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Saving preferences after retirement☆

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ABSTRACT

We investigate the importance of alternative motives for saving and spending patterns after retirement in the Netherlands and Australia. Using an online experimental survey, we elicit the impact on advised spending patterns and underlying saving motives of alternative retirement drawdown designs, ranging from complete flexibility in Australia to full annuitization in the Netherlands, and of major life events such as becoming frail or losing a spouse. We find that important motives for spending and saving after retirement in both countries are the desire to remain financially independent and to ensure that it is possible to enjoy life now as well as later. However, consistent with differences in real world pension settings, life span risk is more important and liquidity less important in Australia than in the Netherlands. With the exception of inter vivos transfers to a surviving spouse, the bequest motive is not important in either country. Our results suggest that an important reason for the widespread behaviour of retirees to hold on to their wealth might be the desire to hold precautionary savings for health and long-term care expenditures. We

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also find that individuals revise their saving motives in anticipation of major life events but are less responsive to variation in 'experimental' retirement drawdown arrangements, remaining aligned to the prevailing institutional arrangements in their country.

1. Background and motivation

The life-cycle model predicts that individuals and their households accumulate wealth during their productive careers and draw down their assets after retirement. Yet despite large differences in pension systems across countries and substantial pension reforms, recent empirical studies for different countries show that many retirees hold on to their assets or even keep on saving well into old age; see Love et al. (2009) for the United States, Van Ooijen et al. (2015) for the Netherlands, and Asher et al. (2017) for Australia. Several explanations for this stylised fact have been suggested, including motives informed by economic theory such as precautionary saving or the utility of leaving a bequest, and more abstract motives such as the fear of losing autonomy or the desire to feel secure.

In this paper, we investigate why people hold on to or even increase their wealth after retirement and examine the importance of saving motives founded on economic theory, as well as motives from economic psychology. In experimental surveys administered in the Netherlands and Australia, we use vignettes with short descriptions of hypothetical retiree couples with given patterns of pension wealth and income and given expected future health conditions of both partners. We then ask the survey participants to advise the retiree household on a spending pattern and to rank the importance of a set of saving motives justifying this advice. The answers reveal the survey participants' stated preferences for spending and saving in retirement. While this would not necessarily match their behaviour in actual situations, stated preference methods are increasingly used to study retirement decisions; see, e.g., Brown et al. (2008), Brown et al. (2017), Elsayed et al. (2018), Brown et al. (2021), de Grip et al. (2020) and Hurwitz et al. (2020). Moreover, the literature shows that stated preferences are often well in line with revealed preferences and help to predict actual behaviour; see, e.g., Whitehead et al. (2008) or Michaud et al. (2020).

We vary pension wealth and income patterns to reflect different pension systems - from full annuitisation (characterised as low wealth and high income and indicative of the Dutch system) to complete flexibility (characterised as high wealth and low income as in the Australian system) - allowing us to analyse how the importance of saving motives varies with pension system design. We focus on the role of the institutional setting for pensions which is very different in the two countries, and on the role of expected health shocks.

Government policy typically plays an important role in individual decisions on retirement saving (the accumulation phase) and drawdown (the decumulation phase). The government can restrict individual choice by mandating (for example, setting compulsory participation and minimum contribution levels), or can direct choice through tax policy (such as providing tax concessions for contributions, fund earnings and/or benefits) or nudges (e.g., for participation, contributions or asset allocation). The aim of policy design should be to efficiently allocate welfare spending in retirement and to improve overall social welfare by preventing or discouraging suboptimal individual choices reducing expected lifetime utility (Beshears et al., 2009). The stylised fact that individuals do not decumulate their wealth after retirement may point to suboptimal decision-making over the life-cycle. A better understanding of motives for continued asset accumulation (or slower than expected decumulation) is important for analysing the efficiency of retirement saving and decumulation policy design. We focus on the Netherlands and Australia, which have very different pension arrangements when it comes to accumulating and, in particular, decumulating pension wealth.

We find that the most important reasons motivating spending and saving after retirement are *self-gratification, autonomy, liquidity* (for the Dutch only) and *security* (for Australians). *Life-span risk* is not highly ranked in either country, but is more important in Australia in line with current pension policy design of full flexibility of pension wealth. Similarly the *intended bequest* motive is not important in either country, except for *inter vivos* transfers to a surviving spouse, which is more highly ranked in the Netherlands in line with expectations. In the absence of expected major health shocks or mortality of the partner, *precautionary health*, is particularly important for those who advise conservative spending patterns - that is, who drawdown slowly or continue to save in retirement. Motives to spend and save after retirement are not sensitive to (experimental) changes in the institutional pension settings, i.e., to whether there is full mandatory annuitisation or complete flexibility. Awareness of the potential risks faced in the actual institutional setting (Dutch or Australian) appears to be more important for the ranking of saving motives than the experimental setting, suggesting that retirees only slowly adjust their saving and spending patterns after an actual policy shift. On the other hand, the importance of saving motives is modified in the event of an expected deterioration in one's own or a partner's health: this makes the *precautionary health* saving motive even more important. Finally, irrespective of the experimental settings, preferred spending in more conservative by Australians than the Dutch.

The remainder of this paper is structured as follows. Section 2 briefly describes the pension systems in Australia and the Netherlands. Section 3 provides a brief review of explanations for why individuals hold on to their wealth in retirement in the economic and psychology literature. Section 4 presents the study design and the structure of the experimental survey.

Section 5 describes the data. Section 6 describes the estimation models. Section 7 presents the results and Section 8 concludes.

2. Pensions in the Netherlands and Australia

The first pillar of the Dutch pension system is a public pension providing a flat-rate pension annuity to all residents at subsistence level. The eligibility age is increasing from 65 years in 2013 to 67 years in 2024. Thereafter it will be linked to the trend in remaining life expectancy at age 65. The second pillar of the Dutch pension system comprises occupational pensions, typically included in collective labour agreements. Employees are obliged to participate and have very limited choice opportunities. After retirement, these pensions are currently fully transformed into an annuity. Information provided by pension funds on (changes in) pension entitlements are therefore mainly in terms of monthly income and not in terms of pension wealth. Most arrangements are defined benefit (DB) but the participants still bear income risk since indexation is conditional of the financial position of the pension fund and even nominal cuts in pensions are possible if the pension funds liabilities exceed their projected resources. In most arrangements, participants can choose to retire early and take the annuity earlier, with a lower income. Most second pillar plans aim for a gross replacement rate of 70% of average career salary including first pillar benefits for an individual with 40 years of (full-time) employment (Knoef et al., 2016). The third pillar of voluntary pension products plays a minor role for employees and is mainly meant for the self-employed. Most of these are life insurance products where wealth can but does not have to be transformed into an annuity after retirement, although this may be attractive due to tax rules.

The first pillar in the Australian system provides a means-tested pension to all residents. The level for singles is 28% of male average earnings. The eligibility age is increasing from 65 years to 67 years between 2017 and 2023. The second pillar in Australia is an earnings-related, defined contribution scheme known as the “superannuation guarantee”. Employers are required to contribute at least 9.5% of an employee’s income into a pension account increasing to 12% by 2025. Participation is mandatory, but fund members can choose the pension provider and plan, the investment portfolio, and whether to make voluntary additional contributions. After retirement (after the minimum age of 60), participants can choose at which age to commence decumulation and in what form benefits are taken: lump sum, phased withdrawal, an annuity, or some combination. Most people choose non-annuitised phased withdrawal products. In Australia, pension adequacy is generally communicated in terms of account balance and absolute rather than relative expenditure levels (ASFA, 2018) and typical replacement rates are much lower than 70% of final earnings (OECD, 2015a). The third pillar has similar flexibility as in the Netherlands.

The first main difference between the two systems is liquidity of pension wealth at retirement. In the Netherlands, the main sources of pension wealth are illiquid since everything is annuitised. In Australia, however, retirement savings can be liquidised at retirement and pensioners have maximum flexibility in this respect (only the state pension is automatically annuitised). This large difference is also the reason why it is interesting to compare these two countries. The second main difference is the level of the replacement rate out of mandatory pension saving (first and second pillar). According to Pensions at a Glance 2021 (p. 144 in OECD, 2021), for a reference worker with mean earnings, the gross replacement rate for a current benchmark retiree is less than 45% in Australia (although increasing over time as the mandatory second pillar matures) and more than 90% in the Netherlands. These differences have huge implications for retirement planning in the two countries. Where the Dutch will typically assume that financial security after retirement is automatic, Australians are used to taking their own responsibility and make their own decisions, potentially leading to different motivations for saving before retirement and dissaving after retirement, the focus of the current paper. Since Dutch retirees are predominantly fully annuitised while Australian retirees are required to self-manage their pension wealth, we expect the Australians to be more concerned about outliving their savings than the Dutch and the Dutch more concerned about access to liquidity than the Australians. We would also expect the Dutch to be more concerned about providing for a surviving spouse or partner: in Australia survivors gain access to remaining household wealth while in the Netherlands pension coverage for a surviving spouse is contingent on pension plan design. Otherwise, we would expect few differences in motivations for saving and spending after retirement between Dutch and Australians. The Netherlands and Australia are developed countries of a similar size with similar public institutions. Both are well served by public support for health and long-term care services with the latter more generous in the Netherlands (OECD, 2020).

3. Saving motives of the elderly

There has been considerable attention in the academic literature to identify, describe, and categorise saving motives for different types of households (Katona, 1975; Browning and Lusardi, 1996; Canova et al., 2005). In an economics context, saving is generally treated as residual unspent income (Lunt and Livingstone, 1991). Economic psychology, however, suggests that ordinary people think of saving as “to actively put money in bank accounts” as, for example, “a protection against future insecurities” (Katona, 1975). From an economics point of view, the difference between active or passive (residual) saving is not important whereas from a psychological point of view the framing of the decision matters.

Table 1
Saving motives used in the vignettes.

Name	Text in vignette (The household...)
Economic	
precautionary	wants to ensure that they will be able to finance any unforeseen expenditures other than health and aged care expenditures
precautionary health	wants to ensure that they will be able to finance unforeseen health and aged care expenditures
life-span risk	wants to ensure that they will not outlive their wealth
intended bequest	wants to ensure that they will be able to leave a bequest to their dependents or estate
liquidity	wants to ensure that they have enough cash on hand at any time
intra-household bequest	wants to ensure that if they die, their partner is able to maintain his/her standard of living
Psychological	
autonomy	wants to ensure that they remain financially independent
security	wants to ensure that they have enough money to have peace of mind
self-gratification	wants to ensure that they are able to enjoy life now as well as later
political risk	wants to ensure that they are protected against a change in the superannuation / pension rules

Table 2
Description of the covariates.

Covariate	Explanation
Demographics	
gender = male	1 if male, 0 if female
marital status = partner	1 if lives together with partner, 0 otherwise
children living at home	1 if participant has at least one child living at home, 0 otherwise
household income (Q3 and Q4)	1 if participant is in (current) income category 3 or 4, 0 otherwise
homeowner	1 if participant owns (potentially with a mortgage) the house (s)he lives in, 0 otherwise
religious / member of a church community	1 if participant considers (him)herself as a member of a certain religion or church community, 0 otherwise
born in the country they are currently living in	1 if participant is born in the country (s)he lives in, 0 otherwise
subjective life expectancy: high	1 if participant expects to live as least as long as predicted according to the Australian Bureau of Statistics / Statistics Netherlands, 0 otherwise
Financial competence	
retirement plan	1 if participant answered 'Yes' to the question: "Have you ever tried to work out how much you need to save for retirement?", 0 otherwise
pension capability: objectively measured[a]	1 if participant had less mistakes than the median number of mistakes in the analysis sample for both the financial literacy questions, the numeracy questions, and pension literacy questions, 0 otherwise.
pension capability: self-assessed	standardised measure comprised of the following questions: "I am knowledgeable about how the state pension works" and "I am knowledgeable about how superannuation / pension works."
Personality traits and preferences	
willingness to take risk[b]	standardised measure comprised of the following question: "How do you see yourself: Are you generally a person who is fully prepared to take risks or do you try to avoid taking risks?"
impulsive financial behaviour[c]	standardised measure comprised of four questions related to self-controlled behaviour in the domain of finances of the participant
future orientation[d]	standardised measure comprised of twelve questions related to patience / future orientation of the participant
personality: TIPI conscientiousness	standardised measure for the personality trait conscientiousness, comprising two conscientiousness related questions from the ten-item personality inventory (TIPI)
Country of residence	
Australia	1 if participant is in the Australian sample, 0 otherwise

Notes: Standardised measures are standardised (mean 0 and standard deviation of 1) using the full analysis sample. [a]Here we use the big three financial literacy questions (Lusardi and Mitchell, 2011), questions on superannuation/pension knowledge (Agnew et al., 2013) and numeracy (Lipkus et al., 2001). [b]See Dohmen et al. (2011). [c]i.e. "buying things on impulse", "spending too much money", "buying things I hadn't planned to buy", and "buying things I don't really need" (Duckworth and Weir, 2011). [d]For the interested reader, these are the twelve statements of The Consideration of Future Consequence Scale (Strathman et al., 1994).

In the experiment analysed in this paper, we restrict ourselves to ten possible saving motives, avoiding the cognitive demands to the survey participants imposed by extensive lists of saving motives.[1] To select the ten motives, we used a pre-test described in detail in Appendix A.1. In the remainder of this section we focus on the literature on the ten selected saving motives in the context of the elderly, see Table 1, distinguishing between those founded on economic theory and more abstract motives informed by economic psychology.

[1] Alternatively, selecting for each participant only a small subset from an extensive list would reduce the statistical power of our analysis.

Table 3
Descriptive statistics.

	Analysis Sample			The Netherlands		Australia	
	Mean	Min	Max	Mean	Sd	Mean	Sd
Country of residence							
Australia	0.41						
Demographics							
gender = male	0.50			0.50		0.50	
marital status = partner	0.72			0.71		0.74	
age: 50–54	0.34			0.31		0.38	
age: 55–59	0.34			0.31		0.39	
age: 60–64	0.32			0.37		0.23	
children living at home[a]	0.40			0.36		0.45	
household income (Q3 and Q4)	0.32			0.31		0.34	
homeowner	0.78			0.74		0.83	
religious / member of a church community	0.32			0.33		0.30	
born in the country they are currently living in	0.85			0.92		0.74	
subjective life expectancy: high	0.49			0.40		0.62	
Financial competence							
retirement plan	0.42			0.33		0.56	
pension capability: objectively measured	0.35			0.26		0.47	
pension capability: self-assessed		-1.88	1.87	0.04	1.05	-0.06	0.92
Personality traits and preferences							
willingness to take risk		-1.97	2.40	-0.04	1.01	0.06	0.98
impulsive financial behaviour		-1.94	5.08	-0.23	0.93	0.34	1.01
future orientation		-4.18	2.80	-0.16	0.99	0.24	0.97
personality: TIPI conscientiousness		-4.11	1.52	-0.12	1.02	0.17	0.94
Individuals	2420			1437		983	

Notes: [a]Recall that 'children' equals one if the participant has at least one child living at home, and zero otherwise (cf. Table 2). Hence, 40% of the participants in our analysis sample have at least one child living at home. Standardised measures have a mean of zero and unit variance for the analysis sample, therefore we only report the minimum and maximum.

Economic saving motives

The economic motives we consider are related to precautionary savings (subdivided into precautions for health and long-term care expenditures and general expenditures), bequests (intra household and intergenerational), lifespan risk, and liquidity. The work surveyed in De Nardi et al. (2016) suggests that the economic saving motives of the elderly essentially break down into two categories: precautionary savings, mainly for the risks implied by lifespan uncertainty (the lifespan risk motive) and uncertain medical - out of pocket - expenditures (the precautionary "health" motive) and bequest motives (the "intra-household" bequest motive). The literature related to savings for lifespan risk has a long history, dating back to Yaari's seminal paper (Yaari, 1965) and empirical studies since then confirm the role of uncertain lifetimes for precautionary saving (Davies, 1981; Kennickell and Lusardi, 2004; De Nardi et al., 2009). De Nardi et al. (2009), using US data on people aged 75 and older, show that individuals deplete their net worth by the end of their certain lifetime whereas individuals facing an uncertain lifespan still have significant asset holdings towards the end of their lives, even when facing poor survival prospects. The marginal utility of consumption may vary with health (Finkelstein et al., 2013; Kools and Knoef, 2019), implying that health also affects the optimal level of life-cycle savings, something that many studies do not consider. The role of savings for health expenditures, however, is undisputed (De Nardi et al., 2016).

The importance of intergenerational transfers, both inter-vivos and in the form of bequests, has gained considerable attention in the economics literature (e.g. Masson and Pestieau, 1997). There is no consensus on why people leave a bequest. Some argue that bequests are mainly accidental (Hurd, 1989) as the elderly keep a buffer as a result of life-span risk. Lockwood (2018) argues that accumulated wealth during retirement serves the double purpose of building a bequest and covering large health care expenditures. Others find that bequests are intentional and motivated by inter-generational altruism or the joy of giving (Laferrère and Wolff, 2006; De Nardi and Yang, 2014).

Finally, the elderly may hold on to their wealth during retirement due to liquidity constraints and investments in illiquid assets such as their own house. Standard models consider retirees' aggregate assets in the household portfolio (including housing) and implicitly assume that households can easily liquidate their housing wealth by selling and moving to a smaller and cheaper house or by, for example, acquiring a second or reverse mortgage. There is a general consensus, however, that the elderly are usually not willing to give up their houses (Fisher et al., 2007; Banks et al., 2012), except in the case of specific events like divorce, widowhood, or children leaving home (see Suari-Andreu et al., 2019 for a survey of the literature). Since most household wealth is invested in home ownership and the take-up of reverse mortgages is low, the willingness to stay put may be a reason for the elderly to save during retirement (Venti and Wise, 2004).

Psychological saving motives

An increasing number of studies in the economics literature emphasise the importance of abstract explanations for savings (Shefrin and Thaler, 1988; Canova et al., 2005). The psychology literature suggests that individuals find more abstract saving goals more important than concrete motivations, or save as a buffer against social risks (Engelberg and Sjöberg, 2007). Canova et al. (2005) identified fifteen salient abstract motives for saving. These include autonomy, self-gratification and security, which are among the ten most important saving motives according to our pre-test. An explanation for why they are perceived as important is that these saving motives are likely to be the target of other saving motives (including 'economic' explanations) and linked to other goals. This aligns with the early work of Yamauchi and Templer (1982) who identify, using an experimental setting, three dimensions to explain the attitude towards money. The first is "power and prestige" – purchasing items or accumulating wealth to impress others and increase your self-esteem; the second and third are "time-retention" and "security", which can be interpreted as placing value on preparing for future goals or security. Moreover, the psychology literature suggests that there is a tendency to view saving as a protection against the kind of vulnerability that is inherent to social involvement (Yamauchi and Templer, 1982; Engelberg and Sjöberg, 2007), explaining the importance of the saving motives autonomy and security. Risks could include the loss of trust and confidence in others, or loss of autonomy and, as a consequence, dependence on other people.

Finally, political risk can be a motivation to save, as an example of building up a buffer against a social risk. In particular, individuals may save to protect themselves against a change in pension rules that may reduce their benefits (Alessie et al., 2013; Fulford, 2015). Diamond (1999) notes that the effect of reforms of the pension system can be twofold: first, they can provide a solution to existing social risk, or they can generate such risks. Since political risks are an inherent part of any pension scheme, individuals may experience discomfort with them. Using a regular survey with a representative sample of the Dutch population, Van Dalen and Henkens (2018) find that the Dutch have reduced their trust in pension funds, banks and insurance companies after the global financial crisis, possibly affecting saving attitudes and actual saving behaviour.

4. The experimental survey

Individuals from representative samples in the Netherlands and Australia were invited to participate in an online experimental survey on spending patterns and saving motives after retirement. The experimental task focused on two main objectives: To investigate the effects of liquidity of pension wealth (that is, lifetime income versus liquid wealth) and to assess the effect of (expected) health problems on preferred spending patterns and saving motives.[2] We use stated-choice questions for hypothetical households, so-called vignettes.[3] Vignettes have often been used in experiments in economics since Van Beek et al. (1997). Our vignettes comprise short descriptions of income, wealth and health status for retired couples. We use hypothetical households so that participants can be asked to make choices in an institutional setting that differs from that in their own country. After each stated choice question, which asked participants to choose a spending pattern, we collected information on the participant's motives for their decisions. In addition, we collected information on personal and household characteristics, personality traits, and financial competence. The Dutch survey was fielded in December 2016 and the Australian survey in March 2017.[4]

Participants in the Netherlands were recruited from two well-established ongoing panels - the LISS panel and the CentERpanel, which include over 5000 households in total. Invited panel members are a representative sample of Dutch households, selected by Statistics Netherlands. Participants respond to surveys on a regular basis (biweekly for the CentERpanel, monthly for the LISS). We selected individuals aged 50–64, working for pay or with a partner working for pay. The Dutch sample comprised 1798 eligible individuals.[5] Participants in Australia were recruited from the commercial web panel 'TEG rewards' (which includes over 1,000,000 panel members).[6] The Australian sample comprised 1004 randomly selected from all panel members aged 50–64 and not yet retired. The median time for completion of the survey was 31 and 30 min for the Dutch and Australian samples, respectively.

The flow of the survey is illustrated in Fig. 1. It comprises of some preliminary questions and four modules. The preliminary questions cover marital status, household income, and age and employment status of participant and partner (if applicable). This information is used to select the sample and to allocate the participant to one of four household income groups.[7] Module 1 is the experimental task, explained in detail in Sections 4.1 and 4.2 below. The other modules have

[2] A third objective, to analyse the role of government prescribed drawdown patterns (that is, implied endorsement), is analysed in Alonso-García et al. (2021).

[3] See Louviere et al. (2000) for advantages and drawbacks of stated preference methods.

[4] Static copies of the questionnaires are available in the supplementary materials as 'Dutch version of the survey.pdf' and 'English version of the survey.pdf'. A 'live' version of the Australian survey is available at http://survey.us.confirmit.com/wix/6/p3081554696.aspx.

[5] LISS panel members were paid € 5 for completing the survey; CentERpanel members only receive a small compensation for internet use.

[6] Australian participants were paid A$4 on completion of the survey.

[7] These questions were not included in the Dutch survey, as the relevant information was already available; Dutch participants with missing information on gross household income were randomly allocated to an income group.

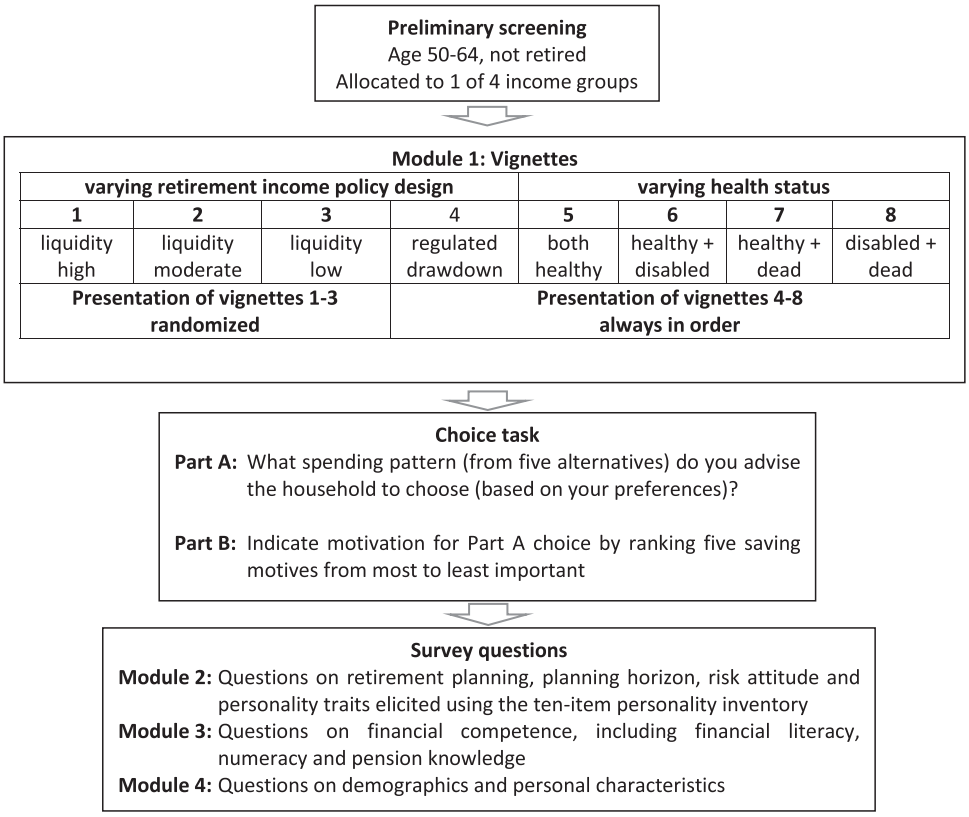

Fig. 1. Simplified overview of the different components within the survey.

questions on risk and time preferences, financial literacy and pension knowledge, personality traits,[8] and other background characteristics that may help to explain savings and consumption patterns and the underlying saving motives.

4.1. Vignette characteristics

The idea of the vignettes is that the context, such as the budget set and expected health status is given by the vignette, and participants make decisions using their own preferences (Elsayed et al., 2018). The alternative of using questions such as "what if you were in the following situation? which consumption pattern would you choose?" has the drawback that the hypothetical context is often too far removed from the participant's real-world situation, with the result that many participants would not take the survey seriously and might be reluctant to answer.[9]

Each participant is shown eight different vignettes, describing eight hypothetical retired couples that differ in expected health status (four alternatives), the institutional retirement income arrangement (presented in terms of "liquidity" - the combination of annuity income and freely available wealth; three alternatives), and implied endorsement (two alternatives). For each vignette the participant (A) advises one preferred spending pattern to the vignette household, and (B) ranks the importance of five saving motives for the given advice in two rounds of best / worst choice sets. Income and wealth of the vignette households are based on (median) wealth and the participant's income group.[10] The net present value of the total wealth at retirement is always the same for participants in a given income group. The liquidity of retirement saving in each vignette is discussed in detail in Section 4.2; The text of the first (base) vignette is displayed in Table A.2 in the appendix. Other characteristics of the vignette household are chosen on the basis of the modal Australian retired household.

[8] We follow the recent practice to add psychological personality tests such as the Big Five to economics surveys (e.g. Borghans et al., 2008; Agnew et al., 2018; Gerhard et al., 2018).

[9] After the survey, we asked the respondents whether the questions were clear. 57% of Dutch and 66% of Australian respondents evaluated the questions as clear or very clear. Moreover, adding whether questions were evaluated as clear as a covariate in the model did not lead to a significant improvement (p-value 0.4554 for the joint test). Thus the minority of respondents who did not find the questions clear still tend to give similar answers to the main questions of interest as the others.

[10] Wealth and income groups are aligned with gross household income in the Dutch panels, converted to Australian dollars with the Purchasing Power Parity (PPP) index (OECD, 2015b)

Lifetime income	
Annual	Fortnightly
$36,050	$1,387

	Spending		Wealth			
	Annual	Fortnightly	At age 65	At age 75	At age 85	At age 95
Spending Plan 1	$42,700	$1,642	$152,775	$86,275	$19,775	$0
Spending Plan 2	$40,650	$1,563	$152,775	$106,775	$60,775	$14,775
Spending Plan 3	$36,050	$1,387	$152,775	$152,775	$152,775	$152,775
Spending Plan 4	$31,450	$1,210	$152,775	$198,775	$244,775	$290,775
Spending Plan 5	$29,900	$1,150	$152,775	$214,275	$275,775	$337,275

Fig. 2. Spending patterns for a household in the lowest income group with moderate income and moderate wealth (as defined in Section 4.2).

Section B.1 in the online appendix explains in detail how the amounts in the vignettes (wealth and income, consumption expenditures) are determined.

Advising a spending pattern and ranking saving motives

We ask participants to advise each vignette household on a specific decision in a given context, and to elicit the motivation(s) for that advice. In the given context, participants find some motives more important than others, and this is the basis for their advice. Since saving and dissaving motives relate to a given advice, we first asked participants to choose the advised consumption pattern, and then asked them to make the reasons for this choice explicit. In this way, participants rationalize the stated choice they are making. We do not think justification bias will be an issue, since there is no actual choice in the past that the participant might want to justify.

For each vignette, the participant advises one spending pattern out of five alternatives. To address potential complexity (Iyengar and Kamenica, 2010), all alternatives have constant expenditures over time as long as financial wealth is positive; after that, expenditures are equal to income. For a given participant, the same five spending patterns are presented in all vignettes; the patterns are aligned to the participant's household income group. To help participants understand the implications of choosing a spending pattern, we remind them of the vignette household's lifetime income (presented earlier in the vignette) and include information on remaining wealth at ages 65, 75, 85, and 95 for all possible choices.[11] Figure 2 shows an example screen shot of the five spending patterns (spending plans) presented.

Informed by the economics and psychology literature, we identified 19 possible saving motives for retirees. Using a pre-test we reduced the list to ten saving motives that were most often considered important; see Appendix Section A.1. Table 1 lists these ten motives, with their explanations as given to the survey participants. These are the motives we used in our experiment. To reduce cognitive burden, each participant ranks the importance of a randomly selected set of five motives (one set of five for the first four vignettes and another set for the last four vignettes).[12] The order in which these five are presented is randomised.

4.2. Differences across vignettes ("treatments")

In the first three vignettes, both partners are 65 years old and just retired. They are in good health and expect to remain so until at least age 70. They own the house they live in (without a mortgage) and do not intend to move or sell the house. If one of them dies, the widow(er) receives less pension income, but the reduction corresponds to the expected decrease in expenditure needs. Based on the participant's income group (online appendix Table B.1), the couple has a given level of total resources (liquid wealth plus net present value of annuities, excluding housing wealth). Vignettes 1, 2 and 3 differ in the extent to which retirement savings are liquid – i.e., liquid wealth versus lifetime annuity. Vignette 1 has *high wealth* and *low income*, vignette 2 has *moderate wealth* and *moderate income*, and vignette 3 has *low wealth* and *high income*.[13] The order in which the first three vignettes are presented is randomised.

An important characteristic of the experimental design is the relation between the liquidity treatments in vignettes 1 – 3 and country specific pension rules. In the Netherlands, second pillar pension contributions are always converted into a lifetime income stream (full annuitisation; vignette 3), whereas Australian retirees can choose to take lump sums, phased withdrawals or annuities from their superannuation (pension) accumulation, mimicked by vignette 1. In the experiment, we explicitly mention lifelong income and wealth at retirement and point out that if wealth is exhausted, the household has to adapt their spending to their income, so there are no additional resources of income or wealth. The intermediate arrangement (vignette 2) corresponds to a potential future direction for both retirement systems, with more flexibility than the current Dutch system but less than the Australian system, offering more longevity protection than the current rules

[11] Remaining wealth at ages 65, 75, 85 and 95 per income group, spending pattern and retirement income policy design can be found Table B.3 in the online appendix.

[12] To be precise, we randomly select three economic motives and two psychological motives.

[13] See Section B.1.2 in the online appendix for the exact amounts.

(Treasury, 2016). Alternatively, vignette 2 could also be interpreted as a system in transition from DB to DC, which is, for example, representative of the US and the UK.

In vignettes 1–3, both household members expect to remain in good health until at least age 70 (shorthand notation: $\{H_{70}, H_{70}\}$). Vignette 4 is not used in the current study (it introduces a feature specific to the Australian system). Vignettes 5 to 8 change the couple's health status (from good to poor). In vignette 5, both expect to remain healthy until at least age 75 ($\{H_{75}, H_{75}\}$). The household in vignette 6 expects that one of them will have difficulties with activities of daily living (ADL) within ten years ($\{H_{75}, M_{75}\}$), while the household in vignette 7 expects that one of them will pass away within 10 years ($\{H_{75}, D_{75}\}$). In both cases, the surviving spouse will remain healthy until at least age 75. The couple in vignette 8 expects that one member of the household will pass away within 10 years, and that the survivor will develop some ADL limitations ($\{M_{75}, D_{75}\}$). For vignettes 5–8, each participant is randomly assigned to liquidity treatment 1 [liquidity = high] or 3 [liquidity = low]. To keep the flow of the survey manageable, we did not randomize the order of the vignettes 5–8. We felt that presenting healthy and unhealthy persons in random order would overly increase cognitive burden, leading to noisier answers. For the first three vignettes, we analysed whether order effects are important, adding dummies for five of the six different orderings for each motive except the benchmark to the model (see next sections). The null hypothesis of no order effects (coefficients on all these dummies are zero (5 x 9 = 45 restrictions)) was not rejected (p-value 0.1254).[14]

5. Data and descriptive analysis

From the initial samples of 1798 Dutch and 1004 Australian survey participants, we dropped 38 Dutch participants who started but did not complete the survey and 138 Dutch participants who did not report gross household income and were (randomly) matched to a very different income category than appeared to be reasonable from other income information. In addition we dropped 185 Dutch participants and 21 Australian participants who *ex post* turned out not to be eligible (e.g. retirees) or had missing information on relevant covariates (see Table 2). This reduced the samples to an analysis sample of 1437 Dutch and 983 Australian participants.

We specifically chose to analyse a sample of pre-retirees (rather than individuals already retired) for several reasons. First, we wanted to avoid the stated choices for the vignette households being influenced by real-world spending and saving decisions which, in turn, would have been influenced by real-world institutional settings for pensions. Second, in the real-world setting equivalent to the moderate and high liquidity treatments, people are typically required to choose a retirement decumulation product before retirement, in which case decisions are made based on expectations of spending. We follow several existing studies here: Beshears et al. (2014) analyse preferences for annuitisation using samples of non-retirees as well retirees and find no significant differences between the two groups. Hanewald et al. (2020) use an online survey of 49-65-year-olds to analyse the preferences for a reverse mortgage as a means to live more comfortably after retirement.

Background variables that may drive the importance of saving motives are defined in Table 2, with descriptive statistics in Table 3. There are some substantial differences between the two countries, with, for example, much less retirement planning and objectively measured pension knowledge in the Netherlands than in Australia. The Australians are also much more optimistic about their life expectancy than the Dutch.

Table 4 presents the distribution of advised spending patterns by vignette (" treatment") and by country. Note that spending patterns are ordered from high spending ($s = 1$) to low spending ($s = 5$; cf. Fig. 2). Irrespective of the treatment, spending patterns $s = 2$ and $s = 3$ are the most popular. There is a salient difference between the countries: Australians tend to choose a more conservative spending pattern than the Dutch in all vignettes. The slow drawdown patterns advised in Australia are in line with the findings on actual drawdown patterns reported by Asher et al. (2017) and Spicer et al. (2016). In the Netherlands, individuals have higher replacement rates, and 70% final pre-retirement earnings is still the social norm (Knoef et al., 2016), corresponding to spending pattern s=2. In Australia, replacement rates are lower (OECD, 2015a), and pension adequacy is generally communicated in terms of absolute rather than relative expenditure levels (ASFA, 2018). These are usually lower than 70% of final earnings.

The headings "high", "moderate" and "low" refer to the liquidity of pension wealth in the vignettes, where "high" refers to the Australian institutional setting (full access to pension wealth) and "low" to the Dutch setting (fully annuitised pension wealth). Different liquidity treatments lead to significant differences in chosen spending patterns in both countries (as shown by the p-values of the Pearson chi-squared test), but the pattern is not monotonic. For example, in both countries, a change from high to low liquidity induces fewer participants to choose the highest but also the lowest spending pattern. Compared to the differences across countries, the differences across treatment seem rather modest and the chosen spending patterns in Australia remain more conservative than in the Netherlands, irrespective of liquidity treatment.

To check the plausibility of the stated advice on spending patterns, we checked their relation to measures of future orientation and risk aversion. In both countries, and controlling for other covariates or not, we found a strong and significant negative association between advising high expenditures and future orientation, showing that individuals who care

[14] We tested whether participants took the questions seriously. We collect data on the difficulty and clarity of the survey and use this information to construct a variable that equals 1 if the participant found the questions (very) difficult and 0 otherwise. If we include this variable in our main specification, the null hypothesis of no effects of this variable (i.e. coefficients on all these dummies are zero) was not rejected (p-value 0.2796). Similarly, we construct a variable that equals 1 if the participant found the questions not clear and 0 otherwise. If we include this variable in our main specification, the null hypothesis of no effects of this variable was not rejected (p-value 0.4554).

Table 4
Advised spending pattern by treatment (percent): the Netherlands and Australia.

		Treatment										
		varying retirementincome policy design			varying health status& low liquidity of wealth				varying health status& high liquidity of wealth			
	Liquidity =	high	moderate	low	low	low	low	low	high	high	high	high
	Health status =	$\{H_{70}, H_{70}\}$	$\{H_{70}, H_{70}\}$	$\{H_{70}, H_{70}\}$	$\{H_{75}, H_{75}\}$	$\{H_{75}, M_{75}\}$	$\{H_{75}, D_{75}\}$	$\{M_{75}, D_{75}\}$	$\{H_{75}, H_{75}\}$	$\{H_{75}, M_{75}\}$	$\{H_{75}, D_{75}\}$	$\{M_{75}, D_{75}\}$
Spending pattern (s)												
The Netherlands												
$s = 1$	[very high spending]	17.1	15.7	7.9	5.4	5.2	7.2	5.0	15.0	13.0	18.5	17.4
$s = 2$		42.2	46.2	56.9	58.7	49.7	57.4	50.5	45.7	40.4	42.5	38.2
$s = 3$		26.4	30.1	28.3	29.9	38.1	26.7	33.5	24.9	31.8	26.0	28.7
$s = 4$		8.8	5.4	3.6	2.9	4.2	4.5	6.0	9.9	10.9	9.6	11.1
$s = 5$	[very low spending]	5.5	2.7	3.3	3.1	2.9	4.2	5.0	4.5	4.0	3.3	4.6
Pearson χ^2 test (p-value)		"base"	0.000	0.000	"base"	0.007	0.149	0.002	"base"	0.043	0.311	0.074
Australia												
$s = 1$	[very high spending]	12.7	12.3	5.6	5.2	4.4	5.4	4.8	12.1	10.5	13.8	13.6
$s = 2$		29.4	28.4	34.3	35.8	32.5	39.2	34.1	33.3	32.0	32.9	28.7
$s = 3$		29.8	36.6	39.6	41.4	41.8	37.8	40.8	28.5	29.1	27.0	32.0
$s = 4$		13.5	13.3	11.8	11.5	14.7	12.3	14.5	12.8	14.9	14.0	11.1
$s = 5$	[very low spending]	14.6	9.4	8.8	6.1	6.7	5.4	5.9	13.4	13.6	12.3	14.6
Pearson χ^2 test (p-value)		"base"	0.001	0.000	"base"	0.516	0.736	0.724	"base"	0.826	0.878	0.425

Notes: Pearson χ^2 test of independence for the difference between treatments. The "base" treatment for varying retirement income policy design is "high liquidity". The "base" treatment for varying health status is "$\{H_{75}, H_{75}\}$" - that is, both members of the hypothetical household are in good health and expect to remain in good health until at least age of 75. M_{75}: the household member will have some difficulties with activities of daily living (ADL) within ten years after the start of retirement. D_{75}: the household member will pass away within ten years after the start of retirement.

more about the future want to save more and spend less, as expected. Individuals who are risk averse also advise more conservative spending, although this association is only marginally significant if other covariates are controlled for.

Table 5 shows how participants change their advised spending pattern if the liquidity of pension wealth or future health status change. For example, the second column (vignette 1 versus vignette 3) shows that changing from high to low liquidity makes 21.3% of Dutch participants switch to a higher advised spending pattern and 19.7% to a lower spending pattern. The majority (59%) sticks to the same advice. Persistence is somewhat less in Australia, but still the majority does not switch. This might be expected in columns 1 and 2, since vignettes 1, 2 and 3 give the same total lifetime wealth.

The remaining columns shows the consequences of expecting a deterioration of health. Again, there is substantial persistence in chosen spending patterns, with no difference in advised spending in the majority of cases for each separate comparison of two health scenarios. This is particularly the case in the Netherlands where health problems of the elderly have limited financial consequences due to more extensive coverage for long-term care services. Still, more participants advise a switch to lower spending if the retiree own or their partner's health expectations are worse. Take, for example, the change from column 3 or column 7 (both in good health at age 75) to column 4 or column 8 (participants in good health but spouse has serious health issues at age 75).[15] The result for the Netherlands is in line with Van Ooijen et al. (2015) who analysed actual expenditure and found that health shocks reduce total spending. Similarly for Australia, the persistence we find is in line with Spicer et al. (2016) who find small effects of health shocks on drawdown patterns.

Table 6 shows the average ranking for each of the ten saving motives by vignette and country, where the 'most important' motive gets value 5 and the 'least important' motive value 1. The importance of each motive is fairly consistent across the vignettes. In both countries, the motives *self-gratification* and *autonomy* are more often ranked as very important. The motives *life-span risk* and *security* are considered quite important in Australia, while *intra-household bequest* and *liquidity* are more important for the Dutch. *Intra-household bequest* is moderately important for both Australian and Dutch participants, while *intended bequest* (to beneficiaries) is not so important. Liquidity of pension wealth only affects the ranking of the saving motives in the case of an expected deterioration in future health ([low, $\{H_{75}, M_{75}\}$], [high, $\{H_{75}, M_{75}\}$] and [low, $\{M_{75}, D_{75}\}$], [high, $\{M_{75}, D_{75}\}$]). Expecting future health problems increases the importance of the precautionary health motive, as one would expect.[16]

Table A.3 in the Appendix presents the distribution of the ranking by saving motive and shows that *intended bequest* is considered the least important motive among the five shown in a majority of all cases. Since the hypothetical household owns the house they live in without a mortgage, an alternative explanation for the unimportance of the intended bequest motive could be the intention to leave the house as a bequest. *Self-gratification* is evaluated as the most important motive in 39% of all cases.[17]

6. Modelling the importance of each saving motive

We model the importance attached to each saving motive underlying the advised spending patterns, focusing on the effects of the participant's country of residence, liquidity of pension wealth, and future health status expectations while controlling for other covariates. The importance of a given motive in a given vignette can be seen as an unobserved variable; we only observe its rank amongst five motives (a random subset of the ten motives in Table 1). We explain the ranking using a Rank-Ordered Logit model (Beggs et al., 1981). To be precise, the importance of motive m ($m = 1, \ldots, 10$) in vignette s ($s = 1, \ldots, 3, 5, \ldots, 8$) for individual i ($i = 1, \ldots, N$) is given by:[18]

$$U^s_{im} = V^s_{im} + \varepsilon^s_{im}$$

U^s_{im} consists of a systematic component V^s_{im}, and a random component ε^s_{im}. We assume that the ε^s_{im} are mutually independent and follow a type I extreme value distribution. The systematic part V^s_{im} is determined by individual characteristics X_i (see Table 2), dummies for the observed advised spending patterns in each vignette (S^s_i), dummies (L^s) differentiating between the retirement income policies in the vignettes (low, moderate or high liquidity) and dummies (H^s) to capture the variation in health status across vignettes. In addition, we include interactions SL^s_i of S^s_i and L^s to allow the effect of advised spending pattern to vary with retirement income policy (the institutional setting). Thus:

$$V^s_{im} = \beta_{1,m} L^s + \beta_{2,m} S^s_i + \beta_{3,m} SL^s_i + \beta_{4,m} H^s + \beta_{5,m} X_i$$

We use the *precautionary* motive ($m = 1$) as reference category, so $\beta_{1,1} = \cdots = \beta_{5,1} = 0$ and $V^s_{i1} = 0$.

[15] A similar pattern is found when comparing the base scenario of health expectations (col. 3 or 7) with any of the other health scenarios.

[16] For the Dutch data, for most participants, we also have information on the importance of general saving motives. There are plausible correlations between these ratings and the reported rankings in our survey. For example, we find a significant positive relation between the importance of the motive self-gratification for the vignette advice and the general motive to increase your freedom so you can do what you want, and between the importance of the experimental precautionary health motive and the general motive to have enough money in your bank account to be sure you will be able to meet your financial liabilities.

[17] It might be seen as a general motive for saving that could be considered as the default. We therefore also conducted our main analysis after excluding *self-gratification*; we found that this hardly affects the results for the other motives.

[18] For notational convenience we do not include a subscript for the set of motives. Note that the set of saving motives varies across participants - see Section 4.

Table 5
Changes in advised spending pattern between treatments (percent): the Netherlands and Australia.

Δ Treatment	varying retirementincome policy design		varying health status& low liquidity of wealth				varying health status& high liquidity of wealth			
Liquidity =	moderate	low	low	low	low	low	high	high	high	high
Health status =	$\{H_{70}, H_{70}\}$	$\{H_{70}, H_{70}\}$	$\{H_{75}, H_{75}\}$	$\{H_{75}, M_{75}\}$	$\{H_{75}, D_{75}\}$	$\{M_{75}, D_{75}\}$	$\{H_{75}, H_{75}\}$	$\{H_{75}, M_{75}\}$	$\{H_{75}, D_{75}\}$	$\{M_{75}, D_{75}\}$
– Liquidity =	high	high	low	low	low	low	high	high	high	high
Health status =	$\{H_{70}, H_{70}\}$	$\{H_{70}, H_{70}\}$	$\{H_{70}, H_{70}\}$	$\{H_{70}, H_{70}\}$	$\{H_{70}, H_{70}\}$	$\{H_{70}, H_{70}\}$	$\{H_{70}, H_{70}\}$	$\{H_{70}, H_{70}\}$	$\{H_{70}, H_{70}\}$	$\{H_{70}, H_{70}\}$
The Netherlands										
spend more	20.46	21.29	11.54	9.74	15.72	11.54	15.46	15.18	20.61	18.94
spend the same	67.29	59.01	74.69	68.98	66.76	64.12	71.03	64.35	65.04	60.58
spend less	12.25	19.69	13.77	21.28	17.52	24.34	13.51	20.47	14.35	20.47
Pearson χ^2 test (p-value)	"base"	0.000	"base"	0.001	0.004	0.000	"base"	0.002	0.025	0.000
Australia										
spend more	22.99	23.09	18.61	17.43	23.37	21.39	18.20	19.04	22.59	22.38
spend the same	62.46	54.93	69.31	63.76	61.78	59.41	68.41	59.83	60.25	56.28
spend less	14.55	21.97	12.08	18.81	14.85	19.21	13.39	21.13	17.15	21.34
Pearson χ^2 test (p-value)	"base"	0.000	"base"	0.012	0.042	0.001	"base"	0.004	0.031	0.000

Notes: Pearson χ^2 test of independence for the difference between treatments. The "base" treatment for varying retirement income policy design is "moderate liquidity" minus "high liquidity". The "base" treatment for varying health status "$\{H_{75}, H_{75}\}$" minus "$\{H_{70}, H_{70}\}$" - that is, both members of the hypothetical household are in good health and expect to remain in good health until at least age 75, relative to age 70. M_{75}: the household member will have some difficulties with activities of daily living (ADL) within ten years after the start of retirement. D_{75}: the household member will pass away within ten years after the start of retirement.

Table 6
Mean importance of saving motives by treatment and country.

		Treatment varying retirementincome policy design			varying health status& low liquidity of wealth				varying health status& high liquidity of wealth			
	Liquidity =	high	moderate	low	low	low	low	low	high	high	high	high
	Health status =	$\{H_{70}, H_{70}\}$	$\{H_{70}, H_{70}\}$	$\{H_{70}, H_{70}\}$	$\{H_{75}, H_{75}\}$	$\{H_{75}, M_{75}\}$	$\{H_{75}, D_{75}\}$	$\{M_{75}, D_{75}\}$	$\{H_{75}, H_{75}\}$	$\{H_{75}, M_{75}\}$	$\{H_{75}, D_{75}\}$	$\{M_{75}, D_{75}\}$
Saving motive (m)												
The Netherlands												
Economic												
$m = 1$	precautionary	3.29	3.33	3.36	3.21	3.36	3.30	3.32	3.33	3.44	3.37	3.35
$m = 2$	precautionary health	3.51	3.59	3.59	3.37	3.61**	3.49	3.65***	3.42	3.75***	3.52	3.78***
$m = 3$	life-span risk	1.85	1.75*	1.76	1.79	1.88	1.93*	1.90	1.87	1.90	1.91	2.00
$m = 4$	intended bequest	1.57	1.58	1.57	1.68	1.57	1.53*	1.52**	1.58	1.55	1.56	1.53
$m = 5$	liquidity	3.65	3.58	3.61	3.65	3.69	3.69	3.69	3.60	3.70	3.67	3.63
$m = 6$	intra-household bequest	3.43	3.49	3.47	3.45	3.44	3.70***	3.65**	3.60	3.44*	3.72	3.68
Psychological												
$m = 7$	autonomy	3.60	3.58	3.56	3.65	3.52	3.51	3.51	3.51	3.46	3.45	3.41
$m = 8$	security	2.66	2.67	2.65	2.55	2.48	2.44	2.44	2.61	2.52	2.49	2.52
$m = 9$	self-gratification	3.79	3.80	3.78	3.76	3.63	3.67	3.60*	3.83	3.72	3.78	3.58***
$m = 10$	political risk	2.75	2.73	2.76	2.69	2.63	2.53*	2.54	2.66	2.52	2.54	2.52
		"base"			"base"				"base"			
Australia												
Economic												
$m = 1$	precautionary	3.27	3.30	3.30	3.16	3.29	3.13	3.36*	3.08	3.22	3.06	3.14
$m = 2$	precautionary health	3.39	3.42	3.39	3.32	3.36	3.29	3.35	3.43	3.79***	3.42	3.72**
$m = 3$	life-span risk	2.73	2.75	2.79	2.85	2.81	2.71	2.74	2.62	2.58	2.56	2.54
$m = 4$	intended bequest	1.57	1.58	1.59	1.53	1.62	1.62	1.60	1.74	1.78	1.80	1.82
$m = 5$	liquidity	2.90	2.94	2.94	2.93	2.89	2.91	2.94	2.74	2.86	2.83	2.78
$m = 6$	intra-household bequest	3.08	3.12	3.14	3.35	3.33	3.54	3.49	3.26	3.20	3.52**	3.43
Psychological												
$m = 7$	autonomy	3.58	3.55	3.62	3.61	3.56	3.63	3.44	3.56	3.44	3.48	3.39
$m = 8$	security	3.54	3.51	3.45	3.25	3.25	3.33	3.28	3.50	3.43	3.49	3.44
$m = 9$	self-gratification	3.79	3.74	3.69	3.67	3.63	3.73	3.62	3.72	3.54	3.64	3.64
$m = 10$	political risk	2.20	2.14	2.15	2.31	2.25	2.06**	2.17	2.35	2.16*	2.19	2.12**
		"base"			"base"				"base"			

Notes: $^{***}p < .01$, $^{**}p < .05$ and $^{*}p < .10$. Significance level for the two-sample test of proportions of the difference between treatments within the Dutch or Australian sample. The "base" treatment for varying retirement income policy design is "high liquidity". The "base" treatment for varying health status is "$\{H_{75}, H_{75}\}$" - that is, both members of the hypothetical household are in good health and expect to remain in good health until at least age 75. M_{75}: the household member will have some difficulties with activities of daily living (ADL) within ten years after the start of retirement. D_{75}: the household member will pass away within ten years after the start of retirement. A participant assesses the importance of five saving motives per treatment. The 'most important' motive is assigned value 5 whereas as the 'least important' motive is assigned value 1. Thus, a value above three suggest that the motive is important, whereas a value below three indicates that the motive is not that important. See Table 1 for the full-text for the saving motives.

The probability of a given ranking $y_i^s = (y_{i1}^s, \ldots, y_{i5}^s)'$ where y_{ij}^s is the motive that is given rank j (given the set of motives and all vignette and individual characteristics), is now given by the product of four multinomial logit probabilities:

$$P(U^s_{iy^s_{i1}} > U^s_{iy^s_{i2}} > \ldots > U^s_{iy^s_{i5}}) = \prod_{j=1}^{4} \frac{\exp(V^s_{iy^s_{ij}})}{\sum_{l=j}^{5} V^s_{iy^s_{il}}}$$

In our quasi likelihood, we treat the rankings for different vignettes as independent. We cluster standard errors at the individual level to account for the correlation between rankings for different vignettes presented to the same participant.

7. Estimation results

We report several sets of results. First, we explore how individual characteristics are associated with the importance attached to a saving motive (Table 7). We then use the model estimates to predict the expected importance of savings motives by country of residence, liquidity of pension wealth and future health expectations (Fig. 3) and by retirement income policy design (institutional setting) and advised spending pattern (Table 8).

7.1. Individual characteristics and saving motives

The estimates of how individual characteristics affect the importance attached to each saving motive can be found in Table 7. The parameter estimates are log odds ratios in relation to the benchmark motive (*precautionary* savings). We find considerable heterogeneity by individual characteristics. For example, row three indicates that males attach lower importance than females to the *precautionary health* motive, ceteris paribus (column 2) and a much higher importance to both *bequest* motives (*intented bequest*, column 4 and *intra-household bequest*, column 6) than females. This is unsurprising as males are generally the first of a couple to pass away (as they, on average, live shorter and are generally older than their spouse). To interpret the size of the effects, take the parameter estimate 0.324 for males for *intended bequest*: suppose a woman with certain characteristics finds the motives *precautionary savings* (the benchmark motive) and *intended bequest* equally important and ranks the first one higher than the other one with probability 0.5 (odds ratio 1). Then a man with the same other individual characteristics who gets the same vignettes has probability 0.580 to rank *intended bequest* higher than *precautionary* saving.

As expected, having a partner significantly increases the importance of the *intra household bequest* motive, whereas the presence of children raises the importance of the general *bequest* motive. High income groups attach more value to the motive *self-gratification* and less to *political risk*. Religious participants attach relatively high value to the *precautionary health* motive and to *life-span* risk, as well as to the *liquidity* motive. This is in line with Renneboog and Spaenjers (2012), who argue that members of a church or religion attach less value to material wealth, are more trusting and have longer planning horizons. Foreign-born participants give less weight to the *intra household bequest* motive. As they are more likely to experience income uncertainty (Islam et al., 2013), they could be more used to receiving (non-)monetary transfers from children, making *intra-household bequest* less important.

We do not obtain any significant estimates for (private) information on subjective life expectancy on the importance of any of the saving motives. Having a retirement plan, providing some financial security at old age, reduces the importance of the *precautionary savings* motive compared to many other motives. Those who objectively have better capabilities for pension planning, attach lower importance to the *intended bequest* and *intrahousehold bequest* motives and are less concerned about *autonomy* and *political risk*.

As expected, less risk averse participants who are willing to take some risks attach less importance to *precautionary* and *precautionary health* motives. They are more willing to lack money for unexpected events, but instead want to ensure that they are financially independent (the *autonomy* motive). On the other hand, a stronger score on "future orientation" implies relatively more importance for the *precautionary* motives compared to many other motives.[19]

Most of the remaining parameter estimates refer to the experimental treatment effects. Due to the interaction terms, the parameters themselves have no direct interpretation.

7.2. Predicted importance of saving motives

We use the model estimates to predict the rank of each saving motive by the liquidity and health status treatments and by advised spending pattern.

Figure 3 reports the average expected importance of the saving motives by the two liquidity of wealth treatments and the four health status treatments, by country of residence. The most salient finding is that, in line with the descriptive statistics reported Section 5, there are some large differences in importance of saving motives between the participants' country of residence, irrespective of the experimental treatment. These differences are in line with the differences in pension systems in the Netherlands and Australia.

[19] In preliminary estimations we also included other demographics in the model such as age, but these were insignificant for all motives.

Table 7
Estimation results. Rank ordered logit.

Saving motive (m)	$m=1$ precautionary	$m=2$ precautionaryhealth	$m=3$ life-spanrisk	$m=4$ intendedbequest	$m=5$ liquidity	$m=6$ intra-hhold.bequest	$m=7$ autonomy	$m=8$ security	$m=9$ self-gratification	$m=10$ politicalrisk
constant	0	0.245	-1.891***	-2.480***	0.0868	-0.619***	-0.0629	-0.994***	-0.298*	-0.618***
	(.)	(1.64)	(-10.94)	(-12.07)	(0.55)	(-4.06)	(-0.39)	(-6.02)	(-1.76)	(-4.00)
country of residence: Australia	0	-0.0440	1.078***	0.433***	-0.472***	-0.0885	0.156*	1.091***	0.123	-0.223***
	(.)	(-0.54)	(11.43)	(3.72)	(-5.42)	(-1.03)	(1.78)	(11.34)	(1.29)	(-2.63)
gender = male	0	-0.139**	0.0878	0.324***	0.0518	0.160**	0.0130	0.110	0.126	0.0396
	(.)	(-2.03)	(1.06)	(3.31)	(0.72)	(2.17)	(0.17)	(1.40)	(1.55)	(0.54)
marital status = partner	0	-0.121	-0.0137	0.115	-0.0585	0.364***	0.0317	-0.0696	-0.0335	-0.0217
	(.)	(-1.50)	(-0.15)	(1.01)	(-0.74)	(4.22)	(0.35)	(-0.74)	(-0.35)	(-0.26)
children living at home	0	-0.0468	-0.0509	0.279***	-0.0177	-0.0784	-0.0761	-0.123	-0.0984	0.00437
	(.)	(-0.67)	(-0.64)	(2.88)	(-0.25)	(-1.07)	(-1.00)	(-1.52)	(-1.19)	(0.06)
household income (Q3 and Q4)	0	0.0444	-0.000928	-0.0557	-0.0314	-0.0179	0.0968	-0.0287	0.208**	-0.175**
	(.)	(0.57)	(-0.01)	(-0.52)	(-0.39)	(-0.22)	(1.12)	(-0.33)	(2.14)	(-2.17)
homeowner	0	0.0465	0.0593	-0.0176	0.0422	0.00915	0.0239	0.0134	0.169*	-0.124
	(.)	(0.55)	(0.60)	(-0.15)	(0.49)	(0.10)	(0.25)	(0.13)	(1.70)	(-1.41)
religious / member of a church community	0	0.196***	0.170**	0.138	0.183**	0.00288	0.0697	0.130	-0.124	0.121*
	(.)	(2.75)	(2.04)	(1.39)	(2.51)	(0.04)	(0.86)	(1.64)	(-1.45)	(1.68)
born in the country they are currently living in	0	0.0622	-0.0433	0.00433	0.0986	0.225**	0.135	-0.0981	0.170	-0.0560
	(.)	(0.66)	(-0.38)	(0.03)	(0.98)	(2.24)	(1.27)	(-0.92)	(1.52)	(-0.56)
subjective life expectancy: high	0	-0.0541	0.0537	-0.0624	-0.0642	0.0333	-0.00701	0.0316	0.0720	-0.0154
	(.)	(-0.80)	(0.67)	(-0.66)	(-0.90)	(0.45)	(-0.09)	(0.40)	(0.88)	(-0.22)
retirement plan	0	0.179**	0.0807	-0.0680	0.0517	0.232***	0.170**	0.124	0.156*	0.150*
	(.)	(2.25)	(0.89)	(-0.62)	(0.66)	(2.90)	(1.99)	(1.40)	(1.76)	(1.85)
pension capability objectively measured	0	0.0163	-0.0366	-0.386***	-0.0794	-0.150*	-0.189**	-0.0214	-0.0650	-0.426***
	(.)	(0.21)	(-0.43)	(-3.62)	(-1.05)	(-1.89)	(-2.21)	(-0.25)	(-0.73)	(-5.54)
pension capability: self-assessed	0	0.000271	-0.0255	-0.0652	0.0204	-0.0659*	-0.0303	-0.0583	-0.0235	-0.00694
	(.)	(0.01)	(-0.59)	(-1.24)	(0.54)	(-1.67)	(-0.76)	(-1.35)	(-0.56)	(-0.18)
willingness to take risk	0	0.0364	0.111***	0.120**	0.0586*	0.0324	0.133***	0.0845**	0.110***	0.103***

(*continued on next page*)

Table 7 (*continued*)

Saving motive (m)	$m=1$ precautionary	$m=2$ precautionaryhealth	$m=3$ life-spanrisk	$m=4$ intendedbequest	$m=5$ liquidity	$m=6$ intra-hhold.bequest	$m=7$ autonomy	$m=8$ security	$m=9$ self-gratification	$m=10$ politicalrisk
	(.)	(1.06)	(2.79)	(2.47)	(1.72)	(0.89)	(3.58)	(2.16)	(2.62)	(2.92)
impulsive financial behaviour	0	-0.0367	-0.0291	0.0186	-0.00155	0.0465	-0.00568	-0.00146	0.0503	-0.0672*
	(.)	(-1.07)	(-0.73)	(0.37)	(-0.04)	(1.24)	(-0.15)	(-0.04)	(1.23)	(-1.87)
future orientation	0	0.0163	-0.111***	-0.0997**	-0.111***	-0.0752*	-0.0707*	-0.0842**	-0.144***	-0.0426
	(.)	(0.43)	(-2.59)	(-2.04)	(-2.98)	(-1.91)	(-1.80)	(-2.01)	(-3.03)	(-1.11)
personality: TIPI conscientiousness	0	-0.0366	-0.128***	-0.191***	-0.00402	-0.0121	-0.0103	-0.0927**	0.0403	-0.109***
	(.)	(-1.09)	(-3.14)	(-3.90)	(-0.11)	(-0.32)	(-0.28)	(-2.32)	(0.99)	(-2.93)
liquidity = high	0	0	0	0	0	0	0	0	0	0
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
liquidity = low	0	0.0593	-0.141	0.120	-0.0470	0.0212	-0.0777	0.125	0.139	0.0205
	(.)	(0.58)	(-1.28)	(0.87)	(-0.48)	(0.22)	(-0.73)	(1.14)	(1.23)	(0.20)
liquidity = moderate	0	-0.114	-0.0631	0.132	-0.0682	-0.0866	-0.0870	0.199*	0.0298	-0.0887
	(.)	(-1.11)	(-0.56)	(1.03)	(-0.68)	(-0.85)	(-0.84)	(1.88)	(0.26)	(-0.84)
spending pattern 1 ([very high spending])	0	-0.102	0.679***	0.619***	0.339**	0.227	0.139	0.679***	0.475**	0.374**
	(.)	(-0.61)	(3.82)	(2.84)	(1.98)	(1.14)	(0.73)	(3.79)	(2.29)	(2.26)
spending pattern 2	0	-0.249***	-0.0372	-0.311**	0.141	0.132	0.0553	0.0933	0.479***	0.0566
	(.)	(-2.70)	(-0.36)	(-2.43)	(1.55)	(1.35)	(0.56)	(0.91)	(4.62)	(0.60)
spending pattern 3	0	0	0	0	0	0	0	0	0	0
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
spending pattern 4	0	-0.0953	0.0779	0.150	-0.0508	0.215	-0.112	0.0428	-0.275	0.254*
	(.)	(-0.50)	(0.48)	(0.76)	(-0.33)	(1.27)	(-0.63)	(0.26)	(-1.51)	(1.67)
spending pattern 5 ([very low spending])	0	-0.182	0.368	0.114	-0.217	-0.292	-0.0639	-0.126	0.119	0.260
	(.)	(-0.89)	(1.53)	(0.46)	(-1.10)	(-1.42)	(-0.30)	(-0.55)	(0.56)	(1.43)
(liquidity = high) x spending pattern 1	0	0	0	0	0	0	0	0	0	0
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
(liquidity = high) x spending pattern 2	0	0	0	0	0	0	0	0	0	0
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
(liquidity = high) x spending pattern 3	0	0	0	0	0	0	0	0	0	0
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
(liquidity = high) x spending pattern 4	0	0	0	0	0	0	0	0	0	0
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
(liquidity = high) x spending pattern 5	0	0	0	0	0	0	0	0	0	0
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
(liquidity = low) x spending pattern 1	0	-0.158	-0.363	-0.522**	-0.0841	-0.154	-0.0708	-0.405*	-0.108	-0.197
	(.)	(-0.75)	(-1.60)	(-1.97)	(-0.41)	(-0.70)	(-0.31)	(-1.91)	(-0.43)	(-0.99)

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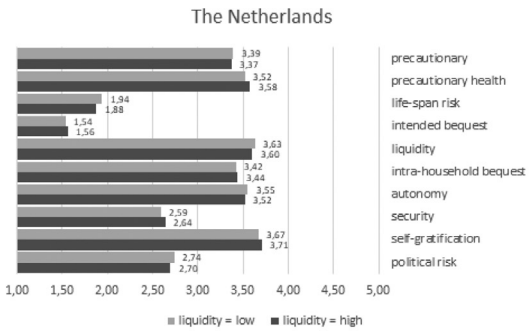
Table 7 (*continued*)

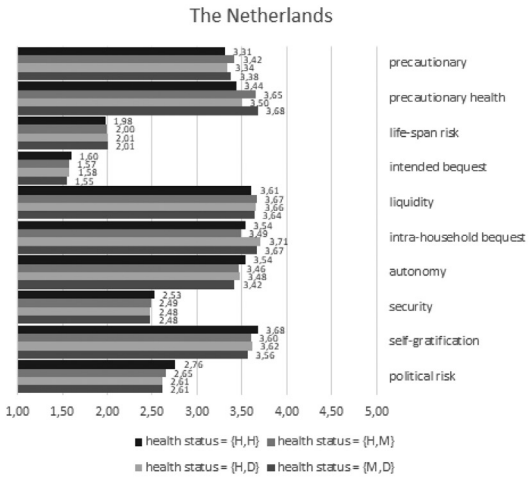
Saving motive (m)	$m=1$ precautionary	$m=2$ precautionaryhealth	$m=3$ life-spanrisk	$m=4$ intendedbequest	$m=5$ liquidity	$m=6$ intra-hhold.bequest	$m=7$ autonomy	$m=8$ security	$m=9$ self-gratification	$m=10$ politicalrisk
(liquidity = low) x spending pattern 2	0	0.140	0.186	0.0615	0.0791	0.152	0.101	-0.0140	-0.0750	0.00826
	(.)	(1.06)	(1.24)	(0.35)	(0.61)	(1.17)	(0.73)	(-0.10)	(-0.49)	(0.06)
(liquidity = low) x spending pattern 3	0	0	0	0	0	0	0	0	0	0
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
(liquidity = low) x spending pattern 4	0	-0.130	0.290	-0.222	-0.0229	-0.329	0.231	-0.0741	0.0478	-0.137
	(.)	(-0.57)	(1.38)	(-0.86)	(-0.12)	(-1.55)	(1.04)	(-0.35)	(0.21)	(-0.70)
(liquidity = low) x spending pattern 5	0	0.00576	0.0743	-0.0803	0.188	0.123	0.261	0.0255	-0.412	-0.159
	(.)	(0.02)	(0.25)	(-0.26)	(0.75)	(0.46)	(0.96)	(0.09)	(-1.54)	(-0.65)
(liquidity = moderate) x spending pattern 1	0	0.224	-0.325	-0.742***	-0.0828	0.336	0.124	-0.408*	0.129	0.0931
	(.)	(0.99)	(-1.35)	(-2.65)	(-0.37)	(1.38)	(0.51)	(-1.72)	(0.48)	(0.41)
(liquidity = moderate) x spending pattern 2	0	0.313**	0.0950	-0.0552	0.0727	0.228	0.117	-0.282*	0.0338	0.0992
	(.)	(2.21)	(0.59)	(-0.30)	(0.51)	(1.56)	(0.79)	(-1.86)	(0.20)	(0.68)
(liquidity = moderate) x spending pattern 3	0	0	0	0	0	0	0	0	0	0
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
(liquidity = moderate) x spending pattern 4	0	0.381	-0.0496	-0.00000101	-0.106	-0.367	0.147	-0.00781	0.135	-0.0431
	(.)	(1.50)	(-0.18)	(-0.00)	(-0.44)	(-1.46)	(0.54)	(-0.03)	(0.53)	(-0.18)
(liquidity = moderate) x spending pattern 5	0	0.112	-0.228	-0.0701	0.165	0.364	-0.0378	-0.471	-0.228	0.0120
	(.)	(0.39)	(-0.79)	(-0.19)	(0.54)	(1.27)	(-0.13)	(-1.57)	(-0.78)	(0.04)
vignette: 1, 2 or 3 ($\{H_{70}, H_{70}\}$)	0	0	0	0	0	0	0	0	0	0
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
vignette: 5 ($\{H_{75}, H_{75}\}$)	0	0.00739	0.160**	0.239***	0.0655	0.221***	0.0904	0.0282	0.100	0.128**
	(.)	(0.11)	(2.25)	(3.02)	(1.01)	(3.45)	(1.34)	(0.42)	(1.41)	(2.02)
vignette: 6 ($\{H_{75}, M_{75}\}$)	0	0.118*	0.0521	0.0375	0.0204	0.0492	-0.105	-0.124*	-0.0835	-0.105*
	(.)	(1.69)	(0.74)	(0.46)	(0.32)	(0.79)	(-1.58)	(-1.87)	(-1.17)	(-1.65)
vignette: 7 ($\{H_{75}, D_{75}\}$)	0	0.0459	0.151**	0.135*	0.0915	0.383***	0.0160	-0.0485	0.0312	-0.0595
	(.)	(0.68)	(2.11)	(1.65)	(1.43)	(5.77)	(0.24)	(-0.73)	(0.43)	(-0.92)
vignette: 8 ($\{M_{75}, D_{75}\}$)	0	0.192***	0.0903	0.0273	0.0203	0.290***	-0.0953	-0.0985	-0.0839	-0.114*
	(.)	(2.76)	(1.25)	(0.33)	(0.31)	(4.39)	(-1.41)	(-1.45)	(-1.16)	(-1.73)
Individuals	2420									
Observations	84700									
Log-likelihood	-68858.5									

Notes: *, ** and *** denote significance at 90%, 95%, and 99% respectively. t-statistics clustered by individual in parentheses. All estimates are interaction terms with their corresponding saving motive.$\{H_{75}, H_{75}\}$: both members of the hypothetical household are in good health and expect to remain in good health until at least age of 75. M_{75}: the household member will have some difficulties with activities of daily living (ADL) within ten years after the start of retirement. D_{75}: the household member will pass away within ten years after the start of retirement. See Table 1 for the full-text for the saving motives as presented to participants.

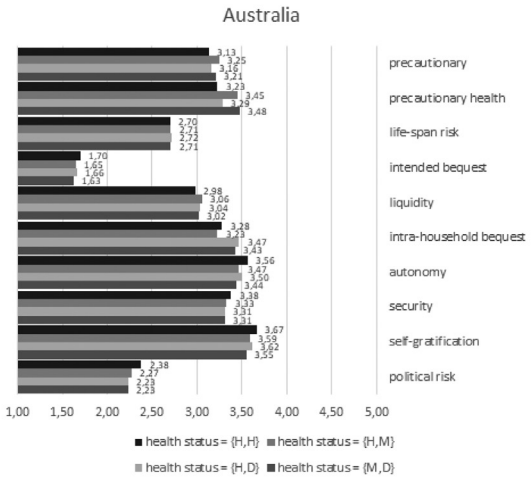


(a) health status $= \{H_{70}, H_{70}\}$

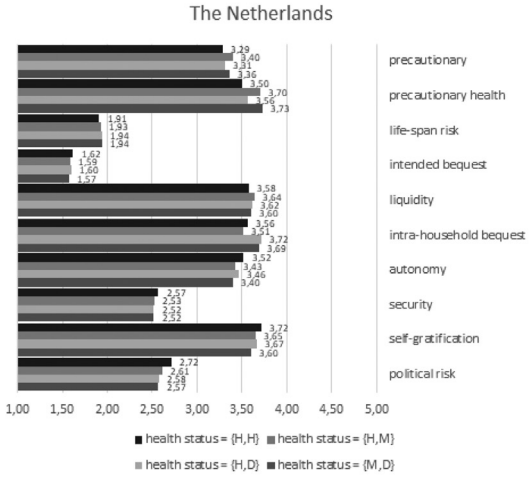
(b) health status $= \{H_{70}, H_{70}\}$



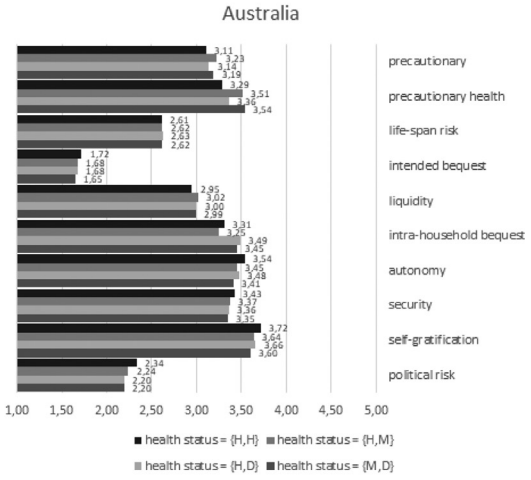
(c) liquidity $=$ low



(d) liquidity $=$ low



(e) liquidity $=$ high



(f) liquidity $=$ high

Fig. 3. Average expected importance of saving motives by treatment and country. *Notes:* Expected rankings were calculated per participant and averaged over individuals per saving motive. A participant assesses the importance of five saving motives per treatment. The 'most important' motive is assigned value 5 whereas as the 'least important' motive is assigned value 1. Thus, a value above three suggest that the motive is important, whereas a value below three indicates that the motive is not that important. $\{H, H\}$: both members of the hypothetical household are in good health and expect to remain in good health until at least age 75. M: the household member will have some difficulties with activities of daily living (ADL) within ten years after the start of retirement. D: the household member will pass away within ten years after the start of retirement. See Table 1 for the full text for the saving motives.

Table 8
Average expected importance of saving motives by retirement income policy per spending pattern.

		Treatment									
		varying retirement income policy design									
	Liquidity =	low					high				
	Health status =	$\{H_{70}, H_{70}\}$					$\{H_{70}, H_{70}\}$				
	Spending pattern(s) =	[very high sp.]				[very low]	[very high sp.]				[very low]
		$s=1$	$s=2$	$s=3$	$s=4$	$s=5$	$s=1$	$s=2$	$s=3$	$s=4$	$s=5$
Saving motive (m)											
The Netherlands											
Economic											
$m=1$	precautionary	3.15	3.38	3.45	3.45	3.47	3.30	3.31	3.43	3.46	3.45
$m=2$	precautionary health	3.32	3.41	3.70	3.62	3.56	3.37	3.51	3.73	3.56	3.60
$m=3$	life-span risk	2.13	1.88	1.92	1.94	2.17	1.91	1.85	1.80	2.05	2.10
$m=4$	intended bequest	1.70	1.43	1.58	1.64	1.62	1.60	1.47	1.64	1.58	1.63
$m=5$	liquidity	3.66	3.68	3.63	3.58	3.45	3.67	3.64	3.56	3.52	3.56
$m=6$	intra-household bequest	3.32	3.46	3.41	3.61	3.15	3.35	3.54	3.41	3.32	3.27
Psychological											
$m=7$	autonomy	3.44	3.57	3.57	3.46	3.55	3.45	3.52	3.49	3.63	3.69
$m=8$	security	2.86	2.60	2.54	2.55	2.43	2.77	2.62	2.63	2.61	2.54
$m=9$	self-gratification	3.69	3.87	3.52	3.26	3.66	3.84	3.86	3.62	3.46	3.38
$m=10$	political risk	2.72	2.71	2.68	2.88	2.93	2.73	2.66	2.69	2.80	2.77
Australia											
Economic											
$m=1$	precautionary	2.95	3.22	3.29	3.28	3.30	3.12	3.14	3.27	3.28	3.28
$m=2$	precautionary health	3.08	3.20	3.51	3.42	3.34	3.15	3.32	3.54	3.34	3.39
$m=3$	life-span risk	2.94	2.53	2.61	2.66	2.97	2.62	2.50	2.46	2.82	2.88
$m=4$	intended bequest	1.83	1.49	1.67	1.73	1.72	1.70	1.54	1.73	1.68	1.74
$m=5$	liquidity	3.01	3.08	3.00	2.94	2.79	3.05	3.03	2.94	2.87	2.91
$m=6$	intra-household bequest	3.03	3.21	3.15	3.36	2.86	3.08	3.30	3.15	3.05	2.98
Psychological											
$m=7$	autonomy	3.43	3.61	3.60	3.48	3.56	3.46	3.55	3.51	3.64	3.70
$m=8$	security	3.74	3.44	3.39	3.42	3.29	3.64	3.46	3.50	3.49	3.41
$m=9$	self-gratification	3.66	3.89	3.51	3.23	3.64	3.84	3.87	3.62	3.43	3.35
$m=10$	political risk	2.33	2.34	2.30	2.50	2.54	2.35	2.29	2.31	2.42	2.38

Notes: Expected rankings were calculated per participant and averaged over individuals per saving motive. A participant assesses the importance of five saving motives per treatment. The 'most important' motive is assigned value 5 whereas as the 'least important' motive is assigned value 1. Thus, a value above three suggest that the motive is important, whereas a value below three indicates that the motive is not that important. $\{H_{70}, H_{70}\}$: both members of the hypothetical household are in good health and expect to remain in good health until at least age of 70.

Focusing first on the expected importance of the saving motives by country reported in Fig. 3(a) and (b), *life-span risk* is much more important in Australia than in the Netherlands where retirees are typically not concerned about running out of pension wealth since state and occupational pensions are fully annuitised. Accordingly, a similar result is found for *security* ("having enough money to have peace of mind"). On the other hand, mandatory annuitisation in the Netherlands makes the Dutch much more concerned about *liquidity* than the Australians. Other motives are similarly important in both countries. For example, the motive *self-gratification* ("wants to be able to enjoy life now and later") always has the highest average rank. This motive is particularly important for those who advise high spending ($s=1$ or $s=2$; see Table 8), as one might expect. In addition, *autonomy* ("to remain financially independent") is similarly important in both countries.

The *intra-household bequest* motive is important in both countries, but not the *intended bequest* motive. This suggests that people save for unexpected expenses and to financially protect their partner as a surviving spouse but are less concerned about the distant future. This aligns with Beshears et al. (2014), who found that the desire to give money to children (*bequest*) and worries about dying early (*life-span risk*) are much less important than flexibility in the timing of their spending or having enough income later in life. The *intra-household bequest* motive is more important for Dutch participants than for the Australians. This is consistent with current arrangements in the Netherlands, where it is common to consider state and occupational pensions as household income, and benefit design usually guarantees that a surviving spouse is able to maintain their standard of living. Australia's income replacement DC system, on the other hand, does not require annuitisation, so if the surviving spouse lives long enough, there is a chance they will run out of money. *Political risk* also matters more in the Netherlands than in Australia, due to the fact that pension reforms in the Netherlands are still ongoing, while substantial reforms in Australia had already taken place at the time of the survey.

There is virtually no within country difference between the high and low liquidity treatments. Thus, for example, putting the Dutch participants in the high liquidity Australian setting does not make the motives *lifespan risk* or *security* as important as in Australia. This suggests that participants are shaped by their own institutions and do not easily respond to a change in

the policy setting, in line with Brown et al. (2017) who ascribe this to cognitive constraints. Individuals adjust only gradually over time, under the influence of changing social norms and increasing awareness of new risks and opportunities. This also hampers the evaluation of policy changes, as it may take a long time before the full effect of a policy change is realised.

Figures 3 (c)–(f) present the expected importance of the saving motives for the health status treatments (vignettes 5–8), separately for low and high liquidity of wealth respectively. In both countries, the expectation that one of the members of the couple will develop difficulties with activities of daily living ($\{H_{75}, M_{75}\}$ or $\{M_{75}, D_{75}\}$) raises the importance of the *precautionary health* motive, as expected. It also raises the importance of the *other precautionary* motive, though much less. Health concerns tend to reduce the importance of *self-gratification* or *autonomy*. In the Netherlands, health concerns also reduce the importance of *political risk*. Expecting the death of a spouse raises the importance of the *intra-household bequest* motive in both countries, making concerns about the financial resources of a surviving spouse more salient.

Finally, the expected rank of each saving motive by retirement income policy design and advised spending pattern is presented in Table 8. For the Dutch participants in the low liquidity setting (column 3, equivalent to the actual institutional setting in the Netherlands) the most important reasons to hold on to wealth (i.e. advise moderate spending; $s = 3$) are *precautionary health, liquidity* of pension wealth and *autonomy*. However, Australian participants in the high liquidity setting (column 8, reflecting Australia's actual pension arrangements), find *precautionary health, self-gratification* and *autonomy* the most important reasons to hold on to wealth. *Intended bequest* is the lowest ranked saving motive in both countries.

8. Conclusion

Recent empirical studies in the United States, the Netherlands and Australia have shown that retirees do not draw down their wealth during retirement, contradicting the theoretical predictions of the standard life cycle model. To address this stylised fact we have investigated the importance of alternative motives for saving after retirement. In an experimental survey, we asked individuals to advise a spending pattern to hypothetical recently retired households ("vignettes") and to rank the importance of saving motives that justify their advice. We administered the same survey questions in the Netherlands, a country with an income driven pension system, and Australia, with a wealth-driven system and examine the relative importance of saving motives based on economic, and psychological explanations. The experimental setting allows analysis of how the importance of saving motives change in each country if the pension system was replaced by that of the other country - that is, if pension wealth became less or more liquid. We also assess the influence of major health events on the importance of each saving motive, such as a health shock or the death of a spouse.

The data reveal substantial differences between advised spending patterns and the importance of saving motives between Dutch and Australian participants. The Dutch tend to advise higher spending patterns, in line with the higher pension replacement rates in the Netherlands while in Australia the emphasis is on an adequate pension income, typically corresponding to a lower replacement rate. Similarly, differences in the perceived importance of saving motives reflect institutional differences in pension arrangements. Liquidity is of less importance to Australians who are used to highly liquid superannuation pension wealth than to the Dutch with their fully annuitised non-liquid occupational pensions, while *life-span risk* is of greater importance to Australians for the same reason. Concerns about a surviving spouse (*intra-household bequest*) play a larger role in the Netherlands where pensions are typically seen as a provision for the couple, than in Australia where pensions are almost always individually-based. Political risk is considered more important in the Netherlands where the debate on pension reform is ongoing and major changes are still expected, while major Australian reforms had already been implemented at the time of the survey. However, both Dutch and Australian participants place high importance on *self-gratification* and *autonomy*. As pension systems move from DB to DC and policy attention moves to decumulation, these findings have implications beyond Australia and the Netherlands to global pension reform more generally.

The vignette methodology allows participants to make choices in different situations, including counterfactual settings that do not reflect the institutions of their own country. It appears that changing liquidity (the income and wealth combination of retirement benefits) affects the advised consumption pattern in both countries. Dutch participants become less conservative (i.e., they more often advise a high spending pattern) if their pension wealth is more liquid than in the actual Dutch pension system. Correspondingly, Australian participants become more conservative in a setting with lower availability of wealth and higher annuity income than in their actual institutional setting. On the other hand, our results suggest that the importance of most saving motives is not substantially affected by the pension wealth liquidity treatment.

However, our results show that expected major health shocks or mortality do have an impact on the advised spending pattern and underlying saving motives. Not surprisingly, expecting a health shock in the near future raises the importance of the *precautionary health* motive. Similarly, the expectation that one of the household members dies within 10 years after retirement significantly raises the importance of the *intra-household bequest* motive. Overall, the results suggest that the experimental liquidity of pension wealth treatment, as a proxy for the institutional setting, hardly affects the importance of saving motives at the start of retirement. Indeed, existing and significant country-differences persist even when participants are presented an unfamiliar institutional (liquidity of wealth) setting.

In the absence of expected major health shocks or mortality of the partner, advising a conservative spending pattern is associated with a greater importance of precautionary savings for health (the *precautionary health* motive) and remaining financially independent (*autonomy*). High spending advice (which is far less frequently advised), however, is often justified by the *self-gratification* motive. In contrast to the results for structural lifecycle models in the US context, for example in

De Nardi et al. (2016), our results suggest that *intended bequest* and *life-span risk* are less important, irrespective of the country of residence, advised spending pattern, or the institutional setting.

Our results have several important implications for policy design to address the tendency for people to hold onto their pension wealth in retirement. First, the availability of liquid pension wealth (i.e., a lump sum instead of life-time annuity), our proxy for the institutional setting, explains a rather small part of the cross-country difference in advised spending patterns or the ranking of the saving motives, at least in the short run. Higher liquidity of wealth is associated with higher spending patterns and less emphasis on the *precautionary* saving motive, but the effect is too small to explain the difference between the Netherlands and Australia. This may mean that, in the short run, individuals do not respond as expected to change in the liquidity of wealth at the start of retirement. It may also hamper the evaluation of major changes in pension policy, as it may take a long time before the full effect of a major policy change is noticed in practice. Second, the most important saving motive for both Dutch and Australian participants who advise conservative spending is *precautionary health* which might be an indication that these people are self-insuring against later life health and long-term care expenses. This suggests a lack of awareness of how well people are insured until they experience a health shock and perhaps a role for public and/or private long-term care insurance. Finally, the relatively high importance of the *intra-household bequest* motive relative to the *intended bequest* motive suggests greater policy attention to survivor benefits is required.

Based on the findings presented in this paper, at least three important directions for future research can be identified. First, lifetime consumption and saving decisions are complex choices for individuals. One option is to use choice architecture to set drawdown decisions for a substantial proportion of individuals (Benartzi and Thaler, 2007).[20] Second, in our experimental setup we ask participants to choose between different constant spending patterns before indicating their preferred saving motives. An interesting extension would be to analyse preferences for saving motives for variable spending patterns, such as higher consumption at the start of retirement, followed by less spending later, which is a policy design under consideration in the Netherlands. A further extension could be to incorporate housing assets to generate income or be considered as a bequest.

Declaration of Competing Interest

None.

Appendix A

A1. Pre-test to identify a short list of saving motives

A1.1. Background and methodology

A review of the economics, psychology and behavioural literature on motives for the spending and saving behaviour of individuals in retirement (see Section 3) identified 19 possible motives. These motives, categorised as economic, behavioural or psychological are listed in Table A.1. We used a pre-test based on best-worst scaling to reduce the 19 potential saving motives to a subset of ten to be included in the experimental task. We did so to minimise cognitive exhaustion while maintaining econometric power. The pre-test was fielded to samples of 100 people aged 50 and over in Australia and the Netherlands in September/October 2016. The commercial web panel provider Pureprofile was used in Australia and the commercial web panel provider Survey Sampling International (SSI) in the Netherlands.

We used a Balanced Incomplete Block Design (BIBD) (Louviere et al., 2015) to make 19 multiple comparison sets comprising ten of the 19 initial saving motives. In order to minimise cognitive load in the pre-test we split these into one set of nine and one set of ten saving motives. In an online survey, participants were randomly assigned to nine or ten sets of ten saving motives and in two rounds of best/worst they were asked to nominate the 'most' and 'least' important motives for saving during retirement. Figure A.1 shows an example.[21]

A1.2. Results

The ranking of the saving motives from the best-worst scaling task is summarised in Table A.1.[22] The precautionary, precautionary health, liquidity, intra-household bequest, mental account II, autonomy, security, self-gratification and political risk are among the top 10 in both countries. Life-span risk is in the top 10 in Australia only, whereas the top 10 in the Netherlands is completed by the mental account I motive.

These results indicate that in general, motives we categorise as economic and psychological are more important than other motives for both Australian and Dutch participants. As expected, life-span risk scores higher in Australia (top 8) than in the Netherlands, where it is the least important saving motive. This aligns with the fact that few retired households in Australia purchase longevity products, exposing themselves to the risk of outliving their wealth. On the other hand, political

[20] This is investigated in Alonso-García et al. (2021).

[21] A 'live' version of the Australian survey is available at http://survey.us.confirmit.com/wix/8/p3080388548.aspx.

[22] The ranking of the saving motives follows from the "Sum of All Possible Pairs" (i.e., knowing most important reason to save, 2nd most important reason to save, least important reason to save and 2nd least important reason to save, we compute how many of the all possible ten options it would surpass). See Louviere et al. (2015) for more information.

Table A.1
Ranking of 19 possible saving motives.

Reasons to save	Australia	The Netherlands
Economic		
You want to ensure that you will be able to finance any unforeseen expenditures other than health and aged care expenditures. [precautionary]	5	6
You want to ensure that you will be able to finance unforeseen health and aged care expenditures. [precautionary health]	6	1
You want to ensure that you will not outlive your wealth. [life-span risk]	8	19
You want to ensure that you will be able to leave a bequest to your dependents or estate. [intended bequest]	18	18
You want to ensure that you have enough cash on hand at any time. [liquidity]	4	2
You want to ensure that if you die, your partner is able to maintain his/her standard of living. [intra-household bequest]	7	7
You want to ensure that you have enough money at hand to help your children finance their house (or other unforeseen events). [inter-vivos]	17	14
Behavioral		
You want to ensure that the amount of your total wealth remains constant over time. [habit formation (1)]	13	12
You want to ensure that the level of your monthly savings remains constant over time. [habit formation (2)]	11	16
You want to ensure that your spending level remains constant over time. [habit formation (3)]	12	11
You want to stick to what you are used to because you tend to delay making decisions. [procrastination]	16	13
Behavioral - mental accounts		
You want to ensure that you will have savings in one account to leave a bequest to your dependents or estate and savings in another account for unforeseen expenditures. [mental account I]	15	10
You want to ensure that you will have sufficient savings to cover unforeseen expenditures and intend to leave any unused savings as a bequest to your dependents or estate. [mental account II]	9	9
Psychological		
You want to ensure that you remain financially independent. [autonomy]	2	3
You want to ensure that your wealth continues to increase. [speculation]	14	17
You want to ensure that you have enough money to have peace of mind. [security]	1	8
You want to ensure that you have enough money so that you feel that you have been successful in life. [self-esteem]	19	15
You want to ensure that you are able to enjoy life now as well as later. [self-gratification]	3	5
You want to ensure that you are protected against a change in the superannuation/pension rules. [political risk]	10	4

Notes: the saving motives selected for the experimental survey are highlighted in bold italics.

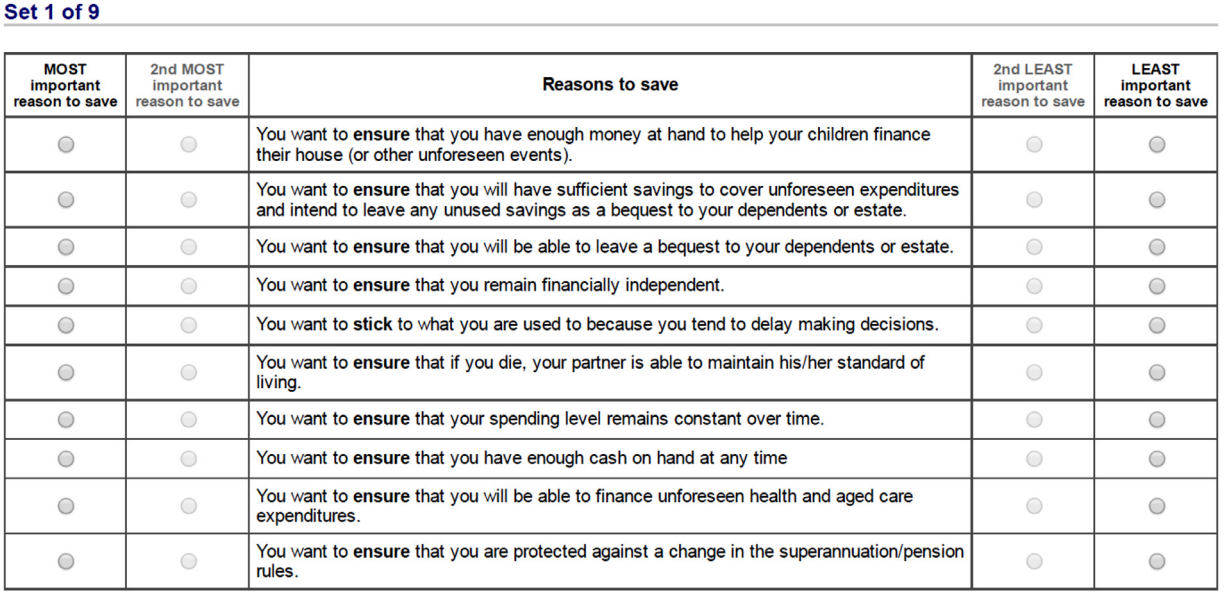


Fig. A.1. Example comparison set to elicit best/worst saving motives.

risk scores much higher in the Netherlands (top 4) than in Australia (top 10). This can be explained by the lack of indexation and even nominal cuts to Dutch second pillar pensions in recent years, and by the debate on further reforms expected to reduce pension generosity. Interestingly, intended bequest (for others than the partner) does not score among the top 10 reasons to save in retirement in either Australia or the Netherlands.

The ten motives we include in our experimental task are highlighted in bold italics in Table A.1. This list deviates from the list of top 10 motives identified in our pre-test for two reasons. First, the pre-test was fielded before we finalised the experimental design. Consequently, the hybrid mental accounts motives turned out to be unworkable in our final design. Second, it was important to include a lesser ranked motive, such as the intended bequest motive, in the experimental set-up to enable comparison with the academic literature.

A2. Base vignette

Table A.2
Text of the base vignette.

The household consists of two individuals currently 65 years old who have just retired. [INSERT FUTURE HEALTH EXPECTATIONS].
The household has a net of tax lifetime income of [INSERT INCOME] and their wealth at retirement is [INSERT WEALTH]. The household owns the house they live in, without a mortgage. They don't want to move or sell their house. If one member of the household dies, the survivor will receive less income but also spend less. The reduction in income is roughly equivalent to the reduction in spending.
At retirement the household has to plan how much they expect to save and spend, based on their income and current wealth. The following table shows five different spending plans together with income and wealth at different ages (if they survive). If their wealth is exhausted then the household has to adapt their spending to their income. [INSERT IMPLIED ENDORSEMENT or not]
Finally, you can assume that prices do not change over time.
Part A:
What spending plan do you advise the household to choose, based on your preferences?
<< Show five different SPENDING PLANS, accompanied by a reminder of annual and fortnightly/monthly income, and information about remaining wealth at ages 65, 75, 85, 95 >>
Part B:
Below you see five possible reasons to choose a specific spending plan.
Please indicate which reason is the most important for this household, based on your own preferences, and which saving motive is the least important. Then indicate which saving motive is the 2nd most important and the 2nd least important.
<< Show five different SAVING MOTIVES in each choice set, randomly selected from 10 (subject to category restrictions)>>

A3. Additional summary statistics and predictions

Table A.3
Distribution of the ranking per motive (%).

		Ranking (r)					Obs.
		[least imp.]				[most imp.]	
		$r=1$	$r=2$	$r=3$	$r=4$	$r=5$	
Saving motive (m)							
The Netherlands							
Economic							
$m=1$	precautionary	0.09	0.17	0.27	0.27	0.21	4936
$m=2$	precautionary health	0.08	0.12	0.23	0.27	0.29	4957
$m=3$	life-span risk	0.46	0.35	0.13	0.04	0.03	4964
$m=4$	intended bequest	0.67	0.19	0.08	0.03	0.03	5157
$m=5$	liquidity	0.05	0.13	0.22	0.31	0.28	5063
$m=6$	intra-household bequest	0.08	0.12	0.25	0.29	0.26	5100
Psychological							
$m=7$	autonomy	0.08	0.15	0.20	0.27	0.29	5058
$m=8$	security	0.23	0.33	0.18	0.14	0.11	4948
$m=9$	self-gratification	0.07	0.14	0.17	0.23	0.39	5142
$m=10$	political risk	0.19	0.31	0.26	0.15	0.09	4970
Australia							
Economic							
$m=1$	precautionary	0.11	0.21	0.22	0.26	0.20	3450
$m=2$	precautionary health	0.09	0.16	0.23	0.27	0.25	3322
$m=3$	life-span risk	0.26	0.24	0.18	0.14	0.17	3351

(*continued on next page*)

Table A.3 (*continued*)

		Ranking (r)					Obs.
		[least imp.]				[most imp.]	
		$r = 1$	$r = 2$	$r = 3$	$r = 4$	$r = 5$	
$m = 4$	intended bequest	0.67	0.15	0.10	0.06	0.03	3488
$m = 5$	liquidity	0.15	0.26	0.27	0.20	0.12	3482
$m = 6$	intra-household bequest	0.12	0.15	0.25	0.30	0.18	3550
Psychological							
$m = 7$	autonomy	0.08	0.16	0.21	0.23	0.32	3510
$m = 8$	security	0.09	0.19	0.21	0.22	0.29	3442
$m = 9$	self-gratification	0.09	0.14	0.16	0.21	0.40	3399
$m = 10$	political risk	0.33	0.34	0.18	0.10	0.04	3411

Notes: A participant assesses the importance of five saving motives per treatment. The 'most important' motive is assigned value 5 whereas as the 'least important' motive is assigned value 1.

Supplementary material

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.jebo.2022.04.005.

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