CESifo WORKING PAPERS

6698
2017

October 2017

Long-Term Care Insurance: Knowledge Barriers, Risk Perception and Adverse Selection

Martin Boyer, Philippe De Donder, Claude Fluet, Marie-Louise Leroux, Pierre-Carl Michaud

CESifo

Impressum:

CESifo Working Papers
ISSN 2364-1428 (electronic version)
Publisher and distributor: Munich Society for the Promotion of Economic Research - CESifo GmbH
The international platform of Ludwigs-Maximilians University's Center for Economic Studies and the ifo Institute
Poschingerstr. 5, 81679 Munich, Germany
Telephone +49 (0)89 2180-2740, Telefax +49 (0)89 2180-17845, email office@cesifo.de
Editors: Clemens Fuest, Oliver Falck, Jasmin Gröschl
www.cesifo-group.org/wp

An electronic version of the paper may be downloaded
· from the SSRN website: www.SSRN.com
· from the RePEc website: www.RePEc.org
· from the CESifo website: www.CESifo-group.org/wp

CESifo *Working Paper No. 6698*
Category 3: Social Protection

Long-Term Care Insurance: Knowledge Barriers, Risk Perception and Adverse Selection

Abstract

We conduct a stated-choice experiment where respondents are asked to rate various insurance products aimed to protect against financial risks associated with long-term care needs. Using exogenous variation in prices from the survey design, and objective risks computed from a dynamic microsimulation model, these stated-choice probabilities are used to predict market equilibrium for long-term care insurance using the framework developped by Einav et al. (2010). We investigate in turn causes for the low observed take-up of long-term care insurance in Canada despite substantial residual out-of-pocket financial risk. We first find that awareness and knowledge of the product is low in the population: 44% of respondents who do not have long-term care insurance were never offered this type of insurance while overall 31% report no knowledge of the product. Although we find evidence of adverse selection, results suggest it plays a minimal role in limiting take-up. On the demand side, once respondents have been made aware of the risks, we find that demand remains low, in part because of misperceptions of risk, lack of bequest motive and home ownership which may act as a substitute.

JEL-Codes: I110.

Keywords: long-term care insurance, adverse selection, stated-preference, health, insurance.

Martin Boyer
HEC Montréal
Canada - Montréal (Québec) H3T 2A7
martin.boyer@hec.ca

Philippe De Donder
ESG UQAM
Canada - H3C 3P8 Montréal (Québec)
de_donder.philippe@uqam.ca

Claude Fluet
Université Laval
Canada - Québec (Québec) G1V 0A6
fluet.claude-denys@uqam.ca

Marie-Louise Leroux
ESG UQAM
Canada - H3C 3P8 Montréal Québec
leroux.marie-louise@uqam.ca

Pierre-Carl Michaud
HEC Montréal
Canada - Montréal (Québec) H3T 2A7
pierre-carl.michaud@hec.ca

September 2017
We acknowledge financial support from the Social Science and Humanities Research Council (435-2016-1109). We wish to thank Georges Dionne, Andreas Richter, Christopher Tonetti for helpful comments and suggestions. We thank seminar participants at the Financing Longevity Conference at Stanford, KU Leuven, HEC Montreal, and the 2017 American Risk and Insurance Meetings for their comments and suggestions. We also thank Sébastien Box-Couillard and Francois Laliberté-Auger for excellent research assistance and David Boisclair for help with the design of the questionnaire.

1 Introduction

Because of rapid population aging, financing and providing Long-term care (LTC hereafter) to older people is an important and growing problem in developped countries.[1] In OECD countries, the population of 80 years old and more is expected to grow from 4% of the total population in 2010 to 10% by 2050 (OECD, 2011). Estimates of the probability that someone approaching retirement will use a nursing home at some point in his life ranges from 35 to 50% in the U.S. (Brown and Finkelstein, 2009; Hurd et al., 2017). Given that the annual cost of a private nursing home varies between 40,000$ and 60,000$ in Canada, this implies a potentially important financial risks for households despite substantial subsidies from governments (OECD, 2011). Yet, few insure privately against such risk (Pestieau and Ponthiere, 2011). In the U.S., only about 10.8 percent of those 60 years and older held such a policy in 2009 (Brown and Finkelstein, 2009). Overall, the share of total LTC spending covered by private insurance was less than 2% in 2011 (OECD, 2011).

Many factors, both on the demand and on the supply sides can explain the lack of a market for LTCI (LTCI hereafter).[2] On the supply side, it is often argued that LTCI is expensive because of important loading factors in the private provision of such insurance (Brown and Finkelstein, 2009). Most of the evidence on this comes from the United States. One reason could be that important asymmetric information problems exists (both moral hazard and adverse selection). These may induce insurers to restrict coverage and charge higher premiums (Sloan and Norton, 1997). For example, Finkelstein and McGarry (2006) find that multiple sources of asymetric information exist in that market. Another reason may be the cost of getting access to public funds in the public sector (rationning of access). This can be potentially important in some countries. For example, Canada has substantial waiting times for public care homes (on average close to 10 months in the province of Quebec).

On the demand side, the importance of family support, either formal or informal,

[1] Long Term Care is defined as the care for people needing daily living support over a prolonged period of time. Support can be provided with activities of daily living (such as bathing, dressing, eating, getting in and out of bed, toileting and continence) or instrumental activities of daily living (which include preparing meals, cleaning, doing the laundry, taking medication, getting to places beyond walking distance, shopping, managing money affairs, and using the telephone and nowadays the Internet). The loss of autonomy is most often associated with old age and should be clearly distinguished from illness, disability and handicap.

[2] See the surveys on long term care by Brown and Finkelstein (2011) and Cremer et al. (2009).

may explain the lack of LTCI. Formal help can be defined as monetary transfers while informal help refers to help in time. Empirical evidence shows that most informal transfers are provided by the family while formal help mostly results from private or public insurance. Family carers are primarily spouses, adult daughters, and daughters-in-law, as mentioned in the OECD (2011) report. Many studies have documented the importance of family help and there is evidence of substitutability between informal and formal help (Bonsang, 2009). Yet, insurance products in Canada are condionned on care needs rather than reimbursements which may yield higher demand for LTCI as an effective way of insuring the family rather than the individual being cared for (say for earnings loss due to caring). Pauly (1990) and Brown and Finkelstein (2008) also show that social insurance (in particular Medicaid) crowds out the demand for private insurance. This is potentially important in Canada as public subsidies in the form of lower co-pays for nursing homes and tax credits for formal care are means-tested. Another substitute for insurance may be home ownership since those holding net home equity may sell their property when moving to a nursing home (Davidoff, 2009). Regarding preferences, Lockwood (2014) shows that bequest motives by reducing the opportunity cost of saving increase saving and decrease purchases of LTCI.[3] But the effect of bequests is ambiguous as those with such a motive may also want to purchase insurance to guard against the risk of not leaving anything behind for their heirs due to LTC costs.

Another reason for the lack of LTCI is related to misperception of risks. Zhou-Richter et al. (2010) finds evidence that these biases are important to explain low demand. Related to this issue, Finkelstein and McGarry (2006) compare the subjective probability of entering a nursing home within 5 years for respondents aged on average 78 to the actual decisions of the same respondents after 5 years. They find that most respondents do not estimate correctly their true probability of needing such a form of LTC. Tennyson and Yang (2014) highlight the role of one's experience with LTC as a contributing factor to the awareness of the risk of LTC costs, or the lack thereof. Hence, risk perceptions may be an important driver of low demand. Generally, lack of financial knowledge in general, and more specifically the lack of knowledge about LTC costs and institutional details in particular may play an important role in the decision to purchase

[3]See also Ameriks et al. (2011) about the importance of bequest motives for late-in-life decisions to save.

such insurance. Individuals often fail to evaluate correctly the size of LTC costs which they may incur late in life and they may not be aware of eligibility rules for care, means-testing, etc. There is a large body of empirical studies on the lack of knowledge of basic financial concepts (Lusardi and Mitchell, 2014; Boisclair et al., 2015). These may in turn have important consequences for saving decisions and retirement planning (Lusardi et al., 2017). There is however not much evidence on whether agents have a good knowledge of the true costs associated with dependency and an understanding of the institutional setting.

To analyze these causes for low take-up, we partnered with Asking Canadians, a Canadian online panel survey organization to field a survey on LTCI, in the fall of 2016. We selected randomly 2000 panel members age 50 to 70 in the two most populous provinces of Canada, Ontario and Quebec. We then matched each respondent with a health microsimulation model capable of estimating personalized lifetime exposure to disability, nursing home and formal care (Boisclair et al., 2016). This allows to estimate actual risk faced by households and potentially covered by insurers and compare those with risk perceptions we elicit in the survey. We also survey respondents about their knowledge of LTC and institutional details and preferences for care which have been shown to be correlated with demand for LTCI (Brown et al., 2012). We then build a stated-preferences experiment to study demand for LTCI.[4]. The second part of our survey consists of an experiment where we presented each respondent with the prospect of purchasing a LTCI product. These scenarios differ in terms of the benefit paid in case of dependency, the premium paid and the provision of an embedded term life insurance contract if the respondent dies prior to age 85. From survey responses and experimental variation in contract characteristics, we can infer the participants' demand for LTCI and find whether there is adverse or advantageous selection in this insurance market. We build on the methodology developed by Einav et al. (2010) which use revealed preferences to estimate the demand and supply curves of employer-provided health insurance using individual-level data from a multinational producer of aluminium and related products, Alcoa Inc. The combination of estimated demand and supply curves enables to evaluate the welfare losses associated with asymetric information (whether it is adverse or advantageous selection). We extend this approach to stated-preference

[4]See J. Louviere (2000) on the merits and disadvantages of stated-choice experiments

data using experimental variation in prices.

Few papers combine stated-preference and revealed preference data to study this market. One exception is Ameriks et al. (2016). They use strategic survey questions along with balance sheet data from the Vanguard Research Initiative (VRI) to estimate preferences, within a well-defined life-cycle model, to explain the low demand for LTCI products.[5] They find that 60% of the panel members should buy LTCI according to their model. In comparison, only 22% actually do buy LTCI in the panel. This gap can be explained by a lack of interest on the demand side as well as poor insurance product features on the supply side. In our framework, we elicit directly preferences of respondents which allows to compute the demand curve using experimental variation in prices without making any assumption regarding the choice problem respondents actually solve. We also consider the supply and demand side jointly, which allows to investigate selection and equilibrium in that market. Another related paper is Dardanoni and Li Donni (2016) who use a framework similar to ours but in a revealed preference context. Their approach rests on evaluating welfare loss from mixture type models using external estimates of the price elasticity of demand for LTCI. They estimate large welfare loss from unpriced heterogeneity and use large estimates of the price elasticity of demand (-3.5 and -2). In our framework, we can estimate this elasticity directly from the stated-preference experiment.

The paper is organized as follows. In section 2, we present the survey and the questionnaire we used. In section 3, we present descriptive evidence from the survey. We present an equilibrium model for LTCI products which can be applied to stated-preference data from our survey in section 4. We present results in section 5. Finally, section 6 concludes.

[5] Ameriks et al. (2015) claim that although the Vanguard Research Initiative sample "explicitly targets the half of older Americans with non-trivial financial assets", similar results would be obtained with an appropriately conditioned sample of the HRS.

2 The Survey

2.1 Survey

Partnering with Asking Canadians, a Canadian online panel survey organization, we conducted a survey on LTCI in late autumn 2016. We randomly selected 2000 panel members aged 50 to 70 residing in the two largest and most populous provinces of Canada, Ontario and Quebec. Participants are rewarded for their participation (with loyalty rewards from major retailers). Despite those efforts, some groups are slightly underrepresented, in particular low-educated and income groups. We stratified by age, gender, province and education groups (three levels) and used the Canadian Labor Force Survey of 2014 (the last year available) to re-weigh the data. The effect of weighing was minimal on our analysis. For example, the median household income we estimate in the survey is 65,000$ for the province of Quebec, while the equivalent number from the Social Policy Simulation Database (SPSD) for 2016 is 69,000$. The 25th percentile of household income in the SPSD is 41110$ for Quebec while we estimate it to be 38,000$ in our survey. Hence, once reweighted, our survey appears representative of the population age 50-70 in Quebec and Ontario.

The questionnaire had 4 major parts. The first three parts asked respondents about socio-economic characteristics, reasons for having purchased (or not) LTCI, risk perceptions and, their preferences regarding the type of LTC they would prefer to receive. For some of these questions, we used a formulation taken from Brown et al. (2012). For questions where we expected a significant fraction of missing information, such as savings and income, we used unfolding brackets. We then used multiple imputation to impute missing values with information from the bracketing, conditional on basic socio-demographic covariates (age, gender). A copy of the questionnaire (in text format) is found in Appendix A.

The fourth and last part of the survey consisted of a stated-preference experiment. We presented each respondent with the prospect of purchasing a LTCI product. These scenarios differ in the benefit paid under LTCI, the premium and a term life insurance if the respondent dies prior to age 85. The introductory text is reproduced below (the equivalent existed in French for Quebec residents who are mostly French speakers).

We are going to show you some simple insurance policies and ask you to rate those. You can assume that if you were to have two or more limitations in activities of daily living, the insurance company offering you this product would pay the benefits no matter what the circumstances. Once you receive benefits, you do not pay any premiums.

Each product has three attributes: a) a monthly premium you have to pay; b) a monthly benefit if you have 2 or more limitations in activities of daily living, starting 3 months after your limitations have been verified; and c) a payout to your survivors if you die before age 85. Assume that if you are healthy and you stop paying premiums for 3 consecutive months, the contract is cancelled and you lose coverage. The premium cannot increase once you have purchased the product. Finally, the benefits are adjusted for inflation (indexed).

We presented scenarios using the following representation:

While healthy	Once you have at least 2 ADL	When you die
You pay π	You receive b_{ltc}	Your survivors receive b_{life}

We use a simple LTCI contract on purpose. In order to avoid uncertainty about the future premiums we explicitly mention that premiums could not increase once the contract is signed. This means of course that in real terms the premiums are decreasing. We also insisted on the possibility of lapse-risk in the sense that respondents were made aware that if a payment was not made for some time, it would lead to the termination of the contract. We mentioned that there is no risk regarding payment of benefits. This meant that if the respondent had 2 or more ADL impairments, then the insurance company would for sure pay the benefits that were contracted upon. We also insisted that the product is offered by a trusted insurance company. We explicitly wanted respondents to dismiss the risks associated with nitpicky insurers (see Bourgeon and Picard (2014)) and the insurers credit risk; in other words, we wanted to avoid having them think of payment risk. Finally, LTCI benefits are indexed to inflation. Apart from wanting to offer a situation that is closer to what occurs in reality where the LTCI protection offered in LTCI products is more often than not indexed to inflation, we also wanted respondents to know that the amount of services they would receive in LTC is independent of time when they become disabled.

We presented five of those scenarios to each respondent. Each time we asked respondents for the likelihood with which he or she would purchase this product if it were offered by a trusted insurance company. Possible answers ranged from 0%, meaning there was no chance whatsoever that the respondent would purchase the LTCI product,

and 100%, meaning that the respondent would certainly purchase that product. We consider jointly LTCI and term life insurance contracts because of the potential desirability of having some life insurance protection in case one dies early, prior to facing significant disability risk. This bundling may be particularly interesting for respondents that have some sort of bequest motive. The reason we asked for probabilities is that they convey considerably more information than a yes or no answer and allow to account for the fact that scenarios are incomplete (Manski, 1999). One advantage of asking for the probability with which one would purchase a contract is that we can use these probabilities directly in our analysis without having to make any assumptions about the functional form that leads to a yes/no answer.

Each scenario is constructed in the following way. For each respondent, a monthly LTCI benefit b_{ltc} is first randomly picked from the distribution $[2000, 1/3; 3000, 1/3; 4000, 1/3]$. We also pick randomly a benefit for the life insurance component of scenario, b_{life} from the distribution $[0, 3/5; 10000, 1/5, 25000, 1/5]$. In Canada, most insurers only use information on age and gender to price this type of insurers. Some insurers will underwrite insurance on the basis of pre-existing medical conditions but premiums are not a function of health status. In our research design, we will therefore concentrate on offering premiums which will consist of an age-gender actuarial premium, computed from a microsimulation model, and a price adjustment factor which will be randomized but centered on 1. Hence, the average premium offered to respondents of a certain age and gender group will be equal to the actuarial premium we will compute from our microsimulation approach. Hence, we first use the health microsimulation model COMPAS, which we describe below, to compute by age and gender the actuarial premium associated to these benefits, assuming a 3% discount rate. These premiums can be compared to those observed in the market. We obtained from CAA-Quebec (which is the Quebec equivalent of the AAA in the United States) premium data corresponding to similar levels of coverage to those presented to respondents. In Table 1, we report average estimates in the sample. These premiums are close to those observed in the market, although our model estimates are higher than market premiums for men in general, and for women at younger ages. They are, however, lower for women at older ages.

We denote by π_h the actuarial premium for each class of risk (by gender and age),

h. Finally, we create exogenous variation in premiums by drawing a factor τ from the distribution

$$\tau = [0.6, 1/5; 0.8, 1/5; 1.0, 1/5; 1.2, 1/5; 1.4, 1/5].$$

The premium is given by $\pi = \tau\pi_h$. Hence a scenario consists of a triple (π, b_{ltc}, b_{life}).

2.2 COMPAS

There is no detailed projection of disability risk in Canada that would allow us to construct personalized risk estimates for respondents in our survey. We use the microsimulation model COMPAS that was developed to project the long-term evolution of health and health care use in Canada (Boisclair et al., 2016).[6] The structure of the model follows from other models such as the Future Elderly Model (Goldman et al., 2005). Each individual in the model has many characteristics :

- Socio-demographic characteristics: age, sex, immigration status, education level, income bracket
- Diseases: diabetes, high blood pressure, heart diseases, stroke, cancer, lung diseases, dementia
- risk factors: smoking, obesity
- Disability: limitations in ADLs and Instrumental ADLs (IADL)
- Long-term care: formal home care, nursing home

Based on these characteristics, the core of the model consists of a Markovian transition model of diseases, risk factors, disability and long-term care characteristics. These transitions are based on a set of transition models which were estimated using the National Population Health Survey (1994-2010). The transition model has been satisfactorily tested by simulating on original 1994 data the trajectories of respondents in the NPHS until 2010 and comparing distribution of outcomes. The model delivers simulated life-trajectories conditional on a set of initial conditions. Given the large number of variables, one cannot construct at transition matrix across all these states. Instead,

[6] A detailed description of the model can be found here

each respondent can be simulated a large number of times and an individualized set of disability and mortality risks can be computed by averaging over these simulations. When designing the questionnaire for our survey, we deliberately asked questions we could then feed directly into the health transition matrix of COMPAS. In particular, we asked respondents for their education level, their health conditions (same as in COMPAS) and smoking habits. Nevertheless, data limitations are likely to impact some of the calculations we make. COMPAS uses NPHS data which records the location of respondents at the time of the survey but no location is available when the respondent has been found to have died. Since nursing home stays tend to occur more frequently at the end of life, this could impact our estimates. Hurd et al. (2017) find that shorter stays, in particular those near the end of life are missed by core interviews in the Health and Retirement Study. Although short stays may be missed, they may matter more for policyholders than for insurers, as these stays are typically shorter than the deductible threshold of LTCI policies (3-5 months). In particular, it may be that we underestimate the individual risks while respondents have correct expectations about such risks.

Hence, we are able to construct a distribution of individualized disability and mortality risks (as a function of a large number of characteristics). Since insurers do not use these characteristics to price such insurance products, we will be able to use these unused pricing characteristics to test for asymetric information and quantity its effect on take-up of such insurance.

3 Descriptive Evidence

3.1 Take-Up, Knowledge and Awareness of LTCI

Table 2 reports the number of people with (the rightmost column) and without (the leftmost column) long term care insurance. We find that the take-up rate of LTCI is low, at 11.8%, at a similar level as that found in the U.S. [7]. We also report the respondents

[7]But this number is significantly larger than what has been previously reported, for example in Quebec. The association representing insurers (ACCAP) reported to us that long-term care insurance policies in effect covered 39,000 persons in 2015. This would imply a take-up rate of 1.7%. It does not appear that our survey is systematically biased in terms of socio-economic status composition to explain this difference. Furthermore, we use a similar question to that used in the U.S. and take-up from surveys tend to match estimates from administrative data there. For life insurance, the Canadian Life and Health Insurance Association reports 22 million covered in Canada which translates into 84% coverage. Our estimate from survey for those 50 to

level of knowledge about LTCI products. Among those who did not purchase LTCI, 39.9% reported having no knowledge about the product, and 8.2% reported not knowing what the product was. Others judged that such policies were too expensive (19%) or unnecessary.

Among the respondents who were covered by LTCI, close to two-thirds (65%) knew little about that type of products whereas 5.7% said they knew nothing at all. The main reason for having purchased an LTCI policy is that they were offered one through one channel or another: only 9.6% of respondents having an LTCI policy declared having actively searched for such a protection while 53% were offered the product, suggesting that the main channel for obtaining LTCI is likely to be through a financial advisor or direct marketing.

The monthly premium paid was 125$ on average (all dollars values are in Canadian dollars, of course; at the time of the survey, one Canadian dollar was worth the equivalent of 0.75 US dollar) for monthly benefits of the order of 2415$ in case of loss of autonomy. Finally, 75% of LTCI purchasers had some sort of life insurance policy (whether term life or other), whereas 22.2% did not have one. Hence, life insurance is much more widespread than LTCI insurance. To summarize, take-up is low but awareness and knowledge of the product is also very low and likely a major driver of low demand.

3.2 Risks and Perception

From the microsimulation model, we can compute mortality and disability risk for each respondent based on health and socio-demographic characteristics at the time of the survey. For each respondent, we need a set of probabilities of having limitations in activities of daily living at future ages (from the current age of respondent i to age 110) and similarly for survival probabilities. The microsimulation model yields simulated life trajectories for each of the respondents. We can estimate a set of simulated probabilities by feeding each respondent 1000 times into the simulator. We use as inputs gender, age, education, smoking status and a set of health variables asked in the survey and used in COMPAS (whether the respondent has had heart disease, diabetes, hypertension,

70 is also in that range (77%). Hence, it is unclear why our numbers for LTCI are so different.

cancer, stroke and mental health problems). In Figure 1, we report the mortality risk for various age groups at the time of the survey. We first compute the expected number of years of life remaining using individual level survival risk. We then order respondents, for each age group, by percentile of the distribution of remaining life expectancy. We report the average mortality risk within each age group and quartile. We see substantial variations in mortality risk at all ages, which predictably becomes more pronounced at older ages. To give an idea of the magnitudes, an individual respondent in the bottom quartile of age bracket 50-54 has a mortality rate at age 85 that is 2.3 times higher than an individual in the top quartile of the same age bracket. This translates into a remaining life expectancy of 28.21 years in the bottom quartile and 38.3 years in the top quartile. Hence, mortality risk modelling using survey respondent characteristics yields substantial heterogeneity in survival risk.

We conduct a similar exercise for disability risk. In Figure 2, we report estimates for disability risk conditional on having survived to a given age for each age group. We also see substantial heterogeneity in risk by age. A respondent aged 90 faces a probability of being disabled, and thus needing care, of the order of 20% to 30%. Given these risks, we can estimate the lifetime risk of ever being disabled and that of ever entering a nursing home for at least 1 year. We present these estimates from COMPAS in Figure 3. On average respondents face a probability of being disabled of 56.1% but this risk is quite heterogeneous in the population. Because nursing home stays are expensive, we also compute the lifetime risk of entering a nursing home. On average respondents face a risk of 26.2%. Again this risk is very heterogeneous in the population.

To get an idea of the financial exposure due to future LTC expenditures, we estimate the net present value of the expenditures associated with formal care and nursing homes for all respondents. To do this, we need estimates of the cost of a year in a nursing home. These costs vary. The annual cost for Quebec public nursing homes is $43,000 (Boisclair et al., 2016). We use this cost in both Quebec and Ontario for illustrative purposes. Of course, respondents never pay the full cost. So we also compute the cost using the user contribution currently set by the Quebec and Ontarian government at roughly $2000 per month, which amounts to $24,000 per year, out-of-pocket. For formal care, we use an estimate of $25 per hour of formal care and the number of hours of formal care predicted from the microsimulation model. Since the Quebec government offers a tax

credit of roughly 33% of expenditures, we also compute an out-of-pocket cost measure for formal care expenditures. There is no such credit in Ontario. We then combine these cost estimates with the probabilities presented earlier to estimate net present value measures of these costs (assuming a 3% real discount rate and no excess inflation in LTC costs). These estimates are shown in Figure 4. If there was no insurance from the government nor the private sector, on average, respondents would face an expected LTC cost of $30,788. There is considerable heterogeneity in that risk. More than 10% of respondents face a net present value of expenditures larger than 54,000$. If we account for government participation and assume respondents use public care homes, we obtain an average estimate of $19,582 for out-of-pocket expenses. Again, more than 10% face a net present value of liability in excess of $34,000. As expected public insurance reduces substantially the dispersion of the financial risk. Yet, for the median respondent, this exposure represents 25.9% of his/her total yearly household income, or 16.2% of total savings at the time of the survey. Hence, we conclude that the residual financial risk is substantial, at least for a large part of the population.

But of course, decisions are based on perceptions of those risks rather than actual risks. In the survey, we asked respondents for the probability they would live to age 85. Hence, we can compare that probability to the one we computed with COMPAS. We can do similarly with the probability of spending at least 1 years with ADLs and the probability of ever needing to enter a nursing home. To compare to actual risks, we compute the deviation of subjective expectations with respect to the objective probability computed from COMPAS. A positive deviation indicates that the respondent overestimates the probability while a negative deviation implies that he underestimates it. Results are shown in Figure 5. We find that respondents overestimate their survival probability to age 85 on average (Difference = 0.106), while they underestimate their probability of living at least 1 year with ADLs (Difference = -0.098). Interestingly however they overestimate their risk of ever entering a nursing home by 0.1 but one should take into account that risks computed for COMPAS exclude short stays particularly at the end of life. It is important to note that there is considerable heterogeneity in these risk perceptions. Furthermore, a large fraction of respondents have trouble forming probabilities on those events. For example, 35% of respondents could not provide a probability of the risk of living at least one year with an ADL and 32% could not report

it for nursing home. This number was only 17% for survival risk. Hence, for those who formed probabilities we find widespread misperception and a significant fraction who have not formed probabilities over those events.

3.3 Stated-Preference Choice Probabilities

In Figure 6, we present an histogram of the distribution of the probabilities to buy a LTCI contract, in the stated-preference experiment, across all contracts offered. While more than 40% of respondents report zero chance they will purchase a product we presented, the other 60% report choice probabilities between zero and 1 which reveals the intensity of preferences with respect to these choice situation. Few respondents report 100 percent chance of purchasing these products which highlights that many considerations are at play and may influence respondents in a real life choice situation.

In Table 3, we report the average choice probability for each combination of benefits for LTC and Life settlements. Interestingly, choice probabilities decrease with the level of the LTC benefit while it increases with the level of the life benefit (except for the contract with the highest LTC benefit). First, this may suggest that on average respondents prefer lower benefits, perhaps because of crowdout from public insurance. Second, it suggests that there may be a joint preference for life and LTC benefits, at least for the contract with a low LTC benefit. The most popular contract appears to combine a monthly LTC benefit of 2000$ with a Life insurance benefit of 25,000$.

4 Model

To understand the interplay between low demand and supply constraints, we build a simple model following the framework of Einav et al. (2010). Results from the survey suggest that the fraction of respondents who own LTCI is low and that a significant fraction of respondents who do not have LTCI has limited awareness of the product. The last component of our survey aims to elicit preferences for LTCI products. We use elicited choice probabilities to construct estimates of demand as a function of the premium each respondent was given in the Survey. Since premiums were randomized conditional on the actuarial premium (based on gender and age), this provides exogenous variations from which we can identify the demand function. Using this identified demand

function, and assuming competition in the LTCI market, we can then construct an estimate of the supply curve and compare market equilibrium under selection with the social optimum. This framework also allows us to construct counterfactuals to study the reasons behind low demand.

4.1 Demand

For each respondent i, we have a measure of the choice probability $q_{i,j}$ that he (she) buys product j if it is offered. We can remain agnostic about the origin of these choice probabilities, but they may well originate from a well-defined expected utility model. Let the indirect utility function of purchasing product j be given by $V_{i,j} = V_i(\gamma_j)$, where $\gamma_j = (\pi_{i,j}, b_{ltc,j}, b_{life,j})$.

This indirect utility function depends on the resources, expectations, and preferences of respondent i. Similarly, let $V_{i,0}$ be the indirect utility function without insurance. Hence, the sign of the difference $\Delta_{i,j} = V_{i,j} - V_{i,0}$ maps into the choice of purchasing coverage. Adding an idiosyncratic error term, $\epsilon_{i,j}$, which one can see as reflecting the incomplete nature of the scenarios or their hypothetical nature, we have:

$$q_{i,j} = \Pr(\Delta_{i,j} + \epsilon_{i,j} > 0) \tag{1}$$

Although we do not seek to estimate the parameters governing V, we can investigate the reduced-form relationship between $q_{i,j}$ and other variables that may affect preference and construct counterfactuals. The premium faced by individual i is given by $\pi_{i,j} = \tau \overline{c}_{h,j}$ where $\tau \in \{0.6, 0.8, 1.0, 1.2, 1.4\}$ is randomly chosen and is exogenous to the characteristics of the individual, while $\overline{c}_{h,j}$ is the actuarial premium for the risk class h defined by gender and age groups to which agent i belongs. Demand for product j as a function of τ is $\overline{q}_j(\tau) = \sum_i q_{i,j}(\tau)$. Because of the random variation in prices, we can estimate the function $\overline{q}_j(\tau)$. One can interpret τ as a relative price where the benchmark is the actuarial premium based on the exogenous characteristics of the risk class.

4.2 Supply

We construct synthetic cost estimates using the microsimulation model we outlined earlier. Denote by $p_{i,a}$ the estimated disability risk of respondent i at age a and by $s_{i,a}$ the survival probability to age a. Voluntary lapsing occurs, i.e., respondents may stop payments and terminate their contract. We account for lapsing using an estimate of the fraction of contracts that voluntarily lapse each year from the Society of Actuaries (see Appendix B). The fraction of LTCI customers who lapsed in 2011 was 1.8%. Since this fraction does not appear to differ by gender nor age, we use this uniform estimate. Denote by $z_{i,a} = (1 - 0.018)^{a-age_i}$ the survival rate of the contract owing to lapsing. We also set the real discount rate to $\rho = 0.03$ and the inflation rate to $\iota = 0.02$. We can then compute the expected discounted cost, for the insurers, of respondent i buying contract j as

$$C_{i,j} = \sum_{a \geq age_i} \frac{1}{(1+\rho+\iota)^{a-age_i}} z_{i,a}(s_{i,a} p_{i,a} ben_{ltc,j} + m_{i,a} I_{(a<85)} ben_{life,j}),$$

where $m_{i,a} = 1 - s_{i,a}/s_{i,a-1}$ is the mortality rate at age a and $I_{(a<85)} = 1$ when $a < 85$.

We plot on Figure 7 the distribution of costs, $C_{i,j}$, for the 9 contracts offered to respondents. The median expected cost ranges from \$20,265 for the contract offering a monthly LTC benefit of 2000\$ and no life insurance benefit to \$46,515 for the contract offering a 4000\$ monthly LTC benefit and a 25000\$ life insurance benefit. We observe substantial variations in the individual costs for any given contract. The largest variation occurs in the case of contracts that bundle life insurance with LTCI benefits. For instance, for a monthly LTC benefit of \$3000 and a \$10,000 life insurance benefit, expected cost to the insurer ranges from \$19,685 to \$44,481 at the 95th percentile.

In order to construct an equilibrium, it is useful to express the total expected discounted cost in terms of the equivalent monthly actuarial premium, denoted by $c_{i,j}$. The two quantities are related by $C_{i,j} = \Pi_i c_{i,j}$ where

$$\Pi_i = \sum_{a \geq age_i} \frac{1}{(1+\rho+\iota)^{a-age_i}} z_{i,a} s_{i,a}(1 - p_{i,a}).$$

is the present value of one dollar of actuarial monthly premium. Therefore, the actuarial

premium $c_{i,j} = C_{i,j}/\Pi_i$ is the constant monthly payment the insurance company would need to obtain from consumer i in order to satisfy the zero expected profit condition.

The average monthly cost of those who purchase the contract j is obtained using information on the cost for each respondent and the choice probabilities,

$$AC_j(\tau) = \frac{1}{\overline{q}_j(\tau)} \sum_i c_{i,j} q_{i,j}(\tau) \tag{2}$$

where $c_{i,j}$ is obtained from above. Adverse selection arises when there is a positive correlation between expected cost and demand at the respondent level. Indeed, this is the case if more risky-agents (and hence more costly agents) buy more insurance. This leads to a positive relationship between $AC_j(\tau)$ and τ. To the opposite, when there is a negative correlation, i.e. less risky agents buy more insurance, propitious (or advantageous) selection arises. Hence a direct test of selection can be conducted from these hypothetical data. Ideally, $c_{i,j}$ would be estimated from realized claims which would allow for more heterogeneity in cost and hence a higher potential for selection. Despite our rich characterization of individual level expected cost, it is possible that we miss some of the selection which may be present in reality. However, there is considerable variance in the cost and revenue estimates within sample and it is sufficient to allow us to test for selection based on the characteristics we account for.

4.3 Equilibrium

Insurers use age and gender to price the contract. Denote a risk class by h and let H be the set of risk classes. The monthly premium is $\pi_{h,j} = \tau_{h,j}\overline{c}_{h,j}$ where $\overline{c}_{h,j}$ is the average cost within the risk class h for product j and $\tau_{h,j}$ is the multiplying factor yielding the market premium. Following Einav et al. [2010], perfect competition drives insurer profits to zero, thus implying that the equilibrium $\tau^*_{h,j}$ solves

$$\tau_{h,j} = \frac{1}{\overline{c}_{h,j}} AC_{h,j}(\tau_{h,j}) \tag{3}$$

where $AC_{h,j}(\tau_{h,j})$ is the average cost of agents i belonging to class h who therefore purchase the contract within class h. The equilibrium fraction of respondents insured is then $\overline{q}^*_{h,j} = \overline{q}_{h,j}(\tau^*_{h,j})$.

Instead of considering each risk class, we look at the conditions for which $\tau^*_{h,j}$ is the same for all risk classes, i.e., $\tau^*_{h,j} = \tau^*_j$. It will be useful to write $\tilde{c}_{i,j} = \frac{c_{i,j}}{\overline{c}_{h,j}}$ for the normalized cost of respondent i for contract j within class h. Similarly, we define $\tilde{q}_{i,j} = \frac{q_{i,j}}{\overline{q}_{h,j}}$ as the normalized demand of respondent i for contract j in risk class h. Using the expression of $AC_{h,j}$ (see equation (2)) , equation (3) can then be rewritten as

$$\tau_{h,j} = \sum_{i \in h} \tilde{c}_{i,j} \tilde{q}_{i,j}(\tau_{h,j}). \tag{4}$$

This is equivalent to

$$\tau_{h,j} = 1 + \sum_{i \in h} (\tilde{c}_{i,j} - 1)(\tilde{q}_{i,j}(\tau_{h,j}) - 1).$$

The right-hand side is (one plus) the covariance between (normalized) individual demand and cost. If this covariance is constant across risk classes, we obtain that $\tau^*_{h,j} = \tau^*_j$ for all h. Multiplying (4) by $\overline{q}_{h,j}$ and summing over every risk classes, one then obtains

$$\tau^*_j = \frac{1}{\overline{q}_j(\tau)} \sum_i \tilde{c}_{i,j} q_{i,j}(\tau^*_j)$$

where the right-hand side can be interpreted as a normalized average cost.[8] The assumption of constant covariance is testable. For each contract, we run a regression of choice probabilities on expected cost allowing the coefficient to depend on the risk class. We then test the assumption of constant slope. We find that for 7 out of the 9 contracts, we cannot reject homogeneity. We interpet this as strong evidence that there are little gains to exploit from this heterogeneity.

There is adverse selection when $\tau^*_j > 1$, reflecting a positive covariance between demand and cost at the individual level. Conversely, there is advantageous selection when $\tau^*_j < 1$. We have a (uniform price) social optimum when $\tau^*_j = 1$ and marginal cost equals average cost at equilibrium. The marginal consumer's willingness to pay for insurance is then equal to marginal cost. Due to selection, the equilibrium is likely to differ from the social optimum. We can compute an estimate of the (normalized)

[8] It is the average relative cost with respect to the risk class benchmarks.

marginal cost $MC_j(\tau)$ from our estimates of average cost and demand. Denoting the socially optimal value of a variable with a double star, this allows us to estimate τ_j^{**} solving $\tau = MC_j(\tau)$. Under adverse selection we expect $\tau_j^{**} < \tau_j^*$ and therefore, $\overline{q}_j^{**} > \overline{q}_j^*$, the classic result of under-insurance.

There is also the possibility of advantageous selection, which would present itself in the form of positive sorting of those with high risk aversion but low cost. In that case, we have $\tau_j^{**} > \tau_j^*$ and $\overline{q}_j^{**} < \overline{q}_j^*$. For each contract, we estimate all quantities as a function of τ using linear approximations. Given that we have 5 points on the grid for τ we cannot consider more flexible functional forms.

5 Results

5.1 Demand Elasticities

There is little concensus on the elasticity of demand for LTCI. Two studies focus on the impact of tax incentives on individuals' purchase of LTCI. Courtemanche and He (2009) study the impact of the tax incentive prescribed in the Health Insurance Portability and Accountability Act (HIPAA) of 1996 and finds a price elasticity of LTCI of -3.9 suggesting that the demand for LTCI is very price elastic. Goda (2011) examines the effect of a variation in tax subsidies for private LTCI on insurance coverage rates and Medicaid expenditure for LTC. Using HRS data for the period 1996-2006, she finds that implementing tax subsidies on private LTCI yields an implied elasticity of -3.3. Yet it is likely that the response to price changes is highly non-linear. In one study using a model approach, Ameriks et al. (2015) find using a life-cycle model that elasticities are much lower, often below unity.

We elicited choice probabilities for various products by varying relative premiums $\tau = \pi/\pi_h$. Since we randomized τ, a relevant question to ask is what is the degree of price sensitivity for each of these contracts. In Table 4, we report estimates along with standard errors. Estimates range from -0.482 to -1.165 so that for the most part demand is inelastic. These elasticity estimates are much lower than other elasticity estimates reported in the literature, such as in Courtemanche and He (2009) and Goda (2011) (see the introduction for details). One first possible reason for this is that estimates found in

these two papers rely on variations in tax incentives and thus may illicit larger responses because of salience effects. A second reason is related to the type of LTCI contracts we proposed, which often include the possibility of buying some life insurance if death occurs prior to 85 years. Estimated elasticities increase substantially with the level of LTC benefits. For example, the elasticity is lower if the contract offers a LTC benefit of $2000 but is much larger when the benefit is $4000. However, demand elasticities are non monotonic with the life insurance benefit, when it is bundled with LTC. As we explain in the next section, the more inelastic demand is, the less there is potential for selection to explain why take-up rates are low. This is in contrast to results in Dardanoni and Li Donni (2016) who use much larger elasticities.

5.2 Equilibrium Results

We now investigate the predicted equilibrium in the LTC market for the different contracts we offered. We first look at contracts that do not include a life insurance benefit. For each of these contracts, we estimate a linear demand and average cost functions from the variation in relative prices. We then solve for the equilibrium relative price and quantity. We similarly derive the marginal cost function from the average cost function. This allows us to compute the social optimum, assuming τ does not vary across risk classes.

Plots of those markets are presented in Figure 8. The equilibrium fraction of respondents who purchase LTCI is close to 22% for those contracts. Hence, even in a market where everyone would be aware of such products, the fraction of individuals who would purchase LTCI is still quite low. There is evidence of adverse selection for at least two of the products, in particular for the contract offering a 4000$ benefit. This finding is expected if the higher benefit is valued more by those who have higher risk. This would tend to exacerbate adverse selection as the co-insurance (i.e. the fraction of total expected LTC expenditures paid by the individual) goes down. Nevertheless, given that demand is somewhat inelastic, selection will imply little variation in the fraction covered in equilibrium. Hence, we can discard, from this evidence, the possibility that selection is what explains the low take-up of LTCI. In fact, the social optimum, 24.2% is not much higher than the predicted equilibrium which implies a modest loss from

selection. The welfare loss is estimated to be 0.001 of the monthly premium (e.g. for first contract, a loss of 0.16$ monthly or 1.92$ annually) which is in-line with results from Einav et al. (2010) who find little welfare loss from adverse selection in health insurance.

Turning to products with life insurance benefits, we report in Figure 9 the predicted equilibrium for contracts with different levels of life insurance settlements but a constant LTC monthly benefit of 2000$. The first important result is that there seems to be very little demand for the life insurance benefit. The fraction of agents who end up purchasing this product remains stable (around 22%). A second result is related to the occurence of advantageous selection and the size of the life insurance benefit. It seems that as the life insurance benefit increases, it becomes more likely to have advantageous selection. However, these results should be interpreted with caution as more than 70% of our respondents already have life insurance outside the LTCI product.

The two main results we obtain from this analysis are that (i) with inelastic demand for LTCI, there are little welfare costs to (adverse, or advantageous) selection in this market, and (ii) the equilibrium take-up rates with selection (around 22%) are roughly twice the actual fraction (11.8%) of agents buying LTCI in our sample. In the next section, we study the reasons that may explain such a difference.

5.3 Awareness

As we have seen from evidence reported in Table 1, premiums observed in the market compare well with those we computed with observed risks. Furthermore, the evidence we presented suggests that selection is unlikely to be a major determinant of low take-up. One striking result of the descriptive evidence presented in Table 2 is that amongst those respondents who do not have LTCI, more than 43.6% were never offered such an insurance. This lack of awareness, which may be due to a multitude of factors, can potentially provide us with an adequate explanation for why the fraction of agents who purchased such products in reality is lower than the equilibrium we predicted. The fact that we asked many questions on LTCI products and on the risk of needing LTC before we asked for choice probabilities is akin to providing information on these contracts which would normally be done by a financial advisor. In order to find whether

this specific reason explains low take-up, we set to zero the choice probabilities for the products we proposed to those respondents having reported no LTCI contract and who were never offered any or did not know anything about LTCI. We then recomputed the equilibrium, whose results we report in Figure 10. Results are similar across contracts. For the contract with a 2000$ LTCI benefit and no life insurance benefit, we find that the fraction of agents who would purchase LTCI would be close to 13%, which is much more in line with the actual fraction of respondents in the sample who reported having LTCI coverage, 11.8%. Hence, one of the important factors for low take-up rate of LTCI appears to be related to the fact that consumers are simply not aware of its existence. This leads to an important welfare loss. We can compute this welfare loss

5.4 Demand Factors

There may be a host of factors which may explain low demand. To assess their effect on market level equilibrium, we proceed in two steps. We first regress the average choice probability over the 5 random scenarios proposed to respondents on variables obtained from questions included in the survey. Specifically, we run the following regression:

$$\overline{q}_i = x_i\beta + \epsilon_i \tag{5}$$

where $\overline{q}_i$ is the average of the choice probability over the 5 scenarios, x_i denotes a set of variables measured in the survey, ϵ_i is an error term. Note that the price level and the benefit are orthogonal to answers to these questions. Hence, we focus on the average choice probability over the 5 scenarios and run the regression over all contracts. We then construct counterfactual choice probabilities k using:

$$\tilde{q}^k_{i,j} = q_{i,j} + (x^k_i - x_i)\hat{\beta} \tag{6}$$

where x^k_i is a counterfactual set of values for x_i, and where $\hat{\beta}$ is the estimated value of β. We can then recompute equilibrium in the market using $\tilde{q}^k_{i,j}$ and compare it to equilibrium using $q_{i,j}$.

We include in x_i a large number of measures we obtain from the survey. First, we include age, gender, whether the respondent lives in Quebec, educational attainment, the number of kids in the household and whether the respondent is married. We then add savings and income using a quadratic form, as well as retirement status. These serve as basic controls for socio-economic background of respondents. We include home ownership as it may act as a substitute for LTCI (Davidoff, 2009). In terms of preferences, we include four variables. First, we asked respondents whether they think that parents should set aside money to leave to their children once they die, even if it means somewhat sacrifycing their own comfort in retirement. We create an indicator variable taking value one if they strongly agree or agree. We take this as an indication that the respondent's bequest motive may be driven by some underlying norm or value that leaving a bequest is desirable. We also asked them whether it is the responsibility of the family, when feasible, to take care of parents. We create a similar indicator variable. We also asked respondents their preference regarding formal and informal care. Finally, we asked respondents about their willingness to take risk. We create an indicator variable taking value one if the respondent is willing to take substantial or above average financial risk expecting higher returns. We include a vector of health status variables to control for underlying LTC risk. These are the same variables used to impute risk in the microsimulation model. To account for misperceptions, we include the deviation between subjective and objective expectations for survival, disability and nursing homes. We also include indicator variables for whether respondents reported not to know the answers to these questions. To measure knowledge of the institutions, we include an indicator variable for whether respondents understand that receiving private insurance benefits may influence the fee they pay for subsidized LTC (crowdout), the amount they think a nursing home costs, an indicator variable if they do not know these costs, whether they think nursing homes are free, the average waiting time for a place in a subsidized home, whether they do not know waiting times, an indicator variable for whether they understand that policies may not reimburse premiums if they lapse and finally a general knowledge indicator if they indicate that they did not know the product before taking the survey. We also include answers to three general numeracy and financial literacy questions and create an indicator for whether they have the correct

answer to all three questions. [9] In Table 5, we report estimates with heteroscedastic robust standard errors.

5.4.1 Preferences and Substitutes

We first find a robust negative relationship between owning a home and the willingness to purchase LTCI. Those who own a house have a 4 percentage point lower demand for LTCI. This confirms that the house may act as a substitute for LTCI as it is mostly illiquid until the point where individuals either die or move into a nursing home, at which point it can be sold (Davidoff, 2009). We find that those who report believing that bequests should be important are also those who are more willing to purchase LTCI, most likely to protect heirs from the run-down of the bequest due to nursing home costs. Hence, this is contrary to other studies which find that bequest motives reduces the opportunity cost of saving and hence lower demand for LTCI (Lockwood, 2014). Interestingly, we find that those who like risk are more willing to purchase the LTCI products we presented. This runs counter-intuitive to the belief that those who are more risk averse should be those who purchase more insurance. It is possible that respondents see purchasing such a policy as a risky investment, in particular because of the risks associated with payouts, lapsing, premiums increases.

Given the structure of the contract, which pays upon reports on ADLs and not upon consumption of LTC services, it is interesting to find that preferences for care from the family are actually positively associated with demand for LTCI. One potential mechanism is that of providing financial relief for children who take care of their parents.[10] We see hint of this by looking at both the effect of general preference for family care and for the probability that the family provides care. Finally, we see that those who prefer formal care have higher demand for LTCI which is what we would expect. Hence, in the Canadian setting it is unlikely that informal care is an explanation for the low take-up of LTCI.

[9] The first two questions ask the respondent about compound interest and diversification and the third is a numeracy question to measure understanding of probabilities.

[10] For instance, Pinquart and Sörensen (2002) show that dependent individuals in general prefer informal help, or a combination of informal and formal support, to purely formal support, at least for short term needs.

5.4.2 Risk Perception

As we have shown, risk perception is very heterogeneous. Hence, we included in the regression the measured bias at the respondent level for survival, disability and nursing home risk. We also included controls for whether the respondent could not form a probability on these events. Results reported in Table 5 show that when the bias is positive (meaning the respondent reports a higher risk than what is predicted from the microsimulation approach), demand for LTCI is also higher. The potential for these risk to explain some of the differences in choice probabilities is important. But their potential to explain aggregate demand is limited since on average survival and nursing home risk is over-estimated (rather than under-estimated). Only in the case, of disability risk is there aggregate under-estimation of the risk. Despite small aggregate effects, the welfare implications of misperceptions may be important.

5.4.3 Financial and Institutional Knowledge

Interestingly, those who were better able to answer the financial literacy and knowledge question had lower demand for the LTCI products we proposed. Hence, lack of demand is not the result of poor general financial literacy. As for other knowledge measures, we find that general lack of knowledge about LTCI reduces by 5.3 percentage points the demand for LTCI while subjective expectations of wait times are positively correlated with demand for LTCI. Given that the waiting period is a period where the respondent must purchase LTC services in the private market, we expected a positive correlation between demand and wait times. But the effect is small. An increase of 10 months leads to a 1.7 percentage point increase in demand. Other measures such as knowledge of means-testing, lapsing, subjective expectations regarding nursing home costs do not appear to be correlated with demand.

To understand how these factors may boost demand, we performed a counterfactual where we changed risk perceptions and knowledge regarding LTCI. First, we set biases to zero and the do-not-know indicator variables for perceptions to zero. Second, we set the institutional detail measures to the true value (means-testing exist and lapsing is a risk) and nursing home costs and wait times to their value found in the field (average of 10 months of wait time, and a monthly cost of roughly 2000$). In Figure 11, we

find that the new equilibrium would predict take-up of 25% instead of 22% in the baseline. Hence, these variables do very little to shift aggregate demand despite having considerable effects at the individual level.

6 Conclusion

In this paper, we provide new evidence, using stated choice probabilities for long-term care insurance contracts, on the determinants of low take-up of LTCI in Canada. The typical LTCI product in Canada differs somewhat from what is observed in the U.S. For example, most insurance companies offer a benefit paid on the basis of ADL limitations rather than reimbursing expenses for LTC. We exploit exogeneous variation in prices across various scenarios differing on benefit structure, to derive predictions for equilibrium under selection as in Einav et al. (2010). Since we ask directly about choice probabilities, we remain agnostic about the exact model that generates demand. With results from our baseline predictions, we then construct a number of counterfactuals exploiting the questions on knowledge, perception and preferences.

Our key results are threefold. First, we find that part of the explanation for low take-up is simply that the near elderly, the prime target group are often not aware of such products. Compared to a baseline projected fraction of the population with LTCI of 20% for a 2000$ a month LTC benefit, a counterfactual where we set choice probabilities to zero for those who were never offered insurance yields an equilibrium take-up rate of 13%, close to the observed take-up rate in our survey of 12%. Hence, supply and information constraints play a large role. We find that a large fraction of respondents, particularly those who haven't bought LTCI, know little about such products and their key characteristics. Second, we find that although adverse selection appears to be present, based on observed health status unused in pricing, the effect of selection on the equilibrium take-up rate of LTCI is rather low (2 percentage points). This is explained in part by the inelasticity of the demand for LTCI. Exploiting exogeneous variation in prices from the survey design, we estimate price elasticities typically below -1. This is in contrast to existing estimates in the literature (Courtemanche and He, 2009; Goda, 2011) but consistent with evidence presented in Ameriks et al. (2015). Third, we find that a host of demand factors explain little of the heterogeneity in choice

probabilities (preferences). We cannot identify segments of the population which would have drastically higher demand for LTCI. Hence, there are important potential welfare gains from increased awareness and knowledge in this market. But, our study suggests that there is limited scope for take-up to reach levels beyond 30%. We can think of two reasons why take-up may be low relative to what one would expect in other contexts. First, public provision of long-term care insurance, through reduced user fees shields consumers from a substantial part of risk, compared to the U.S. where only low income (and asset) consumers can benefit from subsidized LTC services. Second, older Canadians have a generous safety net which provides substantial income replacement rates for a significant portion of the population. Third, one possibility is that individuals do not value consumption when needing care as much as when healthy. But evidence on this channel is conflictual. For example, Ameriks et al. (2015) find estimates that would suggest higher marginal value of money when in need of long-term care.

References

Ameriks, J., Briggs, J., Caplin, A., Shapiro, M. D., and Tonetti, C. (2016). Late-in-Life Risks and the Under-Insurance Puzzle. Working Paper 22726, National Bureau of Economic Research.

Ameriks, J., Briggs, J. S., Caplin, A., Shapiro, M. D., and Tonetti, C. (2015). Long-Term Care Utility and Late in Life Saving. Working Paper 20973, National Bureau of Economic Research.

Ameriks, J., Caplin, A., Laufer, S., and Van Nieuwerburgh, S. (2011). The Joy of Giving or Assisted Living? Using Strategic Surveys to Separate Public Care Aversion from Bequest Motives. *The Journal of Finance*, 66(2):519–561.

Boisclair, D., Cote-Sergent, A., Laliberte-Auger, F., Marchand, S., and Michaud, P.-C. (2016). A health microsimulation model for Quebec and Canada. Technical report, HEC Montreal - CEDIA.

Boisclair, D., Lusardi, A., and Michaud, P.-C. (2015). Financial literacy and retirement planning in Canada. *Journal of Pension Economics and Finance*, pages 1–20.

Bonsang, E. (2009). Does informal care from children to their elderly parents substitute for formal care in Europe? *Journal of Health Economics*, 28(1):143–154.

Bourgeon, J.-M. and Picard, P. (2014). Fraudulent claims and nitpicky insurers. *American Economic Review*, 104(9):2900–2917.

Brown, J., Goda, G., and McGarry, K. (2012). Long-term care insurance demand limited by beliefs about needs, concerns about insurers and care available from family. *Health Affairs*, (6):1294–302.

Brown, J. R. and Finkelstein, A. (2008). The Interaction of Public and Private Insurance: Medicaid and the Long-Term Care Insurance Market. *American Economic Review*, 98(3):1083–1102.

Brown, J. R. and Finkelstein, A. (2009). The Private Market for Long-Term Care Insurance in the United States: A Review of the Evidence. *Journal of Risk and Insurance*, 76(1):5–29.

Brown, J. R. and Finkelstein, A. (2011). Insuring Long-Term Care in the United States. *Journal of Economic Perspectives*, 25(4):119–142.

Courtemanche, C. and He, D. (2009). Tax incentives and the decision to purchase long-term care insurance. *Journal of Public Economics*, 93(1–2):296–310.

Cremer, H., De Donder, P., and Pestieau, P. (2009). Providing Sustainable Long Term Care: A Looming Challenge. Technical Report 3.

Dardanoni, V. and Li Donni, P. (2016). The welfare cost of unpriced heterogeneity in insurance markets. *The RAND Journal of Economics*, 47(4):998–1028.

Davidoff, T. (2009). Housing, health, and annuities. *Journal of Risk and Insurance*, 76(1):31–52.

Einav, L., Finkelstein, A., and Cullen, M. R. (2010). Estimating Welfare in Insurance Markets Using Variation in Prices. *The Quarterly Journal of Economics*, 125(3):877–921.

Finkelstein, A. and McGarry, K. (2006). Multiple Dimensions of Private Information: Evidence from the Long-Term Care Insurance Market. *American Economic Review*, 96(4):938–958.

Goda, G. S. (2011). The impact of state tax subsidies for private long-term care insurance on coverage and Medicaid expenditures. *Journal of Public Economics*, 95(7–8):744–757.

Goldman, D., Shang, B., Hattacharya, J., Garber, A., Hurd, M., Joyce, G., Lakdawalla, D., Panis, C., and Shekelle, P. (2005). Consequences of health trends and medical innovation for the future elderly. *Health Affairs*, 24(6):W5R5–W5R17.

Hurd, M. D., Michaud, P.-C., and Rohwedder, S. (2017). Distribution of lifetime nursing home use and of out?of?pocket spending. *Proceedings of the National Academy of Sciences*.

J. Louviere, D. Hensher, J. S. (2000). *Stated Choice Methods, Analysis and Applications*. Cambridge University Press.

Lockwood, L. M. (2014). Incidental Bequests: Bequest Motives and the Choice to Self-Insure Late-Life Risks. Working Paper 20745, National Bureau of Economic Research.

Lusardi, A., Michaud, P.-C., and Mitchell, O. S. (2017). Optimal Financial Knowledge and Wealth Inequality. *Journal of Political Economy*, 125(2):431–477.

Lusardi, A. and Mitchell, O. S. (2014). The Economic Importance of Financial Literacy: Theory and Evidence. *Journal of Economic Literature*, 52(1):5–44.

Manski, C. F. (1999). Analysis of Choice Expectations in Incomplete Scenarios. *Journal of Risk and Uncertainty*, 19(1):49–66.

OECD (2011). *Help Wanted? - Providing and Paying for Long-Term Care*. Oecd press edition.

Pauly, M. V. (1990). The Rational Nonpurchase of Long-Term-Care Insurance. *Journal of Political Economy*, 98(1):153–168.

Pestieau, P. and Ponthiere, G. (2011). The Long Term Care Insurance Puzzle. In *Financing Long-Term Care in Europe - Institutions*. J. Costa-Font, palgrave macmillan edition.

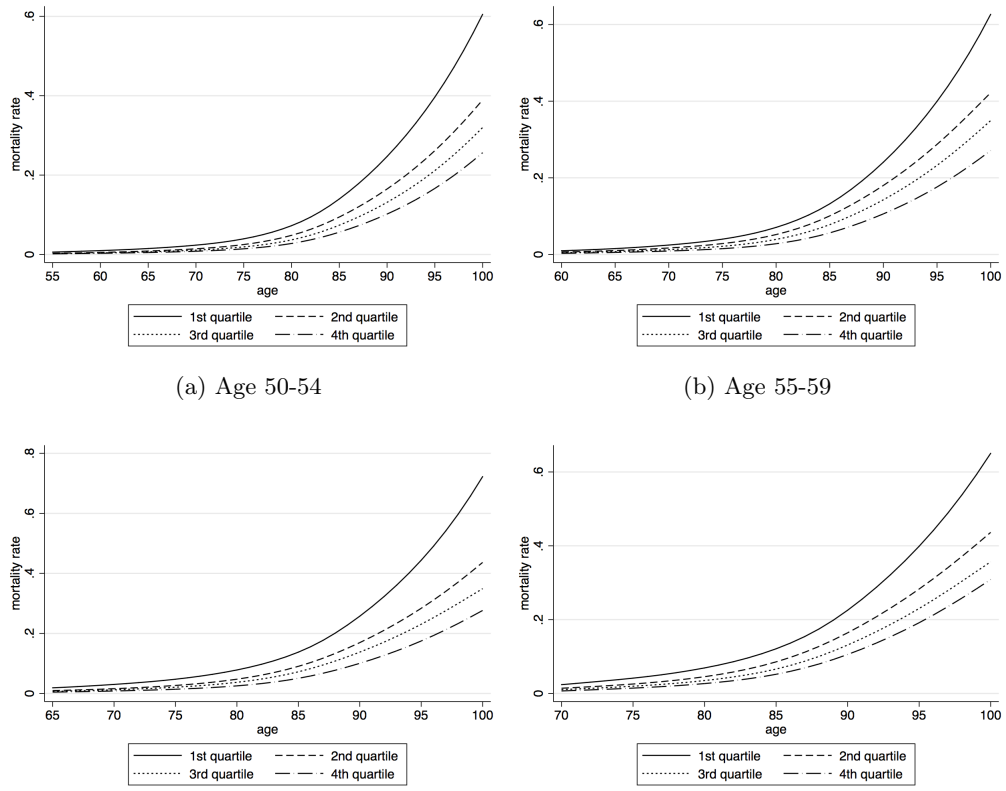
Pinquart, M. and Sörensen, S. (2002). Older Adults' Preferences for Informal, Formal, and Mixed Support for Future Care Needs: A Comparison of Germany and the United States. *The International Journal of Aging and Human Development*, 54(4):291–314.

Sloan, F. A. and Norton, E. C. (1997). Adverse Selection, Bequests, Crowding Out, and Private Demand for Insurance: Evidence from the Long-term Care Insurance Market. *Journal of Risk and Uncertainty*, 15(3):201–219.

Tennyson, S. and Yang, H. K. (2014). The role of life experience in long-term care insurance decisions. *Journal of Economic Psychology*, 42:175–188.

Zhou-Richter, T., Browne, M. J., and Gründl, H. (2010). Don't They Care? Or, Are They Just Unaware? Risk Perception and the Demand for Long-Term Care Insurance. *Journal of Risk and Insurance*, 77(4):715–747.

Figures



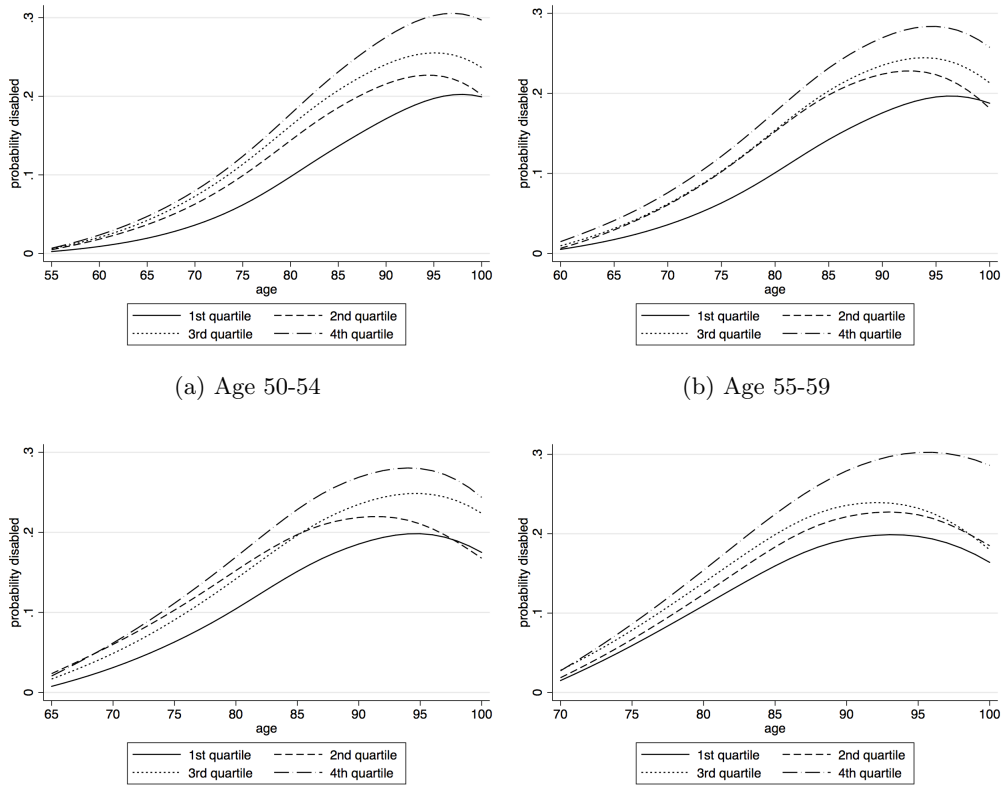
(a) Age 50-54

(b) Age 55-59

(c) Age 60-64

(d) Age 65-69

Figure 1: Mortality Risk Projections by Age Group: For each age group we sort respondents by projected remaining life expectancy and plot average mortality rates by quartiles.



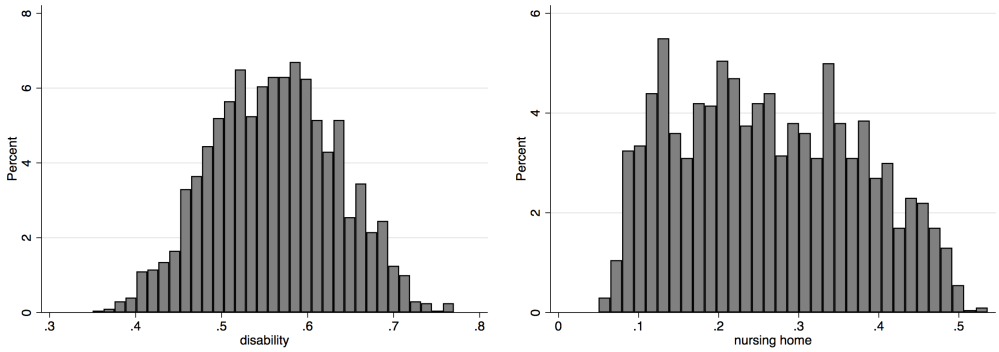
(a) Age 50-54

(b) Age 55-59

(c) Age 60-64

(d) Age 65-69

Figure 2: Disability Risk Projections by Age Group: For each age group we sort respondents by projected expected number of years with disability and plot average disability rates by quartiles. These disability rates are conditional on survival at each age.



(a) Lifetime Disability

(b) Lifetime Nursing Home

Figure 3: Probability of Ever Being Disabled or Enter a Nursing Home: The distribution of these risks are computed from COMPAS.

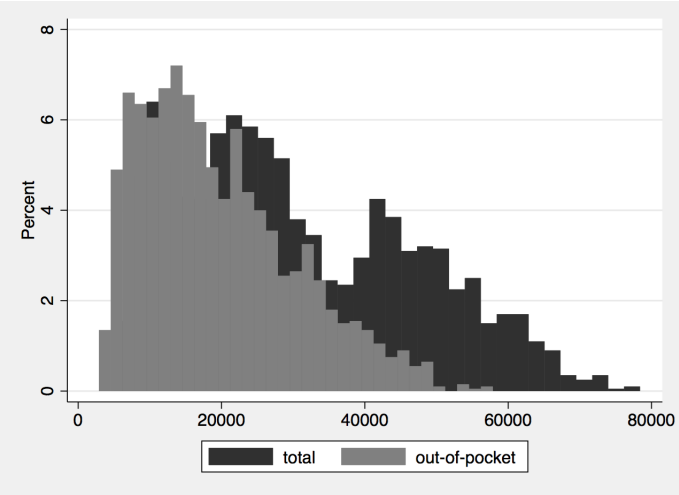
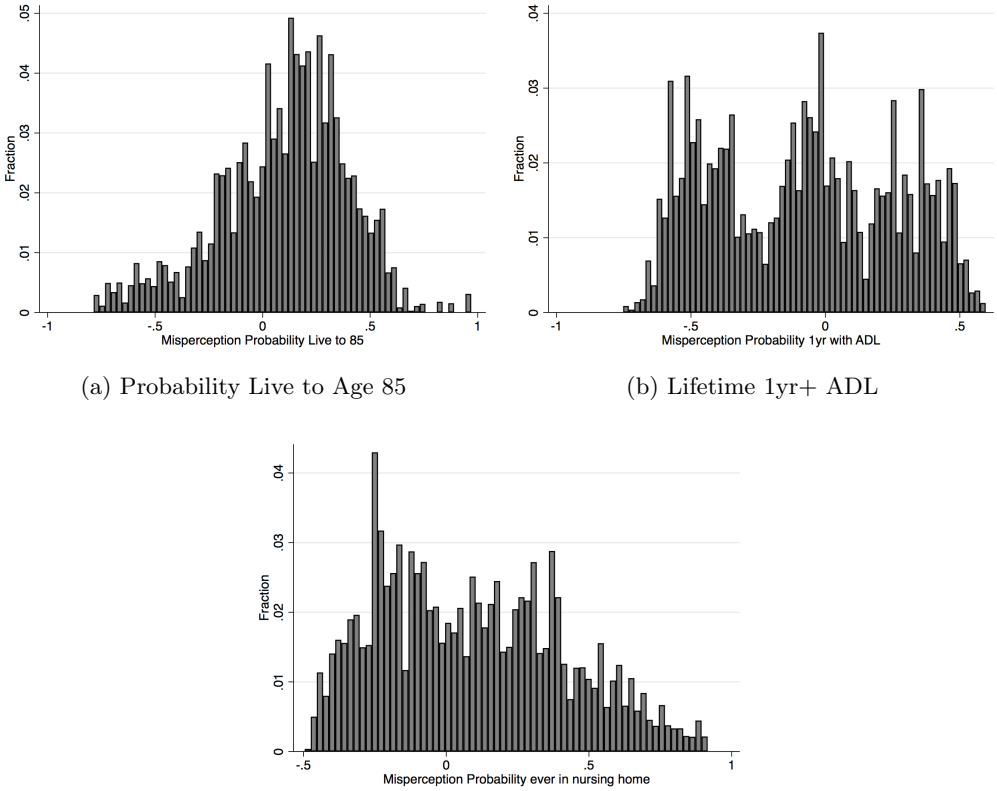


Figure 4: Expected Present Value of Cost to Respondents: A discount rate of 3% is used.



(a) Probability Live to Age 85

(b) Lifetime 1yr+ ADL

(c) Lifetime Nursing Home

Figure 5: Difference between subjective and objective risk (misperception) for survival, disability and nursing home risks. A positive (negative) number implies the respondent overestimates (underestimates) the risk.

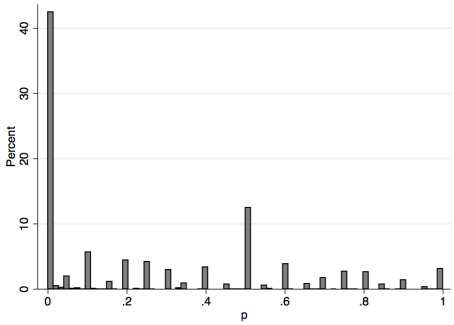


Figure 6: Histogram of the Distribution of Probabilities to Buy LTCI

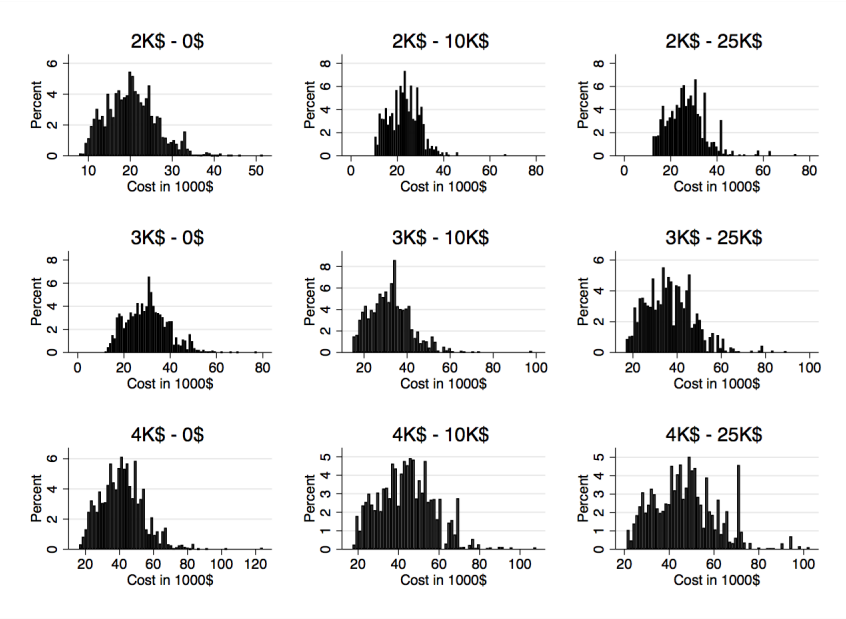
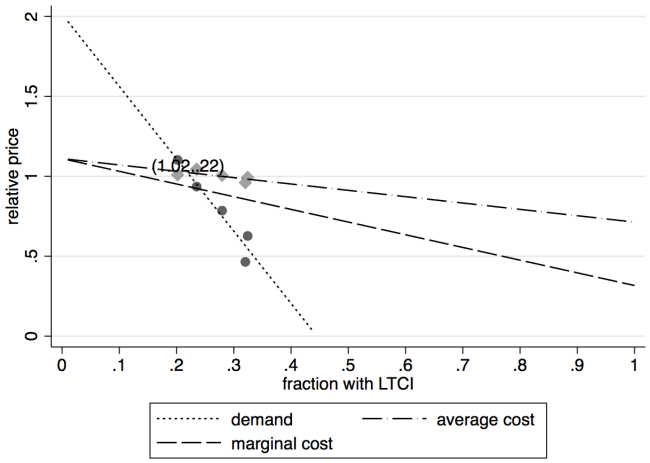
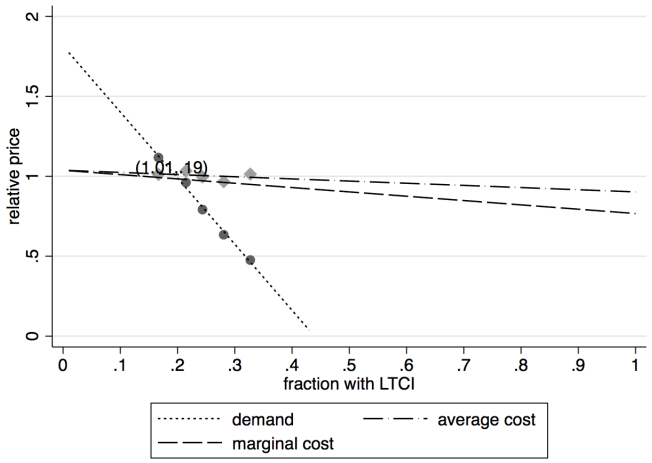


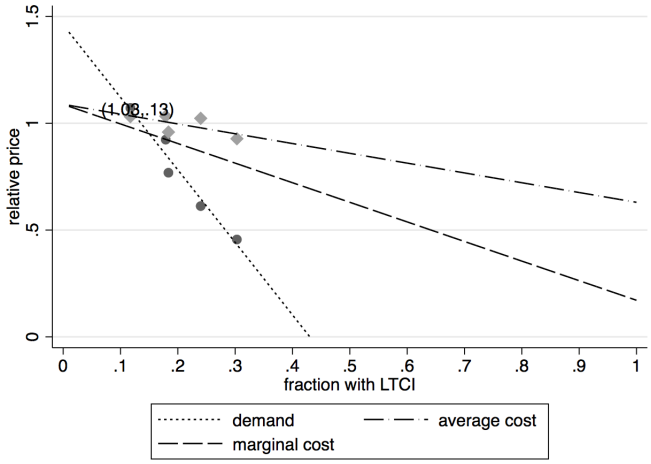
Figure 7: Distribution of Expected Cost by Contract: In each panel, we report a histogram of the distribution of expected costs, as defined in the paper, for each contract defined by the LTC benefit and the life insurance benefit.



(a) $b_{ltc} = 2000$

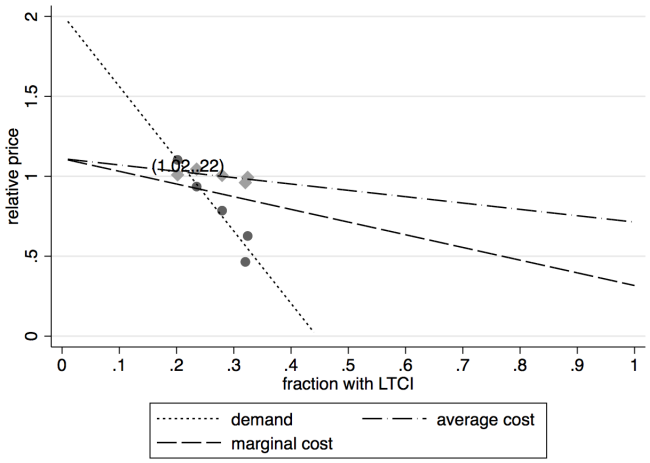


(b) $b_{ltc} = 3000$

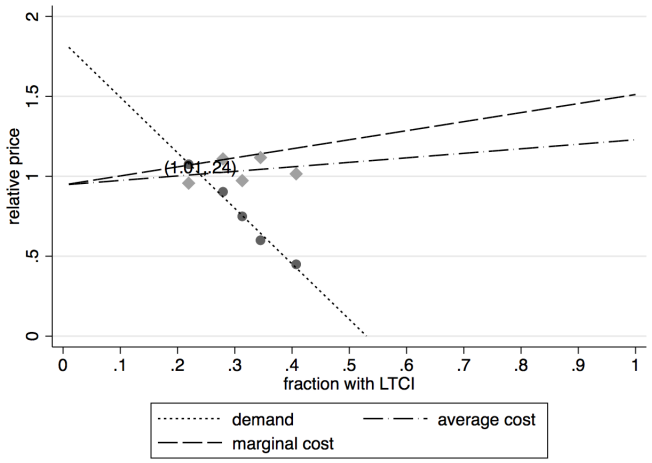


(c) $b_{ltc} = 4000$

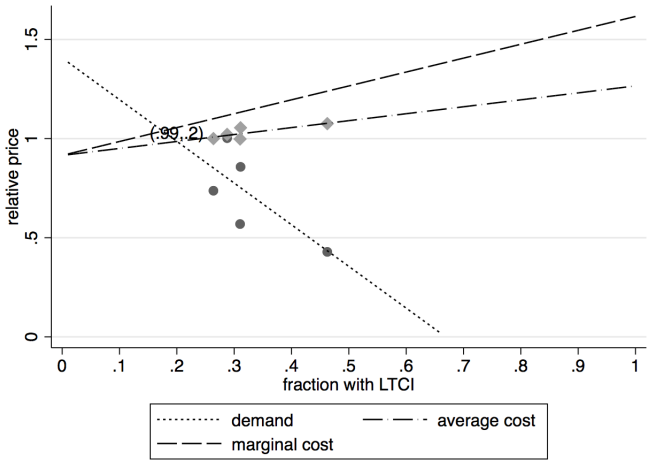
Figure 8: Predicted Equilibrium for Contract without Life Insurance Benefits



(a) $b_{life} = 0$

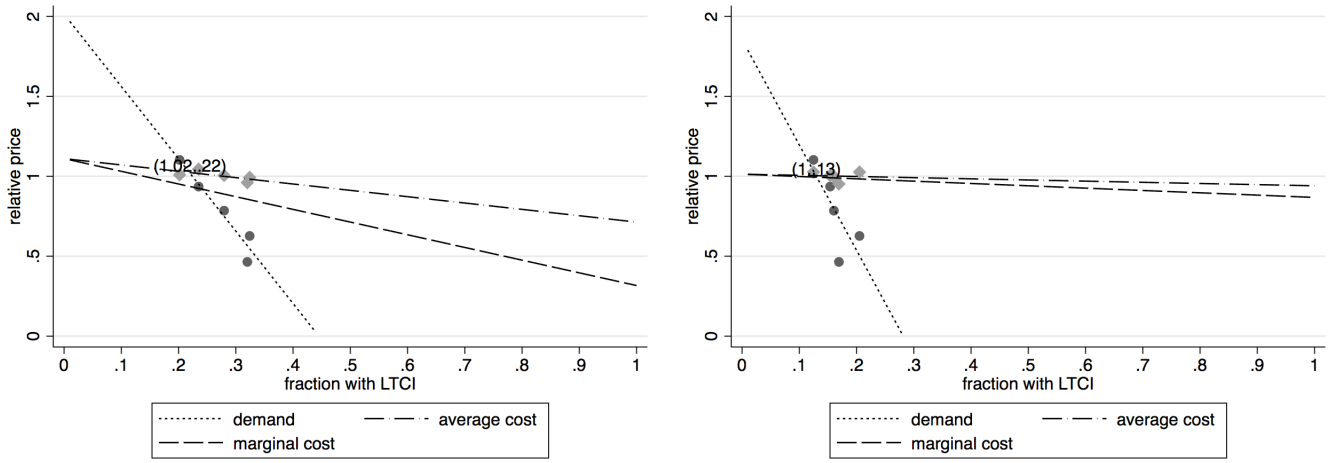


(b) $b_{life} = 10000$



(c) $b_{life} = 25000$

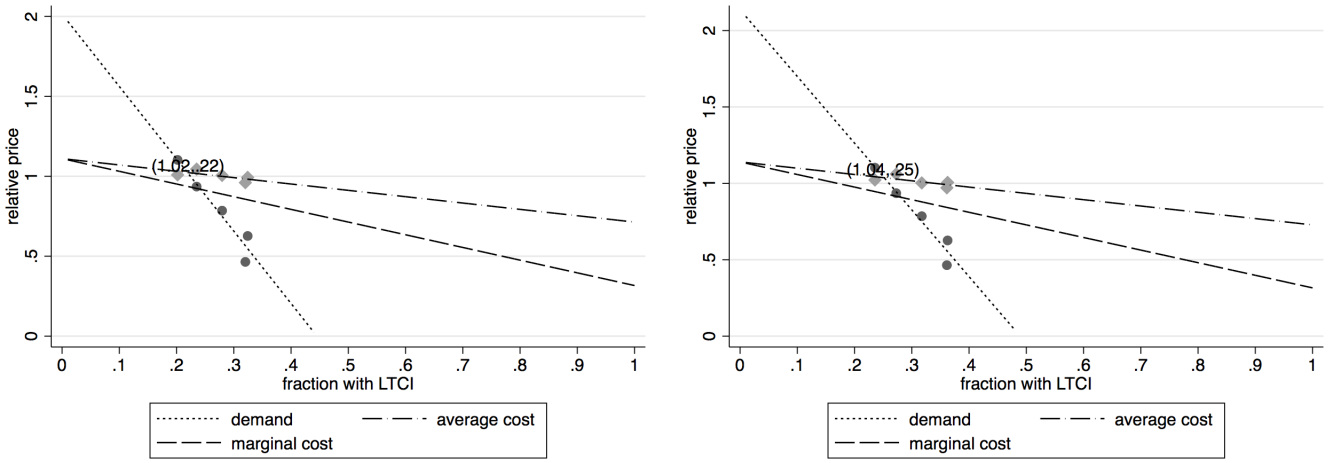
Figure 9: Predicted Equilibrium for Contract with 2,000$ Monthly LTC benefit



(a) Baseline

(b) With Awareness Constraint

Figure 10: Predicted Equilibrium for Contract with 2,000$ Monthly LTC benefit with Awareness Constraint: We plot both the baseline equilibrium and the equilibrium assuming that those who were never offered such a product or were not aware it existed had zero choice probabilities for the product we proposed.



(a) Baseline

(b) Without Knowledge Constraint or Misperceptions

Figure 11: Predicted Equilibrium for Contract with 2,000$ Monthly LTC benefit without Misperception and Knowledge Barriers: We plot both the baseline equilibrium and the equilibrium assuming that respondents did not have misperception regarding risks and had responded correctly to questions on knowledge of these products.

Tables

Age		Female	Male
50-54	Model	139	119
	Data	130	97
55-59	Model	183	155
	Data	175	123
60-64	Model	220	194
	Data	238	174
65-69	Model	291	263
	Data	352	262

Table 1: Monthly Premium from data (CAA Quebec) and Actuarial Premium from modelling (COMPAS microsimulation model): Monthly premiums from CAA with a 2% infation guarantee. Sample average for 2000$ and 3000$ per month benefit.

No LTCI		**LTCI**	
Fraction (%)	88.2	**Fraction (%)**	11.8
Knowledge of LTCI (%)		**Knowledge of LTCI (%)**	
A lot	7.2	*A lot*	29.3
A little	52.9	*A little*	65
None at all	39.9	*None at all*	5.7
Why don't you have LTCI? (%)		**How did you come to purchase LTCI? (%)**	
Never offered one	43.6	*Offered*	53
Not yet made decision	7.7	*Searched myself*	9.6
Used to have one	0.6	*Other*	37.4
Too expensive	19.3		
Doesn't cover my needs	2.2	**LTC policy**	
Don't need such a policy	14.4	*Premium*	$ 125
Don't know what it is	8.2	*Benefit*	$ 2,415
Other	4.1		
Do you have life insurance? (%)		**Do you have life insurance? (%)**	
Yes	67.4	*Yes*	75
No	31.8	*No*	22.2
Don't know	0.77	*Don't know*	2.8

Table 2: Holding of Long-Term Care and Life Insurance

	Life benefit			
LTC benefit	0	10000	25000	Total
2000	.2713	.3128	.3328	.292
3000	.2491	.2855	.2858	.2639
4000	.2044	.2669	.2559	.2273
Total	.2413	.2891	.29	.2608

Table 3: Mean choice probability by combination of LTC and Life benefit in scenarios.

Contract	Estimate	Std error
(2,0)	-.686	.084
(2,10)	-.677	.121
(2,25)	-.481	.128
(3,0)	-.768	.092
(3,10)	-.788	.139
(3,25)	-.703	.135
(4,0)	-1.165	.101
(4,10)	-.808	.143
(4,25)	-1.053	.149

Table 4: Demand Elasticities by Contract: For each contract, defined by the LTC monthly premium (in thousands) and the life insurance settlement (in thousands), we compute the demand elasticity from a regression of the choice probabilities on the relative premium which is drawn exogeneously. We evaluate those elasticities at the mean choice probability. Standard errors are computed using the delta method.

	(1)	(2)	(3)
	q	q	q
own home	-0.0411**	-0.0400**	-0.0383*
	(-2.68)	(-2.63)	(-2.56)
bequest	0.0474***	0.0442**	0.0403**
	(3.46)	(3.28)	(2.98)
risk loving	0.0332*	0.0299*	0.0283*
	(2.28)	(2.08)	(1.98)
family	0.0293*	0.0208	0.0212
	(2.54)	(1.78)	(1.81)
prefers formal	0.0395***	0.0315**	0.0264*
	(3.53)	(2.75)	(2.29)
bias survival		0.0461*	0.0480*
		(2.16)	(2.27)
dnk survival		-0.0160	-0.0164
		(-0.91)	(-0.93)
bias adl		0.0570*	0.0530*
		(2.36)	(2.21)
dnk adl		-0.0321*	-0.0306*
		(-2.09)	(-2.02)
pr family provides care		0.0526**	0.0466*
		(2.81)	(2.48)
dnk family		0.00333	0.000438
		(0.18)	(0.02)
bias nursing home		0.0865***	0.0918***
		(3.46)	(3.69)
dnk nursing home		0.00199	0.00568
		(0.12)	(0.36)
financial knowledge			-0.0290*
			(-2.54)
knows means-testing			0.0142
			(0.94)
monthly cost nursing home			-0.00344
			(-0.81)
dnk cost			-0.00785
			(-0.44)
nursing home free			-0.00184
			(-0.09)
wait time			0.00178*
			(2.08)
dnk wait time			0.0140
			(0.87)
dnk LTCI			-0.0537***
			(-4.63)
knows lapsing risk			0.0305
			(1.08)
R^2	0.066	0.098	0.114

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5: Demand Regression Estimates: OLS estimates with heteroscedastic robust standard errors. Each specification includes controls for socio-economic background characteristics (age, gender, province, educational attainment, marital status, kids, savings, income and retirement status) and health status (whether heart disease, stroke, lung disease, diabetes, cancer, mental illness and hypertension, smoking now and ever).

A Questionnaire

Long-Term Care Insurance Survey (Paper Version of Questionnaire for Internet Survey)

Introduction

For purposes of this survey, when we use the term 'long-term care,' we are referring to assistance with personal care needs such as dressing, bathing, getting in and out of bed, using the bathroom or eating. A long-term care home or assisted living facility refers to a facility that offers board, meals and other basic care services for persons who need long-term care. The facility also offers medical services. It is therefore distinct from a retirement home, where no or limited care is offered.

Section 1: Long-Term Care Insurance

Q1 This survey is going to ask you questions about long-term care insurance. Which of the following best describes your current knowledge about this type of insurance?
1 A lot
2 A little
3 None at all

Q2 For purposes of this survey, we define long-term care insurance as a type of insurance that helps to pay for extended stays in a long-term care home or assisted living facility, or for personal or medical care in your home. It is typically separate from your health insurance and requires paying separate premiums. Do you have a long-term care insurance policy?
1 Yes
2 No
3 Don't Know

IF Q2==3 (Don't know) GOTO Q6
ELSE IF Q2==2 (No)
Q3a Why don't you have a long-term care insurance policy? Choose the main reason.
1 I have never thought about buying one, and I have never been offered one (for instance by a financial advisor).
2 I have thought about buying one, but I have not (yet) made a decision.
3 I used to have such a policy, but I let it lapse.
4 Such insurance policies are too expensive for me.
5 Such insurance policies do not cover my needs.
6 I do not think I will need such a policy.
7 I don't know what that is.
8 Other, open...
GOTO Q6
ELSE IF Q2==1 (Yes)
Q3b How did you come to purchase that insurance policy?
1 I was offered a long-term care policy
2 I searched myself for a long-term care policy
3 Other, open …

Q4 What is the monthly premium on that policy, including taxes?
Numeric
9999 Don't know

IF Q4==9999
Q4a Is it more than $200 1 Yes 2 No 8888888 Refuse to answer
IF Q4a==1
Q4b Is it less than $400 1 Yes 2 No 8888888 Refuse to answer
ELSE IF Q4a==2
Q4c Is it more than $100 1 Yes 2 No 8888888 Refuse to answer
END IF
END IF
Q5 What is the amount of the benefit the insurance would pay out (monthly)?
Numeric
9999 Don't know
IF Q5==9999
Q5a Is it more than $2,500 1 Yes 2 No 8888888 Refuse to answer
IF Q5a==1
Q5b Is it less than $3,500 1 Yes 2 No 8888888 Refuse to answer
ELSE IF Q5a==2
Q5c Is it more than $1,500 1 Yes 2 No 8888888 Refuse to answer
END IF
END IF
END IF

Q6 Do you have life insurance for which you currently pay a premium (or that is in force)?
1 Yes
2 No
3 Don't Know

Section 2: Background

Q7 At the present time, do you smoke cigarettes daily, occasionally or not at all?
1 Daily
2 Occasionally
3 Not at all
IF Q7==1 GOTO Q8
ELSE IF Q7==2,3
Q7a Have you ever smoked cigarettes daily?
1 Yes
2 No
IF Q7a==1 GOTO Q8
ELSE IF Q7a==2
Q7b Have you smoked 100 cigarettes or more in your life?
1 Yes
2 No
IF Q7b==1 GOTO Q8
ELSE IF Q7b==2
Q7c Have you ever smoked a whole cigarette?
1 Yes
2 No

END IF
END IF
END IF

Q8 What is the highest degree, certificate or diploma you have obtained?
1 Less than high school diploma or its equivalent
2 High school diploma or a high school equivalency certificate
3 Trade certificate or diploma
4 College, CEGEP or other non-university certificate or diploma (other than trades certificates or diplomas)
5 University certificate or diploma below the bachelor's level
6 Bachelor's degree (e.g. B.A., B.Sc., LL.B.)
7 University certificate, diploma, degree above the bachelor's level

Q9 What is your marital status?
1 married
2 living common-law
3 widowed
4 separated
5 divorced
6 single, never married

Q10 Do you have children?
1 Yes
2 No
IF Q10==1
Q10a How many children do you have?
Numeric (>0)
END IF

Q11 For 2016, what is your best estimate of the total income received by all members of your household, from all sources, before taxes and deductions?
Numeric
9999999 Don't know or prefer not to say
IF Q11==9999999
Q11a Is it more than $60,000 1 Yes 2 No 8888888 Refuse to answer
IF Q11a==1
Q11b Is it less than $120,000 1 Yes 2 No 8888888 Refuse to answer
ELSE IF Q11a==2
Q11c Is it more than $30,000 1 Yes 2 No 8888888 Refuse to answer
END IF
END IF

Q12 Do you consider yourself retired?
1 Yes
2 No
IF Q12==2

Q12a What is your best estimate of what total income received by all members of your household will be once you are fully retired, as a fraction of your current income?
Numeric (0%-200%)
9999999 Don't know
IF Q12a==9999999
Q12b Is it more than 50%? 1 Yes 2 No 8888888 Refuse to answer
IF Q12b==1
Q12c Is it less than 75%? Yes 2 No 8888888 Refuse to answer
ELSE IF Q12b==2
Q12d Is it more than 25%? 1 Yes 2 No 8888888 Refuse to answer
END IF
END IF
END IF

Q13 Do you own your primary residence?
1 Yes
2 No

IF Q13==1
Q13a What is the current market value of your residence?
Numeric
9999999 Don't know
IF Q13a==9999999
Q13b Is it more than $300,000? 1 Yes 2 No 8888888 Refuse to answer
IF Q13b==1
Q13c Is it less than $600,000? 1 Yes 2 No 8888888 Refuse to answer
ELSE IF Q13a==2
Q13d Is it more than $150,000? 1 Yes 2 No 8888888 Refuse to answer
END IF
END IF

Q14 How much do you still carry as a mortgage, as a proportion of the current market value of your residence?
1 Less than 20%
2 Between 20 and 40%
3 Between 40 and 60%
4 More than 60%
5 Don't know
END IF

Q15 – We are interested in your pension plan and its nature, if you have one. Do you currently contribute to, or receive benefits from, an employer provided pension plan?
1 Yes
2 No
3 Don't Know

IF Q15==1
Q15a Is your pension plan a defined-benefit or a defined-contribution plan? A defined-benefit plan is one where you receive fixed income in retirement for as long as you live and you don't

get to decide how much is contributed and how it is invested. A defined contribution plan is one where you decide how the contributions are invested and you receive at retirement the amount accumulated from your contributions.
1 Defined-benefit
2 Defined-contribution
3 Other
4 Don't Know
END IF

Q16 What is your best estimate of how much you have accumulated in Registered Retirement Savings Plans (RRSPs), Tax-Free Savings Accounts (TFSAs) and other savings accounts?
Numeric
9999999 Don't know or prefer not to say
IF Q16==9999999
Q16a Is it more than $50,000? 1 Yes 2 No 8888888 Refuse to answer
IF Q16a==1
Q16b Is it less than $200,000? 1 Yes 2 No 8888888 Refuse to answer
ELSE IF Q16a==2
Q16c Is it more than $10,000? 1 Yes 2 No 8888888 Refuse to answer
END IF
END IF

Q17 Looking at the following list of health conditions, has a doctor ever told you you had:
[Check any of:]
1 Heart disease
2 Stroke
3 Lung disease
4 Diabetes
5 Hypertension
6 Depression or other mental health problems
7 Cancer

Section 3: Risk Perception

Q18 On a scale of 0 to 100, where 0 is absolutely no chance and 100 is absolutely certain, what do you believe is the percent chance you will live to age 85 or more?
Numeric (0-100)
9999999 Don't know

Q19 On a scale of 0 to 100, where 0 is absolutely no chance and 100 is absolutely certain, what do you believe is the percent chance you will live more than 1 year during your lifetime with two or more limitations in activities of daily living? Activities of daily living include eating, bathing, getting dressed, walking about one's home and getting in and out of bed.
Numeric (0-100)
9999999 Don't know
IF Q19>0
Q19a 2 or more years?
Numeric (Range 0 – Answer to Q19)

9999999 Don't know
IF Q19a>0
Q19b 4 or more years?
Numeric (Range 0 – Answer to Q19a)
9999999 Don't know
END IF
END IF

Q20 Of course nobody wishes to go to a long-term care home, but sometimes this becomes necessary. On a scale of 0 to 100, what do you believe is the percent chance that you will have to move to a long-term care home because of important limitations in your activities of daily living?
Numeric (0-100)
9999999 Don't know

Q21 On a scale of 0 to 100, what do you believe is the percent chance that your family would take up the responsibility of taking care of you if you had important limitations in activities of daily living?
Numeric (0-100)
9999999 Don't know

Formal care refers to that provided by qualified caregivers who are usually paid and unrelated to the person receiving care; **informal** care refers to that usually provided for free by relatives. Please keep these definitions in mind for the following questions.

Q22 **Formal** care refers to that provided by qualified caregivers who are usually paid and unrelated to the person receiving care; **informal** care refers to that usually provided for free by relatives.

Do you agree with the following statements? (Answers: 1 Strongly Agree; 2 Agree; 3 Disagree; 4 Strongly Disagree; 5 Don't know)
Q22a It is the responsibility of the family, when feasible, to take care of elderly parents
Q22b Parents should set aside money to leave to their children or heirs once they die, even when it means somewhat sacrificing their own comfort in retirement
Q22c It is children's duty to provide their parents with informal long-term care or to pay for their formal long-term care, should the need arise.

Q23 **Formal** care refers to that provided by qualified caregivers who are usually paid and unrelated to the person receiving care; **informal** care refers to that usually provided for free by relatives.

If you found yourself in a situation where you needed long-term care, which type of care would you prefer to receive: formal or informal?
1 Formal
2 Informal
3 Don't know

Section 4: Literacy and Knowledge

Now we would like to ask some questions about your familiarity and comfort with financial concepts. Please answer these questions the best you can.

Q24 Suppose you have $100 in a savings account, the interest rate is 2% per year and you never withdraw money. After 5 years, how much will you have in this account in total?
1 More than $110
2 Exactly $110
3 Less than $110
4 Don't know

Q25 True or false? You should invest most of your money in a single stock that you select rather than in lots of stocks or in mutual funds.
1 True
2 False
3 Don't know

Q26 Suppose the chances of someone aged 50 living to age 85 are 60%. What do you think the chances are that this same person will live to age 60?
1 Fewer than 60%
2 More than 60%
3 Don't know

Q27 Which of the following statements comes closest to describing the amount of financial risk that you are willing to take when you save or make investments?
1 I am willing to take substantial financial risks expecting to earn substantial returns
2 I am willing to take above average financial risks expecting to earn above average returns
3 I am willing to take average financial risks expecting to earn average returns
4 I am willing to take under average financial risks expecting to earn under average returns

IF PROV = QC
    Q28 In 2016, what is the average monthly cost of staying in a private, unsubsidized long-term care home (CHSLD) if you are uninsured (for a private room)? This would include the cost of room and board as well as that of all personal and nursing care.
    Numeric
    9999999 Don't know
    IF Q27==9999999
        Q27a Is it more than $3,000? 1 Yes 2 No 8888888 Refuse to answer
        IF Q27a==1
            Q27b Is it less than $5,000? 1 Yes 2 No 8888888 Refuse to answer
        ELSE IF Q27a==2
            Q27c Is it more than $1,000? 1 Yes 2 No 8888888 Refuse to answer
        END IF
    END IF
END IF

TEXT

IF PROV = QC: $HOME = subsidized long-term care homes (CHSLD)
IF PROV = ON: $HOME = long-term care homes

Q29 Are [$HOME] free to the user?
1 Yes

2 No
IF Q29==2
Q29a In 2016, what is the monthly fee that you think you would have to pay in [$HOME] for a private room?
Numeric
9999999 Don't know
Q29b Is there a reduced user contribution if you have low personal resources (income and assets)?
1 Yes
2 No
Q29c If you receive benefits from a long-term care insurance, how does that affect the user contribution you have to pay in [$HOME] if you have low personal resources?
1 It increases my fee
2 It decreases my fee
3 It does not affect my fee
4 Don't know
END IF

Q30 Is there a waiting period to obtain a room in a [$HOME]?
1 Yes
2 No
IF Q30==1
Q30a On average, how many months do you think the wait is in your province?
Numeric (>0)
9999 Don't know
END IF

Q31 If you purchase a long-term care insurance policy and you stop paying premiums after having paid them for several years, do you generally get reimbursed for what you already paid?
1 Yes
2 No
3 Don't know

Section 5: Preferences for Insurance Products

We are going to show you some simple insurance policies and ask you to rate those. You can assume that if you were to have two or more limitations in activities of daily living, the insurance company offering you this product would pay the benefits no matter what the circumstances. Once you receive benefits, you do not pay any premiums.

Each product has three attributes:
a) a monthly premium you have to pay;
b) a monthly benefit if you have 2 or more limitations in activities of daily living, starting 3 months after your limitations have been verified; and
c) a payout to your survivors if you die before age 85.

Assume that if you are healthy and you stop paying premiums for 3 consecutive months, the contract is cancelled and you lose coverage.

The premium cannot increase once you have purchased the product. Finally, the benefits are adjusted for inflation (indexed).

*****

Randomization scheme

Parameters:

Benefit_ltc = [2000,3000,4000] with probability [0.33,0.33,0.33]
Benefit_life = [0,10000,25000] with probability [0.6,0.2,0.2]

With these benefits we will provide EPremium (3 x 3 = 9 data points; see table attached) which is the fair premium by age and sex.

The premium for the contract is given by (please round to nearest dollar):
prem = EPremium * Load where Load [0,6,0.8,1.0,1.2,1.4] with probability [0.2,0.2,0.2,0.2,0.2]

Randomize both Benefits and Load independently (9 x 5 possibilities) for 5 plans (each respondent gets 5 draws of Benefit_ltc, Benefit_life and Load).

Present each plan following…

Example:
[Scenario]

While healthy…	*Once you have at least 2 limitations in your activities of daily living…*	*When you pass away…*
You pay $[prem] per month	You receive $[benefit_ltc] per month	Your survivors will receive $[benefit_life] once

*****

Q32-36

[Scenario]

What are the chances, 0% meaning no chance and 100% for sure, that you would purchase the policy if it were offered to you by a trusted insurance company?

Numeric (0-100)

B Lapsing

We use data from the Long Term Care Intercompany Experience Study 2000-2011 from the Society of Actuaries to compute annual lapsing probabilities. This study gathers information on lapsing from 22 insurance companies. Lapsing can occur due to death or other reasons. Given the definition we use in the paper, we want the probability of lapsing conditional on survival. We use definition 2 of voluntary lapsing, which excludes companies where more than 25% of terminations were of unknown cause. In the table below we report estimates of the lapsing probability by age and gender. Because there is no clear pattern with age and differences by gender are small, we use a uniform probability of lapsing of 1.8%.

Age	Females	Males
<50	0.056	0.070
50-59	0.023	0.025
60-69	0.013	0.015
70-79	0.011	0.011
80+	0.027	0.022
Total	0,018	0,018

Table B.1: Lapsing probabilities by age and gender. Source: Society of Actuaries Long-Term Care Intercompany Experience Study