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Drivers of individuals' Term Life Insurance Demand: evidence from a Discrete Choice Experiment*

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Abstract

Insurance contracts can be summarized into two elements: a risk covered by an insurer and a premium paid by a policyholder. In the term life insurance markets, individuals pay a premium (once or at regular basis) covering their death. Insurer secures a certain amount of money that will be paid to beneficiary(ies) in case of death of the policyholder. However, one contract can differ from another in many ways: the level of private information asked to applicants, the presence of riders in the contract or how the claim is paid. Understanding how the demand is influenced by those possibilities and is not straightforward. We tackled this research question through a Discrete Choice Experiment on a sample representative of the French population. It permits to highlight main elements that influence the purchasing decision and associates a Willingness to Pay for each feature of the term life insurance contract at an individual level, studying both socioeconomic and behavioral characteristics. Optimism relative to survival probability, risk toward asset management and altruism stand out as having the most explanatory power of preferences toward term life insurance demand. The study is valuable to insurers who want to gain insights into consumers' life insurance purchase behavior, especially for professionals who are involved in product development and marketing.

Keywords— Term life insurance, Discrete Choice Experiment, Willingness to Pay

JEL Codes— C83, D12, G22

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1 Introduction

Life insurance is a financial instrument designed to provide security and protection to individuals and their families against unforeseen risks and uncertainties. Term life insurance contracts allow policyholders to secure an amount of money for their beneficiary(ies) in case of death in exchange for a monthly premium paid to the insurer. Marketing surveys highlight consumers' needs are evolving (digitalisation of the society, demand for wellness partners and personalized offering¹ for instance). Insurers are exploring innovative ways to address those changing needs. The whole life-cycle of the insurance product is reviewed, from the underwriting process to the payment of the claim, including the integration of optional preventive measures and riders into their offering. Hence, in addition to the "classic" indemnity, insurance contracts more and more offer services and complementary guarantees. In the French market, the number of policies in force raises from 25 million in 2012 to 31 million in 2021, with around 3 million new businesses each year (France Assureurs (2022)). This trend is stable from 2017 to 2021. Without more granular figures at the industry level, it is difficult to quantify whether consumers' expectations on insurance offering and evolution of term life insurance offerings is actually traduced in a raising insurance demand.

Various elements are at stakes in the life insurance purchasing decision. In their systematic review, Bhatia et al. (2021) retain 76 articles that emphasis life insurance purchase. Demand of life insurance is studied both with macro (Outreville (2012)) and microeconomic variables (Zietz (2003)). Authors focusing on macro-level explanatory variables have established a link between life insurance consumption and economic indicators such as human development index, gross domestic product (Mitra (2016), Emamgholipour et al. (2017)), unemployment rate (Emamgholipour et al. (2017)) and financial sector development (Nguyen et al. (2007)). Household income is also positively correlated with life insurance purchase (Nguyen et al. (2007)). Moving scale to microeconomic level, authors showed relationship between individual demographic (Chen et al. (2001)) as well as household (Luciano et al. (2016), Wang (2019)) characteristics and life insurance demand. Overall, a positive but non-linear relationship exists between age and life insurance demand. Demand for cover is also increasing with education and financial literacy levels. These relations hold at both individual and household level. Depending on data specificity, authors found both positive (Wang (2019)) and negative (Eisenhauer & Halek (1999)) relationships between number of children and life insurance demand. Services provided by supply-side such as quality of third parties' advises (Chow-Chua & Lim (2000)), ease of underwriting process through technology (Nagy et al. (2019)) and performance of companies (Tan et al. (2009)) are also key in purchasing decision because they provide more benefits for consumers. Reputation of insurance providers impact positively individuals' decision to insure (Omar & Owusu-Frimpong (2007), Braun et al. (2016)). Behavioral indicators such

¹See for instance Capgemini's Voice of the Customer Survey series.

as emotions and optimism (Lucarelli et al. (2014)), risk attitudes (Eisenhauer & Halek (1999), Nagy et al. (2019)) and time preferences (Kakar & Shukla (2010)) affect insurance demand. Coe et al. (2016) and Mouminoux et al. (2018) provide evidence that behavioral biases such as status quo, money illusion, mental accounting, anchoring, signaling, loss aversion and obfuscation influence as well insurance demand. Note also that life insurance differ from other insurance markets as the theoretical evidence of adverse selection in insurance market (Rothschild & Stiglitz (1976)) is in majority not confirmed by empirical studies (Cawley & Philipson (1999), Harris & Yelowitz (2014), Hedengren & Stratmann (2016))², mainly explained by the high presence of price discrimination in this market.

To study life insurance contracts as a composition of an indemnity and other elements valued by consumers, the economic and management literature often leveraged on Discrete Choice Experiments. Based on Random Utility Theory (McFadden (1973)), it allows estimating how people value different attributes of a good or service and how much they are willing to pay for it. This method has been widely used to elicit values in a number of areas, including health, transport, agricultural and environmental economics for "multidimensional" products (Louviere et al. (2010)). Most of the DCE on life insurance products are focusing on health insurance (Kerssens & Groenewegen (2005), van den Berg et al. (2008), Leukert-Becker & Zweifel (2008), Zweifel et al. (2010)), in particular in market areas where there is an overall under-covered population (Nanna (2011), Obse et al. (2016), Ozawa et al. (2016), Kazemi karyani et al. (2019), Chen et al. (2022))³. Results have all in common to highlight the main importance of price during the purchasing decisions. Other products of the life insurance sector were also studied with DCE. Demand for long-term care insurance is assessed, as a benefit of a health insurance plan (Kazemi karyani et al. (2019)) or as a specific insurance product (Brau & Lippi Bruni (2008), Worawan & Wasi (2020), Akaichi et al. (2020)). Results have all in common to highlight the main importance of price during the purchasing decisions. Main relevant attributes selected by authors for the design of DCE on insurance are distribution channel, insurance provider (public or private and well-known brand or not), underwriting process, rider, deductible for prevention, reimbursement ratio and level of coverage. To the best of our knowledge, Braun et al. (2016) are the first studying term life insurance demand with Choice-based Conjoint analysis (CBC). They defined term assured, sales channel, underwriting process (basically time consumption of prospects), insurer brand name (well-known, lesser known and well-known but not from the insurance sector) and critical illness rider as attributes of their experiment. The design allows premium levels to be based on participants' age and smoking status. DCE are performed through a survey which permit to gather other information on participants. Individuals' characteristics explaining preferences for specific

²In contrast, He (2009) found adverse selection in the US life insurance market and Pauly et al. (2003) found no clear evidence.

³Note that the Property & Casualty (P&C) sector has also been studied (Sherrick et al. (2003), Brouwer et al. (2014), Kwofie et al. (2018), Doherty et al. (2021), Shee et al. (2021), Frimpong et al. (2022)). It is quite different as, contrary to life insurance, P&C insurance policies don't have designated beneficiaries.

attributes are mainly demographics (gender, age, educational level, income) and health related (self-assessment and linked to smoking habits (Zweifel et al. (2010)). Importance of risk attitudes in attributes preferences are assessed by Akaichi et al. (2020).

In this research, our focus lies in exploring the multifaceted elements that contribute to individuals' purchasing decisions of term life insurance policies, moving beyond the sole consideration of a claim payment. While claim payment is undoubtedly a crucial factor, we assume that additional aspects play significant roles in shaping consumers' choices and test them through a DCE. The rest of the article is organized as follows. The DCE methodology is briefly presented before describing the selection of attributes and their assumed impact on term life insurance demand. Results are then described, highlighting homogeneity and heterogeneity among the population before concluding.

2 Methodology and Design

A DCE is based on assumptions derived from consumer economic theory (Lancaster (1966)). This theory assumes that consumers view a good they're thinking about purchasing as a bundle of different attributes (or characteristics) and that the consumer's ultimate choice is guided by the value she places on each attribute relative to the other attributes. In Lancaster's model, the consumer has preferences that can be represented by a utility function. Preferences and utility levels are defined in terms of characteristics of purchased goods and services. A utility function in Lancaster's framework can be defined as follows for M characteristics and N goods:

$$U = f(c_{11}, c_{12}, \dots, c_{1N}, c_{21}, \dots, c_{MN}) \quad (1)$$

with c_{ij} the amount of the i^{th} ($i \in [1, M]$) characteristic contained in one unit of the j^{th} ($j \in [1, N]$) purchased good. To estimate the value that a consumer associates with an attribute of a product, and with a given level of this attribute, the method consists of presenting each individual with different hypothetical scenarios, each scenario being described by attributes with a particular level associated with it. The individual must choose the scenario she prefers. The repetition of these 'choice tests' makes it possible to estimate the utilities associated with a product (a scenario), the impact of each attribute on utility or the marginal substitution rates between attributes (Berchi & Launoy (2007)).

The implementation of a DCE follows three steps: (1) Identification of relevant attributes and levels that characterize the considered good or service; (2) Identification of a suitable design to elicit preferences for the attributes independently and possibly estimate interactions between attributes and (3) Determining the study population and collecting data.

2.1 DCE design

The selection of attributes and levels for life insurance contract was based on two complementary stages: the literature review on DCE related to term life insurance contracts (see Introduction section) and exchanges with professionals from SCOR (reinsurer). We identified six life insurance attributes to include in the hypothetical term life insurance policies (Table 1): benefit payment method, requested health information during the underwriting process, type of prevention program, additional benefits, survivors' benefits and the monthly premium. It allows to test the appetite of participants for new features of a contract without risking for a commercial failure (consumers are not willing to pay for a new feature available - for instance prevention program). The experiment is also a way to avoid a technical failure, i.e. underestimation of risk at the underwriting stage compared to actual risk in force. We can think about a scenario where consumers purchase a contract with a new additional benefit that leads to excessive claim amount.

Table 1: Attributes and levels of the DCE

Attribute	Description	Levels
Benefit payment method	Specifies how benefits are paid	Lump sum: the beneficiary receives a single payment (€100,000) at the time of death
		Income: the beneficiary receives a payment of €10,000 plus interest each year following the death for 10 years
		No information
Health information	Indicates the health information that is requested when subscribing to the contract	Declarative questionnaire: You must give information about your state of health, your family history, your chronic conditions and diseases, your consumption behaviors (tobacco, alcohol, ...)
		Medical examinations and medical tests: You need to do blood tests, urine tests and an electrocardiogram
		No prevention program
Prevention program	Specifies the type of prevention program included in the contract	Annual medical check-up: offered every year for the duration of the contract
		Personalized prevention program: This program is accessible through a health and wellness application that offers personalized information and recommendations
		No additional benefits
Additional benefits	Indicates the additional benefits that you or your beneficiary can receive during the 20 years of the contract	Payment of a daily fee for hospitalization (€50) if you are hospitalized for more than 3 days
		In case of death by accident, payment of an additional €100,000 to the beneficiary. This amount is paid in addition to the amount provided for in the contract
		No benefits
Survivors' benefits	Indicates the additional benefits that you or your beneficiary can receive after the end of the contract (20 years) if you are alive	Reimbursement of 50% of the premiums paid: They are reimbursed to you if you are alive once the 20 years have elapsed
		Financing funeral expenses: €5,000 will be paid to your family at the time of your death to finance the funeral expenses
		€26
Monthly premium	Gives the amount you need to pay to the insurance company every month	€37
		€48

The 6 attributes and their levels would allow 486 unique attribute combinations in a full factorial design. A main-effects D efficient design was generated using the methodology developed by Street & Burgess (2007) to reduce this design to a more pragmatic number of 12 choice scenarios, allowing independent estimation of preference weights. We used the R package called *idefix* (Traets & Vandebroek (2020)). A pairwise choice format with an opt-out was selected. Concretely, one level of each attribute was selected to define a policy and respondents were asked to mark the alternative they prefer the most (i.e. Policy A, Policy B or neither of these policies).

Assumed impact of attributes on term life insurance demand

Claim payment method

Each level of attributes tested comes with the assumption of having an impact on term life insurance demand (add a summary table?). No studies comparing lump sum and income type of claim payment for term life insurance contracts were found. However, other markets, and especially the annuity market, have compared the two "benefit payment method". Research suggests that individuals' preferences for income streams compared to a lump sum payment are influenced by their risk aversion and time preferences⁴. Those two individual indicators are difficult to disentangle (Andreoni & Sprenger (2012)). Risk-averse individuals, concerned about financial uncertainty and seeking to provide stable support to their beneficiaries, may prefer "income" type of payment, even after controlling by gender (Agnew et al. (2008)). The regularity and predictability of income can offer a sense of security in the face of unforeseen events. Cappelletti et al. (2013) showed also the importance of wealth, education and financial literacy in annuity demand. Unger et al. (2022) claim health-consciousness explain also the preference for annuity. On the other hand, individuals with immediate financial needs, higher preference for the present (Bütler & Teppa (2007)), impaired health and more impatient (Cappelletti et al. (2013)) may opt for a "lump sum" payment. This option provides a large upfront sum that can be valuable for addressing pressing financial obligations, such as outstanding debts or immediate needs relative to family or medical expenses (Sinclair & Smetters (2004)). The flexibility to allocate the lump sum according to their specific priorities can be valuable for these individuals. Benartzi et al. (2011) claim although rational choice theory predicts the choice of annuity at retirement should be attractive, it is in practice chosen by few households, due to both behavioral (mental accounting, loss aversion) but most importantly institutional factors (adding default option, framing of the contract). The decision to receive annuity or lump sum is thus also correlated to the default option set when signing the contract (Bütler & Teppa (2007), Brown & Weisbenner (2009)).

⁴This behavioral characteristics can be estimated directly through preference survey (Falk et al. (2022)) or through a proxy such as smoking status (Lusardi et al. (2010))

Health information sharing

The literature on information asymmetry and adverse selection in insurance markets highlights the importance of the attribute "requested health information". In insurance pricing, banning discrimination based on individual characteristics leads to inefficiencies (Crocker & Snow (1986)) even when categorization is costly (Rothschild (2011)). Browne & Kamiya (2012) showed that the "no information" option may be preferred by high risk individuals who fear potential premium increases or coverage denials due to health disclosures. Applicants might avoid revealing health details to maintain lower premiums. Authors take the example of life insurance market for seniors, where high (low) risk purchase policies without (with) underwriting. The "declarative questionnaire" level, in contrast, can strike a balance between privacy and underwriting transparency. Participants might see health questions as an opportunity to share basic information without undergoing extensive medical exams. It can be seen as a reasonable compromise for individuals willing to provide some health details. When high and low risk individuals demand underwriting, the latter's demand for coverage would be greater than the unconditional pooling policy in equilibrium (Browne & Kamiya (2012)). At the other extreme, the "medical examinations and medical tests" option might appeal even more to low-risk individuals, as it proposes the more accurate risk assessment and lower premiums (Browne & Kamiya (2012)). By undergoing medical exams, individuals provide comprehensive health information to insurers, which could lead to more accurate underwriting and potentially better pricing. Though no study were found, we assume health information sharing can also be seen as a time constraint. Hence, time preference might also influence underwriting process choice as the immediate cost of undergoing medical examinations and tests in addition to the wait time for results might outweigh the potential benefits of reduced premiums in the future.

Prevention program

The "no prevention program" option may be chosen by individuals focusing on traditional life insurance coverage without additional features. They might prioritize affordability and simplicity, considering life insurance mainly as a safety net for their beneficiaries. Studies show that preferences for a prevention program are influenced by perceptions of prevention's value, whether it is seen as self-insurance (reducing the size of the loss) or self-protection (reducing the probability of the loss). In the context of an insurance contract covering death, prevention program can be seen only as a self-protection scheme because the size of the loss can't be reduced. Self-protection and insurance can be seen both as complements or substitutes, depending on the size of the loss (Ehrlich & Becker (1972)) or ambiguity aversion (Alary et al. (2013)). Studies have demonstrated preferences for loss prevention are influenced by risk aversion (Briys & Schlesinger (1990)) and health-consciousness. The "free annual medical check-up" level may appeal to those valuing preventive healthcare and early detection. Respondents might see regular check-ups as a proactive measure to manage health risks and detect potential issues early, thereby reducing

the likelihood of premature claims. Additionally, the "personalized prevention program" option could attract health-conscious individuals seeking tailored risk management strategies. They may value the personalized approach that provides them with targeted health information and recommendations based on their individual health profiles.

Additional and survival benefits

Overall, adding a rider in a life insurance policy seems to increase demand (see for instance Braun et al. (2016) with CI rider and Giacalone (2001) with waiver of premium rider). The "payment of daily fee for hospitalization" option could be appealing to individuals concerned about managing healthcare expenses during hospital stays. The added financial support during medical emergencies can enhance the policy's value, providing extra security for policyholders and their families. Moreover, the "double premium in the event of accidental death" rider might attract both risk-averse individuals or those engaged in high-risk activities. This additional benefit can offer an extra layer of financial protection for beneficiaries in specific adverse events, increasing the policy's appeal for those concerned about accidental death scenarios. With this rider, life insurance can be seen both as a risk cover and "a resource for the affirmation of human value" (Mulder (2020)). The "survival benefit" attribute can significantly influence life insurance choices. The "50% premium reimbursement" option may attract individuals seeking a partial premium refund upon surviving the policy term without making a claim. They might view this benefit as a form of financial reward for maintaining the policy without utilizing its benefits. On the other hand, the "€5000 for funeral expenses" rider can be compelling to those who wish to provide dedicated funds to cover funeral costs. This benefit can alleviate the financial burden on the insured's family during a difficult time, making the policy more attractive for those who prioritize supporting their beneficiaries after their passing (Hau (2000)).

Note that behavioral insurance research emphasizes the importance of framing effects in decision-making (Johnson et al. (1993), Burkovskaya et al. (2022)). Hence, the way of presenting riders might also have impact on purchasing decision⁵. Finally, the "no additional benefit" level might attract individuals seeking a simple and cost-effective life insurance policy without added features. They might prioritize affordability and prefer the core coverage without any extras.

Characteristics of the term life insurance contracts proposed tested all come with the assumption of decreasing or raising the insurance demand. For some levels, assumptions can be made on heterogeneity among the population studied. However, it is less straightforward to assume its magnitude in terms of willingness to pay for term life insurance.

⁵The literature on Computer Science has also tackled this issue, see for instance Kong et al. (2022)

2.2 Estimation strategy

2.2.1 Analysis of mean preferences

Following Lancaster (1966) view of products as bundles of attributes, the benefits that individuals derive from the consumption of a product is assumed to be equal to the sum of their benefits for each of the attributes that constitute the product of interest. We set $j \in [1; 12]$ the alternative (or choice scenario) showed to participants, $t \in [1; 12]$ the order of scenario received by participants. Consequently, N individuals' value function (U_{Njt}) that is specific for each j^{th} alternative at the t^{th} choice occasion takes the form:

$$U_{Njt} = \alpha_1 ASC_{Choice} + \alpha_2 ASC_A + \beta_1 Benefitpayment_{2j} + \beta_2 Healthinfo_{2j} + \beta_3 Healthinfo_{3j} + \beta_4 Prevention_{2j} + \beta_5 Prevention_{3j} + \beta_6 AddBenefits_{2j} + \beta_7 AddBenefits_{3j} + \beta_8 SurvivalBenefits_{2j} + \beta_9 SurvivalBenefits_{3j} + \beta_{10} Premium + \epsilon_{Njt} \quad (2)$$

ASC_{Choice} is a generic intercept entering the utility function for the choosing contract A or B alternative with α_1 being the associated coefficient representing the tendency to choose the contact A or B rather the no choice option. ASC_A is an alternative specific shift dummy entering only the utility function of alternative A, with α_2 being the associated coefficient representing the tendency to choose the alternative A. Attributes' levels are dummy variables displayed in a scenario j with $\beta_1 \dots \beta_{10}$ the coefficients associated with each attribute level. To avoid multicollinearity, one level of each attributes is omitted in the estimation except for Monthly Premium that is coded as a continuous variable. The omitted levels is "Capital (or Lump sum)" for the "Benefit payment" attribute. "No health information", "No prevention program", "No additional benefit" "No survivor's benefit" correspond respectively to the attributes "Health information", "Prevention program", "Additional benefit" "Survivor's benefit" and were set as baseline levels. Thus, the estimated parameters represent respondents' demand response to the included levels with respect to the baseline levels. ϵ_{Njt} is the random component that is assumed to be independent and identically distributed.

Equation 2 is estimated through Conditional Logit (CL) model (McFadden (1973)). This model has the advantage to be estimated quickly. It permits also to obtain results for the whole population and by sub-groups. However, its assumptions (i.e., homogeneity of respondents' preferences and the alternatives included in any choice set are treated by respondents as independent - Independence of Irrelevant Alternatives (IIA)) were viewed as unrealistic and found to generally not hold (Hensher et al. (2015)).

2.2.2 Analysis of preferences heterogeneity

Random Parameter Logit (RPL) or Mixed Logit model (Train (1998), McFadden & Train (2000)) allows individuals' preferences to be heterogeneous and the IIA assumption to be relaxed. In the RPL, at least some of the parameters are specified as random. Utility U_{ijt}

of an individual $i \in [1; N]$ from an alternative j in a choice set t is described as a sum of an observed component $\beta_i' X_{ijt}$ and an unobserved stochastic term ϵ_{ijt} :

$$U_{ijt} = B_i' X_{ijt} + \epsilon_{ijt} \quad (3)$$

where ϵ_{ijt} is assumed to be independently and identically distributed (IID) type-I extreme value. B_i is a vector of individual specific parameters associated with the observable variables (levels of attributes) and includes the alternative specific constants ASC_{Choice} and ASC_A . The coefficient vector B_i varies across the N individuals in the population with density $(B|\theta)$, where θ is a vector of the true parameter of the distribution.

Equation 3 is estimated through Mixed Multinomial Logit model using 500 Halton draws where all coefficients are assumed following a normal distribution. Though particularly computationally intensive, this model is known to be most flexible one (Hess & Train (2017)). In particular it allows accounting for scale heterogeneity, i. e., various degrees of consistency of decisions across respondents.

As Premium is an attribute of the DCE, we can compute Willingness To Pay (WTP) for an attributes' level change in a policy. WTP can be derived from preference model if the cost attribute (Premium) is assumed continuous, computing a ratio between a non-cost attribute's level and the cost attribute (Louviere et al. (2000)). However, Train & Weeks (2005) argue WTP derived from preference models provide large variance compared with WTP obtained through estimation in WTP space. Moreover, RPL model implies an implicit assumption that all participants make the trade-offs between attributes (Sicsic et al. (2018)). This assumption can be misleading as respondents may weigh attributes differently depending on both observed and unobserved characteristics. We investigated the distribution of attributes trade-offs on the basis of individual WTP estimates. We used the Generalized Multinomial Logit model (GMNL) framework using a parameterization in WTP space allowing direct estimation of WTP parameters' distribution (Greene & Hensher (2010)). This model accounts for scale heterogeneity that is especially relevant for stated preference data, where respondents can pay attention and interpret choice situations differently. Note that to test consistency of results, estimations are run both with Stata 15 (Hole (2015)) and R (Helveston (2023)) software.

Finally, GMNL in WTP space model permits to estimate through linear regressions individuals' WTP of different attributes' levels as a function of individual characteristics gathered during the survey⁶.

⁶Note that Seemingly Unrelated Regressions Zellner (1962) were estimated but provided similar results. Thus, simple linear regressions are reported in the analysis.

2.3 Data collection

Participants to DCE are mainly representative of the population where the insurance product is sold. Braun et al. (2016) have recruited individuals who identified themselves as "insurance decision makers". In this case, results don't consider under-covered populations and don't allow comparison between decision makers and others as in Kazemi karyani et al. (2019)

The questionnaire was administered online between 8/27/2021 and 11/22/2021 by a survey company (Odity) on a sample of French population aged between 25 and 75 years. The questionnaire of the survey was in French. The questionnaire is organized in three parts. The first part corresponds to socioeconomic characteristics used by the survey company for the quotas. The second part is the DCE. The last part collects additional information on socioeconomic variables, insurance contracts subscription, risk and time preferences, altruism, health conditions. After data collection, we linked for each individual their survival probability at 75 and 85 years old based on INSEE mortality tables⁷. It considers age, gender and income and permits to compute optimism indicator relative with health, comparing self-perceived survival probability of participants with their actual survival probability. To ensure a good quality of responses, a minimum time of completion of the survey has been fixed to five minutes. Before launching the survey, a pretest pilot survey was conducted among 91 individuals to check the respondents' understanding of the attributes and their levels as well as the questionnaire in general.

3 Empirical results

We study empirical results with the following steps. In (3.1) we describe the sample studied, highlighting its similarities with the French population and the distribution of their characteristics of interest. We check our assumptions at a population level (3.3) and by subgroup (3.3) before analysing heterogeneity of WTP (3.4).

3.1 Description of the sample studied

Characteristics of the sample are described in Appendix (A). It follows the French general population characteristics in term of age (average age of 49 years-old), gender (51% of women) and area of residence (concentration of the population in Parisian basin - 17% and Ile de France region - 18%).

Our sample can be equally divided in terms of education (49% have lower/upper secondary education as highest degree and 51% have at least a short-cycle tertiary diploma). There is a high variability of monthly household income in the sample: 20% (23%) earn less (more) than 1500 (3500) euros (after tax) per month. 10% declared having not any life insurance

⁷See INSEE website.

policy⁸. This figure is inconsistent with public figures as 95% of the French population have a health insurance⁹. Thus, this variable is used as proxy of insurance literacy because individuals who declared not having an insurance policy have probably never read their insurance contract of never underwritten one. 69% of the sample have at least one child and 66% is married or live in couple. The latter would have probably defined their child or spouse as their beneficiary of the term life insurance contract and is thus used as a proxy of bequest motives. 28% have declared having an acceptable, bad or very bad health, 24% have or had a medical treatment in the past five years. A third of the population have smoked during the last 24 months. This indicator will be tested both as a health and a preference over time indicator (Lusardi et al. (2010)).

Behavioral indicators were also elicited during the survey. Time preference of participants is defined following Andreoni & Sprenger (2012) (score impatience). To elicit risk preference, a lottery choice (50% of the sample choose the safe lottery) and self-declaration (Dohmen et al. (2009)) were asked permitting to assess risk preference in general and in the wealth and health domain. Health consciousness is assessed by comparing declared survival probability to leave above 75 and 85 years-old with the actual survival probability based on mortality table (source: INSEE). Individuals are considered as optimistic if their declared survival probability is equal or greater than the one based on mortality table. Altruism indicator is finally defined based on willingness to give to charity.

3.2 Mean preferences among French population

Mean preferences of our sample are provided with both CL and RPL estimations in Table 2. This section permit to define which attributes' level should be analyzed at a more granular basis. Overall, the two models provide quite similar coefficients in terms of sign and statistical significance. Akaike (AIC) and Schwartz (BIC) criteria define RPL as the best model, showing that the population has some degree of heterogeneity on term life insurance preferences.

The coefficient associated with ASC_{Choice} is positive and significant, showing that respondents had a propensity to choose a contract. There is no significant propensity to choose policy A as compared with policy B, indicating that respondents were effectively trading between the two policies (ASC_A). Results indicate that respondents have on average a higher preference for contracts with a claim payment as capital rather than income. Concerning health information, compared to requesting no information, there is no positive or negative significant effect of asking to complete a questionnaire. Heterogeneity of the population, with a share of population willing to share health information and the other not willing to might explain this result. Another explanation might be the habit individ-

⁸In the survey, this question takes into account any type of life insurance contract, including health, mortgage and long term care insurance

⁹Source: DRESS

Table 2: Estimated consumers' preferences

	Clogit	Mixed logit	Mixed logit sd
Intercept			
ASC _{Choice}	1.417 *** (0.105)	4.964 *** (0.293)	-4.221 *** (0.215)
ASC _A	0.009 (0.058)	-0.079 (0.117)	-1.011 *** (0.058)
Benefit payment (Reference: Capital)			
Income	-0.1 *** (0.019)	-0.161 *** (0.035)	0.537 *** (0.03)
Health information (Reference: No information)			
Declarative questionnaire	0.02 (0.015)	0.025 (0.025)	0.076 (0.093)
Medical examinations and medical tests	-0.13 *** (0.018)	-0.217 *** (0.034)	0.352 *** (0.042)
Prevention program (Reference: No prevention program)			
Annual medical check-up	0.067 *** (0.015)	0.103 *** (0.025)	0.2 *** (0.044)
Personalized prevention program	-0.036 . (0.021)	-0.023 (0.04)	0.031 (0.055)
Additional Benefits (Reference: No additional benefits)			
Payment of a daily fee for hospitalization	0.005 (0.016)	0.032 (0.029)	-0.04 (0.084)
Additional €100,000 in case of accident	0.21 *** (0.034)	0.288 *** (0.07)	-0.391 *** (0.048)
Survivors' Benefits (Reference: No survivors' benefits)			
Reimbursement of 50% of the premiums	0.103 *** (0.019)	0.145 *** (0.034)	-0.329 *** (0.037)
Financing funeral expenses	0.197 *** (0.023)	0.332 *** (0.048)	0.3 *** (0.046)
Monthly premium	-0.025 *** (0.002)	-0.056 *** (0.004)	-0.081 *** (0.004)
Number of observations	32400	32400	
Number of clusters	900	900	
AIC	22193.281	16173.547	
BIC	22280.728	16348.442	

Note:

*** p<.001, ** p<.01, * p<.05, . p<.1. Standards deviation are in parentheses.

RPL with 500 Halton draws.

uals have to respond to a questionnaire in underwriting, as asking no information is very unlikely in the term life insurance market. Requiring medical tests has overall a negative effect on utility. Added to the distinction between low and high risk individuals, some low risk might also be reluctant to spend time in medical exams. Proposing prevention program with annual medical check-up has a positive effect on utility. It seems to be seen as complement to death cover by participants. The personalized prevention program is not significant. Except for payment for a daily fee for hospitalization, additional benefits have a significant positive effect on utility compared to proposing no additional benefit. As expected, monthly premium has a negative effect on utility. Daily hospitalization fee might not be valued by the French population as majority of medical expenses are covered by the social security system.

Except for the personalized prevention program, declarative questionnaire and hospitalization fee levels, coefficients of standard deviation are significant thus indicate heterogeneity in preferences. The source of heterogeneity is investigated for other levels in next sections. A sensitivity analysis is performed by modifying the choice response. To do so, we used an additional question asking after each choice, the intention to purchase the policy of participants if such a product were available. We considered that a choice between option

A or B policy was made if respondents indicated being "very likely" or "likely" to purchase the contract if available.

3.3 Mean preferences by sub-groups

Main differences between subgroups in terms of levels preferences are reported in this section, based on CL estimations and Wald tests to compare coefficients. All tables can be found in Supplementary materials. Compared to women, men have a higher propensity to choose a policy. Gender is correlated with financial literacy (Lusardi & Mitchell (2008)) which might explain this difference. Medical tests have a significantly higher negative effect on utility for women. Except for hospitalization, additional benefit have a higher positive effect on utility for women compared to men.

All age groups have a higher preference for capital payment rather than income. Compared to the [25-45] years old, the preference for capital is significantly higher for the oldest. It might be explained by the correlation between age and health. Concerning health information, the negative effect on utility of medical tests is significantly higher for the oldest compared to [25-45] age group. Looking at prevention program, for all age groups annual check-up have a positive effect on utility but this positive effect is significantly higher for the youngest.

Respondents in good health have a higher propensity to choose a policy compared to individuals in bad health. This result is in line with most empirical studies that claim for advantageous selection rather than adverse selection in life insurance market (Hedengren & Stratmann (2016)). During the underwriting process, individuals in good health (perceived) seems to agree more to share health information, which confirms the hypothesis on health and information sharing. Indeed, responding to the declarative questionnaire provides positive utility (10% significance level). However, taking medical examinations and tests provides negative utility (though less than for individuals who have declared having an acceptable, bad or very bad health). It seems that time costs out-weight reduced premium. Individuals in good health show also higher utility for the prevention program. The latter might be more health-conscious.

We test the hypothesis of increased demand for loss prevention with health-consciousness by splitting the sample on their optimism toward survival probability. Optimist (above 75 year-old) individuals have a higher utility associated with annual medical check-up¹⁰.

Splits by risk preference with the lottery measurement does not show significant differences between participants who have chosen the certain lottery and others. The assumptions of income preferences over lump sum linked with financial literacy (defined as having

¹⁰The difference is not statistically significant for survival optimism above 85 years-old variable but results show the same direction.

declared being insured or not) or education level are not confirmed by empirical results. The preference for present (defined with smoking status) is also not traduced with higher preference for lump sum type of payment. Splitting the population whether they have at least one child or not, we found the only difference concern price sensitivity: parents are less sensitive to price. However, the assumption of a link between bequest motives (considering whether participants are parents and/or in a relationship) and higher preference for riders has to be justified.

3.4 Individual characteristics & willingness to pay

Table 3 presents the estimated willingness to pay for each attribute, providing a direct monetary value and facilitating a comparison between attribute levels. Respondents would need a monthly premium reduction of approximately 5 euros to choose a contract with income payments rather than lump sum payment. Additionally, they are willing to accept medical examination tests included in the underwriting process for a reduction of 5.7 euros of the monthly premium. Notably, respondents indicate a willingness to pay of 1.6 euros to the total monthly premium for policies offering annual medical checkups, 3 euros for policies providing an additional €100,000 in case of accidental death, and 2 euros for policies offering a 50% premium reimbursement. The attribute that stands out as significantly more valued by respondents is the option to finance funeral expenses in case of survival, with an increased willingness to pay of 8.5 euros to the total monthly premium.

Table 3: Estimated individual willingness to pay

	Mixed logit WTP	Mixed logit sd
Benefit payment (Reference: Capital)		
Income	-4.799***	(-6.76)
Health information (Reference: No information)		
Declarative questionnaire	0.919*	(1.83)
Medical examinations and medical tests	-5.716***	(-8.99)
Prevention program (Reference: No prevention program)		
Annual medical check-up	1.662***	(3.28)
Personalized prevention program	-0.00124	(-0.00)
Additional Benefits (Reference: No additional benefits)		
Payment of a daily fee for hospitalization	1.329**	(2.29)
Additional €100,000 in case of accident	3.115*	(1.80)
Survivors' Benefits (Reference: No survivors' benefits)		
Reimbursement of 50% of the premiums	2.073**	(2.42)
Financing funeral expenses	8.449***	(9.51)
Monthly premium	-3.169***	(-44.73)
N	32400	
AIC	16704.2	
BIC	16905.400000000001	

Note:

*** $p < .001$, ** $p < .01$, * $p < .05$, . $p < .1$. Standards deviation are in parentheses.

RPL with 500 Halton draws.

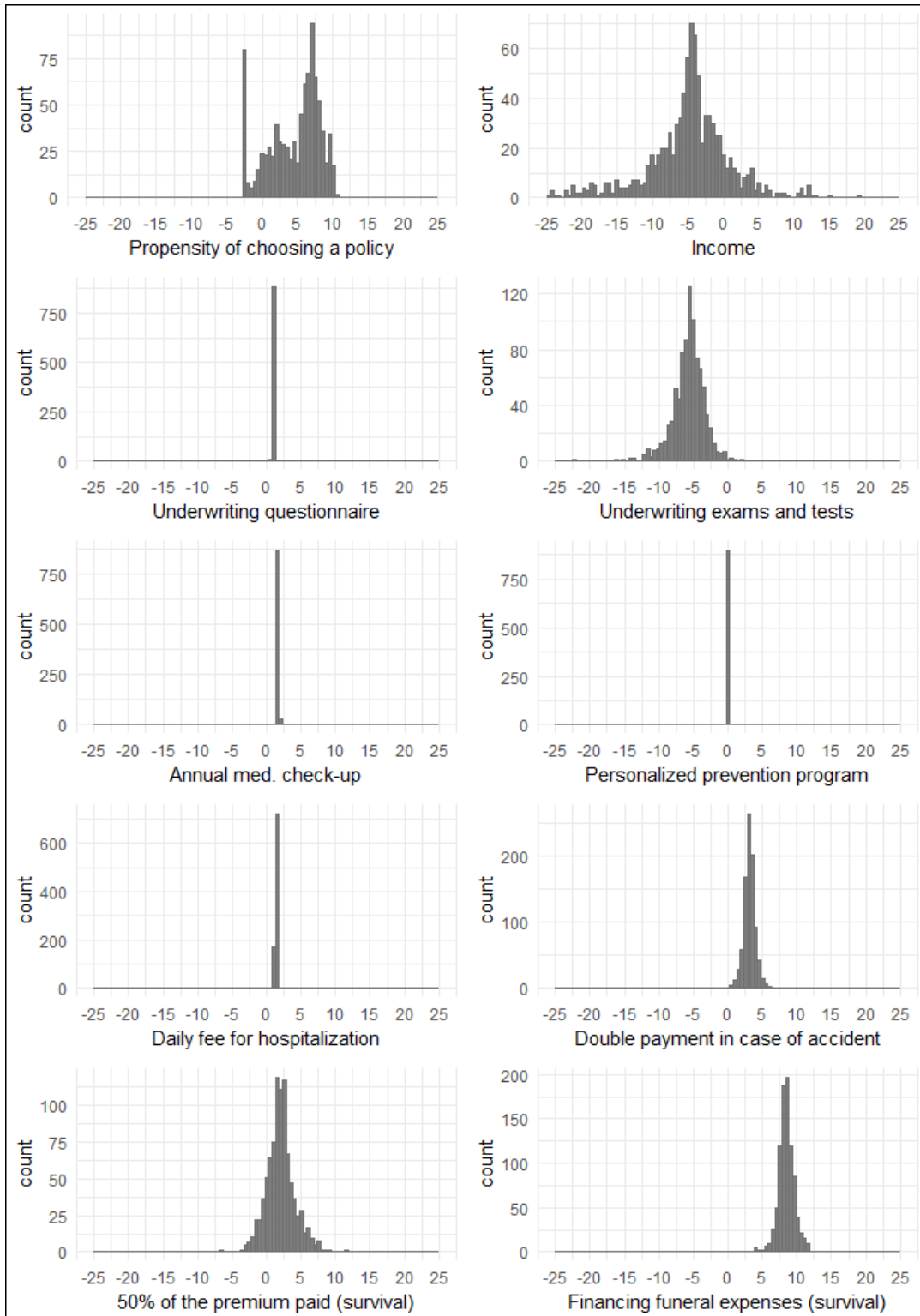


Figure 1: Individual willingness to pay by attributes' level

Propensity of choosing a policy

Figure 1 shows the empirical distribution of $\alpha_{2,n}$ for ASCchoice. Cumulative distribution function is reported in Appendix (Figure 2). It measures the propensity of choosing a contract. $\alpha_{2,n}$ is estimated from the RPL model (Equation 3) for general population. The distribution of $\alpha_{2,n}$ seems heterogeneous with a minimum around -5 and a maximum of 10. 14% of respondents do not want a life insurance contract ($\alpha_{2,n} < 0$). Hence, a majority of respondents (86%) are willing to pay for a life insurance contract ($\alpha_{2,n} > 0$). Determinants of the propensity to choose a contract are estimated Table 6. We consider the propensity to choose a contract as a binary variable (1 = propensity to choose a contract $\alpha_{2,n} > 0$; 0 = propensity to choose a contract $\alpha_{2,n} \leq 0$). Compared to literature, we didn't find positive but non-linear relationship between age and life insurance demand (Luciano et al. (2016)). Having children increases the probability of choosing a contract, in line with findings on bequest motives (Bernheim (1991)). Compared to individuals in very good health, individuals with poorer health have a lower probability to choose a contract. This result differ from general theory on insurance demand but is consistent with the majority of empirical findings on life insurance demand (Cawley & Philipson (1999), Pauly et al. (2003), Harris & Yelowitz (2014), Hedengren & Stratmann (2016)). Looking at personal traits, being concerned about future have a positive effect on the probability to choose a contract. We didn't find relationship between risk preference and term life insurance demand. Having less financial literacy, as a proxy of declaring having or not an insurance contract, has a negative relationship with propensity to choose a contract. However, our hypothesis can't be justified as this result is not significant.

Term life insurance's characteristics impact on WTP

Figures 1 and 2 show little heterogeneity among individual preferences relative to underwriting questionnaire, annual medical check-up, personalized prevention program and daily fee hospitalization. WTP when a declarative questionnaire is included at application stage are very low with positive values. Interestingly individuals do not expect to pay less and in fact will pay a slightly higher premium (ranging 40 cents to €1.40) when a declarative questionnaire is included compared to when no health information is requested at the application stage. Individuals WTP for medical check-up is positive for all respondents and very similar across individuals with a ranging from €1.40 to €1.90 and a median value of 1.6. Individuals are willing to pay an incremental of 1.6 euros for this benefit. There is no heterogeneity in the valuation of this attribute level. Individuals WTP are very low for personalized prevention program ranging from a very small negative to a very small positive value showing there is no appetite to pay for this type of program. Distributions of individuals WTP for prevention level indicate a very small range. Individuals WTP for the payment of fees for hospitalization is positive for all respondents and very similar across individuals with a ranging from €0.55 to €1.70 and a median value of 1.3. Other coefficients show more variability. They are following a normal distribution. We estimate Probit

models to better understand determinants of WTP values. We use cumulative distribution functions (Figure 2) to define the thresholds to apply in order to estimate preferences. All results are reported in Table 6.

The mean value of WTP for income instead of lump sum is -4 euros. We distinguish two types of respondents: those who prefer income payment (with a positive WTP) and those who prefer lump sum payment (with a negative WTP). 20% of respondents prefer income payment method. They have a positive WTP which is positive with a maximum of 26 euros and an average value of 3 euros. On average these individuals are willing to pay an additional of 3 euros to have a policy with income payment. Most of respondents (80%) do not prefer income payment. They are willing to have a monthly reduction of the premium on average 6 euros if the income payment is proposed in the policy. Having children increase the predicted probability of preferring income rather than lump sum payment. Individuals who have chosen one of the risky lottery have a higher preference for income benefit payment. It is inconsistent with results from (Agnew et al. (2008)). Individuals who are optimistic about their survival probability above 85 years-old prefer significantly income benefit payment. It confirm results on health-consciousness (Unger et al. (2022))

When the application stage includes medical tests, the individual WTP are negative for almost all respondents with a mean of -5.15 euros indicating individuals expect a premium reduction when the application process is more invasive. For 63.5% of individuals, this negative WTP is very important: they want a reduction of over 5 euros for the monthly premium if a policy with medical tests is proposed rather than no collection of health information. We investigate the determinants of the distaste for health information with medical tests. We estimate a Probit model with a binary variable equals 1 if the respondent has a very low WTP for medical tests ($WTP < -5$) and 0 if the respondent have a $WTP \geq -5$. The willingness to share medical information through exams and test is increasing but non-linear. It seems that individual young individuals don't want to share information, then middle-aged agree to share and finally elders disagree to share health information through invasive exams. Retired have lower negative utility for this kind of underwriting process, maybe because of time constraints. Those results shed light on the importance given to time by individuals in underwriting. Among other demographic and behavioral indicators gathered, we do not observe any significant variable explaining this heterogeneity. Our hypothesis of heterogeneity with respect to health and time preference is not conclusive.

Concerning additional payment in case of accident, all respondents are willing to pay an incremental amount of the premium. On average, respondents are willing to pay 3 euros for having additional payment in case of accident. There is heterogeneity in the WTP for having additional payment in case of accident. Nearly 12% of the respondents have WTP comprise between to 4 and 8 euros. We investigate the determinants of the high valuation of the attribute payment in case of accident with a Probit model and transform WTP to

a binary variable equals 1 if the respondent has a high WTP for the payment in case of accident ($WTP > 3$) and 0 otherwise. Heterogeneity among participants is observed on risk attitude toward wealth. The more risk lover toward asset management, the less likely to prefer accidental benefit.

The individuals WTP values of survivors' benefits are for the two level normally distributed. Most of participants are willing to pay higher premium for these benefit types. The individual WTP for premium reimbursement benefit has a range from -€5 to +€10 with an average of €2. This results indicate the presence of heterogeneity in WTP to pay for benefiting the 50% reimbursement of the premium in a policy. 14% are willing to pay an incremental of €4 of the monthly premium for having this policy. The individual WTP for funeral expenses is positive for all participants. They are willing to pay on average an incremental of nearly 8,5 euros for benefiting of this attribute level. There is an heterogeneity in the valuation of this attribute, the range of the distribution is from 3.5€ to 15.3€. 10% of the respondents have a higher valuation of this attribute level: in addition to the monthly premium they are willing to pay an additional 9 euros and more for benefiting funeral expenses in the policy. Individuals who are risk lover about wealth have a lower probability of having a high valuation of funeral expenses survival benefits. Altruistic individuals have also a higher WTP for this rider. This result confirm our hypothesis on altruism and additional benefits.

4 Conclusion

In this article, we investigated the term life insurance demand and explore the potential effects of various attributes on individual preferences. The main objective was to understand whether this contract is only seen as a cover for a death risk or if other attributes are influencing demand, namely underwriting process, presence of riders and how the claim is paid. To tackle this objective, we employed a Discrete Choice Experiment. The DCE allowed us to test different attributes on a sample representative of the French population, including benefit payment method, health information sharing, prevention programs, additional and survival benefits, while capturing respondents' willingness to pay.

Our main results reveal valuable insights into the factors influencing term life insurance demand. For the attribute of benefit payment method, respondents were willing to pay nearly 5 more euros per month for income payments over lump sum payments. It is even higher for parents and health-conscious participants. Regarding health information sharing, the introduction of medical examination tests resulted in a 1 euro monthly premium increase. No heterogeneity among individuals have been found. It seems everybody agree to respond to some degree of questions during the underwriting process in order to be offer a fair price. Individuals agree to pass medical exams and tests if the premium per month is on average 5 euros less. Retired agreed for a lower amount of money. Respondents

value policies offering annual medical checkups up to 1.6 euros more to the total monthly premium. In this context, prevention program is seen as complement of life insurance policy. Participants showed a willingness to pay an additional 1.3 euros for financed daily hospitalization, 3 euros for policies with a coverage of €100,000 in case of accidental death, and 2 euros for policies providing a 50% premium reimbursement in case of survival after the term of the policy. Notably, the attribute of financing funeral expenses stood out, with respondents willing to pay an increased 8 euros to the total monthly premium, indicating its high valuation compared to other riders. We let for further research the comparison between WTP and costs of such rider.

There are certain limitations in our study. First, the sample studied might not fully represents the diversity of the French term life insurance market. In fact, there are subgroups more attracted for those products. Additionally, the DCE methodology, while powerful, may not fully capture all the intricacies of real-world insurance decisions, where customers face more than two offers and several distribution channels. One trial for future research could be to better understand the impact of individual preferences and personal traits on insurance attributes valuation. Focus groups could be used to identify the most appropriate behavioral measures to be used, in relation with the specific population, and the context of the study. Compared to the medical check-up, the personalized prevention program were not valued. It is probably due to the vague definition of this level. Next DCEs studying prevention programs should highlight more precisely the objective of such attribute (increasing physical activity or monitoring mental health for instance). Prevention could also become subject of a specific study, by proposing more options and better understanding the appetite of specific subgroups. The monthly premiums proposed were the same for all participants. However, segmentation of premiums (at least based on age and gender) as in Braun et al. (2016) would have been more close to reality and may have provided higher variability in WTP results. For future research, we recommend conducting more extensive studies with larger and more diverse samples to enhance the external validity of results. Additionally, exploring other attributes such as policy duration or other covers (critical illness or long-term care) could further enrich our understanding of insurance demand.

Knowing this, insurers can still leverage on our findings to inform product development strategies. The method is relevant for complex contracts with many characteristics. With tailored prevention programs and additional benefits offers, such as coverage for funeral expenses, professionals can enhance their supply to cater to health-conscious individuals. Doing so, insurers would improve both policy attractiveness and performance of their portfolios. Our study sheds light on the complex dynamics of term life insurance demand and the role of claim payment, underwriting process, prevention programs and riders in influencing consumer preferences. Above usual demographic indicators in use for segmentation, behavioral traits such as optimism relative to survival probability, risk toward asset management and altruism stand out as having the most explanatory power of preference

heterogeneity toward term life insurance demand. Those elements should also be used to help defining target populations. By understanding these dynamics, insurers can better design products that align with customers' needs, enhance their market competitiveness, and offer more appealing insurance solutions to potential policyholders. In an environment where innovation ranks as a top priority of many insurers, such insights can greatly benefit the life insurance industry as a whole. both increasing the number of individuals covered and profitability of products.

A Appendix - Descriptive statistics

Table 4: Description of the sample (1/2)

	Individuals, N = 900
Age	49 (14)
Female	458 (51%)
Living Area	
Parisian basin	155 (17%)
Centre-East	112 (12%)
East	86 (9.6%)
Mediterranean region	111 (12%)
Nord - Pas-De-Calais	53 (5.9%)
West	129 (14%)
South-West	94 (10%)
Ile De France region	160 (18%)
Education	
Lower/Upper secondary education	443 (49%)
Short-cycle tertiary education	181 (20%)
Bachelor's, Master's, doctoral or equivalent level	276 (31%)
Monthly household income	
Less than 1500	181 (20%)
[1500 -2500]	250 (28%)
(2500- 3500]	220 (24%)
More than 3500	211 (23%)
Missing values	38 (4.2%)
Work situation	
Active worker	540 (60%)
Other/Unemployed	144 (16%)
Retired	216 (24%)
No insurance contract	93 (10%)
Children	
0	283 (31%)
1	215 (24%)
2	263 (29%)
3 and more	139 (15%)
Marital status	
Single	304 (34%)
Relationship	596 (66%)
Self-perceived health	
Excellent, very good	273 (30%)
Good	369 (41%)
Acceptable, Bad, very bad	254 (28%)
Missing values	4 (0.4%)
Medical treatment in the last 5 years	
Yes	215 (24%)
No	679 (75%)
Missing values	6 (0.7%)
Smoker during the last 24 months	
Yes	305 (34%)
No	594 (66%)
Missing values	1 (0.1%)

¹ Mean (SD); n (%)

Note:

The sample follows the distribution of French general population in terms of age, gender and living area.

Table 5: Description of the sample (2/2)

Individuals, N = 900	
Score impatient group	
[1,3]	118 (13%)
(3,20]	222 (25%)
(20,32]	346 (38%)
Missing values	214 (24%)
Risk attitudes (OLS)	
A - 16/16	448 (50%)
B - 24/12	275 (31%)
CDE	177 (20%)
Perceived risk group	
0-4	392 (44%)
6-10	293 (33%)
5	215 (24%)
Perceived risk group (health)	
0-5	663 (74%)
6-10	237 (26%)
Perceived risk group (wealth)	
0-5	650 (72%)
6-10	250 (28%)
Concern about future	
[0,5]	337 (37%)
(5,10]	563 (63%)
Optimism 75	
0	310 (34%)
1	197 (22%)
Unknown	393 (44%)
Optimism 85	
0	245 (27%)
1	255 (28%)
Unknown	400 (44%)
Altruism group	
0	153 (17%)
1-5	460 (51%)
6-9	287 (32%)

¹ n (%)

B Appendix - Willingness to pay

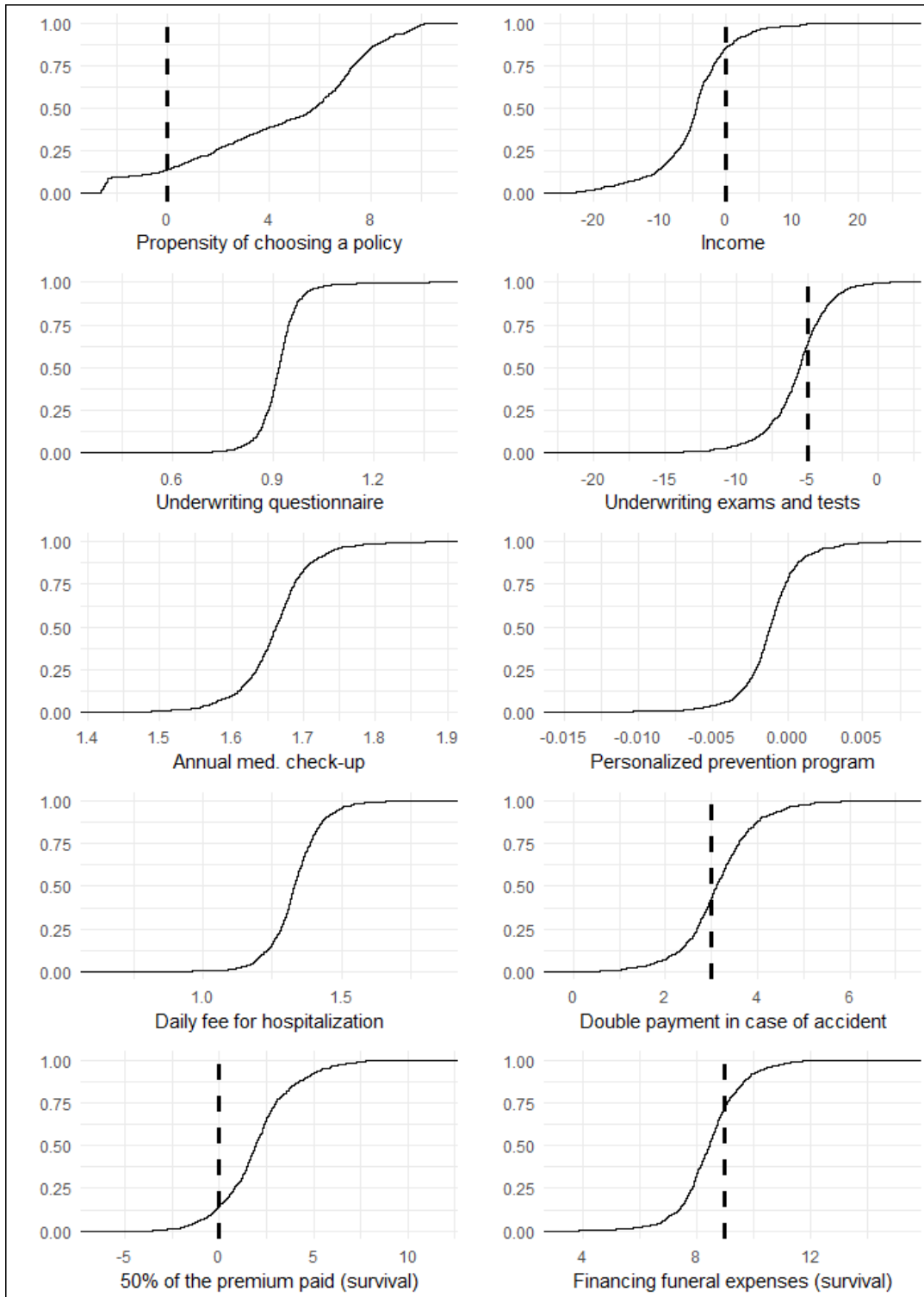
Table 6: Probit models - Propensity of choosing a contract and WTPs

	Choosing contract	Income	UW Tests	Ben. acci.	Surv. premium reimb.	Surv. fun. expenses
Women	-0.118 (0.122)	-0.015 (0.113)	-0.05 (0.094)	0.052 (0.093)	0.157 (0.114)	0.098 (0.099)
Age	-0.018 (0.04)	0.047 (0.038)	0.065 (0.031) *	0.023 (0.03)	-0.065 (0.038)	0.02 (0.032)
Age x Age	0 (0)	-0.001 (0)	-0.001 (0) *	0 (0)	0.001 (0)	0 (0)
1 or more child	0.284 (0.126) *	0.277 (0.125) *	-0.149 (0.099)	-0.049 (0.099)	-0.028 (0.121)	0.122 (0.106)
Monthly household income (Reference: < 1500)						
[1500,2500]	-0.081 (0.177)	-0.136 (0.16)	-0.128 (0.134)	0.267 (0.133) *	-0.192 (0.166)	0.259 (0.143)
(2500,3500]	-0.227 (0.185)	-0.1 (0.168)	-0.051 (0.141)	0.19 (0.14)	-0.062 (0.175)	0.121 (0.153)
3500+	-0.434 (0.196) *	-0.242 (0.179)	-0.131 (0.149)	0.184 (0.147)	0.084 (0.187)	0.097 (0.159)
Work situation (Reference: Active worker)						
Other/Unemployed	-0.245 (0.173)	0.101 (0.16)	0.017 (0.139)	-0.016 (0.138)	0.131 (0.176)	0.088 (0.146)
Retired	0.098 (0.228)	-0.073 (0.23)	0.556 (0.187) **	-0.204 (0.183)	0.019 (0.218)	-0.038 (0.195)
No insurance contract	-0.232 (0.176)	0.11 (0.179)	0.093 (0.151)	0.108 (0.151)	-0.319 (0.174)	-0.249 (0.172)
Perceived health (Reference: Excellent, very good)						
Good	-0.252 (0.154)	0.014 (0.134)	-0.052 (0.11)	0.048 (0.109)	-0.007 (0.131)	0.061 (0.117)
Acceptable, Bad, very bad	-0.524 (0.17) **	0.242 (0.156)	-0.131 (0.131)	0.096 (0.129)	0.258 (0.162)	0.178 (0.138)
Smoked in last 24 m.	0.137 (0.126)	0.047 (0.114)	0.039 (0.095)	0.043 (0.095)	-0.01 (0.116)	0.173 (0.099)
Perceived risk (wealth)	0.005 (0.022)	-0.002 (0.021)	0.003 (0.017)	-0.044 (0.017) *	-0.031 (0.021)	-0.049 (0.018) **
Risky lottery	0.014 (0.119)	0.218 (0.111)	0.074 (0.092)	0.105 (0.091)	0.081 (0.111)	0.022 (0.097)
Concerned about future	0.452 (0.118) ***	0.195 (0.116)	0.085 (0.095)	-0.012 (0.094)	0.045 (0.114)	0.172 (0.101)
Optimism 85	-0.143 (0.179)	0.309 (0.156) *	0.125 (0.127)	-0.101 (0.124)	-0.108 (0.153)	-0.039 (0.131)
Optimism 85 (no idea)	-0.427 (0.147) **	0.184 (0.139)	0.048 (0.112)	0.126 (0.11)	0.021 (0.138)	-0.149 (0.116)
Altruism (Reference: 0)						
1-5	0.16 (0.151)	-0.067 (0.153)	-0.052 (0.128)	0.13 (0.127)	0.2 (0.149)	0.252 (0.139)
6-9	0.274 (0.18)	-0.112 (0.175)	-0.05 (0.144)	0.017 (0.142)	0.269 (0.17)	0.282 (0.155)
AIC	656.36	748.03	1150.42	1179.17	737.31	1018.36
Deviance	614.36	706.03	1108.42	1137.17	695.31	976.36
Num. obs	858	858	858	858	858	858

Note:

*** p<.001, ** p<.01, * p<.05, . p<.1. Standards deviation are in parentheses.

42 participants excluded because they didn't respond to the question on monthly household income.



Vertical lines show thresholds used to estimate probit models.

Figure 2: Individual willingness to pay cumulative distribution functions

C Appendix - Sensitivity analysis

C.1 Intention to purchase model

Table 7: Estimated consumers' preferences: choices vs. intention to purchase

	Preferences	Intention to purchase (1)	Intention to purchase (2)
Intercept			
ASC _{Choice}	1.417 *** (0.105)	-0.147 (0.099)	0.906 *** (0.118)
ASC _A	0.009 (0.058)	0.047 (0.06)	-0.041 (0.069)
Benefit payment (Reference: Capital)			
Income	-0.1 *** (0.019)	-0.068 *** (0.02)	-0.089 *** (0.022)
Health information (Reference: No information)			
Declarative questionnaire	0.02 (0.015)	0.007 (0.018)	0.017 (0.019)
Medical examinations and medical tests	-0.13 *** (0.018)	-0.079 *** (0.02)	-0.104 *** (0.021)
Prevention program (Reference: No prevention program)			
Annual medical check-up	0.067 *** (0.015)	0.054 ** (0.019)	0.061 ** (0.019)
Personalized prevention program	-0.036 . (0.021)	0.003 (0.023)	0.023 (0.025)
Additional Benefits (Reference: No additional benefits)			
Payment of a daily fee for hospitalization	0.005 (0.016)	0.004 (0.019)	0.018 (0.02)
Additional €100,000 in case of accident	0.21 *** (0.034)	0.188 *** (0.034)	0.14 *** (0.039)
Survivors' Benefits (Reference: No survivors' benefits)			
Reimbursement of 50% of the premiums	0.103 *** (0.019)	0.084 *** (0.02)	0.084 *** (0.022)
Financing funeral expenses	0.197 *** (0.023)	0.181 *** (0.024)	0.22 *** (0.027)
Monthly premium	-0.025 *** (0.002)	-0.023 *** (0.002)	-0.026 *** (0.002)
<hr/>			
Number of observations	32400	32400	32400
Number of clusters	900	900	900
Number of events	10800	10800	7141

Note:

*** p<.001, ** p<.01, * p<.05, . p<.1. Standards deviation are in parentheses.

RPL with 500 Halton draws.

Intention to purchase model considers both choices between pairs of contracts and responses to purchasing intention question ("If the contract were available, I would definitely/probably buy it.").

Intention to purchase (1) considers no intention to purchase as opt-out.

References

- Agnew, J. R., Anderson, L. R., Gerlach, J. R. & Szykman, L. R. (2008), 'Who chooses annuities? an experimental investigation of the role of gender, framing, and defaults', *American Economic Review* **98**(2), 418–22.
URL: <https://www.aeaweb.org/articles?id=10.1257/aer.98.2.418>
- Akaichi, F., Costa-Font, J. & Frank, R. (2020), 'Uninsured by choice? a choice experiment on long term care insurance', *Journal of Economic Behavior & Organization* **173**, 422–434.
URL: <https://www.sciencedirect.com/science/article/pii/S016726811930232X>
- Alary, D., Gollier, C. & Treich, N. (2013), 'The Effect of Ambiguity Aversion on Insurance and Self-protection', *The Economic Journal* **123**(573), 1188–1202.
URL: <https://doi.org/10.1111/eoj.12035>
- Andreoni, J. & Sprenger, C. (2012), 'Risk preferences are not time preferences', *American Economic Review* **102**(7), 3357–76.
URL: <https://www.aeaweb.org/articles?id=10.1257/aer.102.7.3357>
- Benartzi, S., Previtiero, A. & Thaler, R. H. (2011), 'Annuity puzzles', *Journal of Economic Perspectives* **25**(4), 143–64.
URL: <https://www.aeaweb.org/articles?id=10.1257/jep.25.4.143>
- Berchi, C. & Launoy, G. (2007), 'Principle, strengths and weaknesses of discrete choice modelling for eliciting public preferences for health care', *Revue d'épidémiologie et de santé publique* **55**, 133–9.
- Bernheim, B. D. (1991), 'How strong are bequest motives? evidence based on estimates of the demand for life insurance and annuities', *Journal of Political Economy* **99**(5), 899–927.
- Bhatia, R., Bhat, A. & Tikoria, J. (2021), 'Life insurance purchase behavior: A systematic review and directions for future research', *International IJC* **45**.
- Brau, R. & Lippi Bruni, M. (2008), 'Eliciting the demand for long-term care coverage: A discrete choice modelling analysis', *Health economics* **17**, 411–33.
- Braun, A., Schmeiser, H. & Schreiber, F. (2016), 'On consumer preferences and the willingness to pay for term life insurance', *European Journal of Operational Research* **253**(3), 761–776.
URL: <https://www.sciencedirect.com/science/article/pii/S0377221716300601>
- Briys, E. & Schlesinger, H. (1990), 'Risk aversion and the propensities for self-insurance and self-protection', *Southern Economic Journal* **57**(2), 458–467.
URL: <http://www.jstor.org/stable/1060623>
- Brouwer, R., Tinh, B. D., Tuan, T. H., Magnussen, K. & Navrud, S. (2014), 'Modeling demand for catastrophic flood risk insurance in coastal zones in vietnam using choice experiments', *Environment and Development Economics* **19**(2), 228–249.
- Brown, J. R. & Weisbenner, S. J. (2009), Who Chooses Defined Contribution Plans?, in 'Social Security Policy in a Changing Environment', NBER Chapters, National Bureau of Economic Research, Inc, pp. 131–161.

- Browne, M. J. & Kamiya, S. (2012), ‘A theory of the demand for underwriting’, *The Journal of Risk and Insurance* **79**(2), 335–349.
- Burkovskaya, A., Teperski, A. & Atalay, K. (2022), ‘Framing and insurance choices’, *Journal of Risk and Insurance* **89**(2), 311–337.
- Bütler, M. & Teppa, F. (2007), ‘The choice between an annuity and a lump sum: Results from swiss pension funds’, *Journal of Public Economics* **91**(10), 1944–1966.
URL: <https://www.sciencedirect.com/science/article/pii/S0047272707001193>
- Cappelletti, G., Guazzarotti, G. & Tommasino, P. (2013), ‘What determines annuity demand at retirement?’, *The Geneva Papers on Risk and Insurance. Issues and Practice* **38**(4), 777–802.
- Cawley, J. & Philipson, T. (1999), ‘An empirical examination of information barriers to trade in insurance’, *The American Economic Review* **89**(4), 827–846.
- Chen, N., Bai, J., Nicholas, S., Maitland, E., Tan, J. & Wang, J. (2022), ‘Preferences for private health insurance in china: A discrete choice experiment’, *Frontiers in Public Health* **10**.
URL: <https://www.frontiersin.org/articles/10.3389/fpubh.2022.985582>
- Chen, R., Wong, K. & Lee, H. (2001), ‘Age, period, and cohort effects on life insurance purchases in the u.s.’, *The Journal of Risk and Insurance* **68**, 303.
- Chow-Chua, C. & Lim, G. (2000), ‘A demand audit of the insurance market in singapore’, *Managerial Auditing Journal* **15**, 372–382.
- Coe, N., Belbase, A. & Wu, A. (2016), ‘Overcoming barriers to life insurance coverage: A behavioral approach: Overcoming barriers to life insurance coverage’, *Risk Management and Insurance Review* **19**, 307–336.
- Crocker, K. J. & Snow, A. (1986), ‘The efficiency effects of categorical discrimination in the insurance industry’, *Journal of Political Economy* **94**(2), 321–44.
- Doherty, E., Mellett, S., Norton, D., McDermott, T. K., Hora, D. O. & Ryan, M. (2021), ‘A discrete choice experiment exploring farmer preferences for insurance against extreme weather events’, *Journal of Environmental Management* **290**, 112607.
URL: <https://www.sciencedirect.com/science/article/pii/S0301479721006691>
- Dohmen, T., Falk, A. & Huffman, D. (2009), ‘Individual risk attitudes: Measurement, determinants and behavioral consequences’, *Journal of the European Economic Association* **5517**, 522–550.
- Ehrlich, I. & Becker, G. S. (1972), ‘Market insurance, self-insurance and self-protection’, *Journal of Political Economy* **80**(4), 623–648.
URL: <https://doi.org/10.1086/259916>
- Eisenhauer, J. & Halek, M. (1999), ‘Prudence, risk aversion, and the demand for life insurance.’, *Applied Economics Letters* **6**, 239–42.
- Emamgholipour, S., Arab, M. & Mohajerzadeh, Z. (2017), ‘Life insurance demand: Middle east and north africa’, *International Journal of Social Economics* **44**, 521–529.

- Falk, A., Becker, A., Dohmen, T., Huffman, D. & Sunde, U. (2022), ‘The preference survey module: A validated instrument for measuring risk, time, and social preferences’, *Management Science* **69**(4), 1935–1950.
URL: <https://doi.org/10.1287/mnsc.2022.4455>
- France Assureurs (2022), ‘L’Assurance Française, Données clés 2021’.
- Frimpong, E., Howard, G. & Kruse, J. (2022), ‘Homeowner preference for household-level flood mitigation in us: Analysis of a discrete choice experiment’, *Journal of Agricultural and Applied Economics* **54**(2), 262–285.
- Giacalone, J. A. (2001), ‘The life insurance market: Asymmetric information revisited’, *Southern Business Review* .
- Greene, W. H. & Hensher, D. A. (2010), *Modeling Ordered Choices: A Primer*, Cambridge University Press.
- Harris, T. & Yelowitz, A. (2014), ‘Is there adverse selection in the life insurance market? evidence from a representative sample of purchasers’, *Economics Letters* **124**(3), 520–522.
- Hau, A. (2000), ‘Liquidity, estate liquidation, charitable motives, and life insurance demand by retired singles’, *The Journal of Risk and Insurance* **67**(1), 123–141.
- He, D. (2009), ‘The life insurance market: Asymmetric information revisited’, *Journal of Public Economics* **93**(9), 1090–1097.
- Hedengren, D. & Stratmann, T. (2016), ‘Is there adverse selection in the life insurance markets?’, *Economic Inquiry* **54**(1), 450–463.
- Helveston, J. P. (2023), ‘logitr: Fast estimation of multinomial and mixed logit models with preference space and willingness-to-pay space utility parameterizations’, *Journal of Statistical Software* **105**(10), 1–37.
- Hensher, D., Rose, J. & Greene, W. (2015), *Applied Choice Analysis, 2nd edition*, Cambridge University Press.
- Hess, S. & Train, K. (2017), ‘Correlation and scale in mixed logit models’, *Journal of choice modelling* **23**(C), 1–8.
- Hole, A. R. (2015), ‘MIXLOGITWTP: Stata module to estimate mixed logit models in WTP space’, Statistical Software Components, Boston College Department of Economics.
URL: <https://ideas.repec.org/c/boc/bocode/s458037.html>
- Johnson, E., Hershey, J., Meszaros, J. & Kunreuther, H. (1993), ‘Framing, probability distortions, and insurance decisions’, *Journal of Risk and Uncertainty* **7**, 35–51.
- Kakar, P. & Shukla, R. (2010), ‘The determinants of demand for life insurance in an emerging economy—india’, *Margin: The Journal of Applied Economic Research* **4**, 49–77.
- Kazemi karyani, A., Baba akbari, A. & Woldemichael, A. (2019), ‘Eliciting preferences for health insurance in iran using discrete choice experiment analysis’, *International Journal of Health Policy and Management* **8**, 488–497.

- Kerssens, J. & Groenewegen, P. (2005), ‘Consumer preferences in social health insurance’, *The European journal of health economics : HEPAC : health economics in prevention and care* **6**, 8–15.
- Kong, H., Yun, W., Joo, W., Kim, J.-H., Kim, K.-K., Moon, I.-C. & Kim, W. C. (2022), ‘Constructing a personalized recommender system for life insurance products with machine-learning techniques’, *Intelligent Systems in Accounting, Finance and Management* **29**(4), 242–253.
- Kwofie, C., Yormekpe, D. D., Osei Mensah, S. & Botchwa1, P. (2018), ‘Choosing between alternative motor insurance policies: A discrete choice experiment’, *International Journal of Mathematics and Mathematical Sciences* .
- Lancaster, K. J. (1966), ‘A new approach to consumer theory’, *Journal of Political Economy* **74**(2), 132–157.
URL: <http://www.jstor.org/stable/1828835>
- Leukert-Becker, K. & Zweifel, P. (2008), ‘Age and choice in health insurance: Evidence from a discrete choice experiment’, *The Patient: Patient-Centered Outcomes Research* **1**, 27–40.
- Louviere, J., Hensher, D. & Swait, J. (2000), *Stated choice methods: analysis and application*, Vol. 17, Cambridge University Press.
- Louviere, J. J., Flynn, T. N. & Carson, R. T. (2010), ‘Discrete choice experiments are not conjoint analysis’, *Journal of Choice Modelling* **3**(3), 57–72.
URL: <https://www.sciencedirect.com/science/article/pii/S1755534513700149>
- Lucarelli, C., Marinelli, N. & Brighetti, G. (2014), ‘Do emotions affect insurance demand?’, *Review of Behavioral Finance* **Volume 6**, 136–154.
- Luciano, E., Outreville, J. & Rossi, M. (2016), ‘Life insurance ownership by italian households: A gender-based differences analysis’, *The Geneva Papers on Risk and Insurance Issues and Practice* **41**.
- Lusardi, A., Mitchell, O. & Curto, V. (2010), ‘Financial literacy among the young’, *The Journal of Consumer Affairs* **44**(2), 358–380.
URL: <http://www.jstor.org/stable/23859796>
- Lusardi, A. & Mitchell, O. S. (2008), ‘Planning and financial literacy: How do women fare?’, *American Economic Review* **98**(2), 413–17.
URL: <https://www.aeaweb.org/articles?id=10.1257/aer.98.2.413>
- McFadden, D. (1973), ‘Conditional logit analysis of qualitative choice’, *Frontiers in Econometrics* **17**, 105–142.
- McFadden, D. & Train, K. (2000), ‘Mixed mnl models for discrete response’, *J. Appl. Econom.* **64**, 207–240.
- Mitra, A. (2016), ‘Influencers of life insurance investments - an empirical evidence from europe’, *Australasian Accounting, Business and Finance Journal* **11**, 54–65.
- Mouminoux, C., Rullière, J.-L. & Loisel, S. (2018), ‘Obfuscation and Honesty Experimental Evidence on Insurance Demand with Multiple Distribution Channels’. working paper or preprint.
URL: <https://hal.archives-ouvertes.fr/hal-01819522>

- Mulder, N. (2020), ‘Bad deaths, good funerals: The values of life insurance in new orleans’, *Economic Anthropology* **7**(2), 241–252.
- Nagy, B., Alt, M., Benedek, B. & Saplacan, Z. (2019), ‘How do loss aversion and technology acceptance affect life insurance demand?’, *Applied Economics Letters* **27**, 1–5.
- Nanna, A. (2011), Health insurance in developing countries : willingness to pay for health insurance in Thailand using discrete choice experiment methods, PhD thesis, Curtin University.
- Nguyen, P., Li, D., Moshirian, F. & Wee, T. (2007), ‘The demand for life insurance in oecd countries’, *Journal of Risk & Insurance* **74**, 637–652.
- Obse, A., Ryan, M., Heidenreich, S., Normand, C. & Hailemariam, D. (2016), ‘Eliciting preferences for social health insurance in ethiopia: A discrete choice experiment’, *Health Policy and Planning* **31**.
- Omar, O. & Owusu-Frimpong, N. (2007), ‘Life insurance in nigeria: An application of the theory of reasoned action to consumers’ attitudes and purchase intention’, *The Service Industries Journal* **27**, 963–976.
- Outreville, J. (2012), ‘The relationship between insurance and economic development: 85 empirical papers for a review of the literature’, *Risk Management and Insurance Review* **16**, 71–122.
- Ozawa, S., Grewal, S. & Bridges, J. F. (2016), ‘Household size and the decision to purchase health insurance in cambodia: Results of a discrete-choice experiment with scale adjustment’, *Applied Health Economics and Health Policy* **14**(2), 195–204.
- Pauly, M. V., Withers, K. H., Subramanian-Viswana, K., Lemaire, J. & Hershey, J. C. (2003), Price elasticity of demand for term life insurance and adverse selection, Working Paper 9925, National Bureau of Economic Research.
- Rothschild, C. (2011), ‘The efficiency of categorical discrimination in insurance markets’, *The Journal of Risk and Insurance* **78**(2), 267–285.
- Rothschild, M. & Stiglitz, J. (1976), ‘Equilibrium in competitive insurance markets: An essay on the economics of imperfect information’, *The Quarterly Journal of Economics* **90**(4), 629–649.
URL: <https://doi.org/10.2307/1885326>
- Shee, A., Turvey, C. G. & Marr, A. (2021), ‘Heterogeneous Demand and Supply for an Insurance-linked Credit Product in Kenya: A Stated Choice Experiment Approach’, *Journal of Agricultural Economics* **72**(1), 244–267.
URL: <https://ideas.repec.org/a/bla/jageco/v72y2021i1p244-267.html>
- Sherrick, B., Barry, P., Schnitkey, G., Ellinger, P. & Wansink, B. (2003), ‘Farmers’ preferences for crop insurance attributes’, *Review of Agricultural Economics* **25**, 415–429.
- Sicsic, J., Pelletier-Fleury, N. & Moumjid, N. (2018), ‘Women’s benefits and harms trade-offs in breast cancer screening: Results from a discrete-choice experiment’, *Value in Health* **21**(1), 78–88.
URL: <https://www.sciencedirect.com/science/article/pii/S1098301517303248>

- Sinclair, S. H. & Smetters, K. A. (2004), Health Shocks and the Demand for Annuities: Technical Paper 2004-09, Working Papers 15868, Congressional Budget Office.
URL: <https://ideas.repec.org/p/cbo/wpaper/15868.html>
- Street, D. & Burgess, L. (2007), ‘The construction of optimal stated choice experiments’.
- Tan, H.-B., Wong, M.-F. & Law, S. (2009), ‘The effect of consumer factors and firm efficiency on malaysian life insurance expenditure’, *International Journal of Business and Society* **10**, 59–73.
- Traets, F. & Vandebroek, M. (2020), ‘Generating optimal designs for discrete choice experiments in r: The idfix package frits traets’, *Journal of Statistical Software* **96**.
- Train, K. (1998), *Discrete Choice Methods with Simulation*, Cambridge University Press.
- Train, K. & Weeks, M. (2005), *Discrete Choice Models in Preference Space and Willingness-to-Pay Space*, Vol. 6, Springer, pp. 1–16.
- Unger, F., Steul-Fischer, M. & Gatzert, N. (2022), ‘How default effects and decision timing affect annuity uptake and health consciousness’, *The Geneva Papers on Risk and Insurance* .
- van den Berg, B., Van Dommelen, P., Stam, P., Laske-Aldershof, T., Buchmueller, T. & Schut, F. T. (2008), ‘Preferences and choices for care and health insurance’, *Social Science & Medicine* **66**(12), 2448–2459.
URL: <https://www.sciencedirect.com/science/article/pii/S0277953608001135>
- Wang, N. (2019), ‘The demand for life insurance in a heterogeneous-agent life cycle economy with joint decisions’, *The Geneva Risk and Insurance Review* **44**(2), 176–206.
- Worawan & Wasi, N. (2020), ‘Incorporating discrete choice experiments into policy decisions: Case of designing public long-term care insurance’, *Social Science & Medicine* **258**, 113044.
- Zellner, A. (1962), ‘An efficient method of estimating seemingly unrelated regressions and tests for aggregation bias’, *Journal of the American Statistical Association* **57**(298), 348–368.
URL: <http://www.jstor.org/stable/2281644>
- Zietz, E. (2003), ‘An examination of the demand for life insurance’, *Risk Management and Insurance Review* **6**, 159 – 191.
- Zweifel, P., Leukert-Becker, K. & Berner, S. (2010), ‘Preferences for health insurance in germany and the netherlands – a tale of two countries’, *Health Economics Review* .