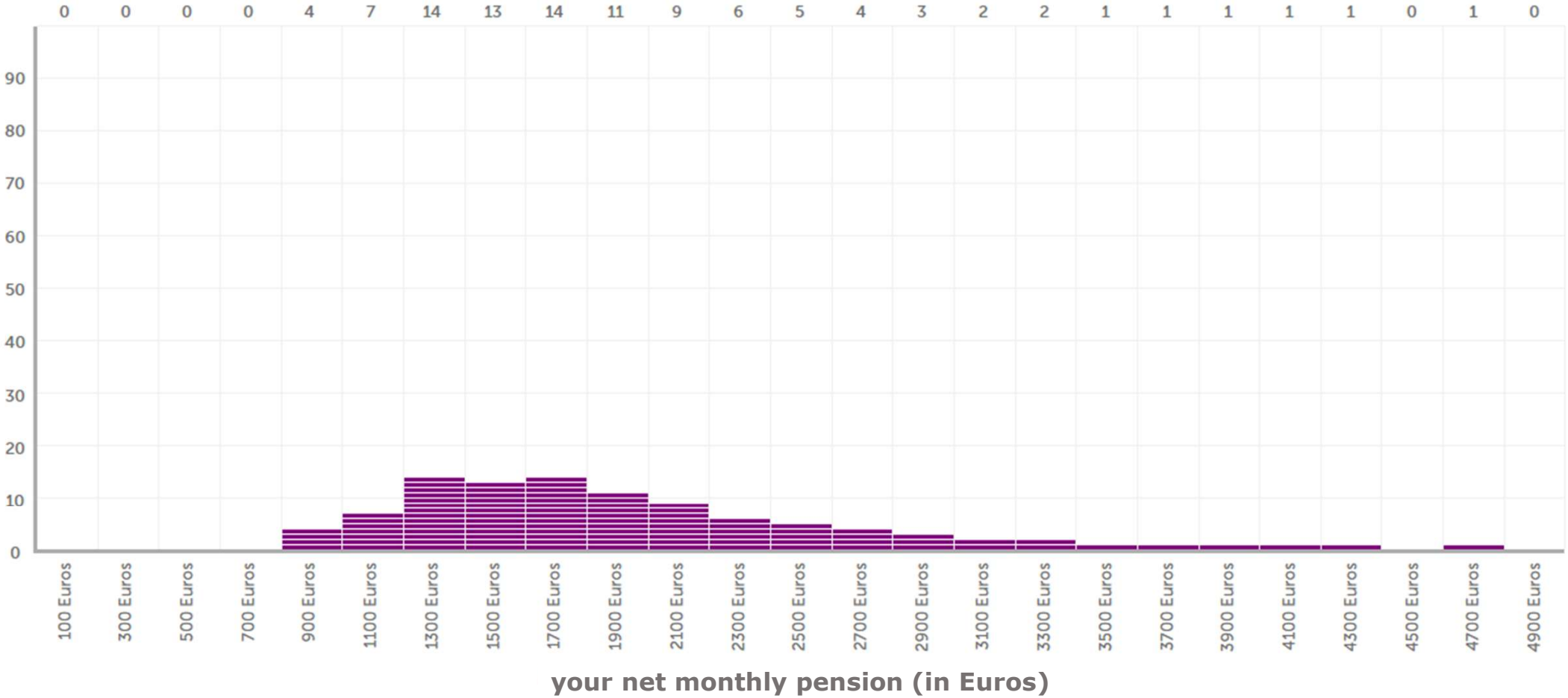
3 challenges: what automated algorithm to use to generate unbiased individual advice?

- user builds preferred income distribution with a slider
- based on the EU model and a CRRA, the algorithm uses constructed preferences to return a numerical estimate of an individual's attitude towards risk (the "lambda"; utility function curvature)
- and corresponding expected returns in three scenarios: optimistic, median, pessimistic (NL)



choose the possible outcomes for your pension

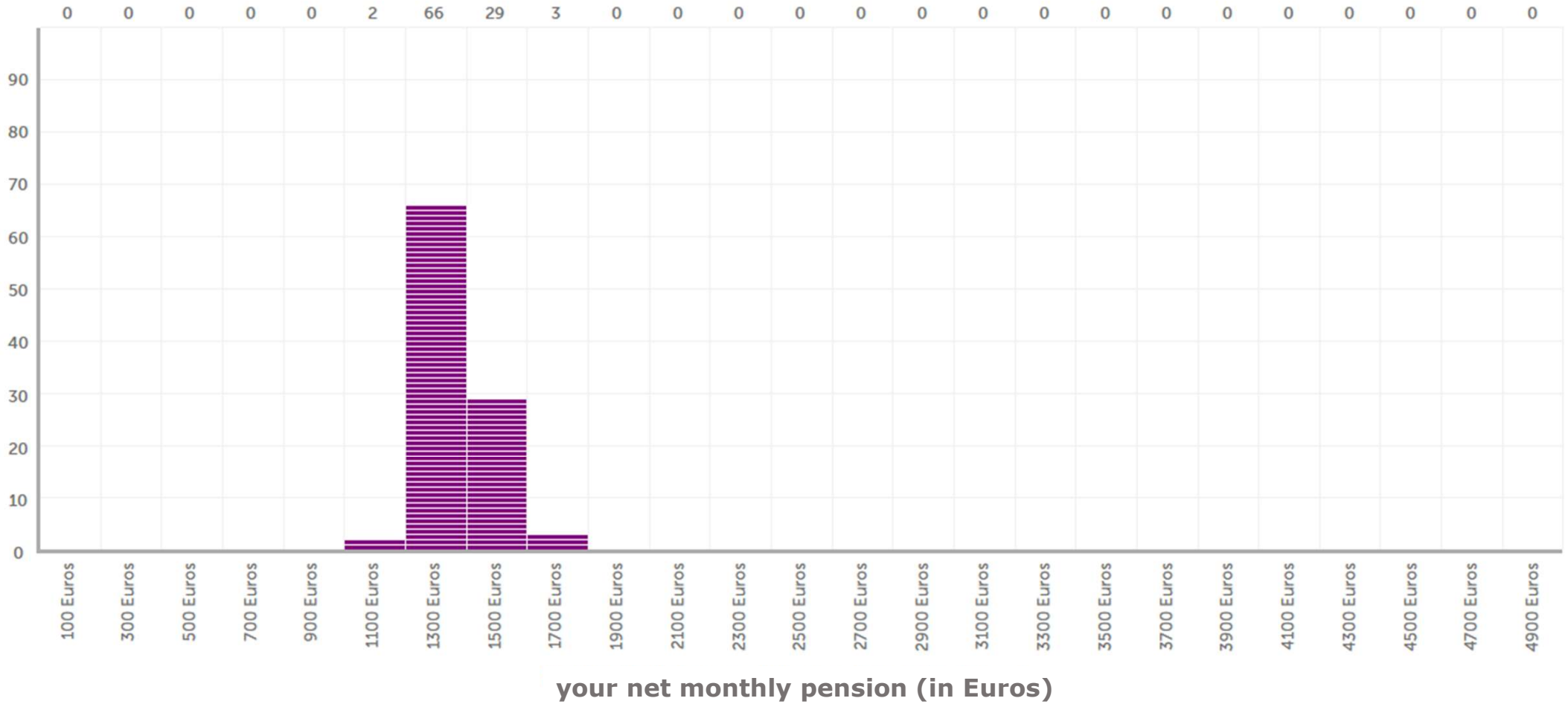
the number of times in 100 scenarios in which your income is as high as:



your net monthly pension (in Euros)

choose the possible outcomes for your pension

the number of times in 100 scenarios in which your income is as high as:



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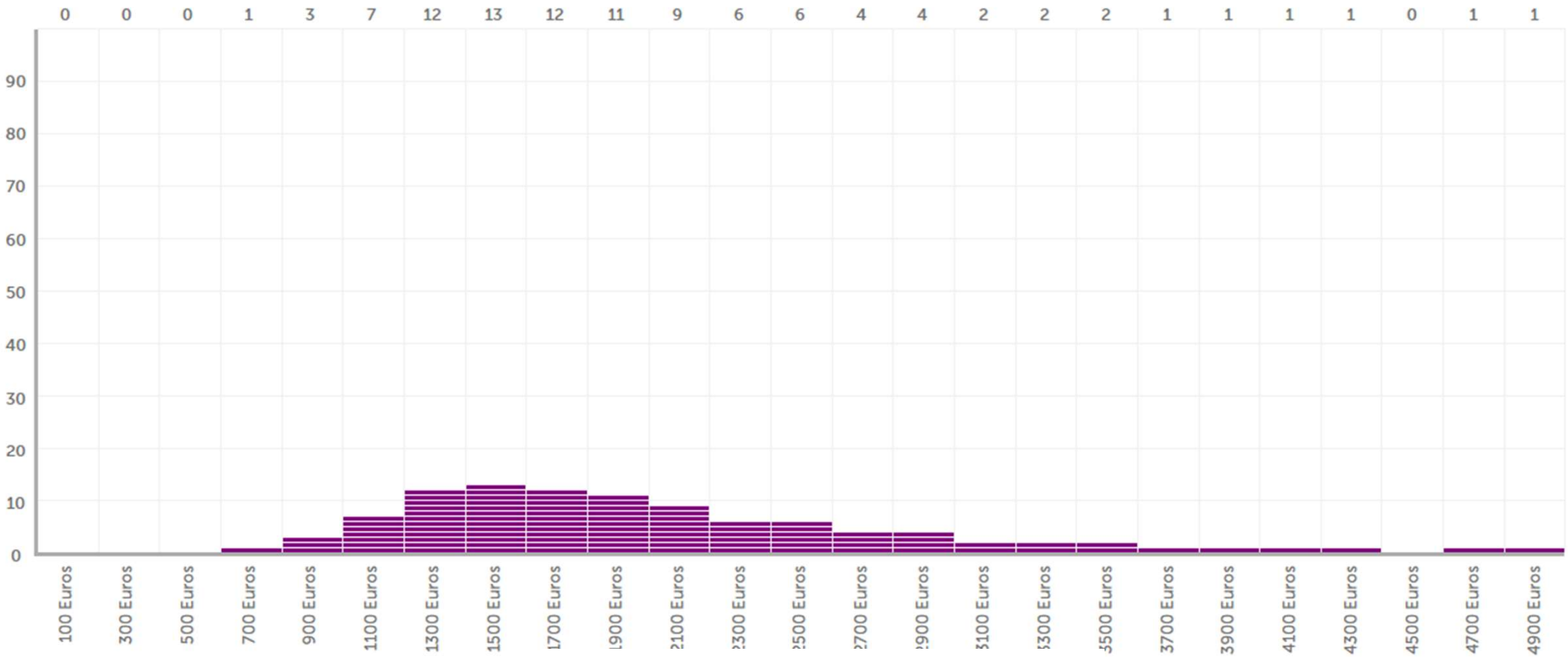
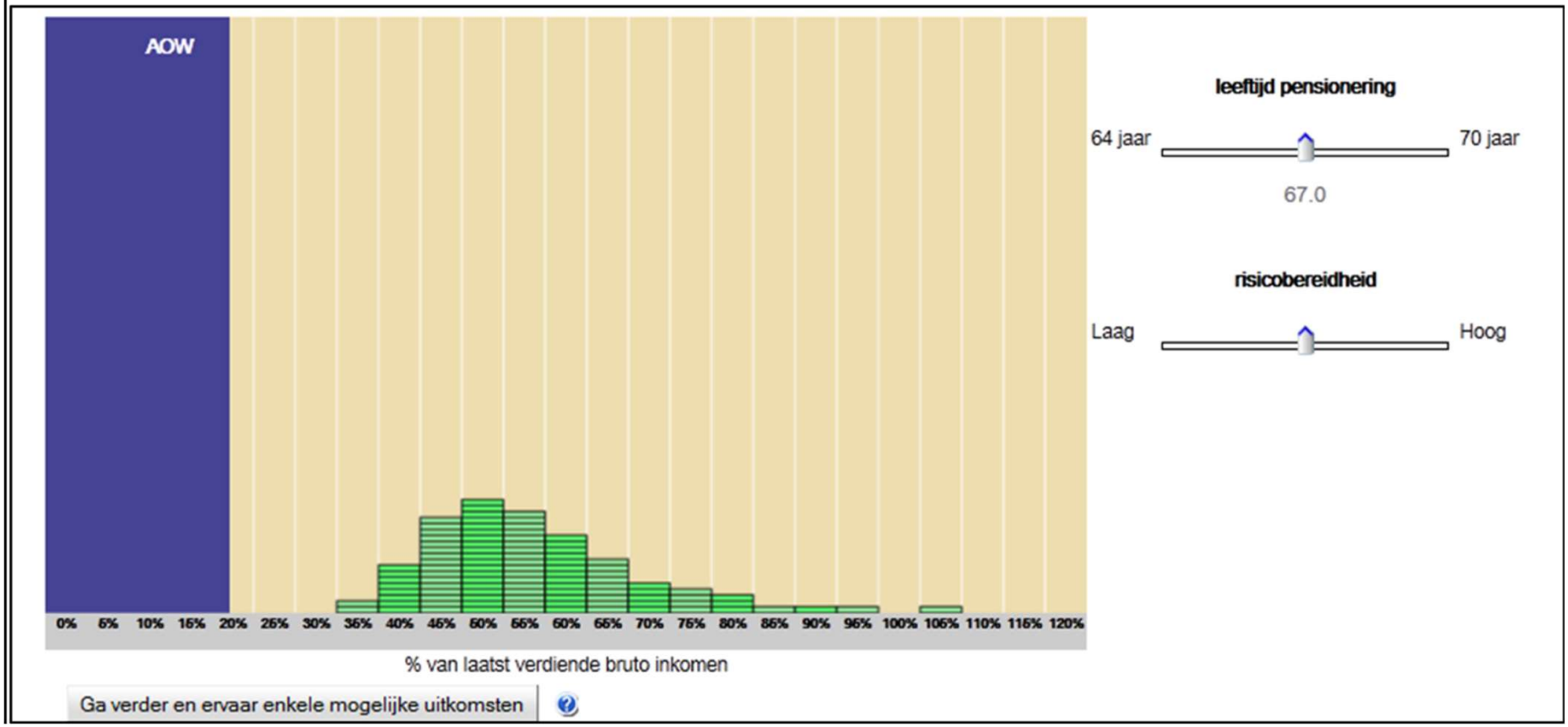


your net monthly pension (in Euros)

The *Pension Builder* interactive decision tool*



measurements

- advice acceptance: “on a 0%–100% probability scale, how likely are you to follow the online advice provided to you”
  (Elrod, Louviere, and Davey 1992)

- 6-item scale for perceptions of expertise & 3-item scale for perceptions of trustworthiness (1=totally disagree; 7=totally agree)

- interaction satisfaction with the robot (1=very dissatisfied; 7=very satisfied)

- age, gender, income, educ., user expertise (1=totally disagree; 7=totally agree)

data

- SSI collected data in NL from representative sample of respondents (if belonging to working population and worked min 12h/week)
- N=1,649 respondents (6,473 started the study)
- 38.1% females; 17.5% HEduc
- after one item of the perceptions of expertise scale was dropped (it loaded also on the trust scale), the Cronbach's alphas were 0.97 for both scales

	Advice Acceptance	Expertise	Trust	Satisfaction	Age	Income	User expertise
Mean	58.51	4.64	4.24	4.67	45.21	41,947.21	3.42
S.D.	23.48	1.32	1.49	1.55	11.35	24,991.32	1.51
Max.	100	7	7	7	65	280,000	7
Min.	0	1	1	1	21	15,500	1
N	1,522	1,649	1,649	1,649	1,649	1,633	1,649

results:
type of firm & satisfaction

- type of firm directly impacts satisfaction with the firm's robot:
  - pension providers' less satisfactory than advisors'-only ($\beta = -0.183$; $p < .01$)
  - for-profits' more satisfactory than not-for-profits' ($\beta = 0.270$; $p < .001$)

results:
type of firm, expertise, trust

- a **profit orientation** is a double jeopardy:
  - negative impact on consumer perceptions of both expertise and trustworthiness
    - for-profits considered less trustworthy ($\beta = -0.491$; $p < .001$)
    - for-profits seen less as experts ($\beta = -0.224$; $p < .001$)
    - to make things worse, expertise positively associated with trust ($\beta = 0.843$; $p < .001$)
  - is carried over to satisfaction interacting with the robot:
    - expertise increases satisfaction ($\beta = 0.296$; $p < .001$)
    - trust increases satisfaction ($\beta = 0.449$; $p < .001$)
- a **product provider** is a double-edge sword:
  - though pension providers are seen more like experts ($\beta = 0.566$; $p < .001$)
  - they are trusted less than advisors-only ($\beta = -0.378$; $p < .001$)

results:
type of firm, expertise, trust

since estimates in respect to common not-for-profit advice-only baseline and measurement of trust & expertise from 1 to 7:

for-profit (vs. not) more important than product provider (vs. advice-only) for **trust**; the opposite for **expertise**.

- a profit orientation is a double jeopardy:
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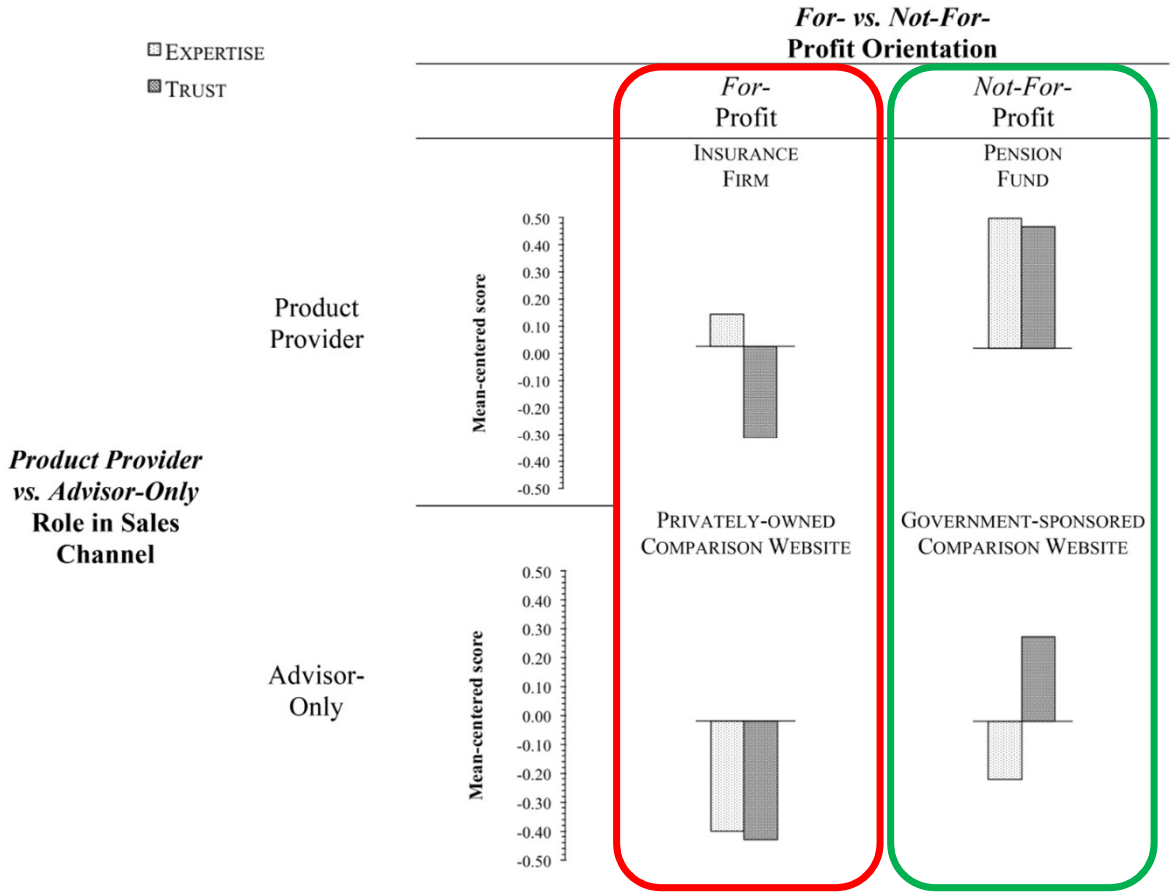
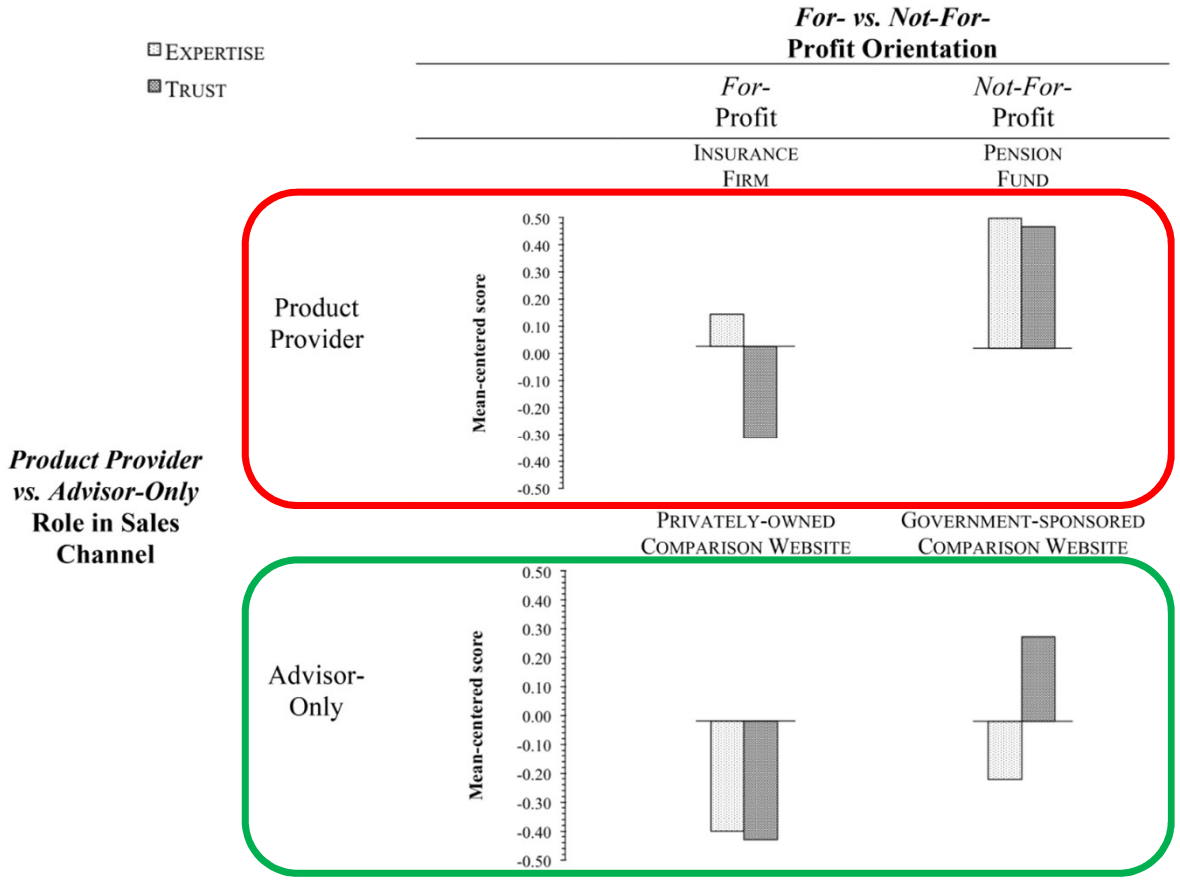


results:
type of firm, expertise, trust



results:
robo-advice acceptance

- effect of type of firm on robo-advice acceptance is not a direct one
  ($\beta = 0.112$; $p > .10$ & $\beta = 0.148$; $p > .10$, respectively)
  - it's fully mediated
    - by (+) effect of both expertise & trust on acceptance
      ($\beta = 3.272$; $p < .001$ & $\beta = 1.185$; $p < .10$, respectively)
    - with expertise being more important than trust
      (std. coeff. = 4.900 > 1.890)
  - it's partially mediated by (+) effect of satisfaction on acceptance
    ($\beta = 9.151$; $p < .001$; in line with decision supp. syst. Lit, e.g., Li and Gregor, 2011, Liang et al., 2006)
- total indirect effect:
  - (–) for for-profits ($\beta_{indirect} = -2.472$; 95% CI = − 4.462 to − 0.483)
  - (+) for product providers ($\beta_{indirect} = 2.235$; 95% CI = 0.416 to 4.055)

results & implications

- if satisfaction + 1 (from average 4.8 to 5.8) --> advice acceptance + 9.2 pp all else constant

- pension advisors must ensure increasingly heterogeneous consumers and in particular **older consumers** closer to retirement are satisfied with automated (AI) tools online
  - older consumers less satisfied with automated tool to generate pension advice ($\beta = -0.005$; $p < .05$)

results & implications

- “least-trusted” for-profits and product providers in particular may benefit from knowing that **older consumers** perceive firms as less trustworthy
  ($\beta = -0.011$; $p < .001$)

- challenge among **female consumers** who also perceive themselves as having lower user expertise
  ($\beta = -0.546$; $p < .001$)

- although **more educated consumers** more inclined to accept robo-advice, they trust online pension advisors less
  ($\beta = 3.008$; $p < .01$); $\beta = -0.170$; $p < .01$)

main implications

- robo-advice most likely to be accepted
  - pension fund (high expertise & trust)
  - insurance firm (high expertise, low trust)
  - government-sponsored comparison website (high trust, low expertise)
  - privately owned comparison website (low on expertise & trust)

- the 5.4 p.p. higher advice acceptance that pension funds enjoy (for same robot of a privately owned comparison website) may represent as much as $38.5 per consumer seeking advice
  (cost of typical session with human advisor is approx. $712 in UK; Delloite 2017)

limitations and future research

- testing in a real world setting
- interactions may need to be more extensive (does the consumer has private savings or investments?) and may need updating from time to time
- consequences of ensuing endogeneity of robo-advice: automated (AI) algorithms will learn consumer preferences based on input of consumers, which itself depends on expected returns from the advice!...

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Carlos J.S. Lourenço [a], Benedict G.C. Dellaert [b c], Bas Donkers [b]

[a] ISEG – Lisbon School of Economics and Management & SOCIUS/CSG – Research in Social Sciences and Management, University of Lisbon, Rua Miguel Lupi 20, 1249-078 Lisbon, Portugal

[b] Erasmus School of Economics, Department of Business Economics, Marketing Section, PO Box 1738, 3000 DR Rotterdam, the Netherlands

[c] Department of Marketing, Monash Business School, Monash University, P.O. Box 197, Caulfield East, Victoria 3145, Australia