

# Beyond framing: the role of information, the endowment effect and institutional setting in annuity valuation

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## ABSTRACT

In this paper we investigate the understanding and valuation of lifetime annuities relative to flexible drawdown products using iterative multiple price lists embedded in an online experimental survey. We set our study in Australia and The Netherlands to exploit the familiarity of the Dutch with annuities and Australians with flexible drawdown products. Our findings highlight the role of information provision, effort, the endowment effect and the impact of wealth illusion. We find that provision of timely, balanced information and opportunities to learn about the key features of annuities and flexible drawdown products narrows the gap between the 'willingness to pay' and 'willingness to accept' annuities, and offsets framing effects, except for those low involvement with the experimental task. We also confirm the impact of wealth illusion on the valuation of annuities and find that participants who have thought more about retirement planning and have a need for income in retirement have a better understanding of retirement benefit products. Institutional effects remain strong with Australians and Dutch participants indicating greater understanding of retirement benefit products with which they are familiar, despite being presented with identical information in the experimental survey.

**Keywords:** Annuity demand, information, framing, cross-country analysis.

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# 1 Introduction and motivation

Until recently retirees in most developed countries received lifetime pensions from defined benefit public and occupational pension plans. Receipt of phased withdrawal products or lump sums were the exception. However, this is rapidly changing and there is an increased prevalence of defined contribution plans with choice of retirement benefit (OECD, 2017). Notable examples of countries with choice of withdrawals from defined contribution and personal pension plans include, the UK following the abolition of mandatory deferred annuitization in 2015 (Cannon et al., 2016) and Australia’s superannuation system which allows retirement savings to be allocated to portfolios of annuities, phased withdrawal products (known as account-based pensions) and lump sums (Bateman, 2016). The Netherlands is considering reforms which will provide more choice of pension plan withdrawals (Bovenberg and Nijman, 2017). The implication is that retirees around the world will increasingly be asked to select a portfolio of retirement benefit products - typically a lifetime annuity product and a product which allows flexible withdrawals from a pension account.

Choosing a retirement benefit or a portfolio of benefits is a complex decision. The typical life annuity and flexible withdrawal products have a range of different characteristics, which are difficult to understand for people with little familiarity of the products and in the absence of high levels of financial capability (Bateman et al., 2016). And, product familiarity is absent where policy and product design is new and there has been little opportunity to learn from experience, peers or elders (Bernheim, 2002).

The growing literature on retirement benefit decisions has investigated optimal allocations to retirement benefit products including annuities and flexible drawdown products (Maurer et al., 2013) and rational and behavioural explanations for lower levels of annuitization than predicted by theory (Brown, 2009b). Behavioural explanations explored have included information framing (Brown et al., 2008b; Agnew et al., 2008; Bockweg et al., 2017), mental accounts (Brown et al., 2017a), stickiness to defaults (Benartzi et al., 2011; Butler and Teppa, 2007), complexity (Brown et al., 2017b), and the use of heuristics (Bateman et al., 2016). Areas of inquiry in recent studies include investigation of widely divergent valuations for small increases versus small decreases in lifetime income payments in the context of US Social Security (Brown et al., 2017a, 2017b), and the role of financial capability and effort in understanding product features when allocating retirement assets between a lifetime annuity and an investment account (Bateman et al., 2016).

In this paper we contribute to the growing literature on retirement benefit decisions by investigating both understanding and relative valuation of lifetime annuities and flexible drawdown products in a cross-

country context. In doing so, we are particularly interested in the effect of information, the endowment effect and the influence of personal characteristics on annuitization choices. Our countries of choice are Australia and The Netherlands which have very similar multi pillar retirement income arrangements, yet quite different payout structures. The Dutch mandatory income replacement pillar is almost always annuitized, while Australian retirees are offered choice of retirement benefit, with most taking flexible withdrawal products.

We designed and implemented an online experimental survey of annuitization choices using iterative multiple price lists (iMPLs) to elicit revealed preferences, which we fielded to representative samples of approximately 1,000 Dutch and 1,000 Australian pre-retirees aged 50-64 in June 2017. The experimental design involves five between-subject treatments - country (Australia, The Netherlands), marital status (single, married), household income (4 levels), information framing (consumption gain, consumption loss, investment gain, investment loss) and product endowment (WTA, WTP). Six within-subject iMPL tasks (which differ by the benchmark allocation of retirement assets between an annuity product, which we call a Lifetime Guaranteed Income product, and a phased withdrawal product, which we call a Flexible Account product) were presented to elicit annuitization preferences. Before completing the six iMPL tasks participants are asked about their perception of the two products in terms of understanding, riskiness and level of control. This allows us to examine both how participants perceive and value the Lifetime Guaranteed Income Product relative to the Flexible Account product.

A feature of the experimental design is that participants are provided with multiple opportunities to learn about the two retirement benefit products. First, before completing the six iMPL tasks, participants are presented with general information about the two retirement benefit products (which differs by frame). Second, they then complete an incentivised product knowledge review quiz for which their responses are reported as correct or incorrect. Third, participants are asked about their perception of the two products, which induces them to reflect on the product features. Fourth, when completing each of the six iMPLs participants are reminded of the key product features (which differs by frame), and finally, to assist with their choice for each iMPL, participants can elect to use an on screen interactive retirement calculator, which shows the possible implications of the take-up of the products. These design features allow us to investigate the impact of information provision and framing on annuitization decisions. Another feature is that participants are randomly assigned to either the WTP or a WTA condition, which allows investigation of the endowment effect. Furthermore, the six within-subject iMPLs tasks with different benchmark product portfolios enable investigation of access to liquidity. Finally, we also collect

a comprehensive set of covariates, which allows us to examine the influence of personal characteristics, access to financial resources, financial capability, propensities to save and plan for retirement and personal traits, and perceptions on and valuation of annuities relative to flexible drawdown products.

For the perceived understanding of the retirement benefit products, we find that participants who are financially competent and put effort into the experimental survey are better able to understand the product features, that framing effects are minimal and that participants who have thought more about retirement planning and have a need for income in retirement have a better understanding of the Lifetime Guaranteed Income product. Institutional effects are strong, with Australian participants showing less understanding of the Lifetime Guaranteed Income product, with which they would be unfamiliar due to the workings of the Australian retirement income arrangements in which drawdown products are the product of choice and the voluntary annuity market has been, until very recently, almost non-existent (Iskhakov et al., 2015).

For the valuation of annuities (the Lifetime Guarantees Income product) relative to the Flexible Drawdown products we confirm earlier studies by finding a gap between WTP and WTA. However, the gap in our experimental survey is much smaller than in earlier work which we contribute to experimental design. We find limited effect of information framing, with effects only for participants who were less engaged in the experimental survey. We confirm earlier studies by finding the wealth illusion, that is participants with a higher income value annuities more than those with a lower income.

The paper proceeds as follows. In Section 2 we summarize the relevant literature. Section 3 describes the experimental design, including the five between-subject treatments and the six within-subject iMPL tasks, and describes the covariates we collect. Section 4 reports regression results on perceived understanding of the retirement benefit products, while section 5 analyses the factors that explain the valuation of annuities relative to flexible drawdown products. Section 6 concludes.

## **2 Literature on framing and endowment effect**

The literature regarding the attractiveness for buying annuities as retirement provision for individuals include a several papers which show the effect of framing and the reference point. Literature on framing focus on whether presenting the information in a consumption frame -annuities providing an income for life- or investment frame -you need to live up to age X to get more than you paid for- and/or gain frame -highlighting positives- or loss frame -highlighting negatives-. Experiments have been conducted using retirement savings and social security benefits.

There are a number of papers which investigate the attractiveness of annuities. Agnew et al. (2008) show that if information is provided which is favorably biased towards annuities (investment), subjects are more (less) likely to opt for the annuity option. The default -annuity or investment option- has little to no effect on the allocation of the subject. Brown et al. (2008a) show that subjects are more likely to consider a fictitious person's decision to purchase an annuity relative to a person who has an investment account to be the better choice when presented in a consumption frame (around three quarters in the case bequest goes to charity). However, the fraction of subjects who consider that the fictitious person who bought an annuity have made a better decision is reduced to around one quarter when annuities are presented in an investment frame where the remaining payments are left to the children instead of charity. In addition, Beshears et al. (2014) test whether frames have an influence on the decision to purchase an annuity and the fraction of retirement savings annuitized. They find only significant effects for the investment frame and the frame highlighting flexibility and control of a lump sum, both reducing the attractiveness of annuities.

Framing has also been investigated in the Social Security Benefit (SSB) claiming in the US. Brown (2009a) argues that people might be ill-informed, financial unsophisticated for making informed rational decisions whether to annuitize or not. Given that people are more familiar with SSB than with annuities, subjects might be better capable to make the tradeoff between income and lump sum in this setting. Brown et al. (2016) find that a gain frame leads to later claiming than a loss frame and that the higher the default age of claiming, the higher the age of claiming SSB. However, they find no significant effect that the consumption frame leads to later claiming of SSB than investment framing. Brown et al. (2016) show that there is a significant status quo bias in SSB valuation. The value of buying an additional \$100 monthly SSB is much less than selling the additional \$100 monthly SSB. This is in line with Thaler (1980) who found that students given a mug valued it much more than students who were not given a mug. Reb and Connolly (2007) show that the main driver of the divergence between willingness to pay and willingness to accept is due to subjective feeling of ownership. Whereas delaying SSB is a way to annuitize wealth, caution should be taken to extrapolate these findings to retirement savings decisions. First, almost half of the people either claim SSB at the earliest age that they qualify for it or when they retire (Munnell and Chen, 2015). This indicates that they see it as an accrued right, which they stake a claim when they can (age 62) or when they withdraw from the labor force. They do not see delaying SSB using savings to provide an income for some years-as purchasing a (cheap) annuity. Second, people's attitude towards the government, the provision of the government of retirement income, and

the (political) risk regarding changing SSB arrangement (especially given financial sustainability of the arrangement in an aging society) might play a role in the perceived attractiveness of SSB.

### 3 Experimental design

We designed and implemented an experimental survey to investigate the effect of information, the endowment effect and the influence of personal characteristics on the annuitization decision. We utilize revealed preferences elicited from iterative multiple price lists to allow us to control information provision, and the experimental setting allows us to conduct a cross country analysis by minimizing effects induced by institutional arrangements.

In June 2017 we surveyed 1,000 Australians and 1,003 Dutch aged 50-64 who are either not retired or part of a couple where at least one is in the labour force. Participants were sourced from a panel maintained by Survey Sampling International with a subject pool of over 500,000 in Australia and 300,000 in the Netherlands. Participants were paid up to A\$7 in Australia and €5 in the Netherlands for a completed survey, which had a median time of completion of 35 minutes. Screen shots of the Australian and Dutch surveys are available in the Supplemental Materials, and live versions of the two surveys can be found at <http://survey.us.confirmit.com/wix/p3080148164.aspx> (Australian version) and <http://survey.us.confirmit.com/wix/1/p3082840831.aspx> (Dutch version).

#### 3.1 iMPL methodology

The use of Multiple Price Lists (MPL) to elicit willingness to pay has a long tradition in economics and decision making: see for example Kahneman et al. (1990). The advantage of the MPL method is that it is relatively straightforward to elicit preferences from a participant, where they are presented with a range of ordered prices and asked to indicate “yes - I would choose” or “no - I would not choose” for each price. A disadvantage is that a concerning proportion of participants exhibit multiple switching behavior, inconsistent with economic theory (see, for example Bruner, 2011; Holt and Laury, 2002; Goeree et al., 2003).

To prevent such irrational behavior, Harrison et al. (2005) introduced switching MPLs (sMPLs). In a sMPL monotonicity is enforced by asking a participant to pick the switch point from one lottery to the other and to identify the prices at which they would not switch. This is enforced by having a price list where when the participant indicates for one of the trade-offs either that he prefers ‘Option A’ or indicates that he prefers ‘Option B’, and the other choices are filled automatically. Hence, for the trade-offs on

the price list above the one selected, the choices will automatically be set to 'Option A' and for the trade-offs in the list below the one selected the choices will automatically be set to 'Option B'. The sMPL mechanism has a couple of advantages. First, it reduces the effort the participant has to undertake since the participant only has to click on one of the options on the list to indicate preferences for all trade-offs on the list. Second, it enhances the participant's understanding of the task, as it is made explicit that there is an order in the attractiveness of the trade-offs on the list, which reduces the cognitive load of the task.

An extension of sMPL is the iterative MPL (iMPL) which consists of multiple (typically two) rounds of sMPL. In the second round the participant is asked to refine his choice from the first round. The range of alternatives presented in this second round are between the two alternatives from which the participant has switched from 'Option A' to 'Option B' in the first round. Andersen et al. (2009) show that the iMPL method generates more precise estimates and tends to mitigate initial presentation and order effects that are present with the MPL. This is particularly important in retirement savings allocation, as previous studies (see e.g. Hedesstrom et al., 2004; Bateman et al., 2017) have shown that these kind of choices are prone to heuristic choice rules.

The advantage of using iMPL is that with limited number of alternatives presented to a participant, we can create a multiple of this number of alternative switching points (including always choosing Option A and always choosing Option B) without overloading the participant with choice alternatives. In the experimental task which we will discuss in Section 3.3.4, the participant has to consider only five trade-offs in the first stage of the iMPL and four trade-offs in the second stage (which will create 30 switching points), yet, in order to implement the iMPL, we need participants to only switch once.

## **3.2 Between subject treatments**

The experimental survey is designed with five between subject treatments and, as discussed in Section 3.3.5 each participant is shown six within-subject treatments (iMPL tasks). The survey commenced with preliminary questions to screen for the desired sample characteristics and to allocate participants to treatments. The treatments are summarized in Table 1.

The first treatment is the country of residence. There are two treatment groups: Australia and the Netherlands. The difference between these treatments is the language of the survey instrument (English versus Dutch) and the currency (A\$ versus €) used in the survey and tasks. Currencies are converted

Table 1: Between subject treatments

Treatment	# of conditions	Characteristics of conditions
Country of residence	2	NL/AU
Marital status	2	Couple/Single
Retirement income (for full annuitization)	4	See Table 2
Information framing	4	Consumption Gain/ Consumption Loss/ Investment Gain/ Investment Loss
Product endowment	2	WTA/WTP

using pricing power parity (PPP).<sup>1</sup>

The second treatment relates to the marital status of the participant with two treatment groups: single, part of a couple. We consider the annuitization decision to be a household decision and therefore it is important whether the participant is single or part of a couple. For participants who are part of a couple, the annuity (referred to in the experimental task as a lifetime guaranteed income product) is joint with two-thirds reversion to the survivor, whereas a single participant is presented with a single life annuity. Therefore, information for a participant who is part of a couple is presented as “you and your partner”, whereas for a single it is presented as “you”. Therefore, when setting the values in the experimental task we use different prices for the single life annuity and the joint and survivor annuity.

The third treatment relates to the participant’s net retirement income in case of full annuitization. Participants are allocated to one of four post retirement (net) income groups using their answer to a question on current gross household income which we ask at the beginning of the survey. The allocation is done such that it roughly aligns to the household income the participant typically could expect when retired. We take this approach to ensure that participant’s hypothetical retirement wealth (either (partially) annuitized or not) in the experiment reasonably well aligned with their personal circumstances. The advantage of doing so is twofold. First, it makes the experimental task more relevant to the participant and thereby reduces the possibility that the participant is alienated by an unrealistic hypothetical situation. Second, the treatment allows us to investigate the effect of the retirement income distribution on the attractiveness of annuities.

We use a participants current gross household income as a proxy for post retirement income, rather than their actual retirement savings at retirement, for two reasons. First, it allows us to perform a cross-country analysis between two countries with two different retirement systems (e.g. in the Australian DC system the accumulated balance is actual retirement savings, whereas in the Dutch DB system, retirement savings are represented as accrued retirement income). Second, we expect that participants

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<sup>1</sup>Using OECD PPP, €1 = A\$1.729958 see [http://stats.oecd.org/Index.aspx?datasetcode=SNA\\_TABLE4](http://stats.oecd.org/Index.aspx?datasetcode=SNA_TABLE4).





### 3.3 The experimental task

After the initial screening and income treatment allocation question the respondent proceeds to the experimental task. The experimental task has six stages. First, the participant is presented with information about the two retirement benefit products included in the experimental task. Second, the participant completes an incentivized product knowledge quiz. Third, the participant is asked about his/her perceptions of the two products. Fourth, the iterative multiple price list method is carefully explained to the participant using an example. Fifth, the participant completes the experimental component of the survey which consists of six within-subject treatments (iMPL tasks). Sixth, for each of the six treatments the participant is asked how likely it would be that he would actually exchange the one retirement benefit product for the other, given the answers they provided in the experimental task.

#### 3.3.1 First stage: Information and information framing

The experimental task begins with the provision of some general information about the experimental component of the survey and the tasks to be completed. This includes informing participants that they will be presented information about two retirement benefit products and then asked to complete a product knowledge quiz for which they can earn additional monetary rewards. We include the incentivised product knowledge quiz to encourage participants to learn about the products and their features to increase the likelihood that they make an informed choice in the iMPL tasks. Participants are then placed into one of four framing treatment groups and provided with an explanation of the general features of the two retirement benefit products (which differ by frame). The text of the general features of the two retirement benefit products for the four frame treatments is presented in Table 3.

Framing in the context of annuitization has been considered in two dimensions, namely consumption versus investment framing and gain versus loss framing (Agnew et al., 2008; Brown et al., 2008b; Bockweg et al., 2017). The four framing treatments are: consumption gain, consumption loss, investment gain and investment loss. When participants are allocated to a particular frame treatment, this applies to both retirement benefit products. In order to put emphasis on the information framing relevant words relating to a particular frame were printed in bold. In the consumption frame the information provided informs the participant of the effect the products have on their possible expenditure pattern. The presentation format therefore emphasises the words income, expenses and standard of living. In this frame, the trade-off between the two products is having certainty regarding lifelong income versus flexibility regarding matching income with (unexpected) expenditures. In the investment frame the information provided

Table 3: Frames for general product features

Guaranteed Lifetime Income Product	Flexible Account Product
Consumption Gain	
<p>This product provides guaranteed <b>income</b> for your regular <b>expenses</b> for as long as you and your partner live, even if you or your partner live longer than expected. The <b>more</b> you buy of this product the <b>more</b> you have for regular <b>expenditures</b> for the rest of your life.</p>	<p>This product allows you to choose you and your partners <b>income</b> level depending on your <b>expenses</b>. If the account balance is <b>sufficient</b> you will be able to pay for unexpected <b>expenses</b> while maintaining the same standard of living. The <b>more</b> you buy of this product the <b>higher</b> the flexibility you will have to match your <b>expenditures</b>.</p>
Consumption Loss	
<p>This product provides guaranteed <b>income</b> for your regular <b>expenses</b> for as long as you and your partner live, even if you need more for unexpected <b>expenses</b>. The <b>more</b> you buy of this product the <b>less</b> flexibility you have for unexpected <b>expenses</b>.</p>	<p>This product allows you to choose your <b>income</b> level depending on you and your partner's <b>expenses</b>. If the account balance is insufficient you will not be able to pay for unexpected <b>expenses</b> and you may not be able to maintain your <b>standard of living</b>. The <b>more</b> you buy of this product the <b>lower</b> your flexibility to match <b>expenses</b> when your account balance is insufficient.</p>
Investment Gain	
<p>This product provides you with a guaranteed <b>return</b> for as long as you live even if the financial markets perform poorly. If you or your partner <b>live long</b> then you get <b>more</b> than you paid for. The <b>more</b> you buy of this product the higher the <b>gain</b> when you <b>live long</b>.</p>	<p>This product allows you to choose your <b>investment portfolio</b>. The more risk you're willing to take, the <b>higher</b> the expected <b>return</b>. Any remaining account balance is inherited by your dependents or estate when you and your partner die. The <b>more</b> you buy of this product the <b>higher</b> your account balance if financial markets perform <b>well</b>.</p>
Investment Loss	
<p>This product doesn't allow you to take <b>any risk</b>. If the financial markets perform well the value of the product will <b>not increase</b>. If you and your partner <b>die early</b> then you get <b>less</b> than you paid for. The <b>more</b> you buy of this product the <b>more</b> you <b>lose</b> when you or your partner do <b>not live long</b>.</p>	<p>This product allows you to choose your <b>investment portfolio</b>. The less risk you're willing to take the <b>lower</b> the expected <b>return</b>. Your <b>account balance</b> might be insufficient if you or your partner live long. The <b>less</b> you buy of this product the <b>lower</b> your <b>account balance</b> if the financial markets perform well.</p>

informs the participant of the effect the products have on their possible annual return. The presentation format emphasizes the words return, portfolio and account balance. In this frame, the trade-off is between the possibility of earning an excess return versus hedging risk. This occurs in the financial market domain as well as the mortality domain (e.g., outliving your money, bequeathable wealth). A further difference is that the investment frame includes information on whether the product is bequeathable or not, which is not included in the consumption frame. In the gain frame the information related to the products was stated in a positive manner - that is, what the benefits of the product are. On the contrary, in the loss frame the information related to the products was stated in a negative manner - that is, what the downside of the products are.

Following the general product information, the participant is presented with information about the specific product features. As compared to the presentation of the general product features, which differs according to the framing treatment to which the participant was allocated, the specific product features are designed to be frame-neutral and were therefore the same for all participants (with only slight differences when the participant had a partner). For example, frame-neutral product features for the Lifetime guaranteed income product and the Flexible account product are presented in Table 4 for participants who are part of a couple. For singles, “you and your partner” is replaced by “you” and the product feature “What happens if I or my partner dies?” is not presented.

### **3.3.2 Second stage: Product knowledge quiz**

After having been presented the information about the product, the next stage of the experimental task. After having been presented the general information (by frame treatment) and the specific product features (frame-neutral) for the retirement benefit products, the next stage of the experimental task was the product knowledge quiz. When completing the product knowledge quiz the participant is asked to indicate which product features relates to which of the two products. The goal of the product knowledge quiz was twofold. First, to incentivize participants to learn about the products, such that they would make an informed choice in the experiment. Second, to provide participant feedback on their performance (product knowledge) by providing the correct answers (to any incorrectly answered questions) once they had submitted the answers. By providing feedback for incorrect answers, this gave the participants another opportunity to learn about the product features. A screenshot of the product knowledge quiz, including the feedback screen is presented in Figure 1.

From Table 5 we observe that participants have on average four out of five questions correct, but

Table 4: Product features

	Lifetime guaranteed income product	Flexible account Product
How much income will I receive? How long do payments last?	You and your partner will receive a regular income Your regular income will be paid for as long as you or your partner live	You can choose how much to withdraw each month You and your partner can continue to withdraw as long as your account balance is positive
What happens if I <u>or</u> my partner dies?	If one of you passes away, the surviving spouse will receive the regular income. However, the income will be reduced by one third (similar to age pension)	If one of you passes away, any remaining money in your account will be left to the surviving spouse
What happens if I <u>and</u> my partner die?	If both you and your partner have passed away, there will be no inheritance for your dependents or your estate	If both you and your partner have passes away, the remaining money in your account will be inherited by your dependents or your estate
What happens if the prices of things I buy increase?	Your regular income is automatically adjusted to the price level	The amount you withdraw is not automatically adjusted to the price level. However, you can increase the amount you withdraw when the prices increase
What happens if there are fluctuations in financial markets (such as interest rates or share prices)?	Your regular income will be unchanged	Your account balance will fluctuate with financial markets
What happens if I live longer than expected?	As long as you or your partner live, you will receive a regular income	When you or your partner live long you may run the risk of outliving your account.

Figure 1: Product knowledge quiz.

*Each statement applies to only one product.*

	Lifetime Guaranteed Income Product	Flexible Account Product
A regular payment is received for as long as my partner and I live.	<input checked="" type="radio"/>	<input type="radio"/>
My partner and I will have money in an account which we can access at any time. We can choose the amount we receive.	<input checked="" type="radio"/>	<input type="radio"/>
If both my partner and I die, payments stop and the remaining value of the product will be inherited by our dependents or estate.	<input type="radio"/>	<input checked="" type="radio"/>
Payments automatically adjust with price increases.	<input type="radio"/>	<input checked="" type="radio"/>
Our account could fluctuate with financial markets.	<input type="radio"/>	<input checked="" type="radio"/>

**Below are the results; showing the correct answer to each statement with a green tick and whether your response was correct or incorrect:**

	Lifetime Guaranteed Income Product	Flexible Account	Your Responses
A regular payment is received for as long as my partner and I live.	✓		Correct
My partner and I will have money in an account which we can access at any time. We can choose the amount we receive.		✓	Incorrect
If both my partner and I die, payments stop and the remaining value of the product will be inherited by our dependents or estate.		✓	Correct
Payments automatically adjust with price increases.	✓		Incorrect
Our regular payments could fluctuate with financial markets.		✓	Correct

only 44% (43% in the Netherlands and 45% in Australia) made no mistakes. The difficult questions relate to whether the remaining wealth is bequest-able or not and whether the product is subject to financial market risks. On the one hand, slightly more Australian than Dutch participants did not know that the Flexible Account Product's remaining account balance would be bequest-able. On the other hand, slightly more Dutch than Australian did not know that the Guaranteed Lifetime Income Product's payments do not depend on the financial market (contrary to the income from Dutch pension funds, which depends on the funding ratio of the fund).

Table 5: Product knowledge quiz

	Percentage correct answers per question				Total number of mistakes		
	Netherlands	Australia	Sample		Netherlands	Australia	Sample
Q1	95.21%	92.40%	93.81%	0	42.87%	45.20%	44.03%
Q2	83.35%	85.10%	84.22%	1	25.12%	22.20%	23.66%
Q3	71.29%	65.50%	68.40%	2	17.25%	20.70%	18.96%
Q4	69.69%	70.50%	70.09%	3	13.46%	10.80%	12.13%
Q5	75.17%	86.10%	80.63%	4	1.20%	1.10%	1.15%
Average	78.94%	79.92%	79.48%	5	0.10%	0%	0.05%

The left panel of the table displays the percentage of participants who had, for each of the questions displayed in Figure 1, the correct answer. The last row of the left panel corresponds to the average of the five questions of the percentage of participants who had the correct answer. The right panel displays the percentage of participants who had 0 to 5 mistakes in the product knowledge quiz.

### 3.3.3 Third stage: Product perception

Following completion of the product knowledge quiz participants were asked about their perception of the two retirement benefit products. For each retirement benefit product participants were asked about their perceived understanding of the product, their perceived riskiness of the product, and their perceived level of control regarding the product. Responses were collected using a Likert scale with values between 0 and 10. These variables aim to measure the individual's perceived ambiguity, risk and flexibility of each of the products. These questions are asked before the six iMPL tasks, to induce participants to think about the features of the products before completing the choice tasks.

Table 6: Product perception

	-10 to -6	-5 to -2	-1	0	1	2 to 5	6 to 10
Understanding NL	0.10%	1.10%	3.49%	68%	17.25%	9.17%	0.90%
Understanding AU	0%	2.20%	6.60%	76%	10.10%	4.80%	0.30%
Understanding	0.05%	1.65%	5.04%	71.99%	13.68%	6.99%	0.60%
Riskiness NL	0.40%	5.28%	5.38%	23.93%	6.08%	32.10%	26.82%
Riskiness AU	0.80%	5.10%	5.50%	26.80%	8.60%	35.50%	17.70%
Riskiness	0.60%	5.19%	5.44%	25.36%	7.34%	33.80%	22.27%
Control NL	15.45%	18.25%	6.48%	28.61%	8.37%	17.75%	5.08%
Control AU	23.50%	29.90%	7.40%	25.80%	5.70%	6.50%	1.20%
Control	19.47%	24.06%	6.94%	27.21%	7.04%	12.13%	2.15%

This table displays the difference in the response to the questions for the Lifetime Guaranteed Income product and the Flexible Account product. A higher value implies that the Lifetime Guaranteed Income product has more favorable features than the Flexible Account product. The top panel corresponds to the question: “How well do you think you understand the features of ...?”. The middle panel corresponds to the question: “How risky do you think the ... is?” The lower panel corresponds to the question: “How much control do you think you have with the ...?” The first row of each panel uses only the participants from the Netherlands, the middle rows only from Australia and the last rows from the Netherlands and Australia.

Table 6 reports responses to the Likert scale. We observe that on average, participants in Australia and the Netherlands have a similar understanding of the products. The Dutch participants do slightly better understand the Guaranteed Lifetime Income Product (a lifetime annuity) more than the Australian participants. This is expected as Australians are familiar with Flexible Account Products, whereas the Dutch are not. (The account-based pension - a type of flexible account product - is the most popular type of retirement benefit product.) The Lifetime Guaranteed Income Product is seen by the Dutch as well as Australians as a less risky product. There are more Dutch respondents who report that they find the Flexible Account Product to be more risky than the Lifetime Guaranteed Income Product, which is as expected given their unfamiliarity with the Flexible Account Product, but also not surprising given Australians ignorance of retirement benefit product features (Bateman et al., 2016). The Australian respondents report that the Flexible Account Product gives them much more control, which the Dutch don’t do so. Again, this is as expected as Australians are familiar with the flexibility of Flexible Account Products (and they are unfamiliar to the Dutch who generally receive lifetime pensions (a form of Lifetime Guaranteed Income Product) .



### 3.3.4 Fourth stage: iMPL task instructions

Before participants proceed to the six iMPL tasks, they are presented with an example of the iMPL method over a series of five screens. The theoretical explanation of the iMPL task is provided in Section 3.1. On the first screen provided general information about the task and on the following four screens the participant is taken through an iterative multiple price list example. To reduce the likelihood that a worked example would guide participant decisions in iMPL tasks, the example used amounts for the flexible account balance and lifetime guaranteed income which did not relate to any of the four income treatments. On the first screen of the example, the trade-off between ‘Option A’ and ‘Option B’ for first row of the first stage of the interactive multiple price list (iMPL) is explained. Note that Option A and Option B are portfolios of the two products - the Lifetime Guaranteed Income product and the Flexible Account product. The second screen explains the trade-off for the last row and the third screen for a row in the middle. The last screen (see Figure 2) provides information about stage two - the iterative part of the iMPL task.

Figure 2: Example.

#### Example 4/4

Once you decided your choice and have clicked ">>" you are asked to make a more refined choice. For example, if you chose Option A in the second row, but Option B in the third row as shown below:

Option A		Option B		Preferred Option	
Flexible Account (account balance)	Lifetime Guaranteed Income (per year, including Age Pension)	Flexible Account (account balance)	Lifetime Guaranteed Income (per year, including Age Pension)	Option A	Option B
\$900,000	\$35,000	\$0	\$35,000	<input checked="" type="radio"/>	<input type="radio"/>
\$900,000	\$35,000	\$0	\$57,500	<input checked="" type="radio"/>	<input type="radio"/>
\$900,000	\$35,000	\$0	\$80,000	<input type="radio"/>	<input checked="" type="radio"/>
\$900,000	\$35,000	\$0	\$102,500	<input type="radio"/>	<input checked="" type="radio"/>
\$900,000	\$35,000	\$0	\$125,000	<input type="radio"/>	<input checked="" type="radio"/>

You will next get the following question:

Please refine your choice. Cast your eye down the table and select the first row for which you prefer Option B over Option A

Option A		Option B		Preferred Option	
Flexible Account (account balance)	Lifetime Guaranteed Income (per year, including Age Pension)	Flexible Account (account balance)	Lifetime Guaranteed Income (per year, including Age Pension)	Option A	Option B
\$900,000	\$35,000	\$0	\$60,000	<input type="radio"/>	<input type="radio"/>
\$900,000	\$35,000	\$0	\$65,000	<input type="radio"/>	<input type="radio"/>
\$900,000	\$35,000	\$0	\$70,000	<input type="radio"/>	<input type="radio"/>
\$900,000	\$35,000	\$0	\$75,000	<input type="radio"/>	<input type="radio"/>

After you click ">>" you will get a similar task, but with different amounts in the options.

### 3.3.5 Fifth stage: main experimental task

Following the guided example, participants proceed to the six iterative multiple price list (iMPL) tasks. For each iMPL task, general product features for the two retirement benefit products are presented at the top of the screen consistent with the framing treatment to which the participant has been allocated (see Table 3). This is done to ensure the participant sees the information framed product features again in order to enhance the impact of information framing on the participants choice in each set.

For each of iMPL task, the participant is asked to indicate for first five (stage one), then four (stage two) alternative trade-offs between two retirement wealth portfolios. That is, whether he prefers the portfolio in Option A or the portfolio in Option B. The portfolios comprise some amount in a Flexible Account product and some amount as a Guaranteed Lifetime Income product. For a given iMPL task, Option A has the same allocation to the retirement products in all the alternatives (the five alternatives in stage one and the four alternatives in stage 2). In Option B either the Lifetime Guaranteed income product or the Flexible Account product has an increasing allocation (as one moves between alternatives in the multiple price list), whereas the value of the other product whether it be the Flexible Account or the Lifetime Guaranteed Income product) remains the same for all alternatives.

In order to inform participants of the possible implications of their choice, a simple retirement calculator appears under the choice set showing the possible implications (of the product allocations) for the draw down of the products. The retirement calculator provides two possible draw down patterns, one for the combination of products in Option A, one for the combination of products in Option B. For Option B we display the possible draw down pattern for the first alternative for which the participant prefers Option B over Option A. Note that Option A has the same allocation to the products in the five alternatives, so the possible draw down pattern for Option A is the same for all the shown alternatives in the question. Participants were given the possibility to adjust four assumptions in the retirement calculator, relating to the product features which could make the products attractive. The first assumption is the last age at which the Flexible Account makes a payment. The range of possible values is between 80 and 110, with 5 year intervals and a default is set at 80 year. The second assumption is the amount of money the participant prefers to set aside for unexpected expenditures or bequests. The participant can choose any value and the default is set at zero. The third assumption relates to the option to have a higher income in the first five years. This is either yes or no, with the default set at no. The fourth assumption is the expected return in excess of the inflation rate for the Flexible Account product. The options range from 0% to 7%, with increments of 1% with the default set at 1%. The default settings are set for the

first time the calculator is used. In later iMPL tasks, the default assumptions are the values previously used (which may be the original or revised assumptions). We take this approach because assumptions should be persistent across iMPL tasks for a given participant and ensuring this reduces the effort the participant has to undertake in the task as he does not have to change the calculator setting each time.

**Between subject treatment: Product endowment**

Participants are allocated one of two product endowment treatments: either a willingness to pay (WTP) for additional income or willingness to accept (WTA) a reduction in income. In the WTP (WTA) treatment, the values of the Guaranteed Lifetime Income (Flexible Account) Product in Option B are increasing and higher than in Option A. Option B has a lower Flexible Account (Guaranteed Lifetime Income) than in Option A. The implicit question for the participant in the WTP frame is -suppose you have the portfolio in Option A- would you decrease your Lifetime Guaranteed Income by A\$X to receive an additional A\$Y in your Flexible Account. The implicit question for the participant in the WTA frame is -suppose you have the portfolio in Option A- would you reduce your Flexible Account by A\$X to receive an additional A\$Y Lifetime Guaranteed Income. The value of X depends on the question and the value of Y increases with the alternatives in the list.

**Within subject treatments: Product allocation**

In the experimental task, each participant is shown six different iMPL choice sets. For each of these six choice sets -the within-subject treatments- we first constructed the amount the participants allocation to the two retirement benefit products in benchmark Option A and benchmark Option B. The other alternatives in a given choice set are based on the composition of the benchmark options. The benchmark portfolios in the six iMPL choice sets vary by the proportion of annuitized retirement wealth in addition to state pension. This retirement wealth which can be used to supplement the Lifetime Guaranteed Income Product or be incorporated in the Flexible Account Product. This is calculated by the difference between the retirement income, as given in Table 2 and the level of state pension. The state pension income level for couples is set by taking the average of €20,000 and A\$35,000. For singles it is two-thirds of that amount.

Since there are six choice sets, there are six benchmark portfolios with levels of annuitization as follows: 100% annuitization for Option A and 2/3 annuitization for Option B; 100% for Option A and 1/3 for Option B; 100% for Option A and 0% for Option B; 2/3 for Option A and 1/3 for Option B; 2/3 for Option A and 0% for Option B; and 1/3 for Option A and 0% for Option B. The fraction of retirement savings which is not annuitized is converted into the Flexible Account using an annuity factor

of 23.00 for couples and 17.38 for singles.<sup>4</sup> The order of the six within-subject treatments (choice sets) is randomized to prevent order effects driving the results as participants progress through the treatments.

**Alternatives in the task**

In the iMPL the list has increasing values in Option B’s Guaranteed Lifetime Income in the WTP frame and increasing values in Option B’s Flexible Account in the WTA frame. In order to set these values we use our benchmark case. For the WTP (WTA) frame, the alternative values for Option B (Option A) are set by multiplying the difference between the benchmark Guaranteed Lifetime Income (Flexible Account) in Option A and Option B and adding that to the Guaranteed Lifetime Income (Flexible Account) of Option B (Option A). For the first round of the iMPL the multiples are 0.5, 0.707, 1, 1.414, and 2 (see first column of Table 7). Thereafter, in the second round, depending on the choice in the first round, the participant is shown four alternatives. The increments are chosen such that they are log-linear (see columns 3-6 of Table 7).

Table 7: Money’s worth ratio in the various alternatives

First round		Second round			
	Always choose Option A:	0.351	0.388	0.429	0.475
0.500	Switch to Option B in first row:	0.522	0.569	0.621	0.677
0.707	Switch to Option B in second row:	0.738	0.805	0.878	0.958
1.000	Switch to Option B in third row:	1.044	1.139	1.242	1.354
1.414	Switch to Option B in fourth row:	1.477	1.610	1.756	1.915
2.000	Always choose Option B:	2.104	2.328	2.577	2.852

This table displays the money’s worth ratio used for setting the alternatives in the task for the WTP treatment. For the WTA treatment the inverse of the numbers is used. The money’s worth ratio is the actuarially fair price of the income stream divided by the price of the Lifetime Guaranteed Income product. A number smaller (larger) than one implies that the annuity is more (less) expensive than the actuarially fair price.

The alternative at which the participant switches in the second round is used to determine the price they are willing to pay for an annuity. This includes always choosing Option A, to which we assign the value 1/3. In case of the WTA (WTP) frame the price of the annuity for which the participant is willing to buy is equal to the price of the annuity multiplied by (the inverse of) the midpoint of the values in Table 7 corresponding to the rows where the participant switches. For the WTA frame the values in Table 7 can thus be interpreted as the multiple of a fair price, whereas for the WTP treatment it would be the inverse of the values in the table.

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<sup>4</sup>The annuity factors were calculated as the net present value of an income stream with a duration of 26 (for couples) or 19 (for singles) years and an interest rate of 1%.

### 3.3.6 Sixth stage: Likelihood to act

One of the disadvantages of using the MPL format is that hypothetical experimental responses might be prone to substantially overestimate WTP (see, for example Cummings et al., 1997).<sup>5</sup> Blumenschein et al. (2008) found that assessing the degree of certainty of the hypothetical responses with Choice Contingent Valuation (see, e.g. Champ et al., 1997 using a ten point scale, Johannesson et al., 1998 using a dichotomous choice) is effective in mitigating hypothetical bias. Therefore, following the six choice sets we ask participants for each of the six choices “how likely is it that you would reduce your Lifetime Guaranteed Income by \$X to receive an additional \$Y (the reported amount) in your Flexible Account?” and in the WTA frame and “how likely is it that you would use \$X from your Flexible Account to buy an additional Guaranteed Lifetime Income of \$Y (the reported amount)?” The responses are collected on a Likert scale with value between 0 and 10. Each of the six questions starts with “Suppose you have \$A in your flexible account and a Lifetime Guaranteed income of \$B”. To prevent cognitive exhaustion, all six questions were displayed on one screen, in the non-randomized order described in Section 3.3.5.

## 3.4 Covariates

After completing the experimental task, participants are asked questions about planning and their personality traits, pension arrangements and financial competence, and demographics and personal characteristics. These variables are collected for two purposes. First, we are interested in whether they could explain the heterogeneity of participant’s valuation of the Lifetime Guaranteed Income product (that is, the annuity). Second, once we correct for the main heterogeneity in the collected variables, the remaining country difference in valuation of the Lifetime Guaranteed Income product would be due to difference in social norms and institutional settings between the Netherlands and Australia.

### Personal characteristics

We collect the following personal characteristics variables. The variable *Female* is an indicator whether the participant is female or not, the variable *Single* is an indicator whether the participant is single or not and the variable *Children* is an indicator whether the participant has children or not. The variable *Age* is the age of the participant in years. The variable *In labour force* is an indicator whether the participant is working -either part-time or full-time and the variable *Self employed* is an indicator whether the participant is self-employed or not. The variable *Household Income* is a categorical variable representing

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<sup>5</sup>This is not found in all studies, for example, Carson et al. (1996) suggest that values from hypothetical choice and revealed preference studies match fairly well.

the four categories of income, see Table 2.

### **Household wealth**

Two variables are collected to measure household wealth. First, the variable *Wealth*, which is household wealth excluding owner-occupied housing wealth and retirement savings. This is a categorical variable with four outcomes: less than \$0 in Australia (less than €0 in the Netherlands), between \$0 and \$34,999 (between €0 and €19,999), between \$35,000 and \$104,999 (between €20,000 and €59,999) and more than \$105,000 (more than €60,000). Second, the variable *Homeowner* which is an indicator variable for whether the participant is a homeowner or not.

### **Life & health**

We collect three variables related to the health and longevity of the participant. The variable *SLE-OLE* is the difference in years between the participants subjective life expectancy elicited in the survey and the objective life expectancy (from either the Australian Bureau of Statistics or Statistics Netherlands). The objective life expectancy includes forecast further improvements in life expectancy and is provided to participants as part of the subjective life expectancy question. Second, the variable *Outlive partner* is elicited using a Likert scale from 0 to 10 for the question how likely do you think you will outlive your spouse or partner, where 0 is very unlikely and 10 is very likely. Third, *Health* is an indicator variable which equals one if the self-assessed health is either “very good” or “excellent” and zero if “poor”, “moderate” or “good”.

### **Financial capabilities**

We have five variables related to financial capabilities. First, *Fin decisions* is an indicator variable which equals one if the participant or the participant and someone else are equally responsible for major financial decisions. Second, the variable *SA fin lit* is a self-assessed financial literacy measure elicited using a Likert scale from 1 to 7 where 1 means a very low and 7 means a very high understanding of finance. The variable *Fin lit* is the number of correct answers to the three standard financial literacy questions from Lusardi and Mitchell (2011), while the variable *Numeracy* is the number of correct answers to the three numeracy questions from Lipkus et al. (2001). Finally, *Bachelor* is an indicator variable which equals one if the respondent had at least a bachelor degree and zero otherwise.

### **Saving & planning**

We include six variables designed to measure savings habits and financial planning. The first variable is *Savings habit* which is the average of twelve questions from Loibl et al. (2011) answered using a Likert scale from 1 to 7. The second variable is *Future time* which is the average of six questions from Jacobs-

Lawson and Hershey (2005) answered using a Likert scale from 1 to 7 where a higher number indicates that the participant is more forward looking. The third variable is *Fin plan* which is an indicator variable for whether the participant has ever tried to work out how much they need to save for retirement. The fourth variable is *Plan knowledge* which is the average of six questions related to retirement planning from Jacobs-Lawson and Hershey (2005). The fifth variable is *Spending horizon* is an indicator variable which equals one if the most important time horizon with regard to planning expenditures and savings is not more than the next couple of months and zero otherwise. The sixth variable is *Retirement distance* which is a variable measuring whether retirement will occur for the participant in the near future or in the distant future, with answers on a Likert scale from 1 to 7.

### **Personal traits**

We include three covariates relating to the psychological personality traits. In the survey we collect the ten item TIPI questions from Gosling et al. (2003), providing us the big 5 personality traits. In addition we collect the conscientiousness measure used in Agnew et al. (2013) and Agnew et al. (2018). The covariates are then standardized.<sup>6</sup>

We combine the standardized conscientiousness measure from Gosling et al. (2003) and Agnew et al. (2013) and construct the covariate *Conscientiousness* which equals one if the participant has a higher than the median score on this measure. We construct the *Extrovert/Open* covariate which equals one if the participant scores higher than the median on the combined standardized extroversion and standardized openness to new ideas measure from Gosling et al. (2003). We construct the *Agreeable/Emotional* covariate which equals one if the participant scores higher than the median on the combined standardized agreeable and standardized emotional measure from Gosling et al. (2003).

We also include two variables for the economic utility parameters. First, the variable *Risk* is derived from the Dohman et al. (2011) question “How do you see yourself: Are you generally a person who is fully prepared to take risks in financial matters or do you try to avoid taking risks in financial matters?”. The question is answered using a Likert scale from 0 (not prepared to take risks) to 10 (fully prepared to take risks). Second, the variable *Patience* is elicited using a question from Becker et al. (2012) asking “How do you see yourself: Are you generally an impatient person or someone who always shows great patience?”. The question is answered using a Likert scale from 0 (very impatient) to 10 (very patient).

### **Representativeness of the sample**

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<sup>6</sup>We also collected the impulsiveness measure used in Tsukayama et al. (2012). To reduce the number of covariates, we performed a factor analysis on the seven variables, which signals that there are 3 factors. We therefore construct three covariates, where each of the constructed covariates are constructed by selecting the standardized personality measures with the two highest (in absolute values) factor loadings.

Table 8 compares the country sub-samples with population characteristics from Statistics Netherlands and the Australian Bureau of Statistics Census data. Apart from being slightly more often in the labor force and slightly more educated than the population, the sample is representative. This is due to the constraint in the experimental survey that at least one member of the household should be in the labour force in order to be eligible to participate in the experimental survey.

Table 8: Representativeness of the sample

	Population		Sample	
	NL	AU	NL	AU
Female	49.93%	51.13%	44.97%	50.00%
Single	33.92%	29.48%	31.80%	31.10%
In labor force	68.19%	73.11%	75.45%	77.60%
Self-employed	17.11%	14.05%	13.06%	14.00%
Bachelor	31.07%	29.03%	40.28%	33.50%

This table displays the representativeness of the sample for the main personal characteristics. Columns (1) and (2) are population fractions. These population fractions are based on national representative figures from statistics Netherlands and the 2016 Australian Census for 50-65 year old. Columns (3) and (4) are the experimental survey sample fractions.

## 4 Perceived product features

The attractiveness of the Lifetime Guaranteed Income product and the Flexible Account product should be mainly driven by whether the participant values the guarantees in the former or the freedom of choice in the latter. Moreover, if the participant has the perception that he does not understand the product features he would be less inclined to prefer that product. Therefore, in this section we investigate what explains participants perceived understanding, riskiness and control of the products. As described in Section 3.3.3, we ask the participant for both products (the Lifetime Guaranteed Income product and the Flexible Account product) three questions. These questions relate to their perceived understanding of the product, their perceived riskiness of the product and the control they perceive to have with the product.

The descriptive statistics in Table 7 show that there is some dispersity in the relative difference in perceived product features. To understand the effect the covariates have on the attractiveness of the Lifetime Guaranteed Income product (relative to the Flexible Account product) the first step is to investigate their effect on the perceived product features. For each of the three product features we perform a linear regression on the difference between the reported values of the Likert scale of the two



products. The parameter estimates are given in Table 9. We perform the regression on the whole sample (columns (3), (6), and (9)) and on the Dutch (columns (1), (4), and (7)) and Australian (columns (2), (5), and (8)) subsamples separately. The latter is to observe whether institutional settings and social norms -which are country specific- might affect the association of the covariates with the perceived product feature.

In the regression we also included a number of covariates specific to our experimental design. The covariate *Quiz mistakes* is an indicator variable which equals one if the participant made at least three mistakes in the product knowledge quiz. The covariate *Short time* is an indicator variable which equals one if the participant was among the 10% of participants who spent the least time on the experimental survey. The covariate *Consumption framing* is an indicator variable which equals one for the information framing treatments *Consumption Gain* and *Consumption Loss* (see Table 3 for the description of the frames), while the covariate *Gain framing* is an indicator variable which equals one for the information framing treatments *Consumption Gain* and *Investment Gain*. The covariates *Consumption framing LOW* and *Gain framing LOW* equal one if the participant has a low participation (measured as either indicator *Quiz mistakes* or *Short time* being equal to one) and was subject to the corresponding framing.

At the end of the experimental survey we asked the participant “How clear do you think the questions in this survey are”. If the participant reported either “Sometimes clear”, “mostly confusing” or “completely confusing” our indicator variable *Confusing* equals one and zero otherwise. Finally, we also include the indicator variable *Short time* which equals one if the participant was among the 10% faster participants in completing the experimental survey.

### **Perceived understanding of the products**

First, we investigate what explains the understanding of the lifetime Guaranteed Income product relative to the Flexible Account product. From columns (1)-(3) in Table 9 we observe the following. As all the frames should include the same information, the framing covariates *Consumption framing* and *Consumption framing LOW* (testing the influence of consumption/investment frames) are expected to have no effect. Indeed we do not observe any significant effect of these covariates on the difference in understanding of the two products. However we find that *Gain framing* and *Gain framing LOW* (which test the influence of loss/gain frames) have opposite effects. Recall that LOW identifies a participant who either completed the experimental quickly (within the shortest 10% of completion times) and/or has a high number of mistakes in the product quiz). This suggests that for the fast completing/unknowlegable participant (as compared with the careful reader) the loss frame for the Guaranteed Lifetime Income

Table 9: Products characteristics Regression table

	NL	Understanding	sample	NL	Riskiness	sample	NL	Control	sample
	(1)	AU	(3)	(4)	AU	(6)	(7)	AU	(9)
<b>Personal characteristics</b>									
Female	-0.0855 (-0.87)	-0.156 ** (-2.07)	-0.120* (-1.95)	0.237 (0.96)	0.153 (0.70)	0.211 (1.32)	-0.111 (-0.37)	-0.403* (-1.69)	-0.293 (-1.55)
Single	0.187 (1.43)	0.0791 (0.65)	0.118 (1.35)	0.506 (1.40)	-0.0103 (-0.03)	0.229 (0.92)	-0.0891 (-0.19)	0.242 (0.68)	0.128 (0.44)
Children	-0.0342 (-0.45)	-0.0652 (-0.87)	-0.0854 (-1.60)	-0.155 (-0.72)	-0.0715 (-0.31)	-0.188 (-1.22)	-0.0657 (-0.23)	-0.231 (-0.95)	-0.175 (-0.96)
Age	0.0133 (1.23)	-0.0118 (-1.56)	0.00155 (0.24)	0.0215 (0.79)	-0.0195 (-0.78)	0.00104 (0.06)	0.00702 (0.21)	0.00707 (0.24)	0.00499 (0.23)
In labour force	-0.208 ** (-1.99)	-0.0660 (-0.68)	-0.131* (-1.83)	-0.420 (-1.64)	0.0885 (0.35)	-0.156 (-0.87)	0.266 (0.82)	-0.0720 (-0.25)	0.0790 (0.36)
Self-employed	-0.0941 (-0.79)	0.0628 (0.75)	-0.0314 (-0.46)	0.432 (1.39)	0.214 (0.74)	0.277 (1.32)	-0.228 (-0.53)	-0.0112 (-0.03)	-0.110 (-0.42)
<b>Financial resources</b>									
Household income	0.0402 (0.86)	0.0490 (1.18)	0.0612 ** (1.96)	0.441 *** (2.99)	0.171 (1.62)	0.314 *** (3.73)	0.335* (1.87)	-0.148 (-1.28)	0.0379 (0.38)
Wealth	0.0306 (0.64)	-0.000242 (-0.01)	0.00349 (0.13)	-0.240* (-1.85)	-0.201* (-1.82)	-0.208 ** (-2.50)	0.140 (0.80)	0.0352 (0.30)	0.118 (1.19)
Homeowner	-0.0779 (-0.72)	-0.215 ** (-2.35)	-0.131* (-1.86)	0.437* (1.81)	-0.0859 (-0.33)	0.224 (1.27)	-0.417 (-1.34)	0.220 (0.78)	-0.00792 (-0.04)
<b>Life &amp; health</b>									
SLE-OLE	-0.00136 (-0.32)	-0.00259 (-0.64)	-0.00214 (-0.74)	0.0205 (1.64)	0.0119 (1.07)	0.0165 ** (2.00)	-0.0177 (-1.24)	-0.0114 (-0.92)	-0.0165* (-1.76)
Outlive partner	0.0106 (0.64)	-0.00277 (-0.20)	0.00199 (0.19)	-0.00561 (-0.11)	-0.0417 (-0.93)	-0.0253 (-0.74)	0.0879 (1.39)	0.0806* (1.68)	0.0924 ** (2.37)
Health	0.196* (1.82)	0.150* (1.69)	0.151 ** (2.28)	-0.0932 (-0.36)	0.0284 (0.13)	-0.0623 (-0.37)	-0.0653 (-0.19)	-0.218 (-0.87)	-0.177 (-0.85)
<b>Financial capabilities</b>									
SA fin lit	-0.0226 (-0.55)	-0.0724 ** (-2.29)	-0.0449* (-1.69)	0.00163 (0.02)	-0.0828 (-0.76)	-0.0647 (-0.87)	-0.0515 (-0.38)	0.139 (1.15)	0.00463 (0.05)
Fin lit	0.0181 (0.33)	-0.0164 (-0.40)	-0.000999 (-0.03)	0.549 *** (4.30)	0.368 *** (2.87)	0.454 *** (5.08)	-0.153 (-0.92)	-0.512 *** (-3.61)	-0.337 *** (-3.09)
Numeracy	-0.0306 (-0.70)	0.00699 (0.21)	-0.0125 (-0.46)	0.333 *** (2.88)	0.404 *** (3.71)	0.382 *** (4.86)	-0.593 *** (-4.24)	-0.401 *** (-3.40)	-0.473 *** (-5.13)
Bachelor	0.0750 (0.96)	-0.0568 (-0.85)	0.000466 (0.01)	0.454 ** (2.06)	0.412* (1.88)	0.425 *** (2.80)	-0.735 ** (-2.47)	-0.210 (-0.87)	-0.441 ** (-2.30)
<b>Saving &amp; planning</b>									
Savings habit	-0.0242 (-0.95)	-0.0280 (-1.30)	-0.0271 (-1.63)	-0.0671 (-0.86)	-0.0173 (-0.22)	-0.0595 (-1.10)	0.0125 (0.12)	-0.0804 (-0.87)	-0.0471 (-0.70)
Spending horizon	-0.0933 (-1.03)	-0.0324 (-0.53)	-0.0621 (-1.18)	-0.126 (-0.46)	0.390* (1.80)	0.184 (1.10)	-0.483 (-1.49)	-0.0486 (-0.21)	-0.173 (-0.90)
Future time	0.0242 (0.50)	0.0499 (1.35)	0.0338 (1.10)	0.00418 (0.04)	-0.0470 (-0.39)	-0.0242 (-0.29)	0.0356 (0.23)	-0.0585 (-0.46)	-0.00959 (-0.10)
Fin plan	-0.110 (-1.26)	-0.0318 (-0.38)	-0.0857 (-1.44)	-0.142 (-0.66)	-0.166 (-0.72)	-0.216 (-1.39)	0.416 (1.48)	-0.0891 (-0.34)	0.0794 (0.42)
SA planning knowledge	0.0456 (1.17)	0.0802* (1.95)	0.0598 ** (2.07)	0.0647 (0.66)	0.0140 (0.12)	0.0764 (1.06)	0.0198 (0.15)	-0.137 (-1.12)	-0.00626 (-0.07)
SA retirement distant	-0.0195 (-0.79)	0.00172 (0.08)	-0.00871 (-0.52)	0.0107 (0.16)	0.00785 (0.12)	0.0183 (0.40)	-0.0246 (-0.28)	0.0457 (0.63)	0.0373 (0.67)
<b>Personal Traits</b>									
Conscientiousness	0.0674 (0.84)	-0.134 ** (-2.01)	-0.0378 (-0.72)	0.410* (1.94)	-0.0867 (-0.41)	0.174 (1.17)	0.140 (0.50)	-0.299 (-1.29)	-0.0954 (-0.52)
Extrovert/Open	0.0466 (0.59)	-0.0274 (-0.43)	0.0161 (0.32)	0.180 (0.86)	0.166 (0.83)	0.193 (1.35)	0.103 (0.38)	0.200 (0.90)	0.179 (1.03)
Agreeable/Emotional	-0.00582 (-0.08)	0.00842 (0.13)	0.00918 (0.18)	0.237 (1.12)	0.466 ** (2.09)	0.384 ** (2.53)	-0.429 (-1.59)	-0.0555 (-0.23)	-0.222 (-1.23)
Risk	-0.0439 ** (-2.06)	-0.0403 ** (-2.48)	-0.0406 *** (-3.03)	-0.187 *** (-4.02)	-0.0768 (-1.62)	-0.135 *** (-4.18)	-0.0961 (-1.58)	-0.0582 (-1.15)	-0.0961 ** (-2.47)
Patience	0.0147 (0.94)	-0.00880 (-0.55)	0.00214 (0.19)	0.0166 (0.32)	0.0176 (0.36)	0.0117 (0.33)	-0.0536 (-0.80)	0.0205 (0.40)	-0.0159 (-0.38)
<b>Experimental design</b>									
Gain framing	0.150 ** (2.06)	-0.0271 (-0.41)	0.0625 (1.26)	0.595 *** (2.66)	0.0249 (0.11)	0.320 ** (2.00)	-0.531* (-1.75)	0.0477 (0.19)	-0.191 (-0.96)
Consumption framing	-0.0508 (-0.69)	0.0334 (0.53)	-0.00102 (-0.02)	-0.542 ** (-2.40)	0.0113 (0.05)	-0.256 (-1.60)	0.506* (1.65)	0.0337 (0.13)	0.272 (1.38)
Gain framing LOW	-0.690 *** (-3.03)	0.107 (0.65)	-0.299 ** (-2.14)	-0.291 (-0.67)	0.00441 (0.01)	-0.166 (-0.59)	0.207 (0.46)	-0.406 (-1.06)	-0.152 (-0.50)
Consumption framing LOW	0.294 (1.23)	-0.127 (-0.79)	0.0971 (0.67)	0.0672 (0.15)	-0.111 (-0.30)	0.0436 (0.16)	-0.668 (-1.49)	-0.0582 (-0.15)	-0.355 (-1.17)
Quiz mistakes	0.486 ** (2.04)	0.0584 (0.35)	0.284* (1.91)	-1.374 *** (-3.06)	-1.322 *** (-2.98)	-1.402 *** (-4.56)	0.921 ** (2.07)	2.565 *** (5.75)	1.631 *** (4.99)
Short time	0.189 (0.82)	-0.286* (-1.88)	-0.0861 (-0.67)	-1.396 *** (-2.71)	-0.960 *** (-2.60)	-1.187 *** (-3.97)	0.860* (1.65)	1.989 *** (4.95)	1.527 *** (4.68)
Confusing	0.0661 (0.56)	0.0162 (0.16)	0.0307 (0.40)	-0.408 (-1.54)	-0.176 (-0.74)	-0.307* (-1.74)	0.0232 (0.08)	0.782 *** (2.81)	0.473 ** (2.26)
Short time x Quiz mistakes	-0.519 (-1.31)	0.255 (1.15)	-0.115 (-0.53)	0.940 (1.30)	1.146 ** (2.19)	1.084 *** (2.60)	-1.069 (-1.55)	-2.093 *** (-4.05)	-1.654 *** (-3.82)
Australian			-0.209 *** (-3.63)			-0.471 *** (-2.86)			-1.613 *** (-8.47)
Constant	-0.395 (-0.53)	1.261 *** (2.62)	0.528 (1.24)	-0.268 (-0.15)	2.737* (1.65)	1.480 (1.24)	-0.0643 (-0.03)	-0.749 (-0.40)	0.360 (0.25)
N	1,003	1,000	2,003	1,003	1,000	2,003	1,003	1,000	2,003

Dependent variable for (1)-(3): Likert scale of understanding Lifetime Guaranteed Income product less Flexible Account product.  
 Dependent variable for (4)-(6): Likert scale of riskiness Flexible Account product less Lifetime Guaranteed Income product.  
 Dependent variable for (7)-(9): Likert scale of control Lifetime Guaranteed Income product less Flexible Account product.

t statistics in parentheses  
 \* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01

product, which highlights the downside of insurance, is more likely to be understood than the gain frame.

Whereas framing does not drive the understanding of the products, there are several factors which play a role in explaining the understanding of the relative products, namely the effort in the experimental survey, familiarity with the products and the need for an income.

Participants who took less time to complete the experimental survey (that is, made less effort to learn about the products) reported to be less familiar with the features of the Lifetime Guaranteed Income product than the flexible account product, as indicated by the significant estimate of *Short time*. This occurs even though the number of mistakes in the product knowledge test -*Quiz mistakes*- does not have a significance influence.

Importantly, being Australian, and therefore less familiar with annuity products and more familiar with draw down products by virtue of the design of Australia's retirement income arrangements, shows up as significant parameter *Australian* in the regression. Relatedly, Australians with a higher score for conscientiousness have a higher perceived understanding of the Flexible Account product.

Those who have thought more about financing retirement -in Australia through a higher score on *Plan knowledge* and in the Netherlands those who are out of the labor force- have more understanding of the Lifetime Guaranteed Income product. Persons not in the labour force are likely to be more familiar with state pensions which have similar features to the features of the Guaranteed Lifetime Income product. On the contrary Australians who self-report having high financial literacy *SA fin lit* might think they know enough and have not spent enough time learning the state pension features (even though the objective measures of financial capabilities are not significant). The covariate *Female* is negative and significant possibly indicating that women in this age cohort (50-64) have thought less about how to finance retirement due to small account balances or pension rights.<sup>7</sup>

Also participants who have a higher need for an income understand the Lifetime Guaranteed Income product better. Homeowners do not have to pay housing rent - an expense generally paid from income - and therefore have a lower need for an income product. Those who are in good health *Health* could expect to live long and have a higher need for income products and therefore know more about the Lifetime Guaranteed Income product. For participants with a higher income *Household income* the need for retirement benefit products which pay an income is larger as the state pension plays a relatively smaller role in financing retirement.

### **Perceived riskiness of the products**

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<sup>7</sup>For example, in Australia the median pension account balance for a women aged 60-64 is A\$36,000 (ASFA, 2017).

Second, we investigate what explains the perceived less riskiness of the lifetime Guaranteed Income product relative to the Flexible Account product. From columns (4)-(6) in Table 9 we observe the following.

The main treatment effects related to information framing are significant at a 5% significance level for the Dutch sub-sample only. The Dutch are less familiar with a Flexible Account product. Therefore, in the gain frames the Dutch participant is more likely to view the information of the insurance features in the Guaranteed Lifetime Income product as reducing the risk of the product. However, the negative sign on the consumption frame variable suggests that this would make them more vulnerable to view the Flexible Account as less risky when the information framing is framed in terms of investment rather consumption.

Participants who are better able to understand the guarantees features of the Guaranteed Lifetime Income product are more likely to find the product less risky. Being better able to understand the features of the product is on the one hand due to the financial capabilities of the participant and on the other hand due to the effort in the experimental survey. We observe that those who perform better on the financial literacy test, the numeracy test and have at least a bachelor degree perceive the Lifetime Guaranteed Income product to be less risky. Whereas those who made more mistakes in the product knowledge quiz, spent less time on the experimental survey and find the survey confusing perceive the Lifetime Guaranteed Income product more risky. Note that another way to interpret the results is that those who are less able to understand the products are more likely to provide similar answers to the product features of the Lifetime Guaranteed Income product and the Flexible Account product.

Participants who would be more likely to prefer a stable and high consumption level also perceive the Lifetime Guaranteed Income product less risky than the Flexible Account product. The positive parameter estimate of *Income* indicates that those with a higher income -whose income replacement rate in retirement relies less on the state pension- find the Lifetime Guaranteed Income product less risky, as do those who expect to live long. However, the negative parameter estimate of *Risk* indicates that participants who are more prepared to take risk find the Lifetime Guaranteed Income product less risky. The negative parameter estimate of *Wealth* indicates that for those with a high (non-retirement, non-housing) wealth have the financial buffer to take risks in retirement and they thus perceive the Flexible Account product relative to the Lifetime Guaranteed Income product as relatively less risky. Finally, participants (particularly the Australian sub-sample) who score high for the psychological trait *Agreeable/Emotional* perceive the Lifetime Guaranteed Income product as less risky.

### **Perceived control the participant has with the products**

Third, we investigate what explains the perception that a participant has more control with the Lifetime Guaranteed Income product relative to the Flexible Account product. From columns (7)-(9) in Table 9 we observe the following.

For the Dutch the framing effects are only marginally significant (and not significant for the Australian sub-sample). In the gain frame the flexibility of the draw down level leads to the perception that the Flexible Account product provides more control. On the contrary, the consumption frame reduces the perceived control of the Flexible Account product as it focusses on the whole life consumption including draw down at advanced ages, which is more uncertain for this product.

Similar to the results for the perceptions of riskiness, participants who are better able to understand the flexibility features of the Flexible Income product are more likely to find the Guaranteed Lifetime Income product provides them with less control. Again, being better able to understand the features of the product is on the one hand due to the financial capabilities of the participant and on the other hand due to the effort in the experimental survey. We observe that those who perform better on the financial literacy test, the numeracy test and have at least a bachelor degree perceive that the Lifetime Guaranteed Income product provides them less control than the Flexible Account product. Whereas those who made more mistakes in the product knowledge quiz, spent less time on the experimental survey and reported to find the experimental survey confusing find the Lifetime Guaranteed Income product provides them with relatively more control. Again, note that another way to interpret these results is that those who are less able to understand the products are more likely to provide similar answers to the product features of the Lifetime Guaranteed Income product and the Flexible Account product.

The Lifetime Guaranteed Income product provides participants more control in case they are worried about outliving their wealth. The positive parameter estimate for *Outlive Partner* indicates that participants who think that it is more likely that they outlive their partner are more likely to perceive the Lifetime Guaranteed Income product to give them a higher control. Moreover, the negative parameter estimate of *Risk* indicates that those who do not wish to take financial risks perceive that the Lifetime Guaranteed Income product provides them with more control.

There are a number of recurring themes in our analysis of the perceived understanding of the retirement benefit products. First, the impact of framing is minimal, mainly influencing the perceptions of the Dutch sub-sample who have no real world familiarity with a Flexible Account-type retirement benefit. Second, those participants who are financially competent and put effort into the experimental survey

are better able to understand the features of the products, which confirms findings in Bateman et al. (2016). Third, those participants who have thought more about retirement planning and have a need for income in retirement have more understanding of the Lifetime Guaranteed Income product. Finally, for all three OLS regressions of perceived product features the significant negative parameter estimate of the *Australian* confirms the lack of familiarity of the Australian participants with annuity-type products due to the workings of the Australian retirement income arrangements in which drawdown products are most popular and the voluntary annuity market has been, until very recently, almost non-existent (Iskhakov et al., 2015).

## 5 Valuing annuities relative to drawdown products

In this section we analyse the drivers that explain the heterogeneity in valuing annuities (our Lifetime Guaranteed Income product) relative to a draw down product (our Flexible Account product). As discussed earlier we collected panel data on 2,003 participants who provided answers to the six within-subject treatments (that is the six iMPLs which differed by their benchmark portfolio of retirement benefit allocations for Option A and Option B). Table 10 reports the parameter estimates of the panel data model with random effects. The dependent variable is the logged money’s worth ratio as displayed in Table 7. The parameter estimates (times 100%) can therefore be interpreted as the required percentage increase in the price needed for the participant to be willing to purchase the Lifetime Guaranteed Income product when the corresponding covariate increases by one unit. The first three columns of 10 display the estimation results with all covariates. The first column reports the estimation results of all six treatments for the Dutch sub-sample, the second column for the Australian sub-sample and the third column for the whole sample. Columns (4) to (9) report the estimation results of each of the six within-subject treatments separately, for the whole sample (Dutch and Australian combined).

As a robustness check, in Table 11 we exclude the three covariates related to the perception of the products, which were analysed in the previous section. We perform this robustness check as these covariates might be confounding variables, affecting both our dependent variable as well as the perception of the product. Controlling for this confounder effect might alter the parameter estimates of the other covariates as it excludes the effect the covariates have through the product perception on the dependent variable. However, we observe that our results are robust to excluding the perception of the products covariates.

In the regressions we also include the following experimental covariates. The variable *WTP treatment*

Table 10: Annuity factor Regression table

	NL (1)	AU (2)	sample (3)	1-2/3 (4)	1-1/3 (5)	1-0 (6)	2/3-1/3 (7)	2/3-0 (8)	1/3-0 (9)
<b>Personal characteristics</b>									
Female	-0.0660 (-1.58)	-0.000690 (-0.02)	-0.0252 (-0.86)	-0.0565 (-1.50)	-0.0405 (-1.14)	-0.0454 (-1.28)	0.0164 (0.45)	-0.00205 (-0.06)	0.00105 (0.03)
Single	0.176 *** (2.84)	0.179 *** (2.86)	0.161 *** (3.64)	0.115 ** (2.03)	0.125 ** (2.37)	0.189 *** (3.47)	0.126 ** (2.32)	0.205 *** (3.83)	0.212 *** (3.83)
Children	0.00183 (0.05)	-0.0641 (-1.47)	-0.0420 (-1.47)	-0.0123 (-0.34)	-0.0641* (-1.84)	-0.0434 (-1.26)	-0.0282 (-0.81)	-0.0463 (-1.34)	-0.0590* (-1.66)
Age	0.00913* (1.79)	0.00233 (0.47)	0.00556 (1.57)	0.00665 (1.50)	0.00989 ** (2.34)	0.00506 (1.19)	0.00747* (1.71)	0.00108 (0.25)	0.00396 (0.91)
In labour force	-0.0169 (-0.36)	-0.0233 (-0.47)	-0.0225 (-0.66)	0.0277 (0.65)	-0.0456 (-1.12)	-0.0313 (-0.76)	-0.0272 (-0.66)	-0.0544 (-1.33)	-0.0153 (-0.36)
Self-employed	-0.0174 (-0.33)	-0.0441 (-0.79)	-0.0333 (-0.86)	-0.0544 (-1.09)	-0.0626 (-1.33)	0.00409 (0.09)	0.0108 (0.23)	-0.0683 (-1.48)	-0.0922* (-1.93)
<b>Financial resources</b>									
Household income	0.0234 (0.99)	0.0508 ** (2.50)	0.0428 *** (2.81)	0.0241 (1.25)	0.0294 (1.60)	0.0601 *** (3.23)	0.0425 ** (2.24)	0.0553 *** (2.97)	0.0473 ** (2.48)
Wealth	0.0148 (0.62)	-0.0104 (-0.50)	-0.00214 (-0.14)	0.00278 (0.14)	0.0131 (0.71)	-0.0165 (-0.90)	-0.00595 (-0.31)	-0.00731 (-0.39)	0.000309 (0.02)
Homeowner	-0.110 ** (-2.35)	0.0213 (0.42)	-0.0471 (-1.36)	-0.0514 (-1.19)	-0.0593 (-1.43)	-0.0360 (-0.87)	-0.0442 (-1.06)	-0.0426 (-1.03)	-0.0508 (-1.19)
<b>Life &amp; health</b>									
SLE-OLE	0.00172 (0.75)	0.00187 (0.87)	0.00214 (1.37)	-0.000343 (-0.17)	0.00163 (0.88)	0.00274 (1.44)	0.00417 ** (2.18)	0.00312* (1.65)	0.00180 (0.93)
Outlive partner	0.0118 (1.37)	-0.00633 (-0.79)	0.000657 (0.11)	-0.000429 (-0.06)	-0.00876 (-1.26)	0.00476 (0.67)	0.000779 (0.11)	0.00382 (0.54)	0.00496 (0.67)
Health	0.000476 (0.01)	-0.00843 (-0.19)	-0.00383 (-0.12)	-0.0226 (-0.56)	-0.00957 (-0.25)	0.00270 (0.07)	-0.0179 (-0.46)	0.0526 (1.36)	-0.0333 (-0.85)
<b>Financial capabilities</b>									
SA fin lit	-0.0194 (-1.04)	0.0147 (0.71)	-0.00445 (-0.33)	0.00736 (0.42)	-0.00162 (-0.10)	-0.0239 (-1.43)	-0.00160 (-0.09)	-0.00757 (-0.45)	-0.00261 (-0.15)
Fin lit	0.0150 (0.57)	-0.000122 (-0.00)	0.00811 (0.44)	0.0227 (0.97)	0.0403* (1.81)	-0.0130 (-0.59)	-0.00532 (-0.23)	0.0129 (0.57)	-0.00464 (-0.20)
Numeracy	-0.0116 (-0.59)	-0.00283 (-0.14)	-0.00612 (-0.43)	-0.000438 (-0.02)	-0.0137 (-0.81)	0.00127 (0.07)	-0.00368 (-0.21)	-0.00344 (-0.20)	-0.0167 (-0.94)
Bachelor	-0.0534 (-1.36)	-0.0443 (-1.11)	-0.0471* (-1.68)	-0.0248 (-0.69)	-0.0251 (-0.74)	-0.0363 (-1.09)	-0.0627* (-1.80)	-0.0666* (-1.94)	-0.0619* (-1.75)
<b>Saving &amp; planning</b>									
Savings habit	0.00933 (0.67)	0.0349 ** (2.25)	0.0208 ** (2.04)	0.0279 ** (2.17)	0.0125 (1.04)	0.0286 ** (2.36)	0.0225* (1.80)	0.0134 (1.10)	0.0167 (1.32)
Spending horizon	-0.0199 (-0.42)	-0.0375 (-0.92)	-0.0297 (-0.97)	-0.0140 (-0.36)	-0.0439 (-1.20)	-0.0182 (-0.49)	-0.0220 (-0.59)	-0.0371 (-1.00)	-0.0308 (-0.80)
Future time	0.0157 (0.78)	0.00846 (0.39)	0.0143 (0.98)	0.00337 (0.18)	0.0149 (0.86)	0.0259 (1.44)	0.0108 (0.60)	0.0242 (1.36)	0.0182 (0.98)
Fin plan	-0.0548 (-1.41)	0.0522 (1.16)	-0.00512 (-0.17)	0.0158 (0.43)	-0.00473 (-0.13)	0.0277 (0.78)	-0.0147 (-0.40)	-0.0392 (-1.10)	-0.0150 (-0.41)
SA planning knowledge	0.00990 (0.52)	-0.0583 *** (-2.84)	-0.0200 (-1.45)	-0.0185 (-1.05)	-0.0236 (-1.40)	-0.0190 (-1.15)	-0.0197 (-1.19)	-0.0207 (-1.24)	-0.0166 (-0.98)
SA retirement distant	0.0231* (1.89)	-0.00603 (-0.49)	0.00861 (1.00)	0.00789 (0.73)	0.0123 (1.18)	0.00522 (0.51)	0.0106 (1.01)	0.00473 (0.46)	0.00975 (0.92)
<b>Personal Traits</b>									
Conscientiousness	0.0216 (0.58)	-0.0378 (-0.92)	-0.00676 (-0.24)	0.00417 (0.12)	-0.0178 (-0.54)	-0.00835 (-0.25)	-0.00730 (-0.21)	0.0149 (0.45)	-0.0255 (-0.74)
Extrovert/Open	-0.0469 (-1.26)	-0.0320 (-0.82)	-0.0431 (-1.61)	-0.0581* (-1.70)	-0.0555* (-1.72)	-0.0470 (-1.48)	0.0118 (0.36)	-0.0342 (-1.04)	-0.0731 ** (-2.18)
Agreeable/Emotional	0.00416 (0.11)	-0.0173 (-0.41)	-0.00886 (-0.31)	0.0289 (0.78)	-0.0241 (-0.70)	0.000347 (0.01)	-0.0301 (-0.85)	-0.0290 (-0.83)	-0.00739 (-0.20)
Risk	-0.0131 (-1.55)	0.00316 (0.36)	-0.00453 (-0.75)	-0.00370 (-0.47)	-0.00701 (-0.98)	-0.00452 (-0.63)	-0.00238 (-0.32)	-0.000205 (-0.03)	-0.00662 (-0.88)
Patience	0.0190 ** (2.22)	0.00402 (0.47)	0.00865 (1.42)	0.00950 (1.21)	0.00761 (1.06)	0.00278 (0.38)	0.0143* (1.90)	0.0100 (1.36)	0.0113 (1.45)
Understanding	0.0139 (0.86)	0.0219 (1.09)	0.0160 (1.30)	0.0117 (0.69)	0.0169 (1.13)	0.0353 ** (2.46)	0.0262* (1.75)	0.00244 (0.17)	0.00495 (0.33)
Riskiness	0.0143 ** (2.34)	0.00853 (1.31)	0.0123 *** (2.75)	0.0127 ** (2.20)	0.0146 *** (2.68)	0.0113 ** (2.07)	0.00831 (1.51)	0.00997* (1.81)	0.0213 *** (3.85)
Control	0.00623 (1.42)	0.0114* (1.95)	0.00903 ** (2.57)	0.00543 (1.21)	0.00809* (1.94)	0.0111 *** (2.62)	0.00908 ** (2.10)	0.00994 ** (2.36)	0.00787* (1.80)
<b>Experimental design</b>									
Quiz mistakes	0.0864 (0.90)	0.148 (1.58)	0.103 (1.57)	0.103 (1.26)	0.146* (1.93)	0.0506 (0.65)	0.150* (1.93)	0.0893 (1.15)	0.0639 (0.82)
Short time	0.00771 (0.07)	0.0163 (0.19)	0.0128 (0.19)	-0.0218 (-0.26)	-0.0227 (-0.27)	0.00835 (0.10)	0.0590 (0.69)	-0.0386 (-0.48)	0.00136 (0.02)
Confusing	-0.108 ** (-1.99)	-0.0905* (-1.72)	-0.0989 *** (-2.66)	-0.0628 (-1.37)	-0.121 *** (-2.69)	-0.111 ** (-2.50)	-0.0776* (-1.75)	-0.101 ** (-2.30)	-0.125 *** (-2.78)
WTP treatment	-0.145 *** (-3.77)	-0.154 *** (-3.77)	-0.138 *** (-4.93)	-0.111 *** (-3.11)	-0.125 *** (-3.73)	-0.156 *** (-4.61)	-0.133 *** (-3.82)	-0.131 *** (-3.83)	-0.164 *** (-4.64)
WTP treatment LOW	-0.0964 (-1.14)	-0.184 ** (-2.23)	-0.155 *** (-2.68)	-0.218 *** (-2.96)	-0.174 ** (-2.52)	-0.124* (-1.77)	-0.152 ** (-2.10)	-0.173 ** (-2.48)	-0.116 (-1.59)
Gain framing	0.0387 (1.01)	-0.0343 (-0.84)	0.00274 (0.10)	-0.0180 (-0.50)	0.0206 (0.62)	0.0108 (0.32)	-0.0102 (-0.29)	0.0263 (0.78)	-0.000327 (-0.01)
Consumption framing	0.0149 (0.39)	0.000291 (0.01)	0.00792 (0.28)	0.00466 (0.13)	-0.00961 (-0.29)	0.0210 (0.62)	-0.00310 (-0.09)	0.0420 (1.24)	-0.00834 (-0.24)
Gain framing LOW	0.103 (1.15)	0.108 (1.37)	0.117 ** (1.96)	0.159 ** (2.12)	0.0934 (1.30)	0.150 ** (2.12)	0.102 (1.46)	0.0409 (0.56)	0.134* (1.84)
Consumption framing LOW	-0.0886 (-1.00)	-0.0439 (-0.51)	-0.0610 (-0.99)	-0.0185 (-0.24)	-0.0579 (-0.79)	-0.0886 (-1.22)	-0.156 ** (-2.13)	-0.0369 (-0.50)	-0.0111 (-0.15)
Short time x Quiz mistakes	-0.109 (-0.82)	0.0370 (0.27)	-0.0279 (-0.30)	-0.0292 (-0.27)	-0.107 (-0.98)	0.0359 (0.33)	-0.0820 (-0.72)	0.0773 (0.68)	-0.0924 (-0.83)
Duration	-0.00339 (-0.47)	0.000888 (0.10)	-0.00199 (-0.36)	-0.0196 (-1.11)	-0.0351 ** (-2.08)	-0.0297* (-1.72)	-0.0214 (-1.35)	-0.00713 (-0.43)	-0.0224 (-1.55)
Order	-0.00658 (-1.37)	0.00370 (0.72)	-0.00164 (-0.47)	-0.00509 (-0.47)	-0.0214 ** (-2.00)	0.0153 (1.51)	-0.0252 ** (-2.37)	-0.00632 (-0.61)	-0.0101 (-0.94)
Likelihood to act	-0.0423 *** (-3.24)	0.00134 (0.10)	-0.0201 ** (-2.16)	-0.0216 (-1.23)	-0.00392 (-0.23)	-0.0387 ** (-2.35)	-0.0587 *** (-3.53)	-0.0431 *** (-2.58)	-0.0212 (-1.25)
1-1/3	-0.0262 (-1.49)	0.0380 ** (1.97)	-0.0202 (-1.20)						
1-0	-0.0155 (-0.84)	0.0212 (1.08)	-0.0235 (-1.38)						
2/3-1/3	-0.0151 (-0.75)	0.0375* (1.77)	-0.0148 (-0.81)						
2/3-0	-0.0190 (-0.92)	0.0339 (1.59)	-0.0190 (-1.03)						
1/3-0	-0.0456 ** (-2.06)	0.00315 (0.14)	-0.0480 ** (-2.46)						
SEx(1/3-0)	-0.0318 (-0.70)	-0.0912* (-1.93)	-0.0625* (-1.90)						
AUx(1-2/3)			-0.0499 ** (-2.18)						
Australian			0.0182 (0.58)	-0.0416 (-1.06)	0.0460 (1.22)	0.00485 (0.13)	0.0262 (0.69)	0.00231 (0.06)	0.0168 (0.43)
Constant	-0.670 ** (-1.96)	-0.153 (-0.45)	-0.367 (-1.53)	-0.475 (-1.56)	-0.395 (-1.37)	-0.278 (-0.96)	-0.375 (-1.25)	-0.140 (-0.47)	-0.221 (-0.73)
N	6,018	6,000	12,018	2,013	2,003	2,003	2,003	2,003	2,003

t statistics in parentheses  
\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

is an indicator variable which equals one if the participant was in the WTP treatment and zero if he was in the WTA treatment. The variable *Duration* represents the logged duration (in minutes) of the iMPL task (this attribute varies per treatment). The variable *Order* takes values in the range of one to six, which represents when the treatment was shown to the participant, given that the order of the treatments randomized by participant. The variable *Likelihood to reduce* represents the per within-subject treatment and WTP-WTA treatment standardized response to the question described in Section 3.3.6. The dummy variables  $(1-2/3), \dots, (1/3-0)$  represent the treatments. The variable  $SEx(1/3-0)$  represents the interaction variable between self-employed and treatment 6 (an allocation of 1/3 vs 0 of the retirement savings to the Lifetime Guaranteed Income product), i.e. an indicator variable which equals one if the participant is self-employed and answers treatment six. The variable  $AUx(1-2/3)$  represents the interaction variable between an Australian participant and treatment 1 (an allocation of 1 vs 2/3 of the retirement savings to the Lifetime Guaranteed Income product), i.e. an indicator variable which equals one if the participant is Australian and has been presented with with-subject treatment one.

## 5.1 Experimental design features

The experimental design includes features to investigate to what extent behavioral factors such as product endowment and information framing are associated with the valuation of the Guaranteed Lifetime Income product.

### Behavior economics: product endowment

We observe substantial effects of the product endowment treatment (that is, WTP or WTA) in the experiment. When a participant is given an income and asked how much does he need to give up the income, the valuation of the Guaranteed Lifetime Income product is much higher than when how much he is willing to pay for the Guaranteed Lifetime Income product. This is contrary to Willig (1976) which shows that the price changes of willingness to pay (price changes for compensating) and willingness to accept (price changes for equivalent) should be very close in value, depending on the size of the income elasticity of the demand for the product. Given that the income effects are minor in the experimental task, one would expect minor effects. An explanation of the size of the treatment effect would be the lack of substitutes (Hanemann, 1991). This disparity between WTP and WTA is well documented in the literature (for example Knetsch and Sinden, 1984).

In the domain of valuing retirement income streams, the gap between WTA and WTP is also investigated in Brown et al. (2017b) and Schreiber et al. (2016) who find a WTA to WTP ratio of the price



of a factor three to four. However, our effects are much smaller than the values in those experiments.

Cognition and complexity has been shown in Brown et al. (2017b) and Brown et al. (2017a) to be a factor which can explain the high buy-sell spread. The Flexible Account is complex as drawdown products have many options (investment portfolio, draw down rates) and the Guaranteed Lifetime Income product is complex to value as it includes for example inflation, compounding and longevity risk. The effect of *WTP treatment LOW* of similar size as the effect of the treatment itself. Hence, participants who had a low participation had a twice as large WTP-WTA gap than other. This is supporting evidence that complexity might reduce the valuation of an income stream as participants who report to have found the experimental survey complex value the annuity less.

Our experimental setting has tried to eliminate or reduce this barrier by using the iMPL methodology and providing participants with a retirement calculator. In general there seems to be evidence that the experimental design succeeded, as our financial capability measures are not significant despite the intrinsic complexity of the task. Our results supplement these earlier studies by showing that even after reducing the complexity of the task there still remains a WTP-WTA gap. Hence, the implication is that online tools similar to our retirement calculator or accessing financial advice could reduce the WTP-WTA gap, but would probably not eliminate it.

The implication is that a default for retirement savings drawdown products -which would induce either a WTP or a WTA frame- would play an important role in the decision between an income product and a drawdown product. This is also supported by the following three findings (discussed more in detail later). First, participants who have a high income prefer the income product more, as choosing the draw down product would reduce their income replacement rate more due to the fixed social security income. Second, Australians relative to Dutch are more reluctant to fully annuitize their retirement savings. Third, the self-employed who typically have to plan and organise their retirement savings themselves, are reluctant to give up any of their wealth to provide for an income just above the state pension level.

In our experimental design we are careful to control for participants misconceptions. First we included a practice round before the main tasks. Second, we included a number of explanatory variables to capture the number of mistakes in the product knowledge quiz, an indicator of whether the participant reported that they found the experimental survey confusing, the time spent on the treatment and the order in which the treatment was presented to the participant. Given that order does not play an effect, the discovered preference hypothesis by Plott (1996) does not seem to play a major role in our experimental setting.

### **Behavioral factor: information framing**

Whereas we find a product endowment effect, the information framing effect is not significant. There have been mixed results in the literature regarding the effects of information framing. Our result of no effect of information framing is present even though the framed information was present on top of the screen for each of the iMPL choice sets. However, the other experimental survey design features, in particular the retirement calculator, were intended to encourage the participant think about how quickly to spent down assets, which would have reduced complexity of the tradeoff they were asked to make between the portfolios in the iMPL tasks. This is supported by our finding that the financial capability measures are not significant. Moreover, for the participants with low participation (measured as either indicator *Quiz mistakes* or *Short time* being equal to one) we find that the gain frame makes the Guaranteed Lifetime Income product more attractive as it highlights the insurance features better. The consumption frame has no significant effect for the participants with low participation, which is likely due to the product name (including “Income”), and the retirement calculator driving the participant towards thinking about how much he could consume. We note that the results are robust when excluding product features (see Table 11).

### **Rational: liquidity**

The six within-subject treatments with various portfolio compositions can be used to examine the effect of the lack of substitutes Hanemann (1991). An income stream is typically irreversible and only by saving from the income can a participant slowly increase his liquid wealth again. Although the wealth in a Flexible Account product could be used to purchase an annuity after retirement, this rarely occurs in practice. The voluntary annuity market in the Netherlands and Australia is small. Therefore, most participants would consider the decision between product portfolios as an irreversible decision. Substitutes for income (except the state pension and the imputed rent from owning a home) and wealth are scarce for retirees. Given that retirement savings are a sizeable proportion of their asset holdings, the allocation decision could have substantial welfare effects if the participant faced a large disutility from a non-optimal product mix.

For the Dutch sub-sample we observe from the within-subject treatment effects that participants would prefer not to diversify. The treatment 1-2/3 (base case) has the highest valuation by the Dutch participants. However, the treatment effects are not significant except for the other extreme treatment 1/3-0. This does however signal that the Dutch participants would generally have a larger disutility from giving up some of their income in exchange for liquid wealth than for giving up a similar amount of their

income in exchange for liquid wealth when they already have a lower income and more liquid wealth. As the Flexible Account product would provide flexibility with regards to unexpected expenses, one would expect the participants to value this feature more when they have most of their wealth in the inflexible Guaranteed Lifetime Income product. This result can also be interpreted that the Dutch prefer to stick to their existing retirement income system (of full annuitization). Contrary to the 1-2/3 portfolio where the Dutch participant might stick to the preference to the simplicity of managing an income product, the 1/3-0 portfolio would induce the participant to consider how to manage the wealth in the Flexible Account product. This does reduce the valuation of the Lifetime Guaranteed Income product for the Dutch sub-sample.

Contrary to the Dutch, the Australians do value income less when they have to fully annuitize their wealth than when they have to partly annuitize their retirement wealth. However, they too have a tendency to stick to their current retirement draw down system, as they also value the income less in case they have to annuitize a bit of their retirement wealth (treatment 1/3-0) or if they have the option between only income and only liquid wealth in addition to income at the state pension level (treatment 1-0).

In addition, we test the product endowment differences between the Dutch and Australian sub-samples in column (3) of Table 10 which includes the interaction term between being Australian and the 1-2/3 treatment. As expected, we observe that the Dutch value the additional income much more than Australians when they already have a sizeable income. Similarly, we test whether the self-employed do not want to give any of their accumulated wealth up for an income. This is tested by the interaction term between being self-employed and treatment 1/3-0. Again, our results support our hypothesis, although this is not significant for the Dutch sub-sample. This might be due to Dutch self-employed, who had in the past accumulated a DB pension, reducing the product endowment.

## 5.2 Personal characteristics

Besides our experimental features, we also collected various covariates of each participant, which are described in Section 3.4. We can use these covariates to investigate the extent to which the participant's choice is driven by monetary reasons (that is, choosing a portfolio as it is good value for money), and the extent to which it is driven by an intrinsic preference for one product over the other (that is, choosing a portfolio as it provides more utility).

### **Rational: value for money**

A Lifetime Guaranteed Income Product would be good value for money if the participant is in good health and expects to live long. However, as indicated in Table 9, the three measures relating life expectancy in the "Life and Health" category are all not significant. This would indicate that the participant's choice for the portfolio of retirement benefit products is not driven by their (private) information on their expected remaining lifetime. We note that the *SLE-OLE* measure typically has the expected sign in the regressions (and is significant in regression (7) too at a level of significance of 5%), indicating that there might be a small effect that people who live longer would find a lifetime guaranteed income more preferable. In addition, gender generally has no significant effect, even though women tend to live longer than men. The sign for *Females* is negative, which would even imply that women, who live longer, would value the Lifetime Guaranteed Income product less than males. However, the gender differences in life expectancy was also expected to have a minor effect given that the Lifetime Guaranteed Income product is a joint and survivor annuity and not a single life annuity.

The effect of being single rather than living together could be that singles prefer an income more than people in a couple. In a couple there would be more opportunity for home production, which could be interpreted economically as an income. However, one does have to be careful interpreting this variable as there is also a pricing difference between a joint and survivor annuity and a single life annuity. Hence, it could also be that participants who are living together value the survivor benefit less than our calculated price.

#### **Rational: utility from products**

The perceived product features *Riskiness* and *Control* have a significant effect on the preference for the Guaranteed Lifetime Income product relative to the Flexible Account product. This indicates that people who tend to see the Lifetime Guaranteed Income product relative to the Flexible Account as having more attractive features do value the Lifetime Guaranteed Income product more. This would indicate that the utility derived from the product would also have an influence on the preference for the products.

In the Dutch sub-sample those who are more patient prefer the Lifetime Guaranteed Income product more. People who are less patient can use the money in the Flexible Account to consume more today. Although *Patience* is not significant for Australia, *Savings habit* is. As people who have better savings habits also tend to be more patient, and Australians who are better savers (and thus typically more patient) tend to prefer the Lifetime Guaranteed Income product more.

In Australia, the bequest motive seems to play a role in the preference for a Lifetime Guaranteed Income product. Participants who have children do generally value the Lifetime Guaranteed Income

product less. However, in the Dutch sub-sample the effect is much smaller and not significant, likely due to their actual retirement income system. Australians would be more aware than the Dutch that they can leave their retirement wealth as a bequest when it is in a Flexible Account. This is because the latter do not have that option in their retirement system.

**Behavioral factor: active participant**

People who tend to exercise more choice in the current retirement system do prefer the Guaranteed Lifetime Income product less. However, as the retirement system and the choice menu are different in the two countries, there are other variables which are significant in our regression. Australians have ample choice and those who prefer to exercise it would typically indicate that they have a good retirement planning knowledge. Contrary to Australia, in the Netherlands people do not have choice regarding the investment decisions: they are decided by the fiduciary (typically a pension fund). However, they can choose to exercise the option to retire early. Hence, for those who exercise the option retirement is not distant and they value the Lifetime Guaranteed income product less.

**Behavioral factor: perception of wealth**

A participant's financial capabilities or labour market participation does not have a significance influence on the valuation of the Lifetime Guaranteed Income product. Nor does liquid (non-housing and non-retirement) wealth play a role. However, the income replacement rate does play a role. Participants who have a high income do value the Lifetime Guaranteed Income product more. Participants who own their home derive an imputed income from it which would equate the cost of renting the property. As in retirement, mortgage repayments are typically much lower than earlier in life, the difference in replacement rate would be smaller for homeowners than for renters, making them value the lifetime Guaranteed Income product less. This is in line with empirical observations in for example the UK<sup>8</sup> and Australia that people tend to take small pension pots as a lump sum whereas larger pots are either annuitized or converted into an income product. In addition, it could be driven by the finding in Goldstein et al. (2016) that people tend to have undervalue an annuity when the income of the annuity is small, but overvalue it when it is large.

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<sup>8</sup>Financial Conduct Authority Data bulletin (10) reports that 86% of people with pension pots of less than £10,000 chose full cash withdrawals whereas 90% of people with pension pots over £250,000 chose annuities or drawdown products.

## 6 Conclusions and policy implications

This paper investigates the stated attractiveness of partial and full annuitization. We use an experimental survey to elicit an individual’s willingness to pay or willingness to accept annuities in a setting where participants choose a preferred allocation of two retirement benefit products - a lifetime annuity (which we call Guaranteed Lifetime Income product) and a phased withdrawal product (which we call a Flexible Account product). To assist participants make informed choices, we reduce the cognitive difficulty associated with choice of allocations of complex and likely unfamiliar products: by provided detailed information about the features of the two products; by implementing an incentivized product knowledge instrument with feedback on answers given; we used the iMPL methodology to reduce the cognitive complexity of the experimental methodology; and to assist with the portfolio choice we provided a retirement calculator with each experimental task in order to inform the participant of the income in retirement related to their choice.

The experimental survey was conducted in two countries, namely Australia and the Netherlands, in order to investigate the impact of institutional differences. The former operates a defined contribution pension system, with choice of retirement benefit (which includes flexible drawdowns), while the latter is predominantly a defined benefit pension system with mandatory annuitization.

We find a product endowment effect, via the WTP-WTA gap, on the valuation of lifetime annuities, despite using an experimental setting designed to address possible causes. For participants with a low-levels of involvement in the experimental survey the WTP-WTA gap is twice as large. However, in general the WTP-WTA gap in our experimental survey, is much smaller than in previous experimental settings (such as Brown et al., 2017a). This could due to the experimental design, which reduced the cognitive by providing a simple retirement calculator (indicating the impact on spending of the income streams corresponding to individual’s choices. This implies that financial advice in conjunction with retirement product allocation should communicate the corresponding income over the remaining lifetime in order to facilitate an informed choice.

Even though we do find a product endowment effect, we find no information framing effect on the valuation of annuities. Our experimental design which provides repeated opportunities to learn about the products, and the frame neutral product descriptions successfully eliminate the framing effect. An exception is those participants with a low engagement with the experimental survey, where we observe that the gain frame is associated with a higher valuation of annuities. Our findings endorse the role of clear basic information to minimize the effect of framing.

We also find that participants do not determine their preference for annuities based on money's worth, but rather on whether the product provides them with utility. For example, the measures related to (subjective) life expectancy do not explain an individual's preference for annuities, while, how an individual perceives the two retirement benefit products (as being risky or providing them control) do explain their preferences. Moreover, people with higher retirement savings are more willing to annuitize. This can be explained by the illusion of wealth, as well as impact of the state pension on the retirement income replacement ratio for people on low incomes.

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## A Robustness check

Table 11: Robustness check Annuity factor Regression table

	NL (1)	AU (2)	sample (3)	1-2/3 (4)	1-1/3 (5)	1-0 (6)	2/3-1/3 (7)	2/3-0 (8)	1/3-0 (9)
<b>Personal characteristics</b>									
Female	-0.0650 (-1.56)	-0.00759 (-0.18)	-0.0274 (-0.93)	-0.0578 (-1.54)	-0.0429 (-1.21)	-0.0509 (-1.44)	0.0119 (0.33)	-0.00350 (-0.10)	0.000878 (0.02)
Single	0.186 *** (2.99)	0.183 *** (2.92)	0.167 *** (3.75)	0.120 ** (2.12)	0.131 ** (2.48)	0.197 *** (3.61)	0.133 ** (2.42)	0.209 *** (3.90)	0.218 *** (3.92)
Children	-0.000984 (-0.03)	-0.0688 (-1.58)	-0.0472* (-1.65)	-0.0164 (-0.45)	-0.0691 ** (-1.98)	-0.0505 (-1.47)	-0.0334 (-0.95)	-0.0501 (-1.46)	-0.0642* (-1.81)
Age	0.00968* (1.89)	0.00199 (0.40)	0.00566 (1.59)	0.00669 (1.50)	0.00996 ** (2.35)	0.00521 (1.23)	0.00756* (1.73)	0.00115 (0.27)	0.00406 (0.93)
In labour force	-0.0240 (-0.52)	-0.0249 (-0.51)	-0.0258 (-0.76)	0.0248 (0.58)	-0.0493 (-1.21)	-0.0367 (-0.89)	-0.0311 (-0.76)	-0.0555 (-1.36)	-0.0185 (-0.43)
Self-employed	-0.0145 (-0.27)	-0.0407 (-0.72)	-0.0317 (-0.81)	-0.0524 (-1.05)	-0.0603 (-1.29)	0.00489 (0.11)	0.0110 (0.23)	-0.0668 (-1.45)	-0.0876* (-1.84)
<b>Financial resources</b>									
Household income	0.0323 (1.36)	0.0517 ** (2.55)	0.0480 *** (3.13)	0.0290 (1.51)	0.0354* (1.92)	0.0663 *** (3.53)	0.0471 ** (2.48)	0.0590 *** (3.16)	0.0543 *** (2.84)
Wealth	0.0127 (0.53)	-0.0117 (-0.56)	-0.00355 (-0.23)	0.000936 (0.05)	0.0111 (0.60)	-0.0174 (-0.95)	-0.00653 (-0.34)	-0.00823 (-0.44)	-0.00326 (-0.17)
Homeowner	-0.108 ** (-2.29)	0.0182 (0.36)	-0.0464 (-1.34)	-0.0498 (-1.16)	-0.0580 (-1.40)	-0.0382 (-0.93)	-0.0457 (-1.09)	-0.0406 (-0.98)	-0.0457 (-1.06)
<b>Life &amp; health</b>									
SLE-OLE	0.00187 (0.81)	0.00179 (0.84)	0.00215 (1.36)	-0.000269 (-0.14)	0.00169 (0.91)	0.00265 (1.39)	0.00410 ** (2.13)	0.00310 (1.64)	0.00198 (1.01)
Outlive partner	0.0125 (1.45)	-0.00582 (-0.73)	0.00123 (0.21)	-0.000146 (-0.02)	-0.00822 (-1.18)	0.00563 (0.80)	0.00152 (0.21)	0.00451 (0.64)	0.00524 (0.70)
Health	0.00118 (0.03)	-0.00742 (-0.17)	-0.00395 (-0.13)	-0.0224 (-0.56)	-0.00909 (-0.24)	0.00519 (0.14)	-0.0163 (-0.42)	0.0504 (1.31)	-0.0353 (-0.90)
<b>Financial capabilities</b>									
SA fin lit	-0.0199 (-1.06)	0.0141 (0.69)	-0.00588 (-0.43)	0.00624 (0.36)	-0.00314 (-0.19)	-0.0261 (-1.55)	-0.00320 (-0.19)	-0.00823 (-0.49)	-0.00398 (-0.23)
Fin lit	0.0220 (0.84)	-0.00315 (-0.12)	0.0105 (0.57)	0.0261 (1.12)	0.0437 ** (1.98)	-0.0120 (-0.54)	-0.00499 (-0.22)	0.0139 (0.62)	0.00156 (0.07)
Numeracy	-0.0110 (-0.56)	-0.00375 (-0.18)	-0.00597 (-0.42)	0.00140 (0.08)	-0.0126 (-0.75)	-0.000396 (-0.02)	-0.00525 (-0.30)	-0.00441 (-0.26)	-0.0127 (-0.72)
Bachelor	-0.0503 (-1.29)	-0.0443 (-1.11)	-0.0456 (-1.63)	-0.0214 (-0.60)	-0.0220 (-0.65)	-0.0361 (-1.08)	-0.0628* (-1.81)	-0.0665* (-1.95)	-0.0558 (-1.58)
<b>Saving &amp; planning</b>									
Savings habit	0.00816 (0.59)	0.0333 ** (2.14)	0.0193* (1.89)	0.0266 ** (2.07)	0.0108 (0.89)	0.0265 ** (2.17)	0.0209* (1.67)	0.0123 (1.01)	0.0151 (1.20)
Spending horizon	-0.0258 (-0.54)	-0.0354 (-0.87)	-0.0300 (-0.99)	-0.0132 (-0.34)	-0.0437 (-1.19)	-0.0200 (-0.54)	-0.0235 (-0.63)	-0.0372 (-1.01)	-0.0282 (-0.74)
Future time	0.0164 (0.81)	0.00846 (0.39)	0.0145 (0.99)	0.00327 (0.18)	0.0147 (0.85)	0.0265 (1.47)	0.0113 (0.63)	0.0239 (1.34)	0.0173 (0.93)
Fin plan	-0.0558 (-1.43)	0.0491 (1.09)	-0.00853 (-0.29)	0.0126 (0.34)	-0.00921 (-0.26)	0.0230 (0.65)	-0.0181 (-0.50)	-0.0408 (-1.14)	-0.0192 (-0.52)
SA planning knowledge	0.0115 (0.60)	-0.0581 *** (-2.84)	-0.0182 (-1.31)	-0.0168 (-0.95)	-0.0211 (-1.25)	-0.0160 (-0.97)	-0.0175 (-1.05)	-0.0198 (-1.19)	-0.0147 (-0.86)
SA retirement distant	0.0229* (1.87)	-0.00541 (-0.44)	0.00906 (1.05)	0.00835 (0.77)	0.0128 (1.23)	0.00554 (0.54)	0.0110 (1.05)	0.00528 (0.51)	0.0106 (0.99)
<b>Personal Traits</b>									
Conscientiousness	0.0292 (0.78)	-0.0448 (-1.08)	-0.00608 (-0.22)	0.00569 (0.16)	-0.0169 (-0.51)	-0.00885 (-0.26)	-0.00755 (-0.22)	0.0156 (0.47)	-0.0229 (-0.66)
Extrovert/Open	-0.0429 (-1.15)	-0.0288 (-0.74)	-0.0389 (-1.45)	-0.0547 (-1.61)	-0.0511 (-1.58)	-0.0422 (-1.33)	0.0154 (0.47)	-0.0305 (-0.93)	-0.0675 ** (-2.01)
Agreeable/Emotional	0.00460 (0.12)	-0.0139 (-0.33)	-0.00610 (-0.21)	0.0324 (0.88)	-0.0207 (-0.60)	0.00243 (0.07)	0.0288 (0.82)	-0.0276 (-0.80)	-0.00142 (-0.04)
Risk	-0.0169 ** (-2.02)	0.000958 (0.11)	-0.00766 (-1.28)	-0.00633 (-0.82)	-0.0102 (-1.44)	-0.00849 (-1.20)	-0.00535 (-0.73)	-0.00257 (-0.35)	-0.0102 (-1.36)
Patience	0.0192 ** (2.25)	0.00419 (0.48)	0.00868 (1.42)	0.00961 (1.22)	0.00769 (1.07)	0.00280 (0.38)	0.0142* (1.90)	0.0100 (1.36)	0.0113 (1.45)
<b>Experimental design</b>									
Quiz mistakes	0.0802 (0.82)	0.164* (1.75)	0.103 (1.56)	0.0990 (1.20)	0.144* (1.87)	0.0594 (0.75)	0.157 ** (2.01)	0.0891 (1.14)	0.0519 (0.66)
Short time	-0.00403 (-0.04)	0.0219 (0.25)	0.00798 (0.11)	-0.0267 (-0.31)	-0.0265 (-0.31)	0.00302 (0.04)	0.0562 (0.65)	-0.0390 (-0.48)	-0.00503 (-0.06)
Confusing	-0.112 ** (-2.07)	-0.0825 (-1.57)	-0.0978 *** (-2.62)	-0.0641 (-1.39)	-0.121 *** (-2.69)	-0.108 ** (-2.42)	-0.0747* (-1.68)	-0.0994 ** (-2.26)	-0.126 *** (-2.80)
WTP treatment	-0.142 *** (-3.72)	-0.155 *** (-3.78)	-0.137 *** (-4.88)	-0.109 *** (-3.07)	-0.124 *** (-3.68)	-0.156 *** (-4.60)	-0.133 *** (-3.82)	-0.130 *** (-3.81)	-0.162 *** (-4.59)
WTP treatment LOW	-0.0939 (-1.09)	-0.180 ** (-2.19)	-0.151 *** (-2.58)	-0.217 *** (-2.92)	-0.170 ** (-2.45)	-0.118* (-1.67)	-0.147 ** (-2.01)	-0.168 ** (-2.39)	-0.110 (-1.50)
Gain framing	0.0465 (1.22)	-0.0345 (-0.84)	0.00602 (0.21)	-0.0140 (-0.39)	0.0245 (0.73)	0.0142 (0.42)	-0.00795 (-0.23)	0.0276 (0.81)	0.00506 (0.14)
Consumption framing	0.0102 (0.27)	0.00119 (0.03)	0.00740 (0.26)	0.00305 (0.09)	-0.0105 (-0.31)	0.0210 (0.62)	-0.00306 (-0.09)	0.0421 (1.24)	-0.0104 (-0.29)
Gain framing LOW	0.0896 (0.99)	0.108 (1.37)	0.108* (1.81)	0.152 ** (2.02)	0.0850 (1.18)	0.137* (1.91)	0.0927 (1.31)	0.0379 (0.52)	0.126* (1.72)
Consumption framing LOW	-0.0892 (-0.99)	-0.0473 (-0.55)	-0.0625 (-1.01)	-0.0199 (-0.26)	-0.0601 (-0.82)	-0.0884 (-1.21)	-0.156 ** (-2.11)	-0.0391 (-0.53)	-0.0154 (-0.20)
Short time x Quiz mistakes	-0.114 (-0.84)	0.0330 (0.24)	-0.0296 (-0.32)	-0.0275 (-0.25)	-0.106 (-0.96)	0.0312 (0.28)	-0.0859 (-0.75)	0.0755 (0.66)	-0.0875 (-0.78)
Duration	-0.00250 (-0.35)	0.000666 (0.07)	-0.00155 (-0.28)	-0.0166 (-0.97)	-0.0309* (-1.89)	-0.0288* (-1.68)	-0.0199 (-1.27)	-0.00641 (-0.40)	-0.0149 (-1.03)
Order	-0.00628 (-1.31)	0.00363 (0.71)	-0.00149 (-0.43)	-0.00338 (-0.31)	-0.0208* (-1.95)	0.0147 (1.45)	-0.0246 ** (-2.32)	-0.00651 (-0.63)	-0.00641 (-0.60)
Likelihood to act	-0.0431 *** (-3.30)	0.00137 (0.10)	-0.0205 ** (-2.21)	-0.0237 (-1.35)	-0.00691 (-0.41)	-0.0401 ** (-2.42)	-0.0602 *** (-3.61)	-0.0433 *** (-2.59)	-0.0244 (-1.44)
1-1/3	-0.0262 (-1.49)	0.0380 ** (1.97)	-0.0201 (-1.20)						
1-0	-0.0154 (-0.84)	0.0212 (1.08)	-0.0235 (-1.38)						
2/3-1/3	-0.0151 (-0.75)	0.0375* (1.77)	-0.0148 (-0.81)						
2/3-0	-0.0190 (-0.92)	0.0339 (1.59)	-0.0190 (-1.03)						
1/3-0	-0.0456 ** (-2.06)	0.00319 (0.14)	-0.0480 ** (-2.46)						
SEx(1/3-0)	-0.0317 (-0.70)	-0.0912* (-1.93)	-0.0624* (-1.90)						
AUx(1-2/3)			-0.0499 ** (-2.17)						
Australian			-0.00555 (-0.18)	-0.0590 (-1.53)	0.0224 (0.61)	-0.0258 (-0.69)	0.00216 (0.06)	-0.0190 (-0.51)	-0.00760 (-0.20)
Constant	-0.689 ** (-2.01)	-0.109 (-0.32)	-0.341 (-1.42)	-0.465 (-1.53)	-0.379 (-1.32)	-0.241 (-0.83)	-0.353 (-1.17)	-0.123 (-0.41)	-0.226 (-0.75)
N	6,018	6,000	12,018	2,003	2,003	2,003	2,003	2,003	2,003

t statistics in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$