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Reducing the under-insurance puzzle by product design: Experimental evidence of life care annuity demand

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Reducing the under-insurance puzzle by product design: Experimental evidence of life care annuity demand[*]

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ABSTRACT

We investigate whether a life care annuity—the integration of a life annuity with long-term care insurance (LTCI)—can enhance insurance participation to mitigate the economic puzzle of under-insurance in the longevity insurance and LTCI markets. Using an online choice experiment, we elicit individuals' preferences for consumption in different health conditions and their demand for a life care annuity and its health-contingent income feature. We find that on average people prefer to spend more in good health than in bad health. However, those who are more forward looking, have certain cultural backgrounds, and have higher long-term care risk have a stronger preference for consumption in bad health. Results also show that over half of the participants prefer income-indemnity LTCI paying cash benefits than expense-reimbursement insurance. These preferences are mainly driven by the flexibility provided by income-indemnity insurance and by the needs to compensate for informal care. While we find no evidence of selection effects in the purchase decision of life care annuities, we find that individual preferences over the income features of the product could potentially lead to a separating equilibrium of various risk types. We also document other determinants of the demand for life care annuities, including availability of informal care, financial circumstances, awareness of long-term care risk, and product knowledge.

Keywords: Long-term care insurance; aged care; informal care; retirement incomes; annuity experiment.

JEL Classifications: D14, G22, H55, I13, J32

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1   Introduction and motivation

While economic theory predicts that life annuities (Yaari, 1965) and long-term care insurance (LTCI) (Ameriks et al., 2011) should be of great value to risk averse individuals facing uncertain lifetime and long-term care (LTC) costs, the private markets for both products remain small in many countries (Brown and Finkelstein, 2007; Mitchell et al., 2011). Recently, the life care annuity, which combines LTCI with a life annuity, has been proposed to address major issues in the separate markets for life annuities and LTCI (Murtaugh et al., 2001). The adverse selection effect[1], which makes life annuities more expensive than the actuarially fair price, is an important reason contributing to the low demand (Mitchell et al., 1999).[2] For LTCI, the underwriting practice excludes a significant proportion of the population from purchases (Murtaugh et al., 1995).[3]

Murtaugh et al. (2001) propose a life care annuity to deal with these issues by pooling longevity risk and LTC risk. The paper argues that integrating LTCI and a life annuity would reduce the need for underwriting, allowing the relatively unhealthy group to purchase a life care annuity and thereby lowering the costs of purchasing insurance coverage for LTC risk and longevity risk. Two later studies examine whether the life care annuity would work as it is claimed. Using data from the Health and Retirement Study (HRS), Brown and Warshawsky (2013) calculate that the expected present values of LTC costs are similar for different risk groups, confirming that the need for underwriting for life care annuities is minimal.[4] Using the same categorization of risks, Table 1 displays the costs of a life annuity, LTCI and a life care annuity for males in different risk groups. The calculation shows that it costs the least healthy males (health state 4) around 21% more than the actuarially fair premium to purchase a life care annuity.[5] Wu et al. (2016) study whether these people should purchase a life care annuity using a life-cycle framework. The paper finds that the coverage for LTC risk provided by a life care annuity to the least healthy purchasers, who would otherwise not be able to get from LTCI due to underwriting, leads

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[1]That is as individuals with better longevity prospectives are more likely to purchase life annuities, annuity providers will have to incorporate this into product pricing and raise the price of life annuities.

[2]See Brown (2007) for a survey of other reasons for non-annuitization.

[3]A life care annuity could also potentially address the poor product design issue of LTCI in the current markets. The typical expense-reimbursement type of LTCI policies in the current markets reduces the demand of those people who plan to rely on informal care provided by family members (Wu et al., 2017). Moreover, the high rate of lapses for periodically-renewed LTCI policies has resulted in an even lower coverage at advanced ages when people are more likely to need LTC. Although the high lapse rate allows LTCI policies to be sold at a much cheaper price, it is at the expenses of those people who surrender their policies due to liquidity problems and lost their accrued benefits. Overall, this cross-subsidization does not increase, if not decrease, individual welfare.

[4]One would only need underwriting for LTCI to eliminate the poor health, but not for life annuities.

[5]Brown and Warshawsky (2013) calculate that the least healthy male purchasers of a life care annuity pay about 7% more than the actuarially fair premium. This differs from the number in Table 1 due to differences in product features. The life care annuity in Brown and Warshawsky (2013) pays more LTCI benefits for each dollar of life annuity payment.

to willingness-to-pay as much as a 21% loading on top of the risk pooling price. Using stated preferences, our study contributes to this literature by investigating whether people indeed would purchase a life care annuity as predicted and by exploring the determinants of heterogeneity in the demand for life care annuities.

Table 1: Costs of life annuities, long-term care insurance and life care annuities

The table reports the prices of three income products for males in different health states, under different pricing assumptions. Health state 1 is the most healthy state and health state 4 is the least healthy state. The life annuity pays $10,000 per year as long as the annuitant is alive. The long-term care insurance pays $20,000 per year during the period when the insured has two or more limitations in Activities of Daily Living (ADLs) or is cognitively impaired. Combining these two products, the life care annuity pays $10,000 per year as long as the annuitant is alive and $20,000 per year during the period when the annuitant has two or more limitations in ADLs or is expense-reimbursement. These prices are calculated based on the estimated health transition probabilities in Wu et al. (2016).

	Actuarially fair price for health state				Risk pooling price
	1	2	3	4	
Life annuity	$135,677	$123,903	$120,339	$100,593	$125,410
% differ from the risk pooling price	7.57%	-1.22%	-4.21%	-24.67%	
Long-term care insurance	$13,462	$14,282	$13,032	$14,453	$13,593
% differ from the risk pooling price	-0.97%	4.83%	-4.31%	5.95%	
Life care annuity	$149,139	$138,185	$133,371	$115,046	$139,003
% differ from the risk pooling price	6.80%	-0.59%	-4.22%	-20.82%	

In this paper, we provide new empirical evidence on the demand for life care annuities. Using a large experimental survey of over 1,000 Australians between age 55 and 64. The survey provides stated preferences over life care annuities which would not be directly observed in the publicly available household surveys such as the HRS. The benefit of having Australian participants is twofold. First, Australia has a mandatory universal Defined Contribution system, with currently a minimum retirement savings rate of 9.5% of gross income. Therefore, most Australians have a significant amount of retirement savings. This makes the choice for retirement income products relevant for the participants. Second, Australians are very unlikely to have previous experience with a LTCI policy and its flaws.[6] This prevents the stated preferences of the participants in the experimental survey to be influenced by early experience.

We use an experimental survey to elicit stated preferences over life care annuities, with the aim to uncover the determinants of these preferences. As it is cognitively demanding for participants to trade off liquid wealth, longevity insurance, and LTCI at the same time, we conduct a two-stage experiment. In the first stage, we elicit the preference for health-contingent income (i.e., LTCI providing regular income

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[6]There is no private LTCI market in Australia.

in the period of disability). We ask participants to state their demand for health-contingent income at various levels of life-contingent income (i.e., life annuity income) that is pre-determined. In the second stage, participants compare different retirement income portfolios which are set from the choices they have made in the first stage. They then rank these portfolios from the best to the worst, from which we elicit their preferences for both life- and health-contingent income.

We contribute to the understanding of how to better offer longevity insurance and LTCI to individuals in four ways. First, we elicit an individual's preference for spending in good and bad health, using a newly constructed survey question in a similar manner to eliciting risk attitude (Dohman et al., 2011) and patience (Becker et al., 2012). Results show that on average people prefer to consume and spend more in good health than in bad health. We also find that people who are more forward looking, have certain cultural backgrounds, and have higher LTC risk due to health deterioration prefer to consume more in bad health. These results imply that people might update their preferences for consumption in bad health if they have experienced a health shock.

Second, we provide an empirical analysis of individual preferences between income-indemnity LTCI and expense-reimbursement LTCI. An income-indemnity policy provides fixed income payments for the period when the insured is disabled, whereas an expense-reimbursement policy reimburses the costs of formal care for the disabled insured.[7] Earlier studies (Murtaugh et al., 2001; Spillman et al., 2003) provide a general discussion of the benefits and issues with providing cash benefits (i.e., income-indemnity) instead of service benefits (i.e., expense-reimbursement) but offer little empirical evidence. We find that a majority of the participants prefer income-indemnity insurance over expense-reimbursement. Although income-indemnity only provides a partial coverage for formal care costs, the flexibility of the life care annuity seems to be important for many people. Indeed, people who rely on informal care, especially those relying on forms of informal care other than intra-household, are even more likely to prefer income-indemnity insurance to expense-reimbursement insurance.

Third, we study whether a life care annuity would be subject to selection effects, which could potentially prevent the product from pooling different risks. It is well known that life annuities are subject to adverse selection, being more attractive for people who live long. For LTCI and health insurance, empirical findings suggest no adverse selection or even advantageous selection. Those who are healthy (and live long) are more likely to be insured (Finkelstein and McGarry, 2006; Cutler et al., 2008; Fang et al., 2008; Buchmueller et al., 2013; Doiron et al., 2008). We study the selection issue in both the decision

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[7]Thus the insured will receive a fixed amount of income during the period of disability, even if there are no expenses incurred for care provision.

to purchase a life care annuity and the preferred product feature (that is, the ratio of health-contingent income over income from life annuities). Our results show that health indicators have no significant impact on the decision to purchase a life care annuity. However, individual preferences over the product feature could potentially lead to a separating equilibrium of various risk types. This is because those who are more likely to need home care prefer a lower health-contingent income than those with a higher self-reported chance of needing residential care.

Fourth, we explore the determinants of demand for life care annuities. We find that people who plan to receive low care from close family members are more likely to purchase a life care annuity. Conditional on purchase, those who would rely on informal care for extensive support prefer a much higher level of health-contingent income than professional care users. These results signal that individuals use life care annuities to avoid being a burden to their families. In addition, those who are richer in assets, have less household income, and are more aware of LTC costs have a stronger demand for the life care annuity. We also find that financial product knowledge is important. The non-monetary costs to acquire knowledge for a life care annuity reduce the demand. Our results provide the first investigation of the determinants of the demand for life care annuity.

The remainder of the paper is organized as follows. The next section provides a description of the experimental tasks to elicit stated preferences for life care annuities. After that, we provide an empirical analysis on the individual preferences over spending in different health states, as well as the preferences between income-indemnity insurance and expense-reimbursement insurance. We then examine the demand for life care annuities and income preferences. The last section concludes.

2   Experimental design

Given the non-existence of a market for life care annuities, analyzing its demand and supply issues using empirical data is not possible. Therefore, we rely on experimental revealed (stated) preferences in order to investigate the extend to which life care annuities could be a viable product, which can help overcome product design issues within both the annuity market as well as the LTCI market. The experimental task is designed such that it can provide insights into two main questions. First, we are interested in people's preferences for health-contingent income. Second, we are interested in the product features of a life care annuity that people would prefer. In particular, we are interested in people's preferences of the ratio of income in the state with a health condition relative to the state without a health condition. This ratio is also important as it affects possible risk pooling in the case that "good risks" are more interested in

other product features than "bad risks".

In October 2015 we sampled 1,008 Australians aged 55-64, without dementia or two or more ADL limitations, from a large panel of over 180,000 Australians maintained by the online survey firm Lightspeed GMI. The exclusion of individuals with health conditions is because they would, upon purchase, qualify for the health-contingent additional income of the life care annuity. Participants were paid up to A\$7 for the complete survey, which had a median time of completion of 30 minutes. The participants in the experiment are representative of the Australian population aged 55-65, see Table 2. The participants on average have a slightly higher education level and a slightly lower percentage is employed. However, this has no effect on the representativeness of the income distribution.

Table 2: Demographics

The table compares demographic characteristics of survey participants with Australian Census population data. The survey samples 1008 Australians aged 55-64, who do not have dementia or need help with two or more activities of daily living. The population data is for ages 55-64 years and from the Australian Bureau of Statistics Census of Population and Housing 2011.

	Population	Sample		Population	Sample
Gender			Personal income		
Male	49.4%	51.4%	Negative or no income	7.6%	7.6%
Marital status			\$1 to \$20,799	28.8%	24.8%
Married/De facto	66.9%	67.4%	\$20,800 to \$41,599	24.3%	25.2%
Work status			\$41,600 to \$64,999	18.4%	20.7%
Employed	60.4%	47.6%	\$65,000 to \$103,999	13.4%	16.0%
Education			\$104,000 or more	7.6%	5.7%
Bachelor or above	19.1%	32.7%			
Year 10 or above	81.4%	94.6%			

The aim of the experimental design was to enable participants to make an informed choice. For most people overseeing the benefits and drawbacks of the income products would be a complex task. To enhance participants' capability to make an informed choice we implemented three strategies.

The first strategy to enhance the participants' capability to make informed choices was to provide information within the experiment. The information provided consisted of three parts. The first part presented information on expenditures in retirement and how people use income and drawdown products to cover their expenditure needs. The sources to cover regular expenditures were age pension (e.g. state pension), annuity (framed as "lifetime annual income product") and a retirement saving drawdown account. The second part presented information regarding aged care prevalence and costs. We informed participants that 3 out of 5 will need care at some stage in their life (also graphically displayed), and

the chance is higher for females than males. Also the costs of care can range from less than $1,000 a year for basic home support to around $65,000 a year for residential aged care. To induce participants to consider their possible future prevalence for the need of care, we asked participants their self report chance of needing in-home as well as residential care. The possible responses for each of those two questions were "*lower than the average for people of your gender*", "*higher than the average for people of your gender*", and "*about the average*". The last part of the information consisted of information related to the retirement income products in the experiment which can be used to cover expenditures in retirement. The products were "lifetime annual income", "aged care income" and "account-based pension product" (a retirement saving drawdown account). For each of the products, the information consisted of the cost, conditions for payment and whether wealth is bequestable.

The second strategy to enhance the participants' capability to make informed choices was to incentivize the knowledge acquisition of the hypothetical product features. This was done by implementing a recall quiz relating to the product features. Participants were informed about the incentivized reimbursement for participating in the experiment at the introduction of the survey as well as at the stage the hypothetical product information was presented. The mechanisms to enhance knowledge acquisition though the recall quiz is twofold. First, participants are intrinsically motivated to put in effort to acquire the product feature knowledge as they receive feedback on whether they could recall the product features. Second, participants were motivated by the monetary reward related to the recall quiz.

The third strategy to enhance the participants' capability to make informed choices was to conduct two focus groups when designing the experiment. Among other things, the focus groups feedback informed us on the labelling of the products, including information on inflation indexation, and the design of the experimental task. To check the clarity of the survey, participants were asked to assess the clarity of the survey at the end. Only 5% indicated that they found the survey either "mostly confusing" or "completely confusing".

The participants in the experiment are informed what would influence their revealed preferences in the experiment, whereas people in general might not have the same information. This is a potential limitation of the study; people who are not informed might not behave in a similar manner as the participants in the experiment. The experimental design would more accurately mimic the actual behaviour of people who plan for later financial needs or who seek financial advise (which provides information of the life care product) than those who don't. More people are using financial advice. For example, using the 1998 to 2007 Survey of Consumer Finances, Hanna (2011) shows that there has been an increase in utilization of

financial advice in the U.S. from 21% in 1997 to 25% in 2007.

The remainder of this section will present the experimental task in detail. The experimental task was divided into two parts to reduce cognitive complexity. The first part focuses on the need for income in the state with a health condition. The second part focuses on the need for income in general. After these tasks, participants were asked whether they prefer to have either health-contingent income or LTC expense-reimbursement insurance. We asked this question after these tasks as they will inform participants about how a health-contingent income could assist in covering their expenditure needs.[8]

2.1   Task 1: Optimal health-contingent income level

In the first task, the aim is to collect the participant's revealed preference for the level of health-contingent income level for various levels of annuitization of retirement savings. We consider five alternatives for annuitization levels, namely 0%, 25%, 50%, 75%, and 100%. These annuitization levels are of retirement savings, on top of a flat age pension of A$22,000 per annum (e.g. pre-annuitized wealth). The first task consists of four consecutive optimal aged care income allocations, as in case of full annuitization the participant has no savings left to purchase the aged care income product.

For each of the partial annuitization levels (0%, 25%, 50%, and 75%) of retirement savings alternatives we ask the participant to indicate their optimal health-contingent income level. The participant has to move a slider in the experiment to indicate their optimal level. The participant can choose any value between using none and all of their (after annuitization) retirement wealth to purchase the health-contingent income product. To prevent revealed preferences which are due to inaction, participants were forced to move the slider before proceeding.

Information provided to participants on the screen with the health-contingent income choices is the initial situation (before purchasing the health-contingent income product) above the slider and the outcome of their choice below the slider. The information on the initial situation consists of the income level and their retirement wealth. Participants are asked to allocate their retirement wealth between an account based pension (retirement savings drawdown account) and health-contingent income. The information on the outcome of the choice consists of their income (unaffected by their choice), their health-contingent income and the account balance of the account based pension. Participants can see the features of the products by hovering over the product names.

For a given participant, the retirement savings (e.g. the net present value of the income plus liquid

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retirement savings) are the same in all choices. To prevent alienation with the task and to be able to investigate the effect of accumulated wealth, we considered four hypothetical retirement savings levels, namely A\$50,000, A\$175,000, A\$375,000, and A\$1,000,000. To set the amount of retirement savings for a given participant, we collected data on the participant's net wealth excluding family home and its mortgage. To allocate a participant to one of the four retirement saving levels we use cut off points of net wealth—which were A\$100,000, A\$250,000 and A\$500,000. Note that the participant is shown four different (after annuitization) retirement wealth levels, as 0%, 25%, 50% and 75% of the retirement savings is annuitized in the four questions. For each \$1,000 of retirement savings, the participant receives an annual income of \$85 or \$75, for males and females respectively. These are calculated based on the actuarial fair price, using HRS calibrated health state transition probabilities and an interest rate of 3%.

2.2   Task 2: Optimal income level

The second task is designed to elicit the participant's revealed preference for the level of income and the level of health-contingent income. This second task comprises of two parts, in each part three combinations of products (income, health-contingent income and account based pension) are presented. The income is based on the 5 levels of annuitization. The allocation to health-contingent income and account based pension is based on the participant's response in the previous task with the corresponding level of annuitization. Participants are then asked to indicate which of the three combination of products they consider to be best for them and which of the three combination of products they consider worst for them.

The best/worst technique is used often is stated preferences experiments. It measures the relative importance or perceived trade-offs among choice alternatives and provides better outcomes (Lee et al., 2007) and takes significantly less respondent time (Lee et al., 2008) than traditional rating scale or ranking approaches. The method has been applied in the field of health economics (Flynn et al., 2007). In addition, similar to this study's design, using a subset of three alternatives out of a larger subset has previously been successfully applied (Louviere et al., 2013).

Figure 1 illustrates graphically the dependency between the first and the second task. In the first part of the second task the level allocated to the three products correspond to the revealed preferences for the level of health-contingent income (with the remainder of the retirement wealth in an account based pension) for the three partial annuitization (i.e., 25%, 50%, and 75%) tasks in the first stage. The combination of three products which the participants ranks best is again displayed as an alternative in the

second part of the second task. The other alternatives are the combination of products the participant reported as optimal given no annuitization and the case of full annuitization (with no health-contingent income and no money in the account based pension). The combination of products indicated as 'best' at this stage represents the participant's optimal income and health-contingent income, used for analysis in this paper.
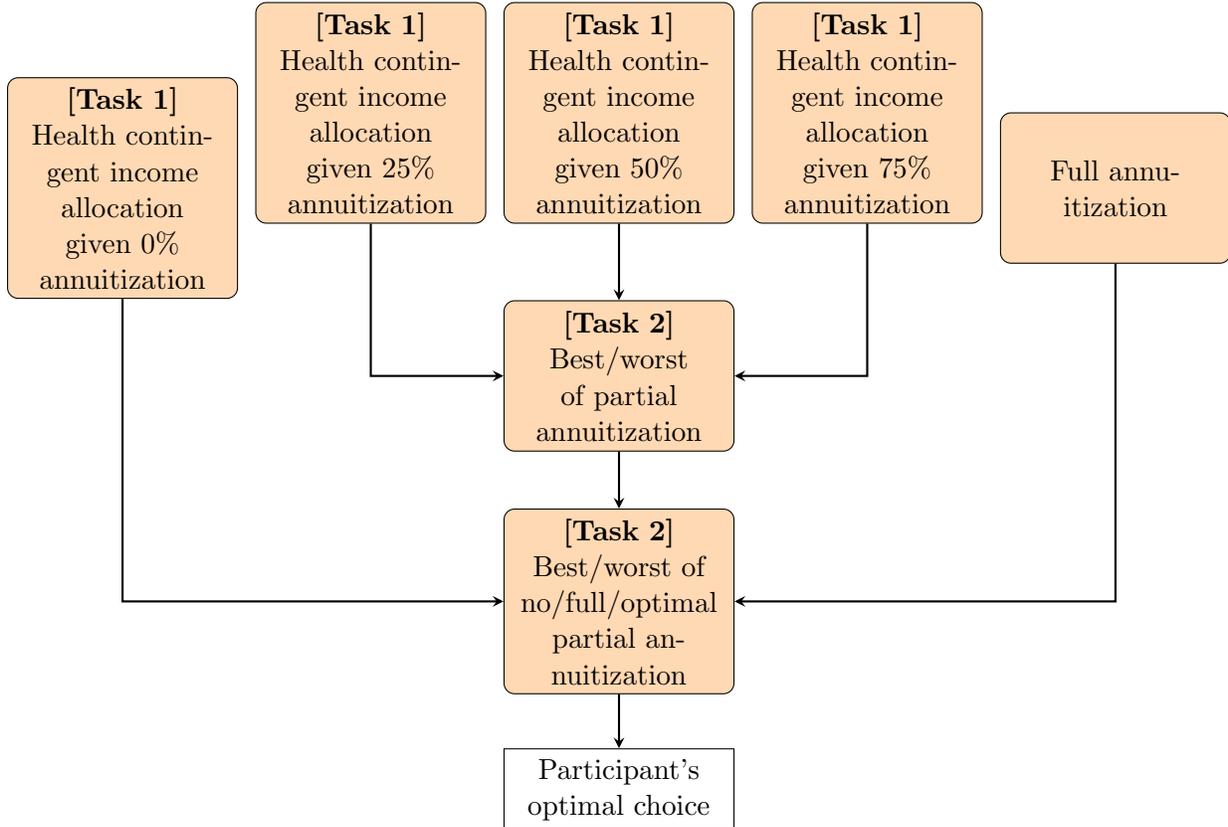
Figure 1: Experimental task procedure

Table 3: Classification of health states

The table explains the classification of health states (1 - 4). Heart problems refer to heart attack, coronary heart disease, angina, congestive heart failure, or other heart problems. Lung disease refers to chronic lung diseases like chronic bronchitis and emphysema.

Health state	History of major illness	Self-reported health	Disability status
1	None	Good to Excellent	0 ADL
2	None	Poor to Fair	0 ADL
	None	All	1 ADL
3	Heart problems or diabetes, but not both	All	0-1 ADL
4	Heart problems and diabetes, or Lung Disease, or Stroke	All	0-1 ADL

2.3 Explanatory variables

After the experimental task, we collect information on the participants (some questions related to screening participants and pricing were collected before the experiment). The questions are for the information collected is provided in Appendix A Table 5. Questions related to objective measures of the exposure to LTC risk include dummies for gender (female), current smoker, and receiving formal care within the last five years, and a continuous variable for current age. Following Brown and Warshawsky (2013) and Wu et al. (2016), an ordinal variable for the health state is created by combining information on Activities of Daily Living (ADLs), major illnesses, and self-reported health. The ADLs include dressing, bathing, eating, getting in or out of bed, and toileting. Major illnesses include heart problems, diabetes, lung disease, and stroke. Self-reported health is rated based on five scales, excellent, very good, good, fair, or poor. Table 3 provides the classification of health states based on the health information collected.

For subjective indicators of exposure to LTC risk we collect the subjective life expectancy and create a variable of the difference relative to the population based predicted life expectancy. We create dummy variables for higher home-care and residential care risk for participants. Higher home-care (residential care) risk are participants who report higher than average chance of needing home-care (residential care) and about average or below average chance of needing residential care (home-care), as well as those who report about average chance of needing home-care (residential care) and below average chance of needing residential care (home-care).

For awareness of LTC care we create an ordinal variable financial planning for LTC, which can be either "'have set aside money', "expect to rely on the government", and 'do not know needs and costs". Moreover, we include a dummy for care provider, which equals one if either the participant actively provided informal home-care in the past week or has parents, siblings or other close relatives who received formal home-care in the previous five years.

For the availability of informal care we include ordinal variables for self report sources of some (low) and extensive (high) care, which can take either values "Informal care only", "Informal care and other sources", and "No informal care". In addition, two objective indicators are included, which are a dummy for non-partnered and a continuous variable for the number of children. We also include a dummy for non-homeowner to measure whether the participant could use housing wealth to cover LTC costs.

For utility parameters, we include willingness to take financial risk, patience, utility in bad health and strength of bequest motive using the chance of leaving a $100,000 bequest. For individual capability and product knowledge, we include the number of mistakes in the big three financial literacy test (Lusardi

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and Mitchell, 2009), number of mistakes in the numeracy test (Lipkus et al., 2001), general product knowledge measured by the number of self reported products the participant has heard of, and specific product knowledge of life annuities and LTCI measured by the number of correct answers to the test related to both products respectively. In addition, we include a dummy for whether the participant holds private health insurance.

Regarding retirement planning, we include a dummy variable for planning to retire before 65, and a dummy variable for whether the participant had given at least some thought about the financial aspects of retirement. A continuous variable retirement spending change is also created to measure the projected percentage change (or the experience of change for retired participants) of consumption upon retirement. Other control variables include an ordinal variable for country of birth, a dummy variable for having a university degree, an ordinal variable for work status, a continuous variable for household gross income and a categorical variable for wealth.

3   Ex-ante health-contingent utility

As the income payments of a life care annuity depend on the annuitant's health, it is important to understand people's preference for consumption and spending in different health states. In this section, we investigate whether participants might have an ex-ante preference for a higher consumption level in a bad health state, and the determinants of these preferences.

There are two streams in the existing literature arguing opposite effects of health shocks on optimal consumption. On the one hand, some studies (French, 2005; French and Jones, 2011; Capatina, 2015) investigate the optimal consumption in different health states in a life cycle model. This stream of literature assumes that individuals are rational utility maximizers. A health shock corresponds to a reduction in home productivity and therefore individuals would consume more. The literature relies on individuals being rational and will foresee a reduction in home productivity when a health shock occurs. On the other hand, there are studies (see, e.g. Finkelstein et al., 2009; Brown and Finkelstein, 2009; Viscusi and Evans, 1990; Finkelstein et al., 2013) incorporating the reduction in the marginal utility of consumption when a health shock occurs, leading to a reduction in consumption. These studies rely on the observed difference in consumption when a health shock occurs. They assume that individuals are rationally forward looking, but do not update their marginal utility in the bad health state after they have experienced the health shock. As a result, people choose their consumption in good health conditional on their beliefs of what their future utility in bad health would be. Once they have experienced a health

shock, even though this would coincide with having additional information on the marginal utility in bad health, they stick with their consumption plan for the bad health state that they have made previously.

In this paper, we neither assume that individuals are rational utility maximizers with full information, nor that they won't ex-post update their marginal utility of consumption in the bad health state. Instead, we are interested in an individual's ex-ante belief of how they would change their consumption when a health shock occurs. This is because individuals make the purchase decision for insurance based on the information and beliefs available to them at the time of purchase. Therefore, we asked a question similar to the self-reported risk aversion (Dohman et al., 2011) and patience (Becker et al., 2012) questions. The question in the experiment was as set out below. Participants were asked to response a Likert scale from 0 to 10 where 0 indicates "person A" and 10 indicates "person B":

People's general spending behaviour may be different when they are not healthy. How do you see yourself: Are you generally like person A or person B?

- **Person A**: *Spends as much as possible while being in good health and spend little while being in bad health.*

- **Person B**: *Spends as much as possible while being in bad health and spend little while being in good health.*

Figure 2 displays the distribution of the responses. The average of the responses is 4.253, indicating that on average individuals expect to consume slightly more in good health than in bad health. However, around 40% of the participants (more females than males) indicate that they prefer to have similar consumption in good and bad health states. Another 40% of participants (more males than females) prefer more consumption in good health and the remainder 20% prefer to have more consumption in bad health.

Table 6 (Appendix B) provides the odds ratio of an ordered logit regression of the participants' responses to the above question. The independent variables are the covariates collected in the experiment. The results uncover three drivers of preference for higher consumption in bad health. These drivers are whether a participant is forward looking rather than having a present bias, the cultural background and exposure to LTC risk.

There are three variables which indicate that forward looking people prefer a higher level of consumption in bad health than those with a present bias. The effects are generally more significant for females than for males. First, females who expect to consume more in retirement also prefer a higher income in
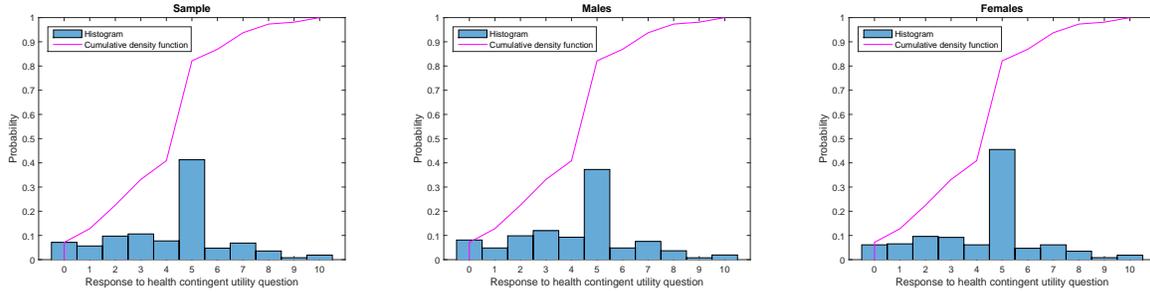
Figure 2: Distribution of participant's health-contingent income preference

Notes: 0 indicates **Person A**: Spends as much as possible while being in good health and spend little while being in bad health; 10 indicates **Person B**: Spends as much as possible while being in bad health and spend little while being in good health.

case of bad health (at 10% level of significance). These people prefer to consume more later in life which is likely when they are in bad health. Second, we observe that people who have a greater knowledge of life annuities prefer to consume more in bad health. A life annuity is a product which exchanges a lump sum for a lifetime income stream. Forward looking individuals are more likely to be interested in the product—and thus gain knowledge about it. Third, people who have not bought a family home are less likely to prefer consumption in the bad health state. Compared to non-homeowners, homeowners ar more likely to be forward looking, as purchasing a family home often requires a significant amount of deposit to be paid at the time of purchase.[9] As this deposit affects one's consumption, purchasing a family home requires future planning for spending.

Two cultural backgrounds have an effect on preference for spending in different health states, with the impact also being more prevalent for females. First, people from Asia prefer to spend more in bad health, compared to Australians and New Zealanders. This is because in Asia out-of-pocket payments—rather than expense-reimbursement insurance—are the predominant means of financing healthcare (O'Donnell et al., 2008). Moreover, Van Doorslaer et al. (2007) show that healthcare expenditure could substantially reduce the standard of living in Asia. Second, people from the Mediterranean also, but to a lesser extend, prefer a higher level of spending in bad health. In southern Europe, national healthcare systems were established only in the 1980's and are under-resourced (Freeman, 2000). Moreover, Mediterranean countries are characterized as countries with strong-family-ties relying more on informal care (Bolin et al., 2008).

The extent to which a participant is exposed to LTC risk also affects preference for consumption

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[9]In Australia, it typically requires 20% of the home value to be paid on purchase, with the rest 80% coming form the mortgage.

in different health conditions. Compared to the healthy, people who have already experienced some deterioration in their own health—those in health state four (e.g., people who have had a stroke) or in health state two (e.g., people with one ADL limitation)—have a stronger preference for consumption in the bad health state. These people also have higher LTC risk. The actuarially fair prices of LTCI for these people are the highest among all eligible purchasers (see Table 1). Moreover, most of the other measures for LTC risk (such as *Current smoker* and *Received care*) have positive signs, although they are not significant.

4 Preference for income-indemnity insurance

Benefits of LTCI can be paid in two ways. The typical LTCI policies in the current markets are based on reimbursement, which pay the costs of receiving care from a professional care giver. The other alternative is income-indemnity. An income-indemnity LTCI policy provides fixed income payments for the period when the insured is disabled, whether the insured pays for care provision or not. As a life care annuity requires attaching an income-indemnity LTCI to a life annuity, its demand will be affected by people's preference for income-indemnity insurance. In this section we study whether people would prefer income-indemnity insurance over expense-reimbursement insurance and what types of individuals are more likely to do so.

After the main experiment where we elicit a participant's optimal demand for life- and health-contingent income, we ask the participants to choose in which way they would prefer the insurance benefits to be paid. The comparison is between "Fixed payments" (income-indemnity) and "Reimbursements" (expense-reimbursement). The exact wording of the question was: *In the scenarios so far the aged care insurance product has paid fixed annual payments. Now imagine that there are two alternative ways you can receive a benefit to cover aged care costs. The price you would pay would be the same regardless. The benefits you would receive are also projected to be the same.*

- **Option A - Fixed payments**: *You will receive regular payments (CPI-indexed) if you suffer from either health condition 1) or 2). That is, you will receive the full payment even if you don't have to pay that much for your care (for example, if the care is provided by your family members). However, if your aged care expenses exceed the Aged Care Income payments, you will need to **pay** for the shortfall.*

- **Option B - Reimbursements**: *You will be reimbursed for the full cost of care that you have*

*incurred. However, you **will not** receive any payments if you do not have to pay for the costs of care.*

Which option do you prefer?

○ *I would prefer fixed payments - Option A*

○ *I would prefer reimbursements - Option B*

4.1 Aggregate preference for income-indemnity insurance

Generally one would expect that individuals would prefer reimbursement of incurred costs in the insurance context. This is because fixed payments (as income-indemnity insurance) only provide a partial coverage to LTC costs, leading to basis risk (Cole et al., 2013; Giné and Yang, 2009). However, the responses from the participants (see Table 4) indicate that more people prefer the fixed payments option rather than the expense-reimbursement option, especially females.

Table 4: Preference for income-indemnity

The table reports the percentage of responses to the income-indemnity insurance question. Option A refers to the "Fixed payments" (income-indemnity insurance), wheareas Option B refers to the "Reimbursements" (expense-reimbursement).

	Sample	Males	Females
Preferring Option A	57.94%	53.06%	62.55%
95% Confidence interval	(54.88%, 60.99%)	(58.37%, 66.73%)	(48.63%, 57.50%)
Total number of respondents	1,008	518	490

Given that the costs and expected benefits are the same for both products, one could consider this question as a trade-off between two types of basis risks. The fixed payments (Option A) provide cash benefits which could be used to pay for either formal or informal care, but are exposed to uncertainty in covering potentially high formal care expenses. The reimbursements (Option B) only covers formal care costs, and thereby inducing a different type of basis risk corresponding to costs of informal care. Therefore, we next investigate which determinants drive the preference for income-indemnity insurance.

4.2 Drivers of preference for income-indemnity insurance

Given the variables collected in the survey, including the measure for utility in bad health, we are interested in explaining the heterogeneity in the preference for income-indemnity insurance over expense-

reimbursement insurance, which was observed in Table 4. First, we investigate whether health or longevity measures are indicators for preference between income-indemnity insurance and expense-reimbursement insurance. This is important as it would indicate whether income-indemnity insurance could be subject to selection effects. Next, we will look at other personal characteristics to explain heterogeneity in individual preferences.

Is health or longevity an indicator of preference for income-indemnity insurance?

Table 7 (Appendix B) presents the average partial effects of a logit regression, where the dependent variable takes the value of one if a participant prefers income-indemnity insurance over expense-reimbursement insurance. For independent variables, columns (1)-(3) include possible pricing factors. Columns (4)-(6) also include variables which could indicate private information regarding an individual's health.

Results show that most health indicators do not have significant explanatory power over individual preferences for income-indemnity insurance. An exception is that participants who have received formal home care are more likely to prefer income-indemnity insurance. These people are more likely to need care in future, but more importantly they have experience with care providers. Despite that they may have had past experience with expense-reimbursement insurance, they are more likely to prefer the flexibility and control over spending provided by income-indemnity insurance. Whereas this may indicate a possibility for adverse selection for income-indemnity LTCI, it would not be the case for a life care annuity. This is because the dominant risk for a life care annuity is longevity risk (Brown and Warshawsky, 2013), which is less likely for those who received care previously.

In addition, gender plays a significant role. Females are less likely to prefer income-indemnity insurance in general. Although females tend to live longer and spend longer time in bad health (see, for example Majer et al., 2013), this will not lead to any selection issue for a gender-specific life care annuity (such as the product in our experiment). For a gender-neutral life care annuity, in which case the product provider cannot charge a different price according to sex,[10] the aggregate selection effect due to gender is unclear. On one side, this gender effect on preference for income-indemnity insurance may lead to advantageous selection. On the other side, there may also be adverse selection as females may be more likely to purchase a gender-neutral life care annuity than males. This is because the actuarially fair price of a life care annuity for females is much higher than that for males (Brown and Warshawsky, 2013).

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[10]This is the case in European Union. On 1 March 2011, the Court of Justice of the European Union declared invalid as from 21 December 2012 an exemption in EU equal treatment legislation which allowed Member States to maintain differentiations between men and women in individuals' premiums and benefits. In its ruling on 1 March 2011 in the Test-Achats case (C236/09), the Court of Justice of the EU gave insurers until 21 December 2012 to change their pricing policies in order to treat individual male and female customers equally in terms of insurance premiums and benefits (MEMO/11/123).

The effect of personal characteristics on preference for income-indemnity insurance

Next, we consider whether other variables collected in the survey have explanatory power. Table 8 (Appendix B) presents the estimated average partial effects of a logit regression for the full model. We observe that there are three additional drivers—in addition to the ones described above—for preference for income-indemnity insurance. These are: consumption in bad health, informal care provision, and non-monetary cost related to the two products.

Especially for males, income-indemnity insurance is more preferred among people who might use it for consumption in bad health. This is evident from the utility in bad health variable, but also from those who expect to rely on the government to cover aged care costs. These people could use the cash benefits provided by income-indemnity insurance as a supplement for income in the bad health state, while minimizing the basis risk for formal care expenses from public insurance provided by the government.

The availability of and the form of informal care provides an important role in explaining the preference for income-indemnity insurance. People who expect to rely on informal care are more likely to prefer income-indemnity insurance, which provides them more flexibility to cover informal care costs. Moreover, whether informal care can be provided intra-household also matters. People with more children and without a partner are more likely to prefer the income-indemnity insurance. These people are less likely to receive intra-household informal care. This could indicate that the income-indemnity insurance is potentially seen as a means to financially compensate informal care providers. Moreover, those who have experience with care provision are more likely to prefer income-indemnity insurance. This is, as discussed previously, apparent from the higher preference for the feature from people who have received care in the past five years. In addition, women -contrary to males- who work part-time often have other caring tasks (Van Houtven et al., 2013) and they are more likely to prefer the income-indemnity product.

We find that non-monetary cost related to the types of insurance also play a role in explaining the preference for income-indemnity insurance. People who have a better knowledge of (expense-reimbursement) LTCI are less likely to prefer income-indemnity insurance. Their cost of acquiring information related to the new feature is high, compared to the already known features of the expense-reimbursement insurance. On the other hand, people who self-report having a better knowledge of financial products in general are more likely to prefer the income-indemnity insurance. This might be explained by two drivers. First, they more easily acquire financial product knowledge and thereby would have a lower cost of acquiring new information. Second, as it is self-reported, it might be the more confident (or *over*confident) persons that think they easily get to know the product features of income-indemnity insurance. This might also

partly explain the gender difference as males tend to be overconfident (Barber and Odean, 2001). As income-indemnity insurance is presented in the experiment as an insurance type whose payment structure is simple, people who tend to be more impatient prefer the product.[11] This is because for the expense-reimbursement type of insurance people would have to take time—among other features—to figure out what expenses are covered and what are not to decide which one is best for them. For an impatient person this is not attractive and the easy payment structure would be their preference.

5   Demand for Life Care Annuity

In this section we study the demand for a life care annuity. We first investigate whether the demand is subject to selection effects, which could prevent the product from pooling different risks. We then explore other demand determinants. In order to investigate these, we estimate a two-part utilization model analyzing both the decision to purchase a life care annuity or not and the income feature of the product. The income feature is characterized by the level of health-contingent income (which will be received in bad health) relative to the income from a life annuity (which will be received in both good and bad health). This allows us to study who are more likely to purchase the product and what are the preferred income features of the product conditional on purchase.

We use a logit model to study the purchase decision. We define that a participant is willing to purchase a life care annuity if the participant i) prefers income-indemnity insurance over expense-reimbursement insurance and ii) has a positive allocation in their optimal portfolio to life annuities and health-contingent income. For the analysis of the income feature, we use an OLS regression to study the ratio of health-contingent income over income from a life annuity, conditional on purchasing a life care annuity.

5.1   Selection

We are interested in whether the life care annuity would be subject to selection effects. Existing studies (Brown and Warshawsky, 2013; Wu et al., 2016) suggest that the dominant risk for a life care annuity provider is longevity risk. If adverse selection appears, pricing of life care annuities needs to be based on the characteristics of buyers rather than the characteristics of the eligible population. In this case, a risk pooling equilibrium cannot be sustained and it will lead to an increase in price, making a life care annuity less attractive (see, for example, the adverse selection in the annuity market, Mitchell et al., 1999). A risk

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[11]Often in economics patience is related to the individual's discount factor. However, as the question states that for both types of insurance the expected costs and benefits are the same, the individual's discount factor is not relevant and other forms of patience are driving the estimated result.

pooling equilibrium requires both (i) the decision to purchase a life care annuity and (ii) the preferred product feature (that is, the ratio of LTC-contingent income over income from life annuities) does not depend on measures of exposure to LTC risk. If the former is not the case, then the pool of purchasers will contain more people in a specific health state, resulting in a failure of risk pooling. If the latter is not the case, then the product providers can intentionally attract a specific type of risk by altering the feature, leading to a separating equilibrium.

Although the aim of the life care annuity is not to have underwriting, columns (1)-(3) of Table 9 (Appendix C) presents the preference for the life care annuity for various possible pricing factors. We observe that none of the possible pricing factors, except for gender, has a significant effect on the preference for the life care annuity. This would indicate that, even without underwriting, the life care annuity can be priced using population health transition and mortality probabilities. We observe that females are less likely to purchase the life care annuity. As the life care annuity is priced actuarially fair, the prices for females is higher than for males. The finding that females are less likely to prefer the life care annuity would reduce the selection effects in the case that the life care annuity provider would not be able to discriminate on the basis of gender, as in Europe. Next columns (4)-(6) of Table 9 presents the preference for the life care annuity for various health indicators. The addition of subjective indicators of health does not lead to any significant variables, indicating that selection effects for a life care annuity would be small.

Next, we are interested in whether, in the case that life care annuity providers would differentiate by various health-contingent income level relative to life-contingent income level, the life care annuity providers would each attract different types of risk. This could reduce the viability and the potential benefits of risk pooling of a life care annuity. Therefore, Table 10 (Appendix C) presents the results of the optimal health-contingent income relative to the life-contingent income for the participants who would purchase a life care annuity. This reduces the sample to 223 observations, of which 129 are male and 94 are female.[12] Again, using the results in column (1) we find that possible pricing factors have no significant influence on the preference for the health-contingent income feature. Using the results in column (4) we find that a subjective health indicator has a significant influence on the preference for the health-contingent income feature. People who consider themselves having a higher home care risk are less likely to prefer a high health-contingent income relative to life-contingent income than those who consider themselves having a higher residential care risk. This can be due to informal care being a substitute for

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[12]As the sample size is smaller, for the results in Table 10 we focus on the effects for the sample.

formal care in the case of home care. Indeed, Bonsang (2009) shows that informal care substitutes for paid domestic help and that informal care is a weak complement to nursing care. Therefore, those with higher home care risk can more effectively use the life care annuity to reduce formal care needs and need a lower health-contingent income. However, as higher home care risk might be correlated to living longer, there could be a potential separating equilibrium based on the health-contingent income feature.

5.2 Other determinants

There are four drivers which can explain the demand for life care annuities and the level of income in bad health relative to good health state. Interestingly, some drivers are different for the decision to purchase a life care annuity (see columns (1), (2), and (3) in Table 11, Appendix C) and the optimal health-contingent income relative to life-contingent income (see columns (4) in Table 11, Appendix C).

First, we find that people would use life care annuities to avoid being a burden to their families. Our results show that people who would receive low care from their families are more likely to purchase a life care annuity than professional care users. Non-partnered females, for whom children may be the only source of informal care, are also more likely to purchase a life care annuity than females with a partner. Conditional on purchase, those who plan to rely on informal care for extensive support also prefer a higher level of health-contingent income (relative to life-contingent income). We also find that people born in Asian countries, where family members caring for older people is much more common, demand a higher level of health-contingent income. These findings suggest that people use life care annuities to supplement their income when they would need family support for care.

Second, people's financial circumstances affect the demand for a life care annuity. We find that people who are asset rich (wealth group 3 and 4) and who are income poor are more likely to purchase a life care annuity. In addition, people in the lowest wealth group who are most likely liquidity constrained prefer a higher health-contingent income relative to life-contingent income. This indicates that health-contingent income is more important for the poor.

Third, people who are more aware of LTC costs prefer the life care annuity. People who had either their parents, siblings or other close relative receive some formal home care in the past five years or have provided informal care in the past week prefer a higher level of health-contingent income relative to life-contingent income. They are more aware of the costs, both for formal and informal care providers. This effect is larger for females, who are typically the informal care providers. In addition, people who have set aside money for LTC costs, are typically more aware of LTC costs and thus are more likely to

purchase the life care annuity.

Finally, the non-monetary cost related to acquiring knowledge for a life care annuity plays a primary role in explaining whether people purchase a life care annuity or not. People who have a better knowledge of (expense-reimbursement) LTCI and/or life annuities are less likely to purchase a life care annuity as their cost of acquiring information related to the new feature is high. However, those who have a higher self-reported general knowledge of financial products have a higher preference for the life care annuity as they typically more easily acquire new information at a lower cost.

6   Conclusions

The analysis presented in this study explores the viability of life care annuities and whether they can address the issues associated with the separate markets for life annuities and LTCI. Using data from a large-scale online experiment, this study provides an empirical examination of the preference for LTCI type (expense-reimbursement versus income-indemnity), and explores any potential selection effects and determinants of life care annuity demand.

We use a newly constructed question to elicit an individual's self-reported preference for consumption in good and bad health, in a similar manner to eliciting risk attitude (Dohman et al., 2011) and patience (Becker et al., 2012). We demonstrate that on average people prefer to consume and spend more in good health than in bad health, with about 40% of people preferring an equal consumption level. These results imply that people might update their preferences for consumption in bad health if they have experienced a health shock. These preferences over consumption in different health conditions are also found important to explain the preferences for income-indemnity insurance to expense-reimbursement insurance.

We then analyze individuals' preferences between income-indemnity insurance and expense-reimbursement insurance. Results show that more participants prefer income-indemnity insurance over expense-reimbursement. In particular, people who rely to some extent on informal care are more likely to prefer income-indemnity insurance, taking advantage of its flexibility to cover informal care costs. Importantly, people who would are likely to receive informal care from their children are more likely to prefer the income-indemnity insurance. We also find that the non-monetary costs of acquiring the new product information and the complexity of the product play a role in explaining individual preferences between income-indemnity insurance and expense-reimbursement insurance.

We also investigate whether a life care annuity would be subject to selection effects. We find no evidence of selection effects in the purchase decision of life care annuities. Both possible pricing factors

and other subjective measures of health do not have any explanatory power to explain the preference for life care annuities. These results imply that a life care annuity could be priced on health and mortality probabilities of all eligible purchasers, confirming the minimal need for underwriting (Brown and Warshawsky, 2013). We also find that people with higher self-reported residential care risk have a larger demand for income in bad health compared to those with a higher home care risk. This may induce a separating equilibrium based on this product feature.

Finally, although health indicators do not explain the demand for life care annuities, other determinants do. The availability of informal care influences the demand for life care annuities, but the effect depends on whether an individual relies on informal care for low care or for extensive care. We observe that people who rely on family members for low care are more likely to purchase a life care annuity, whereas people relying on informal care for extensive support prefer to have a higher level of income in bad health. These findings suggest that individuals use life care annuities to avoid being a burden to their families. In addition, people who are wealthier and are more aware of LTC costs have a stronger demand, whereas a higher level of household income and the non-monetary costs to acquire knowledge for a life care annuity reduce the demand.

Our analysis shows that there is the potential for a life care annuity market. The product, with a income-indemnity LTCI feature rather than an expense-reimbursement feature can complement the current market without being subject to adverse selection effects. A life care annuity is more preferable for people who rely on informal care for their care needs. This also has societal advantages, as it could increase informal care provision and reduce negative financial consequences for the informal care providers.

Appendix A Covariates and experimental questions [Online appendix]

Table 5: Covariates and experimental questions

The table reports the experimental questions for the dependent variables. For dummy variables, the outcome for which the variable takes the value one is bold. For categorical variables the categories are listed in the first column with an indent. The last column reports the average outcome for the variable.

Variable	Question	Answer	Value construction	Mean/Proportion
Objective measures of exposure to LTC risk				
Female	Are you?	Male / **Female**	Binary vairable: 1 for females and 0 for males	0.486
Age	What is your age?	55-64	Continuous variable from the answer	59.539
Health state	ADL: Does anyone ever help you with i) Dressing, including putting on shoes and socks; ii) Bathing or taking a shower; iii) Eating, such as cutting up your food; iv) Getting in or out of bed; v) Using the toilet, including getting up and down.	Yes / No	Categorical variable (Based on Brown and Warshawsky, 2013)	
			1 (0 ADLs, no Illness, and Good to Excellent health)	0.597
	Illness: Has the doctor ever told you have had the following i) a heart attack, coronary heart disease, angina, congestive heart failure, or other heart problems; ii) diabetes, or high blood sugar; iii) chronic lung disease such as chronic bronchitis or emphysema; iv) a stroke.	Yes / No	2 (0 ADLs, no Illness, and Poor to Fair health) or (1 ADL, no illness, and any self-reported health)	0.090
			3 (0-1 ADLs, Heart problems or diabetes but not both, and any self-reported health)	0.196
	Self-reported health: Would you say your health is excellent, very good, good, fair, or poor?	Excellent / Very good / Good / Fair / Poor	4 (0-1 ADLs, (Heart problems and diabetes) or (Lung Disease) or (Stroke), and any self-reported health)	0.116
Current smoker	Which of the following best describes your smoking behaviour?	Ever smoked, currently smoking / Ever smoked, currently not smoking / Never smoked	Binary vairable: 1 for current smoker and 0 otherwise	0.157
Received care	In the last five years, have you ever received assistance or services provided by any medically-trained person who came to your home to help you?	Yes / No	Binary vairable: 1 for Yes and 0 for No	0.062
Subjective indicators of exposure to LTC risk				
Subjective life expectancy	According to Australian Bureau of Statistics, Australian females at your age on average are expected to live to age X, to what age do you think you will live? (X is retrieved from the cohort life table for Australians)	Numerical value	Continuous variable calculated by Answer LESS X	-3.186

continued on next page

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Table 5 – continued

Variable	Question	Answer	Value construction	Mean/Proportion
Chance of needing care	What do you think are the changes that you will ever need in-home care?	Lower than the average / Equal to the average / Higher than the average	Categorical variable based on the two questions	
			Equal risk of home care and residential care	0.841
	What do you think are the changes that you will ever need residential care?	Lower than the average / Equal to the average / Higher than the average	Higher home care risk	0.106
			Higher residential care risk	0.053
Availability of informal care				
Informal care for some (low) care	If you were to need some help with daily living activities (e.g., bathing, dressing, feeding) and/or domestic tasks (e.g., shopping, gardening, cleaning, cooking), who do you expect will provide that help? (You may choose more than one)	Spouse or partner / Children or extended family / Friends and neighbours / An aged care provider, in my home / An aged care provider, in residential care / Personal carers, gardeners, or cleaners etc that I can hire myself	Binary vairable: 1 if select any one of Spouse or partner / Children or extended family / Friends and neighbours, and 0 otherwise	0.704
Informal care for extensive (high) care	If you were to need extensive help with daily living activities (e.g., bathing, dressing, feeding) and/or domestic tasks (e.g., shopping, gardening, cleaning, cooking), who do you expect will provide that help? (You may choose more than one)	Spouse or partner / Children or extended family / Friends and neighbours / An aged care provider, in my home / An aged care provider, in residential care / Personal carers, gardeners, or cleaners etc that I can hire myself	Binary vairable: 1 if select any one of Spouse or partner / Children or extended family / Friends and neighbours, and 0 otherwise	0.501
Non-partnered	What is your current marital status?	Never married and not living in a long term (de facto) relationship / Widowed / Divorced / Separated but not divorced / Married / Living in long term (de facto) relationship	Binary variable: 1 if select any one of Never married and not living in a long term (de facto) relationship / Widowed / Divorced / Separated but not divorced, and 0 otherwise	0.326
Number of children	How many children do you have that are still alive? Please count all natural children, fostered, adopted and stepchildren.	Numerical value	Continuous variable from the answer	1.961
Other sources of financing for LTC costs				
Non-homeowner	Do you (and your husband/wife/partner) currently	i) Own (or are buying) your own home ii) Rent your home iii) Other (please specify)	Binary variable: 1 if choosing (i) and 0 otherwise	0.191
Measures of utility parameters				
Willingness to take (financial) risk	How do you see yourself: Are you generally a person who is fully prepared to take risks in financial matters or do you avoid taking risks in financial matters?	0 (Not prepared to take risks) to 10 (Fully prepared to take risks)	Continuous variable from the answer	3.975

Table 5 – continued

Variable	Question	Answer	Value construction	Mean/Proportion
Patience	How do you see yourself: Are you generally an impatient person, or someone who always shows great patience?	0 (Very impatient) to 10 (Very patient)	Continuous variable from the answer	6.36
Utility in bad health	How do you see yourself: Are you generally like person A or person B? Person A: Spends as much as possible while being in good health and spend little while being in bad health. Person B: Spends as much as possible while being in bad health and spend little while being in good health.	0 (Person A) to 10 (Person B)	Continuous variable from the answer	4.253
Chance of $100K bequest	Think about the inheritance you and your partner might leave (but not including any inheritance you might leave to each other): What are the chances that you and your partner will leave an inheritance totally $100,000 or more? Include properties and other valuable items as well as money here.	No chance, almost no change (1 chance in 100) / Very slight possibility (1 chances in 10) / ... / Almost sure (9 chances in 10) / Certain, practically certain (99 chances in 100)	Continuous variable from the answer in percentage points	52.589
Individual capability and knowledge about retirement financial products				
Earnings from recall quiz	Six questions testing the understanding of product features of the three products introduced in the experiment	Tick the correct product feature{s}	Continuous variable from the bonus earnings	3.119
	Suppose you had $100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow?	More than $102 / Exactly $102 / Less than $102 / Do not know		
No. of mistakes in FL	Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, how much would you be able to buy with the money in this account?	More than today / Exactly the same / Less than today / Do not know	Continuous variable from the number of incorrect answers	0.648
	Please evaluate whether this statement is true or false. Buying shares in a single company usually provides a safer return than buying units in a managed share fund.	True / False / Do not know		

Table 5 – continued

Variable	Question	Answer	Value construction	Mean/Proportion
No. of mistakes in Numeracy	Imagine that we rolled a fair, six-sided die 1,000 times. Out of 1,000 rolls, how many times do you think the die would come up even?	Please enter a number between 0 to 1000 in the box.	Continuous variable from the number of incorrect answers	1.298
	In a lottery, the chance of winning a $500 prize is 1%. What is your best guess of how many people would win the prize if 1,000 people each buy a single ticket in the lottery?	Please enter a number between 0 to 1000 in the box.		
	In a raffle, the chance of winning a car is 1 in 1,000. What per cent of tickets in the raffle win a car?	Please enter a percentage.		
Knowledge on life annuity	Regarding a lifetime annuity, which of the following statements are always true? Select all that apply.		Continuous variable from the number of correct answers	2.167
	i) It's a type of life insurance product			
	ii) As a purchaser, you exchange a lump sum for regular income payments	True / False		
	iii) Income from this product lasts your whole life regardless of how long you live			
	iv) The estate receives a lump sum payment purchaser dies			
	v) Purchasing this product results in regular income payments at interest rates higher than an equivalent term deposit			
Knowledge on LTCI	Regarding aged care insurance, which of the following statements are always true? Select all that apply		Continuous variable from the number of correct answers	1.217
	i) As a purchaser, you pay a single/regular premium in exchange for benefits that help you cover (or reduce) the cost of long-term age care or support expenses			
	ii) The insurance covers costs of residential care only			
	iii) The premium of the insurance is higher if you are older	True / False		
	iv) There is a chance that you will not be able to purchase aged care insurance if you have difficulties with with one or more activities of daily living (such as bathing, eating, dressing)			
	v) With regular premium payments, you may not get your payments back or receive any benefits if you surrender your insurance by discontinuing payment of the regular premiums			

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Table 5 – continued

Variable	Question	Answer	Value construction	Mean/Proportion
General product knowledge	Have you heard of the following: Bank or credit union transaction account / Bonds / Shares (stocks) / Private health insurance / Life insurance policies / Superannuation accounts / Account-based (or allocated) pension / Lifetime annuity / Fixed term annuity / Aged care annuity	Yes / No	Continuous variable from the number of Yes	8.495
No private health insurance	Not including Medicare, are you covered by any private health insurance plan, whether in your own name or through another family member?	Yes / No	Binary vairable: 1 for No and 0 for Yes	0.382
Awareness of LTC risk				
Care provider	Did you look after any sick or disabled adult in the past week (including your partner or other people in your household)? By 'look after' we mean active provision of care	Yes / No	Binary variable: 1 if Yes to any of the two questions and 0 otherwise	0.262
	Have you ever looked after any sick or disabled adult in the last five years (including your partner or other people in your household)?	Yes / No		
Financial planning for LTC	Which of the following statements best describes your thoughts about financing your aged care expenses?	i) I've made sure I've got enough money or assets to pay for care when I need it;	Categorical variable	
		ii) I will need some help from my family to pay for my aged care costs;	Have set aside money buy may need help (any of i to iii)	0.508
		iii) I will need some help from the government to pay for my aged care costs;	Expect to rely on government (iv)	0.083
		iv) I expect the government to pay all my aged care costs;	Do not know needs and costs (v)	0.409
		v) Can't say - don't know what aged care services I may need or how much they will cost.		
Retirement planning				
Intend to retire before 65	Are you intending to retire before age 65?	Yes / No / Don't know	Binary vairable: 1 for Yes and 0 for No	0.493

Table 5 – continued

Variable	Question	Answer	Value construction	Mean/Proportion
Financial planning for retirement	Which of the following statements best describes your thoughts about the financial aspects of retirement?	i) I've not thought about what savings I will need for retirement	Binary vairable: 1 for(ii) to (iv) and 0 for (i)	0.782
		ii) I've checked out my current saving position and started to think about what I need for retirement		
		iii) I've a firm idea of what I need for retirement and I'm not on track to reach my savings goal		
		iv) I've a firm idea of what I need for retirement and I'm on track to reach my savings goal		
Retirement spending change	For many households, overall spending changes dramatically upon retirement. Please indicate below what your experience has been (if you are retired), or what your expectations are (if not retired)	My household had (or expects to have) no change in spending at retirement	Continuous variable from the answer in percentage points	-17.005
		My household has spent (or will spend) more at retirement		
		My household has spent (or will spend) less at retirement		
	About how much more or less (as a percentage of your annual pre-retirement spending)?	Please enter a percentage.		
Demographics and other controls				
		i) Australia	Categorical variable	
		ii) New Zealand	Australia & New Zealand (i and ii)	0.78
		iii) United Kingdom, Channel Islands, Isle of Man	Northwestern Europe (iii and iv)	0.13
		iv) North-West Europe (excl. United Kingdom, Channel Islands, Isle of Man)	Mediterranean & Eastern Europe (v and vi)	0.03
Country of birth	Where were you born?	v) Mediterranean countries	Asia (vii, viii, and ix)	0.02
		vi) Eastern Europe	Other countries (x)	0.04
		vii) China		
		viii) India		
		ix) Asian country other than China and India		
		x) Other, please specify		

Table 5 – continued

Variable	Question	Answer	Value construction	Mean/Proportion
Bachelor or above	What is the highest post school qualification you have?	i) PhD ii) Master Degree or equivalent iii) Graduate Diploma and Graduate Certificate from university or equivalent iv) Bachelor Degree or equivalent v) Advanced Diploma and Diploma from university/TAFE or equivalent vi) Certificate or equivalent from TAFE or equivalent vii) None of the above	Binary vairable: 1 for(i) to (iv) and 0 otherwise	0.327
Work status	Which of the following best describes your current work status?	i) Employed full time	Categorical variable	
		ii) Employed part time	Full time (i)	0.270
		iii) Unemployed	Part time (ii)	0.206
		iv) Not in the labour force-Stay-at-home parent or caregiver	Unemployed/not in labour force (iii, iv, and vi)	0.384
		v) Not in the labour force-Retired	Retired (v)	0.140
		vi) Not in the labour force-Other		
Household gross income	Which of the following categories best describes your weekly (annual) gross underlinehousehold income (before tax)?	Nil income $1-$199 ($1-$10,399) $200-$299 ($10,400-$15,599) $300-$399 ($15,600-$20,799) $400-$599 ($20,800-$31,199) $600-$799 ($31,200-$41,599) $800-$999 ($41,600-$51,999) $1,000-$1,249 ($52,000-$64,999) $1,250-$1,499 ($65,000-$77,999) $1,500-$1,999 ($78,000-$103,999) $2,000-$2,499 ($104,000-$129,999) $2,500-$2,999 ($130,000-$155,999) $3,000-$3,499 ($156,000-$181,999) $3,500-$3,999 ($182,000-$207,999) $4,000-$4,999 ($208,000-$259,999) $5,000 or more ($260,000 or more)	Continuous in thousand dollars per year (constructed by mid-points of annual income intervals)	73.672
Wealth group	Which of the following categories best describes your net wealth (what you own (your assets) LESS what you owe (your debts))? (If you are married or in a de facto relationship, include only your share of wealth).	i) $0 less than $99,999	Categorical variable	
		ii) $100,000 - $249,999	1 (i)	0.275
		iii) $250,000 - $499,999	2 (ii)	0.252
		iv) Greater than or equal to $500,000	3 (iii)	0.209
			4 (iv)	0.264

Appendix B   Section 3 regression results

Table 6: Determinants of health dependent utility question

The table reports the estimates of the odds ratio for the ordered logit regression of responses to the following health dependent utility question:
People's general spending behaviour may be different when they are not healthy. How do you see yourself: Are you generally like person A or person B?

- **Person A**: *Spends as much as possible while being in good health and spend little while being in bad health.*

- **Person B**: *Spends as much as possible while being in bad health and spend little while being in good health.*

The responses were on a Likert scale of discrete values from 0 to 10, where 0 indicates "Person A" and 10 indicates "Person B". The dependent variable for all columns is from these responses. The explanatory variables are the covariates collected in the experiment. Robust standard errors (Huber-White) are shown in parentheses. *, **, and *** indicate significance at 10, 5, and 1 percent level, respectively.

Dependent variable:	Health dependent utility		
	Sample (1)	Male (2)	Female (3)
Objective measures of exposure to LTC risk			
Female	1.226		
	(0.162)		
Age	1.004	1.025	0.983
	(0.022)	(0.033)	(0.032)
Health state: base case = 1			
2	1.508*	1.724*	1.212
	(0.336)	(0.509)	(0.403)
3	1.129	0.970	1.303
	(0.179)	(0.212)	(0.357)
4	1.689**	1.812*	1.366
	(0.383)	(0.591)	(0.542)
Current smoker	1.271	1.311	1.399
	(0.246)	(0.332)	(0.442)
Received care	1.354	1.174	2.037
	(0.356)	(0.363)	(0.932)
Subjective indicators of exposure to LTC risk			
Subjective life expectancy	1.000	1.003	0.998
	(0.008)	(0.011)	(0.011)
Chance of needing care: base case = equal risk of home care and residential care			
Higher home care risk	1.291	1.853**	0.795
	(0.263)	(0.560)	(0.247)
Higher residential care risk	0.955	1.322	0.792
	(0.304)	(0.492)	(0.541)
Availability of informal care			
Informal care for some (low) care	1.119	1.504	0.803
	(0.205)	(0.402)	(0.239)
Informal care for extensive (high) care	1.074	1.037	1.128
	(0.154)	(0.230)	(0.240)
Non-partnered	1.117	1.604**	0.803
	(0.183)	(0.371)	(0.214)
Number of children	0.944	0.974	0.902
	(0.050)	(0.080)	(0.066)
Other sources of financing for LTC costs			
Non-homeowner	0.677**	0.720	0.546*
	(0.133)	(0.193)	(0.185)
Measures of utility parameters			
Willingness to take (financial) risk	1.066	1.105	0.985
	(0.090)	(0.145)	(0.122)
Willingness to take (financial) risk^2	0.997	0.989	1.014
	(0.010)	(0.015)	(0.017)
Patience	1.019	1.002	1.065
	(0.030)	(0.042)	(0.047)
Chance of $100K bequest	1.001	1.002	1.000
	(0.002)	(0.003)	(0.003)
Individual capability and knowledge about retirement financial products			

Table 6 – continued

Dependent variable:	Health dependent utility		
	Sample (1)	Male (2)	Female (3)
No. of mistakes in FL	1.047	1.064	1.100
	(0.091)	(0.156)	(0.128)
No. of mistakes in N	1.032	1.094	0.907
	(0.063)	(0.102)	(0.084)
Earnings from recall quiz	0.945	0.947	0.918
	(0.037)	(0.052)	(0.056)
General product knowledge	0.930	0.967	0.895
	(0.055)	(0.083)	(0.070)
Knowledge on life annuity	1.125**	1.037	1.199**
	(0.061)	(0.082)	(0.096)
Knowledge on LTCI	1.020	1.038	1.002
	(0.046)	(0.063)	(0.073)
No private health insurance	1.069	1.214	0.918
	(0.148)	(0.253)	(0.187)
Awareness of LTC risk			
Financial planning for LTC: base case = do not know needs and costs			
Have set aside money buy may need help	1.216	1.253	1.086
	(0.147)	(0.223)	(0.198)
Expect to rely on government	1.071	1.003	1.105
	(0.282)	(0.338)	(0.478)
Care provider	0.926	1.024	0.813
	(0.130)	(0.194)	(0.177)
Retirement planning			
Intent to retire before 65	0.961	1.177	0.802
	(0.142)	(0.279)	(0.154)
Financial planning for retirement	0.824	0.888	0.826
	(0.138)	(0.207)	(0.221)
Retirement spending change	1.001	0.997	1.007*
	(0.003)	(0.004)	(0.004)
Demographics and other controls			
Country of birth: base case = Australia & New Zealand			
Northwestern Europe	1.120	1.321	1.126
	(0.211)	(0.406)	(0.282)
Mediterranean & Eastern Europe	2.327**	1.007	3.862***
	(0.847)	(0.606)	(1.545)
Asia	4.156***	2.697	6.254***
	(1.774)	(1.690)	(3.103)
Other countries	1.281	1.225	1.425
	(0.520)	(0.845)	(0.762)
Bachelor or above	0.984	1.012	0.987
	(0.135)	(0.198)	(0.210)
Work status: base case = full time			
Part time	1.071	1.182	0.885
	(0.192)	(0.320)	(0.250)
Unemployed/not in labour force	0.879	0.923	0.678
	(0.170)	(0.273)	(0.198)
Retired	0.856	0.768	0.773
	(0.183)	(0.265)	(0.231)
Household gross income	0.999	0.998	0.999
	(0.001)	(0.002)	(0.002)
Wealth group: base case = 1			
2	0.922	1.046	0.810
	(0.169)	(0.279)	(0.223)
3	0.839	0.870	0.794
	(0.162)	(0.270)	(0.222)
4	1.364	1.541	1.167
	(0.308)	(0.505)	(0.429)
N	1008	518	490
Log likelihood	-1919.711	-1011.114	-879.909

Table 7: Determinants of preference for income-indemnity insurance (reduced form)

The table reports the estimates of the average partial effects for the logit regression of responses for the following income-indemnity insurance question:

In the scenarios so far the aged care insurance product has paid fixed annual payments. Now image that there are two alternative ways you can receive a benefit to cover aged care costs. The price you would pay would be the same regardless. The benefits you would receive are also projected to be the same.

- **Option A - Fixed payments**: *You will receive regular payments (CPI-indexed) if you suffer from either health condition 1) or 2). That is, you will receive the full payment even if you don't have to pay that much for your care (for example, if the care is provided by your family members). However, if your aged care expenses exceed the Aged Care Income payments, you will need to **pay** for the shortfall.*

- **Option B - Reimbursements**: *You will be reimbursed for the full cost of care that you have incurred. However, you **will not** receive any payments if you do not have to pay for the costs of care.*

Which option do you prefer?

- *I would prefer fixed payments - Option A*
- *I would prefer reimbursements - Option B*

The dependent variable for all columns is a binary variable taking the value of 1 if the participant chooses the Option A and 0 otherwise. The explanatory variables for columns (1), (2), (3) only include possible pricing factors for a life care annuity. The explanatory variables for columns (4), (5), and (6) also include other health indicators. The estimation results of the full model with all covariates are reported in Table 8. Robust standard errors (Huber-White) are shown in parentheses. *, **, and *** indicate significance at 10, 5, and 1 percent level, respectively.

	Pricing factors			Pricing factors & health indicators		
	Sample (1)	Male (2)	Female (3)	Sample (4)	Male (5)	Female (6)
Objective measures of exposure to LTC risk						
Female	-0.089***			-0.089***		
	(0.031)			(0.031)		
Age	-0.001	-0.004	0.000	-0.001	-0.004	0.001
	(0.006)	(0.008)	(0.008)	(0.006)	(0.008)	(0.008)
Health state: base case = 1						
2	0.009	-0.063	0.093	0.006	-0.062	0.077
	(0.057)	(0.077)	(0.082)	(0.057)	(0.077)	(0.085)
3	0.027	-0.037	0.115*	0.024	-0.036	0.105
	(0.041)	(0.052)	(0.065)	(0.042)	(0.053)	(0.066)
4	0.012	-0.024	0.041	0.007	-0.022	0.024
	(0.050)	(0.066)	(0.079)	(0.051)	(0.066)	(0.080)
Current smoker	-0.013	-0.049	0.026	-0.017	-0.047	0.013
	(0.043)	(0.057)	(0.063)	(0.043)	(0.058)	(0.064)
Received care	0.145**	0.085	0.227**	0.143**	0.087	0.229**
	(0.061)	(0.079)	(0.092)	(0.062)	(0.080)	(0.093)
Subjective indicators of exposure to LTC risk						
Subjective life expectancy				-0.001	0.001	-0.003
				(0.002)	(0.002)	(0.003)
Chance of needing care: base case = equal risk of home care and residential care						
Higher home care risk				0.008	0.005	0.016
				(0.051)	(0.067)	(0.079)
Higher residential care risk				0.014	0.002	0.038
				(0.070)	(0.085)	(0.124)
N	1008	518	490	1008	518	490
Log likelihood	-678.187	-341.082	-333.320	-678.050	-341.052	-332.806

The table reports the estimates of the average partial effects for the logit regression of responses for the following income-indemnity insurance question:

In the scenarios so far the aged care insurance product has paid fixed annual payments. Now image that there are two alternative ways you can receive a benefit to cover aged care costs. The price you would pay would be the same regardless. The benefits you would receive are also projected to be the same.

- ***Option A - Fixed payments***: *You will receive regular payments (CPI-indexed) if you suffer from either health condition 1) or 2). That is, you will receive the full payment even if you don't have to pay that much for your care (for example, if the care is provided by your family members). However, if your aged care expenses exceed the Aged Care Income payments, you will need to **pay** for the shortfall.*

- ***Option B - Reimbursements***: *You will be reimbursed for the full cost of care that you have incurred. However, you **will not** receive any payments if you do not have to pay for the costs of care.*

Which option do you prefer?

- *I would prefer fixed payments - Option A*
- *I would prefer reimbursements - Option B*

The dependent variable for all columns is a binary variable taking the value of 1 if the participant chooses the Option A and 0 otherwise. The explanatory variables are the covariates collected in the experiment. Robust standard errors (Huber-White) are shown in parentheses. *, **, and *** indicate significance at 10, 5, and 1 percent level, respectively.

Dependent variable:	Preference for income-indemnity insurance		
	Sample (1)	Male (2)	Female (3)
Objective measures of exposure to LTC risk			
Female	-0.120***		
	(0.034)		
Age	-0.002	-0.001	-0.000
	(0.006)	(0.008)	(0.008)
Health state: base case = 1			
2	-0.009	-0.075	0.074
	(0.057)	(0.077)	(0.092)
3	-0.012	-0.083	0.075
	(0.041)	(0.052)	(0.066)
4	-0.014	-0.060	0.021
	(0.051)	(0.070)	(0.077)
Current smoker	-0.039	-0.065	-0.017
	(0.044)	(0.059)	(0.062)
Received care	0.101	0.064	0.170*
	(0.066)	(0.081)	(0.103)
Subjective indicators of exposure to LTC risk			
Subjective life expectancy	-0.001	0.001	-0.005
	(0.002)	(0.002)	(0.003)
Chance of needing care: base case = equal risk of home care and residential care			
Higher home care risk	0.025	0.023	0.037
	(0.051)	(0.066)	(0.082)
Higher residential care risk	0.010	-0.017	0.009
	(0.067)	(0.084)	(0.125)
Availability of informal care			
Informal care for some (low) care	0.090**	0.136**	0.061
	(0.045)	(0.059)	(0.068)
Informal care for extensive (high) care	0.061	0.071	0.044
	(0.038)	(0.053)	(0.054)
Non-partnered	0.093**	0.046	0.121**
	(0.040)	(0.054)	(0.057)
Number of children	0.023*	0.011	0.030*
	(0.012)	(0.017)	(0.016)
Other sources of financing for LTC costs			
Non-homeowner	-0.018	-0.015	-0.021
	(0.046)	(0.058)	(0.070)
Measures of utility parameters			
Willingness to take (financial) risk	0.029	0.018	0.031
	(0.019)	(0.027)	(0.028)
Willingness to take (financial) risk^2	-0.003	-0.003	-0.002
	(0.002)	(0.003)	(0.003)

Table 8 – continued

Dependent variable:	Preference for income-indemnity insurance		
	Sample (1)	Male (2)	Female (3)
Patience	-0.012*	-0.016*	-0.012
	(0.006)	(0.009)	(0.009)
Utility in bad health	0.006	0.019*	-0.012
	(0.007)	(0.010)	(0.010)
Chance of $100K bequest	-0.000	0.000	-0.001
	(0.000)	(0.001)	(0.001)
Individual capability and knowledge about retirement financial products			
No. of mistakes in FL	0.032	0.017	0.047
	(0.021)	(0.031)	(0.029)
No. of mistakes in N	0.021	0.024	0.007
	(0.016)	(0.023)	(0.022)
Earnings from recall quiz	-0.036***	-0.053***	-0.023
	(0.010)	(0.013)	(0.015)
General product knowledge	0.033***	0.028*	0.050**
	(0.012)	(0.015)	(0.020)
Knowledge on life annuity	-0.021	-0.028	-0.015
	(0.013)	(0.018)	(0.019)
Knowledge on LTCI	-0.015	-0.005	-0.036**
	(0.011)	(0.014)	(0.018)
No private health insurance	-0.003	-0.059	0.050
	(0.035)	(0.050)	(0.048)
Awareness of LTC risk			
Financial planning for LTC: base case = do not know needs and costs			
Have set aside money but may need help	0.043	0.024	0.063
	(0.034)	(0.047)	(0.048)
Expect to rely on government	0.088	0.122*	0.089
	(0.058)	(0.067)	(0.104)
Care provider	0.017	0.013	0.007
	(0.035)	(0.050)	(0.049)
Retirement planning			
Intent to retire before 65	0.035	0.027	0.039
	(0.038)	(0.053)	(0.053)
Financial planning for retirement	0.008	-0.051	0.069
	(0.042)	(0.054)	(0.063)
Retirement spending change	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)
Demographics and other controls			
Country of birth: base case = Australia & New Zealand			
Northwestern Europe	0.038	0.038	0.016
	(0.045)	(0.068)	(0.063)
Mediterranean & Eastern Europe	0.098	-0.118	0.236**
	(0.093)	(0.129)	(0.105)
Asia	-0.043	-0.046	-0.059
	(0.104)	(0.151)	(0.133)
Other countries	0.027	0.071	0.072
	(0.081)	(0.102)	(0.129)
Bachelor or above	0.032	0.042	-0.004
	(0.035)	(0.049)	(0.052)
Work status: base case = full time			
Part time	0.005	-0.098	0.113*
	(0.046)	(0.064)	(0.065)
Unemployed/not in labour force	-0.034	-0.085	0.028
	(0.048)	(0.065)	(0.073)
Retired	-0.045	0.020	-0.027
	(0.056)	(0.075)	(0.080)
Household gross income	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)
Wealth group: base case = 1			
2	-0.082*	-0.054	-0.101
	(0.046)	(0.062)	(0.065)
3	-0.033	0.036	-0.124*
	(0.050)	(0.072)	(0.069)
4	-0.006	0.009	-0.028
	(0.052)	(0.071)	(0.075)
N	1008	518	490
Log likelihood	-637.527	-306.621	-305.295

Appendix C   Section 4 regression results

Table 9: Determinants of life care annuity purchase decision (reduced form)

The table reports the estimates of the average partial effects for the logit regression of the life care annuity purchase decision. The data for the estimation is from the health-contingent income question combined with the best/worst question in task 2. The dependent variable for all columns is a binary variable taking the value 1 if the participant purchases a life care annuity (and 0 otherwise). This requires the participant i) preferring income-indemnity insurance than expense-reimbursement insurance and ii) having the best portfolio in task 2 including positive allocation to life annuities and health-contingent income. The explanatory variables for columns (1), (2), (3) only include possible pricing factors for a life care annuity. The explanatory variables for columns (4), (5), and (6) also include other health indicators. The estimation results of the full model with all covariates are reported in Table 11. Robust standard errors (Huber-White) are shown in parentheses. *, **, and *** indicate significance at 10, 5, and 1 percent level, respectively.

Dependent variable:	Pricing factors			Pricing factors & health indicators		
	Sample (1)	Male (2)	Female (3)	Sample (4)	Male (5)	Female (6)
Objective measures of exposure to LTC risk						
Female	-0.052**			-0.051*		
	(0.027)			(0.027)		
Age	-0.001	-0.001	-0.002	-0.001	-0.001	-0.001
	(0.004)	(0.007)	(0.006)	(0.004)	(0.007)	(0.006)
Health state: base case = 1						
2	-0.002	0.001	-0.009	-0.010	0.001	-0.029
	(0.047)	(0.069)	(0.064)	(0.046)	(0.069)	(0.061)
3	0.030	0.014	0.051	0.019	0.003	0.040
	(0.036)	(0.048)	(0.055)	(0.035)	(0.048)	(0.053)
4	0.051	0.016	0.095	0.034	0.003	0.072
	(0.045)	(0.059)	(0.071)	(0.044)	(0.059)	(0.069)
Current smoker	-0.049	-0.055	-0.049	-0.059	-0.063	-0.066
	(0.038)	(0.055)	(0.055)	(0.039)	(0.055)	(0.057)
Received care	0.040	0.024	0.062	0.030	0.014	0.054
	(0.058)	(0.078)	(0.090)	(0.058)	(0.079)	(0.092)
Subjective indicators of exposure to LTC risk						
Subjective life expectancy				-0.002	-0.002	-0.003
				(0.002)	(0.002)	(0.002)
Chance of needing care: base case = equal risk of home care and residential care						
Higher home care risk				0.061	0.064	0.071
				(0.045)	(0.063)	(0.068)
Higher residential care risk				0.044	0.064	-0.002
				(0.060)	(0.078)	(0.093)
N	1008	518	490	1008	518	490
Log likelihood	-528.067	-290.062	-237.233	-525.696	-288.901	-235.498

Table 10: Determinants of life care annuity income feature (reduced form)

The table reports the estimates of the OLS regression of income features of the life care annuity. The data for the estimation is from the best/worst question in task 2. The dependent variable for all columns is a continuous variable which equals the health-contingent income divided by the income from life annuities, in the portfolio that is indicated as the best in task 2. The subject pool is restricted to only those who would purchase a life care annuity. The explanatory variables for columns (1), (2), (3) only include possible pricing factors for a life care annuity. The explanatory variables for columns (4), (5), and (6) also include other health indicators. The estimation results of the full model with all covariates are reported in Table 11. Robust standard errors (Huber-White) are shown in parentheses. *, **, and *** indicate significance at 10, 5, and 1 percent level, respectively.

Dependent variable:	Pricing factors			Pricing factors & health indicators		
	Sample (1)	Male (2)	Female (3)	Sample (4)	Male (5)	Female (6)
Objective measures of exposure to LTC risk						
Female	-3.184**			-3.062*		
	(1.560)			(1.589)		
Age	0.129	-0.004	0.282	0.242	0.130	0.408
	(0.285)	(0.468)	(0.324)	(0.277)	(0.457)	(0.327)
Health state: base case = 1						
2	-1.605	-4.971*	3.810	-2.679	-5.927*	2.918
	(2.062)	(2.619)	(3.093)	(2.360)	(3.155)	(3.125)
3	-0.323	-1.135	-0.453	-0.117	-0.328	-1.828
	(2.092)	(3.101)	(2.727)	(2.140)	(3.159)	(2.515)
4	2.344	-3.101	9.872***	2.436	-1.596	8.263***
	(2.293)	(3.142)	(3.185)	(2.353)	(3.301)	(2.967)
Current smoker	1.159	1.193	1.748	0.836	0.712	1.470
	(2.586)	(4.274)	(2.768)	(2.583)	(4.285)	(2.899)
Received care	-0.411	-0.416	3.726	0.071	-0.372	4.857
	(2.495)	(3.135)	(4.074)	(2.376)	(2.851)	(3.917)
Subjective indicators of exposure to LTC risk						
Subjective life expectancy				-0.059	-0.000	-0.137
				(0.137)	(0.211)	(0.113)
Chance of needing care: base case = equal risk of home care and residential care						
Higher home care risk				-5.218***	-7.420***	-0.002
				(1.687)	(2.289)	(2.276)
Higher residential care risk				5.082	2.780	11.989
				(4.389)	(5.025)	(7.943)
Constant	4.360	13.565	-9.721	-2.170	6.155	-17.731
	(17.079)	(28.121)	(18.880)	(16.621)	(27.492)	(19.034)
N	223	129	94	223	129	94
R^2	0.026	0.015	0.157	0.063	0.058	0.226

Table 11: Determinants of life care annuity purchase decision and income feature (full model)

The table reports the estimates of the average partial effects for the logit regression of the life care annuity purchase decision in columns (1), (2) and (3), and the estimates of the OLS regression of income features of the life care annuity in columns (4), (5), and (6). The data for the estimation for columns (1), (2) and (3) is from the health-contingent income question combined with the best/worst question in task 2. The data for the estimation for columns (4), (5) and (6) is from the best/worst question in task 2. The dependent variable for columns (1), (2) and (3) is a binary variable taking the value 1 if the participant purchases a life care annuity (and 0 otherwise). This requires the participant i) income-indemnity insurance than expense-reimbursement insurance and ii) having the best portfolio in task 2 including positive allocation to life annuities and health-contingent income. The dependent variable for columns (4), (5) and (6) is a continuous variable which equals the health-contingent income divided by the income from life annuities, in the portfolio that is indicated as the best in task 2. The subject pool for columns (4), (5), and (6) is restricted to only those who would purchase a life care annuity. The explanatory variables all columns are the covariates collected in the experiment. Robust standard errors (Huber-White) are shown in parentheses. *, **, and *** indicate significance at 10, 5, and 1 percent level, respectively.

Dependent variable:	Purchase life care annuity			$\frac{\text{Health-contingent income}}{\text{Income from life annuities}}$		
	Sample (1)	Male (2)	Female (3)	Sample (4)	Male (5)	Female (6)
Objective measures of exposure to LTC risk						
Female	-0.068**			-3.760*		
	(0.029)			(2.023)		
Age	0.000	0.002	0.000	0.306	0.142	0.429
	(0.005)	(0.007)	(0.006)	(0.286)	(0.592)	(0.401)
Health state: base case = 1						
2	-0.006	0.015	-0.049	-2.749	-6.826	3.749
	(0.046)	(0.073)	(0.059)	(3.066)	(4.800)	(3.954)
3	0.014	0.010	0.016	-1.056	0.402	-4.441
	(0.034)	(0.047)	(0.049)	(2.425)	(3.695)	(2.687)
4	0.065	0.032	0.097	1.027	-2.300	6.314
	(0.047)	(0.064)	(0.068)	(2.534)	(4.381)	(4.721)
Current smoker	-0.046	-0.067	-0.020	-1.945	-3.225	-1.515
	(0.040)	(0.061)	(0.056)	(2.378)	(3.511)	(2.600)
Received care	0.032	0.001	0.040	-0.930	-0.444	3.931
	(0.056)	(0.080)	(0.091)	(3.114)	(5.425)	(3.675)
Subjective indicators of exposure to LTC risk						
Subjective life expectancy	-0.002	-0.002	-0.004	-0.079	-0.050	-0.224*
	(0.002)	(0.002)	(0.002)	(0.134)	(0.243)	(0.120)
Chance of needing care: base case = equal risk of home care and residential care						
Higher home care risk	0.047	0.028	0.056	-3.733*	-6.496*	5.505
	(0.042)	(0.059)	(0.060)	(1.980)	(3.613)	(4.084)
Higher residential care risk	0.051	0.051	0.040	4.288	-0.991	16.496*
	(0.061)	(0.076)	(0.107)	(4.378)	(4.618)	(9.005)
Availability of informal care						
Informal care for some (low) care	0.084**	0.126**	0.051	-2.781	-2.985	-7.118
	(0.041)	(0.061)	(0.056)	(2.840)	(4.283)	(4.733)
Informal care for extensive (high) care	0.027	0.028	0.020	3.578**	3.167	4.293*
	(0.033)	(0.048)	(0.044)	(1.733)	(2.964)	(2.533)
Non-partnered	0.049	0.005	0.090**	3.464	4.609	0.034
	(0.034)	(0.055)	(0.044)	(2.225)	(3.576)	(2.901)
Number of children	0.005	0.000	0.010	-0.201	0.101	0.173
	(0.010)	(0.016)	(0.014)	(0.718)	(1.236)	(1.132)
Other sources of financing for LTC costs						
Non-homeowner	-0.048	-0.040	-0.011	0.487	-1.448	4.206
	(0.042)	(0.057)	(0.060)	(2.383)	(3.651)	(3.352)
Measures of utility parameters						
Willingness to take (financial) risk	-0.003	-0.018	0.014	0.479	-0.145	1.031
	(0.017)	(0.026)	(0.022)	(1.365)	(2.511)	(1.548)
Willingness to take (financial) risk^2	-0.000	0.000	-0.001	-0.048	0.010	-0.078
	(0.002)	(0.003)	(0.002)	(0.153)	(0.258)	(0.208)
Patience	-0.001	-0.013	0.012	0.016	0.037	-0.034
	(0.005)	(0.008)	(0.008)	(0.369)	(0.651)	(0.466)
Utility in bad health	0.006	0.012	-0.002	0.218	0.734	-0.062
	(0.006)	(0.008)	(0.008)	(0.496)	(0.898)	(0.532)
Chance of $100K bequest	-0.000	-0.001	0.000	0.027	0.012	0.030
	(0.000)	(0.001)	(0.000)	(0.026)	(0.035)	(0.041)
Individual capability and knowledge about retirement financial products						
No. of mistakes in FL	-0.009	-0.003	-0.019	0.325	-0.211	-1.457
	(0.018)	(0.032)	(0.023)	(0.988)	(2.467)	(1.429)

Table 11 – continued

Dependent variable:	Purchase life care annuity			Health-contingent income / Income from life annuities		
	Sample (1)	Male (2)	Female (3)	Sample (4)	Male (5)	Female (6)
No. of mistakes in N	0.001	-0.007	0.007	0.507	0.018	-0.205
	(0.014)	(0.021)	(0.018)	(1.017)	(1.808)	(1.161)
Earnings from recall quiz	-0.021***	-0.021*	-0.032***	-0.979	-0.635	-1.738**
	(0.008)	(0.013)	(0.011)	(0.665)	(1.058)	(0.780)
General product knowledge	0.026**	0.020	0.041*	0.033	0.526	-1.010
	(0.011)	(0.012)	(0.023)	(0.685)	(1.695)	(0.721)
Knowledge on life annuity	-0.019*	-0.004	-0.032**	-0.508	-1.780	1.716*
	(0.011)	(0.016)	(0.015)	(0.857)	(1.529)	(0.917)
Knowledge on LTCI	-0.026***	-0.023*	-0.046***	0.281	0.250	0.207
	(0.010)	(0.012)	(0.017)	(0.695)	(1.055)	(1.326)
No private health insurance	-0.015	-0.021	-0.015	1.873	0.612	4.071*
	(0.031)	(0.047)	(0.040)	(1.996)	(3.403)	(2.323)
Awareness of LTC risk						
Financial planning for LTC: base case = do not know needs and costs						
Have set aside money buy may need help	0.053*	0.073*	0.017	1.085	1.651	1.392
	(0.028)	(0.042)	(0.036)	(1.553)	(2.592)	(2.200)
Expect to rely on government	0.078	-0.028	0.367***	-3.129	-1.664	-1.026
	(0.056)	(0.064)	(0.098)	(2.983)	(5.489)	(3.821)
Care provider	-0.023	-0.013	-0.051	2.605	1.769	4.035*
	(0.030)	(0.044)	(0.041)	(2.185)	(3.644)	(2.099)
Retirement planning						
Intent to retire before 65	0.020	-0.006	0.060	0.638	3.064	-0.480
	(0.031)	(0.047)	(0.041)	(2.053)	(3.559)	(2.235)
Financial planning for retirement	-0.009	-0.033	0.023	-1.237	-1.744	-0.689
	(0.037)	(0.056)	(0.051)	(2.559)	(4.264)	(2.966)
Retirement spending change	-0.000	-0.000	0.000	-0.006	0.018	-0.043
	(0.000)	(0.001)	(0.001)	(0.058)	(0.105)	(0.059)
Demographics and other controls						
Country of birth: base case = Australia & New Zealand						
Northwestern Europe	0.055	0.092	0.035	-1.175	-0.909	0.181
	(0.042)	(0.066)	(0.053)	(2.523)	(4.747)	(3.332)
Mediterranean & Eastern Europe	0.089	-0.024	0.266**	-1.939	1.185	0.898
	(0.087)	(0.110)	(0.122)	(5.526)	(12.497)	(3.424)
Asia	-0.071	-0.088	-0.007	18.640**	17.665	19.567*
	(0.083)	(0.118)	(0.104)	(8.022)	(10.650)	(10.830)
Other countries	0.027	0.045	0.107	3.924	3.963	10.215
	(0.080)	(0.115)	(0.133)	(4.629)	(6.081)	(10.278)
Bachelor or above	0.035	0.050	0.024	-1.164	-2.136	-2.044
	(0.029)	(0.043)	(0.039)	(2.110)	(4.053)	(2.056)
Work status: base case = full time						
Part time	-0.014	-0.059	0.034	3.670	7.997*	0.364
	(0.040)	(0.061)	(0.048)	(2.515)	(4.778)	(3.129)
Unemployed/not in labour force	-0.036	-0.085	0.028	0.358	2.026	-0.975
	(0.039)	(0.060)	(0.052)	(2.316)	(3.966)	(3.338)
Retired	0.016	0.077	-0.008	1.221	3.992	-1.919
	(0.051)	(0.087)	(0.055)	(2.933)	(4.895)	(4.298)
Household gross income	-0.001**	-0.001***	-0.000	0.013	0.041	0.018
	(0.000)	(0.000)	(0.000)	(0.018)	(0.033)	(0.019)
Wealth group: base case = 1						
2	0.032	0.025	0.081	-5.885**	-7.586*	-4.336
	(0.035)	(0.051)	(0.049)	(2.834)	(4.379)	(3.636)
3	0.108***	0.113*	0.136***	-3.917	-7.753	0.434
	(0.040)	(0.064)	(0.048)	(3.226)	(6.139)	(4.412)
4	0.151***	0.161**	0.180***	-5.831*	-8.235	-5.103
	(0.044)	(0.065)	(0.059)	(3.224)	(5.292)	(4.195)
Constant				-5.220	2.493	-9.841
				(19.331)	(39.533)	(26.617)
N	1008	518	490	223	129	94
Log likelihood	-494.816	-263.972	-207.331			
R^2				0.245	0.296	0.577

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