On Consumer Preferences and the Willingness to Pay for Term Life Insurance

Alexander Braun, Hato Schmeiser, and Florian Schreiber*

Abstract

We run a choice-based conjoint analysis for term life insurance with a sample of 2,017 German consumers, for which data has been collected through web-based experiments. Individual-level part worth utility profiles are estimated by means of a hierarchical Bayes model. Drawing on the elicited preference structures, we compute relative attribute importances and different willingness to pay measures. In addition, we present comprehensive simulation results for a realistic competitive setting that allows to assess market expansion and product switching effects. Brand, critical illness cover, and medical underwriting are found to be the most important non-price product attributes. Thus, the market is prepared to accept significant markups in the monthly premium, if a policy comprises their preferred levels. However, we also document a large fraction of individuals that have no willingness to pay at all, presumably due to the absence of a need for mortality risk coverage. Among those who are generally interested in a term life contract, preferences vary considerably, implying that product differentiation helps to avoid price pressure and grow market shares. Finally, based on the predicted demand sensitivities and a set of cost assumptions, it is shown that insurers require an in-depth understanding of consumer preferences to choose the profit-maximizing price.

Keywords: Willingness to Pay, Term Life Insurance, Choice-Based Conjoint Analysis
JEL classification: C83; D12; G22

1 Introduction

Being able to adequately gauge consumer preferences and willingness to pay (WTP) is crucial for strategy formulation, product design, demand assessment, sales management, and, most notably, pricing decisions.1 Accordingly, over the past decades, there has been substantial conceptual and methodological progress in the area of preference elicitation and WTP measurement. Not surprisingly, the central determinants of consumer behavior are now well-understood for a broad range of goods and services. Yet, this development seems to have largely bypassed the insurance sector, where products are still valued purely based on cost considerations. By the same token, there is a fairly limited amount of scientific research dealing with the question of how individuals evaluate risk transfer and reduction instruments.

---

*Alexander Braun (alexander.braun@unisg.ch), Hato Schmeiser (hato.schmeiser@unisg.ch), and Florian Schreiber (florian.schreiber@unisg.ch) are from the Institute of Insurance Economics, University of St. Gallen, Kirchlistrasse 2, CH-9010 St. Gallen. We are grateful to Lukas Steinmann, Stephan Schreckenberg, and their colleagues at Swiss Re for their regular advice as well as their valuable comments and suggestions throughout the course of this research project.

1The WTP or reservation price can be defined as the utmost amount of money that an individual is prepared to spend on a given good or service (see, e.g., Wertenbroch and Skiera, 2013). While some authors have suggested to view WTP as a range (see, e.g., Wang et al., 2007), we follow the more common conceptualization of treating it as a point estimate.
In the welfare economics literature, WTP is frequently employed to estimate the benefits generated by public health care systems (see, e.g., Johannesson, 1996; Hammitt and Graham, 1999; Olsen and Smith, 2001; Olsen et al., 2004), safeguards against environmental hazards such as accidents, diseases, and disasters (see, e.g., Jones-Lee, 1974; Savage, 1993; Hammitt and Liu, 2004; Zhai and Suzuki, 2008), and mortality risk mitigation (see, e.g., Arthur, 1981; Shepard and Zeckhauser, 1984; Cropper and Sussman, 1988; Johannesson et al., 1997; Eeckhoudt and Hammitt, 2001; Alberini et al., 2006). Among those articles with an explicit insurance context, the largest part exhibits a development economics focus, aimed at assessing the WTP for health insurance in rural areas across Africa (see, e.g., Asenso-Okyere et al., 1997; Dong et al., 2003; Gustafsson-Wright et al., 2009; Ichoku et al., 2010; Onwujeckwe et al., 2010), Asia (see, e.g., Asgary et al., 2004; Zhang et al., 2006; Bärnighausen et al., 2007; Lofgren et al., 2008; Sricharoen and Buchenrieder, 2008; Chen et al., 2011), India (see, e.g., Mathiyazaghan, 1998; Dror et al., 2007), and Latin America (see, e.g., Vargas Bustamante et al., 2008; Eckhardt et al., 2011). In addition, preferences and WTP have been studied for crop insurance (Sherrick et al., 2003; Heenkenda, 2011), livestock insurance (see, e.g., Shaik et al., 2008; Buchenrieder and Fischer, 2009; Khan et al., 2013), flood insurance (Botzen and Van den Bergh, 2012), health insurance (Chakraborty et al., 1994; Booske et al., 1999; Kerssens and Groenewegen, 2005; Van den Berg et al., 2008), long-term care insurance (Costa-Font and Font, 2009; Jacobs-Lawson et al., 2010), interest rate guarantees in unit-linked life insurance (Gatzert et al., 2011), weather insurance (Fraser, 1992; Musshoff et al., 2008), as well as auto, home, and house insurance (Hansen et al., 2013).

A thorough investigation of consumer preferences for term life insurance, however, has not been conducted to date. The only explicit figures in this regard come from a recent set of practitioner studies by Swiss Re (2012). Considering the importance of life insurance in most developed economies and the degree of competition in most of these markets, this is quite astonishing. The German term life insurance market, for example, is well developed, substantial and very competitive. In 2012, the term insurance premium volume amounted to about EUR 3’145 million (new business reached EUR 355 million) and 7.48 million policies were in force. With respect to the inforce business, premium income has been growing slowly, but steadily since 1995. However, sales have peaked in 2006 and have been declining since with no signs of recovery. As a result, insurers are competing on prices, distribution channels and product design. We contribute an innovative piece of behavioral research intended to close this the gap. In doing so, we resort to choice-based conjoint (CBC) analysis, a powerful preference elicitation method grounded in random utility theory (RUT). Data for the study has been collected through web-based choice experiments with 2,017 consumers in Germany. Drawing on this sample, we derive individual-level part-worth utility profiles by means of hierarchical Bayes (HB) estimation, which enable us to compute relative attribute importances as well as WTP figures for both incremental product adjustments and complete term life policies. Finally, we simulate a realistic market setting consisting of four generic product types, assess the prevailing demand sensitivities, and construct price-revenue and price-profit curves.

This manuscript is organized as follows. Section 2 begins with a brief review of CBC analysis and RUT. We then discuss the selection of product attributes and levels, describe the sample composition
and the design of the discrete choice experiments, explain the estimation routine for the conjoint utilities, and define key concepts such as relative attribute importances, WTP measures, and market simulations. Moreover, an extensive presentation of our empirical results can be found in Section 3. Finally, in Section 4 we summarize our main findings and conclude the paper.

2 Data and Methodology

2.1 Choice-Based Conjoint Analysis

Extant research in the risk management and insurance literature favor a type of direct stated preference approach such as the contingent valuation framework, in which customers are asked to explicitly specify their WTP via an open-ended question format (see Abrams, 1964; Mitchell and Carson, 1989). In the context of infrequently-purchased, durable, and rather abstract product categories that are associated with a more elaborate decision process, however, this method is known to generate inaccurate WTP estimates (see, e.g., Backhaus et al., 2005; Voelckner, 2006; Miller et al., 2011). Consequently, it is not suitable for insurance policies. Typical indirect stated preference methods come from the family of conjoint analyses, that found its way into the marketing literature about four decades ago (see Green and Rao, 1971; Johnson, 1974) and has since received considerable attention in academia and practice.\(^2\) In particular, it has been regularly employed in WTP studies (see Breidert et al., 2006). Among the different conjoint elicitation tasks, CBC designs, in which consumers are required to select complete product profiles over sets of alternatives, are recommended for price-related research (see, e.g., Orme, 2009). This is due to the fact that, in contrast to ratings or rankings, choice tasks are cognitively less challenging, especially when the complexity of the marketplace is high. Apart from that, they more closely mirror the real purchase situation, in which the consumer is also confronted with a range of policies (see, e.g., Huber, 1997).\(^3\) Since each term life contract shown in a given choice set is associated with distinct advantages and drawbacks, individuals are instigated to trade off product attributes against each other. Hence, through their selection from available alternatives, they convey preference information that can be employed for the estimation of part-worth utility profiles.

A frequently discussed limitation is the artificial nature of the choice tasks, which may give rise to hypothetical bias (see Cummings et al., 1995; Harrison and Rutström, 2008). To deal with this issue, some authors have proposed incentive-aligned CBC analysis (see Ding et al., 2005; Ding, 2007; Dong et al., 2010), relying on the well-known Becker et al. (1964) mechanism that obliges participants to actually purchase the product under consideration, if their inferred WTP is higher than a randomly drawn purchase price. Yet, purchase obligations are virtually infeasible for term life insurance contracts. Moreover,\(^2\) for an overview of common applications in market research refer to Green et al. (2001) or Gustafsson et al. (2003). Usage regarding insurance products is very limited to date, with a few exceptions relating to health insurance (Chakraborty et al., 1994; Kerssens and Groenewegen, 2005; Sriraroen and Buchenrieder, 2008; Van den Berg et al., 2008), livestock insurance (Buchenrieder and Fischer, 2009), crop insurance (Sherrick et al., 2003; Heenenda, 2011), and value added services in the insurance industry (Von Watzdorf and Skorna, 2010).\(^3\) Since WTP is a context-sensitive concept, the suitability of measurement methods critically hinges on their ability to emulate the actual evaluation process for the product under consideration.
hypothetical bias should be negligible for our study in that, even if the estimated demand curves differ from the true ones, the revealed effects may still lead to correct pricing decisions (see Miller et al., 2011). Thus, we refrained from an incentive alignment.

2.2 Theoretical Foundations

CBC analysis is theoretically underpinned by RUT (see Thurstone, 1927; Von Neumann and Morgenstern, 1944). Let $C$ denote the set of all relevant alternatives, $y_{ij}$ the $i$-th observed value of a discrete choice variable for individual $j$, and $M$ the total number of alternatives shown in a given choice task $c \subset C$. Each individual $j$ associates alternative $a$ with a latent utility $U_{ja}$. Under the assumption that all individuals are utility maximizers, alternative $a$ is chosen (i.e., $y_{ij} = a$), if and only if its utility exceeds that of all other available alternatives: $U_{ja} = \max(U_{j1}, U_{j2}, \ldots, U_{jM})$. To account for the probabilistic nature of choice, RUT describes utilities by means of a deterministic component ($V_{ja}$) and a stochastic component ($\epsilon_{ja}$) that captures unobserved aspects as well as measurement error (see, e.g., ?):

$$U_{ja} = V_{ja} + \epsilon_{ja}. \quad (1)$$

The condition under which $a$ is selected can then be expressed as follows:

$$U_{ja} > U_{jm}$$
$$V_{ja} + \epsilon_{ja} > V_{jm} + \epsilon_{jm}$$
$$\epsilon_{ja} - \epsilon_{jm} > V_{jm} - V_{ja} \quad \forall \ m \neq a. \quad (2)$$

Therefore, the probability of individual $j$ choosing alternative $a$ equals

$$\Pr(y_{ij} = a) = \Pr(U_{ja} > U_{jm}) = \Pr(\epsilon_{ja} - \epsilon_{jm} > V_{jm} - V_{ja}) = 1 - \Pr(\epsilon_{ja} - \epsilon_{jm} \leq V_{jm} - V_{ja}). \quad (3)$$

By assuming that the $\epsilon$ are independent and adhere to a Gumbel (type-I extreme value) distribution, it is possible to derive the Lucean choice model (see, e.g., McFadden, 1974)

$$\Pr(y_{ij} = a) = \frac{\exp(V_{ja})}{\sum_{m=1}^{|C|} \exp(V_{jm})} \quad \forall \ m, \quad (4)$$

which is characterized by the independence from irrelevant alternatives (IIA) property.\footnote{IIA implies that “the odds of choosing alternative $a$ in relation to alternative $b$ must be constant, regardless of what other alternatives are present” (Louviere and Woodworth, 1983).} We may now condition on the choice task $c$ and explicitly specify $V_{ja}$ and the $V_{jm}$ in terms of product attributes to derive the multinomial logit (MNL) model that lies at the heart of the CBC approach:

$$\Pr(y_{ij} = a|c) = \frac{\exp(X_{a}\beta_j)}{\sum_{m=1}^{M} \exp(X_{m}\beta_j)} \quad \forall \ m, \quad (5)$$
where the $\mathbf{X} = (\mathbf{x}_1', ... , \mathbf{x}_N')'$ are $N \times Q$ matrices whose column vectors include values for the $Q$ predictors (attribute levels) as shown in $N$ choice tasks and $\beta_j = (\beta_{j1}, ..., \beta_{jQ})'$ represents the $Q \times 1$ vector of unknown parameters (part-worth utilities).

### 2.3 Product Attributes and Levels

There is no generally accepted procedure for the determination of appropriate product attributes and levels to be used in a CBC research design. We decided to conduct focus group discussions with industry professionals from Swiss Re, based on which we adopted the six attributes (i) insurance premium, (ii) term assured, (iii) sales channel, (iv) medical underwriting, (v) brand, and (vi) critical illness (CI) rider. The sums insured for all policies were held fixed at 100,000 EUR. When specifying the levels, we adhered to the guidelines suggested by Orme (2002), particularly concise labeling, independence, and mutual exclusivity. An overview of all attributes and their levels can be found in Table 1.

Selecting levels for the monthly insurance premium was a particularly challenging task. First of all, we aimed to avoid distortions due to the range and number-of-levels effects (see Verlegh et al., 2002). Thus, as suggested in the extant literature, we determined a realistic range bounded by the minimum and maximum price of comparable policies offered in Germany (see, e.g., Miller et al., 2011). This was achieved by interviewing market experts and evaluating quotes for a large number of products via the online comparison platform www.check24.de. Second of all, term life insurance differs from common consumer goods in that there is a direct link between the individual's age and physical condition on the one hand and the price on the other hand. More specifically, premiums for old policyholders with impaired health will be substantially higher than for young and fit ones. Accordingly, we needed to ensure that each individual is confronted with a price range that matches his or her mortality risk. For this purpose, we allocated the survey participants to ten different groups that are characterized by an age bracket and a smoking status. Throughout the choice experiments, each of those groups saw product profiles based on the corresponding price levels (“very low” to “very high”) as shown in Table 2.

Moreover, we offered policies with 10, 15, or 20 year term assureds that could be purchased online or face to face from a human sales person. With regard to the underwriting procedure used by insurers to link an individual’s risk to his premium rate, we allowed for questionnaires with three and ten questions, an innovative twelve month waiting period until the coverage becomes effective, as well as a the traditional full-fledged medical examination. The brand of the contract provider was represented by three major categories: well-known and large insurance companies (e.g., Allianz), lesser-known insurers with a rather insignificant footprint in the German market (e.g., MyLife), and companies with a strong brand name that is not associated with insurance (e.g., IKEA). Finally, the CI rider is an innovative feature that entitles the policyholder (not the beneficiary) to a lump sum payment if he is diagnosed with a

---

5Note the special form of this MNL model, resembling the conditional logit approach (see, e.g., McFadden, 1986). By contrast, MNL predictors are usually individual characteristics instead of product attributes, whereas parameters vary across alternatives.
severe disease (e.g., cancer) as defined in the contract’s terms and conditions.6

<table>
<thead>
<tr>
<th>No.</th>
<th>Attribute</th>
<th>Levels</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Insurance Premium</td>
<td>5 levels from “very low” to “very high”</td>
<td>Equally sized price steps</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Euro amounts differ by group Source: market quotes/expert opinion</td>
</tr>
<tr>
<td>2</td>
<td>Term Assured</td>
<td>10, 15, 20 years</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>Sales Channel</td>
<td>Human salesperson, online channel</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>Underwriting Procedure</td>
<td>Questionnaire (3), questionnaire (10), min. 1-year survival, medical examination</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>Brand</td>
<td>Well-known insurer, lesser-known insurer, non-insurance brand</td>
<td>Graphical representation (logos) within the stimuli</td>
</tr>
<tr>
<td>6</td>
<td>CI Rider</td>
<td>Yes, no</td>
<td>50,000 EUR benefit if diagnosed with a severe disease</td>
</tr>
<tr>
<td></td>
<td>Sum Insured</td>
<td>Fixed at 100,000 EUR</td>
<td>Participants were informed that additional coverage would be available</td>
</tr>
</tbody>
</table>

Table 1: CBC-Analysis Attributes and Levels

2.4 Sample Selection and Discrete Choice Experiments

We collected data for a sample of 2,017 people in Germany who identified themselves as insurance decision makers.7 All survey participants are between 20 and 54 years old and virtually population-representative with regard to domicile state and gender. In addition, one half of them actually owns a term life insurance contract. Respondents were allocated to the ten groups shown in Table 2 according to their stated age and smoking habits. To ensure a roughly equal distribution across groups as conducive for the estimation quality, a ten percent quota was targeted and met up to a maximum error margin of 0.8 percentage points. We established contact with the individuals through the consumer panel of a well-respected market research firm, seeking to maximize response rates and minimize the risk of missing data. Participation in the study was incentivized by bonus points that can be spent for consumption purposes.

The online survey relied on the latest CBC system of Sawtooth Software, Inc. and underwent a technical pretest before the two-week field phase. At the outset, we asked for completion of categorization questions with regard to age, gender, smoking habits, and domicile state. This introductory part was followed by the choice experiments. After a short explanation of the hypothetical buying situation, the

6The death benefit remains unaffected thereof.
7In the context of this study, the term “insurance decision maker” is defined as a person, who either purchases insurance policies himself or participates in the decision to do so. This criterion was applied to ensure that respondents understand the product type under consideration and can therefore make sufficiently informed decisions between the conjoint stimuli. Robustness of the results was confirmed based on a second, purely population-representative sample, that comprised another 938 individuals.
mechanics of term life insurance as well as the product attributes, participants were confronted with twelve choice tasks, each one comprising two complete policy profiles and the possibility to opt out of the purchase (none option).\(^8\) While the attribute order within each conjoint stimulus remained fixed, the pairwise comparisons were generated according to the balanced overlap method, a randomized experimental design that accounts for the principles of minimal overlap, level balance, as well as orthogonality and thus curtails psychological context and order effects (see Sawtooth Software, 2013).\(^9\) At the end of the survey, we included a set of additional questions to capture basic socioeconomic information about the respondents.

### 2.5 Estimation of Individual-Level Part-Worth Utility Profiles

We estimated individual-level part-worth utilities from the observed choices by means of the HB routine implemented in Sawtooth CBC/HB 5.0 (see Sawtooth Software, 2009).\(^10\) The corresponding set-up is hierarchical in the sense that it comprises two levels. On the lower level, the choice data is explained by the MNL model in Equation (5). In addition, there is an aggregate or upper level comprising the prior for the individual part-worth utilities. More specifically, the \(\beta_j\) in Equation (5) are assumed to come from a multivariate normal distribution with mean vector \(\alpha\) and covariance matrix \(\Sigma\) that describes the heterogeneity across individuals. For computational ease, the HB approach relies on another multivariate normal and the inverse Wishart distribution as conjugate hyperpriors for \(\alpha\) and \(\Sigma\).

---

\(^8\)The introductory and explanatory statements were carefully phrased to rule out framing effects.

\(^9\)The reader is referred to Huber and Zwerina (1996) for a more detailed description of these conjoint design principles. As recommended by Orme (2002), we refrained from prohibiting any attribute level combinations to avoid estimation problems and confounded utilities.

\(^10\)The suitability of HB models for conjoint studies has been documented in several pieces of high-class research (see, e.g., Arora et al., 1995; Lenk et al., 1996; Arora et al., 1998; Huber, 1998; Arora and Huber, 2001; Train, 2009).
A robust iterative process with initial values of zero serves to estimate the unknown parameters. The Metropolis-Hastings Algorithm is employed to draw the $\beta_j$, while $\alpha$ and $D$ are determined by means of Gibbs sampling.\(^\text{11}\) An important property of the HB model is the incorporation of shrinkage, implying that the individual-level estimates become more efficient because they inform each other via the group-level. We ran 20,000 burn-in iterations of the Markov chain and 50,000 post-convergence iterations for the subsequent sampling of the posterior distributions. After the Bayesian updating of the prior probabilities with our choice data was complete, we imposed monotonicity constraints on the posterior part-worth utilities for the attribute premium using the tying after estimation procedure.\(^\text{12}\) The reason is that monotonically falling price-utility curves are a necessary condition for the computation of one of our WTP measures.

### 2.6 Relative Importances, Willingness to Pay, and Shares of Preference

By itself, the MNL model in Equation (5) is unidentified. Thus, it is impossible to find a unique set of estimates without imposing some form of restriction on the parameters. CBC analysis commonly relies on a normalizing constraint for identification such that the sum of part-worth utilities equals zero. This is achieved through effects coding of the product attributes.\(^\text{13}\) As a corollary, conjoint utilities are interval scaled, i.e., they do not exhibit a meaningful origin (see, e.g., Orme, 2010). Consequently, we may add any arbitrary constant to the part-worth profiles of the product attributes without affecting the predicted choice probabilities. On the other hand, however, utility values are not comparable across attributes and individuals and ratios must not be formed.\(^\text{14}\)

Since the interval-scale character complicates the interpretation of the findings, we draw on the part-worth utility profiles to derive metrics with a more intuitive economic meaning. We begin with relative importances, which measure the impact of an attribute on the overall utility of a product in percentage terms (see Orme, 2010). Formally, the relative importance $RI_{jk}$ of attribute $k \in \{1, 2, 3, 4, 5, 6\}$ (see Table 1) with levels $l \in \{1, ..., L_k\}$ as perceived by individual $j$ can be expressed as follows:

$$\text{RI}_{jk} = \frac{\max_l (\beta_{jkl}) - \min_l (\beta_{jkl})}{\sum_{k=1}^{K} \left( \max_l (\beta_{jkl}) - \min_l (\beta_{jkl}) \right)}.$$

The $RI_{jk}$ follow a ratio scale, add up to 100% for each respondent $j$, and are readily comprehensible: The larger the utility range associated with an attribute, the higher its potential to increase or decrease an individual’s choice probability for a product. Therefore, based on the $RI_{jk}$, one may identify key

\(^{11}\)Technical details on these Markov Chain Monte Carlo (MCMC) methods can be found in Chib and Greenberg (1995).

\(^{12}\)This method implies running the HB estimation without constraints and then recursively tying the values in each offending pair of part-worths until all violations have been eliminated. It has been shown to perform very well in terms of hit rate and share predictions (see Johnson, 2000).

\(^{13}\)More specifically, the last level of every attribute is estimated as the negative of the sum of the other levels. Although dummy coding would also introduce an identification constraint by selecting one attribute level as the baseline category and setting it to zero, effects coding has emerged as the standard in the early 1990s (see Sawtooth Software, 2009).

\(^{14}\)Furthermore, as Swait and Louviere (1993) emphasize, estimates of identical model parameters that come from samples with different variances are not directly comparable.
product features for a given market.\textsuperscript{15}

Beyond the relative importances, our main focus lies on measures for the WTP, which may also be employed for interpersonal comparisons.\textsuperscript{16} We differentiate between the marginal WTP for changes in product attributes and the maximum WTP for whole products. A common approach to estimate individual $j$’s marginal WTP (MWTP$_j$) for the step from level $l$ to level $h$ of product attribute $k$ is based on a simple exchange-rate between utility and price (see, e.g., Jedidi and Jagpal, 2009):

$$\text{MWTP}_{jk}(h,l) = \left( \frac{\max(p_j) - \min(p_j)}{\max(\beta_{jhl}) - \min(\beta_{jhl})} \right) \cdot (\beta_{jkh} - \beta_{jkl}),$$ \hspace{1cm} (7)

where $p_j$ denotes the levels of the price attribute ($k = 1$) in EUR associated with age and smoking status of individual $j$ (see Table 2) and the $\beta_{jhl}$ represent the corresponding part-worth utilities. MWTP$_{jk}$ is equivalent to the marginal rate of substitution between non-price and price attribute and expresses the utility increases or decreases induced by product adjustments in monetary terms. The resulting figures, however, should be interpreted with care, because this concept assumes a strictly linear part-worth curve across the whole price range, does not consider a specific product context, and fails to take into account the option not to buy or the impact of competition in the market.\textsuperscript{17}

With regard to the maximum WTP for whole products, we adopt the approach of Kohli and Mahajan (1991), who suggest a definition based on the following relationship:

$$u_{j \sim p} + v_j(p_j) \geq u_j^* + \xi,$$ \hspace{1cm} (8)

where $u_{j \sim p}$ equals the sum of utilities for all product attributes except price as perceived by individual $j$, $v_j(p_j)$ is the utility associated with price level $p_j$, $u_j^*$ represents a threshold utility, and $\xi$ stands for an infinitesimally small positive number. Following Jedidi and Zhang (2002), we treat $u_j^*$ as the utility of the none option, implying that individual $j$ will only choose the product, if the associated total utility is at least as high as the utility of not buying. The maximum WTP can now be derived by finding the lowest price for which Equation (8) still holds (indifference condition):

$$\text{WTP}_j = v_j^{-1}(u_j^* - u_{j \sim p}),$$ \hspace{1cm} (9)

with $v_j^{-1}$ denoting the inverse of the price-utility curve. We employ a piecewise-linear approach to calculate the maximum WTP (see, e.g., Miller et al., 2011).\textsuperscript{18} Since the part-worth profiles for the in-

\textsuperscript{15}Due to statistical noise, conjoint part-worth profiles will almost never be flat. Hence, the RI$_{jk}$ values for attributes with little relevance may be upward biased, because of the exclusive focus on extreme utility values (see Orme, 2010).

\textsuperscript{16}The reason for this property of the WTP lies in the fact that the intercept disappears in monotonic transformations. For a formal discussion see Jedidi and Zhang (2002).

\textsuperscript{17}Beside these conceptual limitations, it may yield heavy-tailed posterior distributions (see, e.g., Sonnier et al., 2007).

\textsuperscript{18}Jedidi and Jagpal (2009) differentiate between an informational and an allocative effect of price and document that WTP estimates can become negative, when the two are not separated within a CBC analysis. To mitigate this “confounding problem”, we follow Rao and Sattler (2003) by exclusively adopting the most prominent product attributes.
surance premium have been captured at discrete points only, they are interpolated with straight lines. Similarly, in case the values fall outside the range covered by our estimates, the nearest segment of the curve is extrapolated.

We complete the analysis by simulating consumer behavior in a competitive environment, thus converting our individual-level part-worth utility profiles into “shares of preference” (shares of choice). Product demand is predicted by the first choice method (maximum utility rule), which assumes that each individual buys the policy with the highest overall utility (see Orme, 2010). In a first step, we want to benchmark our previously calculated marginal WTP values. Beginning with two identical products, we improve an attribute of one of them, while keeping the counterpart unchanged. Subsequently, we also modify the premium of the product under consideration until its original share of preference is reestablished. The difference between the new and the old price, if positive, represents the surcharge that the market will accept or the monetary value of the product enhancement. Furthermore, we construct a setting with four generic term life products, establish a base case scenario, and then assess the impact of contract modifications and price variations on shares of preference. Thereby it is possible to isolate market expansion, market contraction, as well as product switching effects. Finally, we derive price-revenue and, by adding a set of cost assumptions, price-profit curves for the insurance providers.

3 Empirical Results

3.1 Partworth Utilities and Relative Attribute Importances

Before discussing the partworth utilities and relative importances for the six attributes in our study, we start with a short description of our final data sets. At the beginning, we had a total of 2,017 respondents in the sample with insurance decision makers (sample 2), and 938 respondents in the population representative sample (sample 1). Given the extent and number of choice tasks in our experiment, we deemed it appropriate to remove respondents with answer times below one minute from both samples. Furthermore, we cleaned the data sets from respondents with WTP estimates above 1,000 Euros on a monthly basis. Finally, we are left with 1,995 respondents in sample 2, and 920 respondents in sample 1. The following results in this section are based exclusively on sample 2, which contains the 1,995 insurance decision makers. After the cleaning process, the mean response time in our CBC experiment among those respondents amounts to 8.27 minutes.

The main results of each conjoint analysis are the individual preferences of the respondents for each attribute level. Generally, these preferences are depicted as partworth profiles with the utility values on the vertical axis and the attribute levels on the horizontal axis. Figure 1 shows the individual partworth

---

19 Shares of preference are an even more intuitive measure than classical WTP and, given suitable conditions, may track actual long-term equilibrium market shares quite well. Yet, as conjoint part-worth profiles do not incorporate many important real-world determinants such as advertising, promotions, and sales force effects, one should be careful not to confound these two concepts (see Orme, 2010).

20 Respondents with such high WTP estimates can be referred to as random noise (see, e.g., Orme, 2010).
profiles for all six attributes in our CBC experiment. The light gray lines represent the individual utility values that respondents assign to the respective attribute level, while the bold black lines depict the preference structures of the average respondent. Across all 1,995 respondents, we obtain a mean root likelihood (RLH) of 0.759, which is approximately 2.3 times better than the chance level.21

At a first glance, it can be seen that the individual partworths shown in subfigure 1(a) differ substantially from the ones for the remaining attributes. This is due to the fact that the monthly premiums of a term life policy differ substantially between different age and health groups. However, in order to enhance comparability between the partworth profiles for the attribute premium, we decided to display the partworth profiles per CBC analysis in one graph. Obviously, the partworths of the young non-smokers are located on the left (given the low premium levels from the CBC experiment) and the old smokers on the right hand-side of subfigure 1(a). From subfigure 1(b), it can be inferred that the average respondent is almost indifferent regarding the term of the product with a small preference towards shorter terms. The same holds true for the attribute sales channel, although the individual preferences are nearly equally distributed between the two levels. Subfigure 1(c), on the other hand, shows a falling partworth profile for the average respondent implying that a more complex medical underwriting reduces the utility explicitly. However, a point worth mentioning is the large disagreement about the one-year survival option, which can be seen from the spread of the individual partworth profiles.

---

21The root likelihood measures the goodness of fit when estimating the individual partworth profiles. It is derived from the likelihood of the data and equals the geometric mean of the predicted probabilities (see, e.g., Sawtooth Software, 2009, 2013). Given $M$ alternatives per choice task, the minimum value of the RLH is $1/M$, which resembles a so-called chance model with equal probabilities for each $m \subset M$, while the best possible value is 1.0.
Figure 1: Individual Partworth Profiles

This figure contains the partworth profiles per respondent for each attribute in our CBC experiment. The light gray lines depict the individual partworth profiles, while the dashed horizontal line marks the threshold between positive and negative utility values. In addition, the bold black lines represent the preferences of the average respondent.
Figure 2: Relative Attribute Importances

In this figure, the distributions of the relative attribute importances are shown. Additionally, the mean of the distributions as well as the 95% the highest density intervals (HDI), represented by the black lines, are quoted.
Subfigure 1(d) contains the partworth profiles for the attribute brand. It can be recognized that the classic brand insurer is more preferred by the respondents than noname insurers and companies from other industries such as Apple and Amazon.com, respectively. To be more specific, except from brand insurers, the average respondent receives a negative utility from the two other brands, although the utility values for the latter are almost equal. Finally, subfigure 1(f) comprises the preferences for the CI cover. Given the positive utility value, it becomes clear that the average respondent values this innovative term life feature. Nonetheless, the individual partworths show that a large number of respondents receive more utility if this feature is not present in their policy.

Figure 2 shows the distributions of the relative attribute importances in our sample with the corresponding mean and the 95% highest density interval (HDI). Generally, in contrast to the points located outside the HDI, the latter contains the points with a higher believability (see, e.g., Kruschke, 2011). In other words, it covers the range in which 95% of the distribution’s mass is located. From a statistical point of view, the width of an HDI can be considered as a way to measure uncertainty of beliefs (see Kruschke, 2011). In that respect, a wide HDI is associated with a higher uncertainty of beliefs, while a tighter HDI is associated to a lower uncertainty of beliefs. When considering Figure 2, it can be seen that the insurance premium is the most relevant feature in a term life product with an attribute importance of approximately 41.4%, followed by brand (15.9%), medical underwriting (14.8%), and the CI cover (13.4%). Both the term assured (7.86%) and the sales channel (6.66%), on the other hand, are of small importance only. These observations are in accordance with the shape of the partworth profiles in Figure 1. A change in the premium, for example, involves a significant change in utility to the average respondent, while changing the sales channel from online to personal has merely an influence on the total utility. Hence, we conclude that both the sales channel as well as the term assured (see subfigures 1(e) and (b)) are of minor importance. Although deemed to be the most important product feature, with respect to the 95% HDI, however, we observe that there is a large disagreement among the respondents for the attribute insurance premium. As can be seen from subfigure 2(a), the HDI ranges from approximately 3% (lower bound) to 75% (upper bound) of importance, which implies that both price-sensitive as well as price-insensitive respondents are included in our sample. The former assign a high attribute importance to the insurance premium, while the reverse holds true for the price-insensitive respondents. An explanation could be that we ran ten different CBC experiments with different price levels (see Table 2). Given calculation of the relative attribute importances, tighter price ranges result in lower importances for this attribute (see, e.g., Orme, 2010). Nevertheless, since we chose realistic price ranges for each age and health bracket (see Section 2.3), this is less an issue in our study.

Regarding the distributions of the remaining five attributes, on the other side, we note that the HDIs are more narrow. This serves as an indication that there is less disagreement about the relative importances among the respondents. From subfigures 2(c), (d), and (f) we observe that the upper bounds of the HDIs for the attributes brand, medical underwriting, and CI cover are above 30%. However, the distribution means close to approximately 15% indicate that a large number of respondents assigns importances of less than 20%. Hence, it can be concluded that the relatively high HDI ranges are caused
by a few respondents with very high importances for the respective attributes (positively skewed). All in all, this serves as further evidence for a heterogeneous sample and affirms our approach to calculate the importances per respondent in first place and averaging the results afterwards.

3.2 Marginal Willingness to Pay for Changes in Attribute Levels

Simple Exchange-Rate

As it has already been explained in Section 2.6, we calculated a single exchange rate per respondent in order to link the utilities to a monetary basis. By drawing on these exchange rates, we are able to determine the respondents’ MWTP for changes in attribute levels. In this first step, we neither consider full products nor competition between various products in a hypothetical market setting. Instead, this simple MWTP tells how much the respondents are willing to pay for an increase/decrease in attribute levels detached from a product and market context. Figure 3 displays the obtained results for specific changes in the attributes brand, CI cover, medical underwriting, and term assured.

At a first glance, it can be seen from subfigure 3(a) that the MWTP is highest for a change from an unknown insurance company towards a brand insurer. On average, the MWTP amounts to 19.50 Euros over all age and health brackets. However, we detect a peak at zero, implying that some respondents are indifferent between the two types of insurers. Nevertheless, given the fact that most of the 95% HDI covers positive values, it can be concluded that the high importance for the attribute brand as observed in Figure 2 is reflected in the MWTPs. According to subfigure 3(b), adding a CI cover is associated with a mean MWTP of 11.40 Euros. As it has been discussed in Section 3.1, the wide range of the 95% HDI is an indication of the disagreement about this product feature among the respondents, although the peak of the distribution is located in the positive area of the MWTP.

Regarding the attribute medical underwriting, the highest MWTP is observed for the change from a full medical examination towards a questionnaire with 10 questions (mean MWTP: 10.40 Euros). Changing from a medical examination to the one-year survival feature, on the other hand, the MWTP decreases to an average of 5.17 Euros. A closer look at the location of the 95% HDIs reveals that the respondents’ evaluation of this innovative feature diverge more than for the change towards 10 questions. In accordance with the distribution for the CI cover, we identify a peak at small positive MWTPs.

Finally, positive MWTPs are obtained for shorter terms assured: a change from 20 to 15 years yields an average MWTP of 4.59 Euros, while the latter amounts to 2.96 Euros for a shortening from 15 to 10 years. From subfigures 3(e) and (f) can be seen that the shape of both distributions is almost identical, which also holds true for the range of the 95% HDIs. Besides these common characteristics, the location of the distributions’ peaks differ slightly. In subfigure 3(e), the latter is located in the positive area whereas the opposite holds true for subfigure 3(f). Nevertheless, both positive mean WTPs from a term assured reduction are very interesting from the perspective of insurers since shorter term assureds are advantageous under cost aspects. Hence, the insurer could benefit from such a reduction in two ways: firstly, the costs are at a lower level, and secondly, the customers are willing to pay a higher premium.
Figure 3: Marginal Willingness to Pay (MWTP) for Changes in Attribute Levels

This figure shows the distributions of the marginal willingness to pay (MWTP) for changes in attribute levels as well as the corresponding means and 95% highest density intervals (HDI). Furthermore, the dashed vertical lines mark the border between negative and positive MWTPs.
Market Simulation

So far, the MWTPs have been calculated by simple exchange rates detached from a full product and hypothetical market setting. In this subsection, however, we construct such a setting in order to provide a more realistic estimation of MWTPs for attribute changes. The market under consideration consists of two identical products and the none-option. Since we want to determine the maximum MWTP for each attribute change, the product in our hypothetical market is composed of the attribute levels associated with the lowest utility values for the average respondent. Therefore, the term assured is assumed to be 20 years, the sales channel is set to online, the full medical examination is chosen as medical underwriting, the product is offered by a company with a non-insurance brand, and finally, a CI cover is not present. In the first run of the simulation, the insurance premium has been set to medium.

In contrast to the distributions shown in Figure 3, all attribute changes are contained in Table 3. The attributes brand and term assured have two possible changes, while the attributes CI cover and sales channel allow one change, respectively. Medical underwriting, on the other hand, has been changed four times as we found it to be quite interesting showing changes from a full medical examination to both 10 questions and the one-year survival option. From the third column, the number of respondents in each age and health bracket can be extracted. According to the weights depicted in the fourth column, the average MWTPs have been calculated both for the non-smokers and smokers (highlighted by a light gray background). Finally, the last row (with a dark gray background) contains the weighted average MWTPs for all respondents in our CBC experiment.

At a first sight, we observe that the change from the unknown insurer to the brand insurer exhibits the highest MWTP (18.96 Euros), followed by the addition of a CI cover with a MWTP of 18.35 Euros. We further detect that both reductions in the term assured are associated to a positive MWTP with a 1.12 Euros markup for the reduction from 20 to 15 years. By now, all results are in line with the MWTPs obtained by the simple exchange rates. Regarding the attribute medical underwriting, however, we detect a higher MWTP for the change from a full medical examination towards the one-year survival option (9.73 Euros) compared to 7.21 Euros for a change towards 10 questions. Furthermore, it can be concluded that both the changes from the one-year survival option towards 10 questions (-1.72 Euros) as well as the change from a company with a non-insurance brand to an unknown insurer (-1.23 Euros) entail a negative MWTP. Furthermore, the simulation reveals a relatively low MWTP for a change in the sales channel.

---

22 Orme (2010) states that these estimations, which are based on the changed market demands, are most successful when the simulation framework is based on individual utilities. Hence, by fulfilling this criterion, we expect reliable estimates of the MWTPs by this approach.

23 This setting ensures that the addition of a more preferred attribute level results in a higher MWTP. Nevertheless, we ran the same analysis with a product exhibiting all attribute levels associated to the highest utility values as a robustness check. Apart from minor deviations between the two settings, the results stay the same and are available upon request.

24 Please note that the MWTPs in the dark highlighted rows are calculated on the basis of weighted averages. For reasons of clarity and in order to enhance the readability, we decided to refrain from stating this in the following course of this paper.
Regarding both health groups, slight differences can be found. Generally, the non-smokers are characterized by positive MWTPs for all changes, while the smokers have a negative MWTP both for one change in the attributes brand and medical underwriting, respectively. Besides the strong preference towards products offered by a brand insurer, particularly the addition of the CI cover as well as reliefs in the medical underwriting generate high MWTPs among both groups. Though, except for the two negative MWTPs, the smokers are mainly willing to pay a higher premium for all remaining product modifications than the non-smokers. One common observation for both health groups is that the young respondents have relatively high MWTPs for most attribute improvements, while the opposite holds true for the older ones. This effect is reinforced when comparing both the young and old non-smokers vs. smokers.\(^{25}\)

When comparing the MWTPs obtained by the simple exchange-rates detached from a product and market context with the ones obtained from our market simulation, it can be concluded that the results are stable. Obviously, due to the different assumptions among the two approaches, the MWTPs are not to the nearest centime. The important and insightful information is that the directions as well as the magnitudes remain constant and comparable, respectively, across the product modifications. From the point of view of insurance companies, two results are of greatest relevance. Firstly, consider the change in the sales channel from online to personal. If it is possible for the insurer to offer the online sales channel at a lower cost compared to providing a nation-wide network consisting of local sales persons representing the company, the positive MWTP regarding the human sales persons may be crowded out by the cost savings.\(^{26}\) Secondly, it can be seen that the focus of companies from other industries entering the German term life market should be placed on the products offered by unknown rather than brand insurers. The negative MWTP for this attribute change indicates that the brands from non-insurance industries are associated with a higher trust by the respondents than the brands of the unknown insurers.

### 3.3 Maximum Willingness to Pay for Complete Products

**Non-Competitive Setting**

A further level of sophistication consists of determining maximum WTPs for full-fledged term life products by drawing on piecewise inversions of the individual partworths for the attribute insurance premium (see, e.g., Miller et al., 2011). Hence, we decided to construct four different term life products characterized by substantial variations in the chosen attribute levels.\(^{27}\) However, as a common characteristic, all products have a term assured of 15 years. The first product under consideration is offered by a company with a non-insurance brand and distributed via the online channel. It demands a questionnaire with 10

---

\(^{25}\)It should be kept in mind that the different absolute premium levels shown in the CBC experiment are also an explanation for higher MWTPs of older respondents and smokers.

\(^{26}\)As it has already been explained in the previous section, an almost similar consideration applies to the positive MWTPs obtained by reductions in the term assured. This result is even more interesting since a positive MWTP is accompanied by lower costs.

\(^{27}\)Although we are studying a non-competitive setting at this stage, which means that the respondents decide upon each product independently from the other products and the none-option, the product designs are inspired by real term life products available on the German market.
<table>
<thead>
<tr>
<th>Health</th>
<th>Age</th>
<th>Persons</th>
<th>Weight</th>
<th>MGTPs (in Euros)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NS</td>
<td>20-29</td>
<td>183</td>
<td>18.03%</td>
<td>9.00</td>
</tr>
<tr>
<td></td>
<td>30-39</td>
<td>208</td>
<td>20.49%</td>
<td>7.00</td>
</tr>
<tr>
<td></td>
<td>40-44</td>
<td>207</td>
<td>20.39%</td>
<td>3.85</td>
</tr>
<tr>
<td></td>
<td>45-59</td>
<td>212</td>
<td>20.89%</td>
<td>7.50</td>
</tr>
<tr>
<td></td>
<td>50-54</td>
<td>205</td>
<td>20.20%</td>
<td>21.00</td>
</tr>
<tr>
<td>Total</td>
<td>20-54</td>
<td>1,015</td>
<td>100.00%</td>
<td>9.65</td>
</tr>
<tr>
<td>S</td>
<td>20-29</td>
<td>184</td>
<td>18.78%</td>
<td>8.25</td>
</tr>
<tr>
<td></td>
<td>30-39</td>
<td>185</td>
<td>18.88%</td>
<td>6.00</td>
</tr>
<tr>
<td></td>
<td>40-44</td>
<td>197</td>
<td>20.10%</td>
<td>6.00</td>
</tr>
<tr>
<td></td>
<td>45-59</td>
<td>206</td>
<td>21.62%</td>
<td>56.25</td>
</tr>
<tr>
<td></td>
<td>50-54</td>
<td>208</td>
<td>21.22%</td>
<td>60.75</td>
</tr>
<tr>
<td>Total</td>
<td>20-54</td>
<td>980</td>
<td>100.00%</td>
<td>28.61</td>
</tr>
<tr>
<td>All</td>
<td>20-54</td>
<td>1,995</td>
<td></td>
<td>18.96</td>
</tr>
</tbody>
</table>

Table 3: Marginal Willingness to Pay for Changes in Attribute Levels in a Competitive Context
questions and has no CI cover. Given its design, we decided to denote it as budget product. The second product, on the other hand, is provided by an insurance company with a well-known brand and sold by human sales persons. In accordance with the budget product, the CI cover is nonexistent as well. It is further characterized by a full medical examination and is denoted as classic product.

The two products mentioned so far are supplemented by the so-called innovative and premium product. The former is assumed to be in the product portfolio of an unknown insurance company and contains the two cutting-edge features CI cover and one-year survival option (medical underwriting). It is distributed via the online channel. Finally, the premium product exhibits the most favorable attribute levels from the perspective of the average respondent. Hence, it is offered by a well-known insurance company and vended by human sales persons. The medical underwriting consists of a questionnaire with 3 questions and in addition, the CI cover is included. An overview of all products is provided in Table 4.

<table>
<thead>
<tr>
<th>Budget Product</th>
<th>Classic Product</th>
<th>Innovative Product</th>
<th>Premium Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>Term Assured</td>
<td>15 years</td>
<td>Term Assured</td>
<td>15 years</td>
</tr>
<tr>
<td>Sales Channel</td>
<td>Online</td>
<td>Sales Channel</td>
<td>Human sales person</td>
</tr>
<tr>
<td>Medical Underwriting</td>
<td>10 questions</td>
<td>Medical Underwriting</td>
<td>Medical examination</td>
</tr>
<tr>
<td>Brand</td>
<td>Non-insurance brand</td>
<td>Brand</td>
<td>Well-known insurer</td>
</tr>
<tr>
<td>CI Cover</td>
<td>None</td>
<td>CI Cover</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Term Assured</td>
<td>15 years</td>
</tr>
<tr>
<td>Term Assured</td>
<td>15 years</td>
<td>Sales Channel</td>
<td>Human sales person</td>
</tr>
<tr>
<td>Sales Channel</td>
<td>Online</td>
<td>Medical Underwriting</td>
<td>3 questions</td>
</tr>
<tr>
<td>Medical Underwriting</td>
<td>1-year survival</td>
<td>Brand</td>
<td>Well-known insurer</td>
</tr>
<tr>
<td>Brand</td>
<td>Unknown insurer</td>
<td>CI Cover</td>
<td>Yes</td>
</tr>
<tr>
<td>CI Cover</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 4: Exemplary Term Life Products**

This table contains the four exemplary term life products that are available on our hypothetical market. The products are composed of varying levels from the attributes term assured, brand, sales channel, CI cover, and medical underwriting.

Figure 4 contains the distributions for the maximum WTPs associated with the four reference products that have been obtained by the piece-wise linear approach. There is one common characteristic for all products, which stands out immediately: a peak at a WTP of zero. Given the general objective of a term life product, this observation makes absolute sense from an economic point of view. Being a holder of such a product is beneficial to the respondent only, if a certain security motive is present. In other words, in order to be interested in such a product, someone or somewhat to protect is needed since the respondent will not receive any payment by himself.\(^{28}\) Hence, the buying decision can be considered as a two-step process. Firstly, the respondent evaluates his or her situation and determines whether a term

\(^{28}\)As it has been defined, the respondent itself receives the lump sum from the CI option, whenever the latter is included in the contract. However, from a financial perspective, this is not sufficient to enter in a term life product.
life product would fit the personal needs. In the second step, if a demand exists, the respondent decides between several products offered to him. An additional explanation is that some respondents exhibited extreme preference structures, which lead to negative WTPs. Since a negative WTP is not very useful in our context, we decided to assign WTPs of zero to these respondents.\footnote{Please note that the holding of a term life policy does not result in a WTP of zero. On the contrary, the briefing prior to our CBC experiment ensured that the respondents are empathized in the situation where the term life product was bought.}

Figure 4: Maximum Willingness to Pay for Four Reference Products
This figure contains the distributions of the maximum WTP for the budget, classic, innovative, and premium term life product. Additionally, the dashed vertical line highlights the mean, while the bold black line displays the 95\% HDI, respectively.

Subfigure 4(a) contains the distribution of the maximum WTP for the budget product with a mean among all respondents of 18.20 Euros. The classic product shown in subfigure 4(b), on the other hand, achieves an average WTP of 22.20 Euros. Both the innovative (mean: 25.50 Euros) and premium (mean: 35.70 Euros) product generate higher average WTPs. Obviously, the same observation holds true for upper bounds of the 95\% HDIs: the budget product is associated with the lowest value (92.40 Euros)
while the opposite holds true for the premium product (157.00 Euros). These results yield some very interesting insights. Firstly, we detect that the WTP for the premium product is conspicuously above the figures for the three remaining products, while the average WTPs of the latter are within a range of approximately 7 Euros. Although the budget product is offered by a company with a non-insurance brand, it achieved a WTP almost comparable to that of the classic product offered by a brand insurer. For the latter, not even the high benefit in utility that the human sales person provides to the average respondent is sufficient to compensate the loss in utility caused by the full medical examination. An almost same explanation holds true for the small difference in the average WTP between the innovative and the classic product. The CI cover is associated with a gain in the average WTP (see Table 3) whereas the unknown insurance brand leads to a reduction compared to the brand insurer. All in all, the innovative product exhibits a higher average WTP as well as a wider 95% HDI. Finally, due to its design, which is oriented at the features providing the maximum utility for the average respondent (see Figure 1), the premium product attains the highest WTP.

**Market Simulation**

From the results shown so far, one level of sophistication remains: the introduction of competition between the products as well as the inclusion of the possibility not to buy at all. To be more precise, the four products defined in the previous section meet in a hypothetical market scenario. As it has been mentioned before, the design of the products has been chosen in order to resemble a realistic term life market. Firstly, the budget product with its features can be seen as an entry-level product that represents the lower bound of our market. Hence, we assume that it is priced with the very low premium (see Table 2). Secondly, we consider the classic product as standard term life characterized by common features observed in today’s market in Germany. Regarding the premium, we assigned it the second price level (low). The same applies to the innovative product, on the other hand, which exhibits the cutting-edge features CI cover and one-year survival option for the medical underwriting. Therefore, as its name suggests, it should be seen as novel term life product. Finally, the premium product represents the high-end segment of the market and is priced with the medium premium level.\(^\text{30}\) Generally, there are two ways how to apply market simulations and the concept of shares of preferences. On the one hand, it is possible to change an attribute level of a specific product and analyze the change in the shares of preferences. On the other hand, the product designs can be held constant, while the price of a specific product is increased or lowered, respectively. Under both approaches, the changed product feature or product price will influence the shares of preferences of all products available in the market.

As a first step, we consider changes in the product design and the corresponding effects on our hypothetical market. Table 5 shows both the base case as well as the changes in the shares of preferences for the four reference products. The base case shown in the first row of Table 5 can be seen as initial state of the market. In this scenario, the budget product is priced with the very low premium, the classic

---

\(^{30}\)Given the diversity of the providers on the German term life market, a full replication including all niche products is impossible. However, since the major product categories are represented by our dummy products, i.e., a realistic competition is given in the simulation (see Orme, 2010), we deem our hypothetical market as appropriate.
and the innovative product at the low price level, and the premium product with the medium price level. Due to its very low price, the budget product captures a share of preferences of 15.89%, followed by the premium (12.93%) and the innovative (8.77%) product. The classic product, on the other hand, attracts the lowest number of respondents (4.51%). From the fifth column, the shares of preference of the none-option can be seen, i.e., the percentage of respondents who do not buy at all. In the base case, this share of preferences amounts to 57.89%.

From the top part of Table 5, the effects from variations in the attributes of the budget product can be extracted (with a light gray background). By adding the CI cover to the product and holding all other attributes as well as the premium constant, the share of preferences increases by 78.55%. Both the reduction to a questionnaire with 3 health questions (+9.78%) as well as the reduction of the term assured to 10 years (+6.31%) result in positive market reactions. However, only the addition of the CI cover offers the possibility to extend the total market size significantly (+11.78%). When looking at the effects from a changed classic product in the second part of the table, a similar picture arises. The highest increase in shares of preferences can be obtained by adding the CI cover to the product (+150.00%), while a changed medical underwriting with 10 questions results in a 10.00% increase. However, in contrast to the budget product, the share of preferences of the none-option remains stable across all changes.

Table 5: Market Shares after Product Adjustments

<table>
<thead>
<tr>
<th>First Choice</th>
<th>Budget</th>
<th>Classic</th>
<th>Innovative</th>
<th>Premium</th>
<th>None</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Case</td>
<td>15.89</td>
<td>4.51</td>
<td>8.77</td>
<td>12.93</td>
<td>57.89</td>
<td>100.00</td>
</tr>
<tr>
<td>Budget [CI]</td>
<td><strong>28.37</strong></td>
<td>4.66</td>
<td>3.71</td>
<td>10.33</td>
<td>52.93</td>
<td>100.00</td>
</tr>
<tr>
<td>+78.55%</td>
<td><strong>+3.33%</strong></td>
<td>+57.71%</td>
<td>-20.16%</td>
<td>-8.57%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Budget [3Q]</td>
<td>17.44</td>
<td>4.71</td>
<td>7.97</td>
<td>12.58</td>
<td>57.29</td>
<td>100.00</td>
</tr>
<tr>
<td>+9.78%</td>
<td>+4.44%</td>
<td>-9.14%</td>
<td>-2.71%</td>
<td>-1.04%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Budget [10y]</td>
<td>16.89</td>
<td>4.51</td>
<td>8.52</td>
<td>12.83</td>
<td>57.24</td>
<td>100.00</td>
</tr>
<tr>
<td>+6.31%</td>
<td>-</td>
<td>-2.86%</td>
<td>-0.78%</td>
<td>-1.15%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Classic [CI]</td>
<td>15.54</td>
<td><strong>11.28</strong></td>
<td>7.62</td>
<td>8.82</td>
<td>56.74</td>
<td>100.00</td>
</tr>
<tr>
<td>-2.21%</td>
<td>+150.00%</td>
<td>-13.14%</td>
<td>-31.78%</td>
<td>-1.99%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Classic [1Y-SO]</td>
<td>15.94</td>
<td>5.46</td>
<td>8.02</td>
<td>13.03</td>
<td>57.54</td>
<td>100.00</td>
</tr>
<tr>
<td>+0.32%</td>
<td>+21.11%</td>
<td>-8.57%</td>
<td>+0.78%</td>
<td>-0.61%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Classic [10Q]</td>
<td>15.74</td>
<td>4.96</td>
<td>8.72</td>
<td>12.73</td>
<td>57.84</td>
<td>100.00</td>
</tr>
<tr>
<td>-0.95%</td>
<td>+10.00%</td>
<td>-0.57%</td>
<td>-1.55%</td>
<td>-0.69%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Classic [10y]</td>
<td>15.94</td>
<td>5.01</td>
<td>8.62</td>
<td>12.98</td>
<td>57.44</td>
<td>100.00</td>
</tr>
<tr>
<td>+0.32%</td>
<td>+11.11%</td>
<td>-1.71%</td>
<td>+0.39%</td>
<td>-0.78%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Innovative [3Q]</td>
<td>16.09</td>
<td>4.51</td>
<td><strong>9.67</strong></td>
<td>12.28</td>
<td>57.44</td>
<td>100.00</td>
</tr>
<tr>
<td>+1.26%</td>
<td>-</td>
<td>+10.29%</td>
<td>-5.04%</td>
<td>-0.78%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Innovative [10y]</td>
<td>15.49</td>
<td>4.46</td>
<td><strong>10.08</strong></td>
<td>12.83</td>
<td>57.14</td>
<td>100.00</td>
</tr>
<tr>
<td>-2.52%</td>
<td>-1.11%</td>
<td>+14.86%</td>
<td>-0.78%</td>
<td>-1.30%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Premium [10y]</td>
<td>15.89</td>
<td>5.21</td>
<td>8.07</td>
<td><strong>13.48</strong></td>
<td>57.34</td>
<td>100.00</td>
</tr>
<tr>
<td>+15.56%</td>
<td>-8.00%</td>
<td>+4.26%</td>
<td>-0.95%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Due to its more favorable designs regarding the preferences of the average respondent, only less changes remain for both the innovative and premium product. Nevertheless, it can be seen that a reduction to 3 health questions (+10.29%) as well as a reduced term assured (+14.86%) lead to a growing share of preferences for the innovative product. Reducing the term assured in the premium product, on the other hand, is associated with a smaller, but still positive increase (+4.26%). In accordance with the classic product, the total market size remains virtually unaffected in both cases. Generally, an increased share of preferences resulting from changed attribute levels can be interpreted as follows: the provider of the product could increase the product price until the share of preferences from the base case is obtained. The differences in prices equal the MWTP. Hence, we conclude that all the changes shown in Table 5 are associated with positive MWTPs. These results are in line with the MWTPs detached from a product and competitive context (see Figure 3) as well as the MWTPs from a pure product context without competition as shown in Table 3.

Besides adaptations on the existing product designs, the effects associated with varying price levels are of relevant importance for the insurance providers. Hence, start from the base case and let the price for each product vary between the levels very low and very high, while holding all other prices constant. Subfigure 5(a) shows the obtained results for the budget product. In this graph, the shares of preferences representing the base case are located at the very low price level, since the latter corresponds to the initial price of the budget product.\footnote{Please note that during the price variations of this product, the classic and innovative products are priced at the low level and the premium product at medium. Hence, with the budget priced at very low the base case is obtained.} It can be seen that prices above the level low lead to a dramatic drop in the budget’s share of preferences, while the total market size levels off at approximately 37% of the respondents. If the budget product is priced at the high level and above, it virtually vanishes from the market. Subfigure 5(b) shows the impact on the remaining products in the market.\footnote{Since the budget is priced at very low in the base case, a change in the price level implies a price increase, which leads to falling shares of preferences. Hence, subfigure 5(b) exhibits negative switches only.} While the effects on the classic and premium product can almost be neglected, in particular the innovative product as well as the none-option benefit from the changed budget prices. In other words, a significant number of respondents leave the market as a reaction of price increases by the budget provider.

Subfigure 5(c) shows the results for the classic product, in which the base case can be found at the low price level. Compared to the analysis for the budget product, the price may either be increased or decreased. With reference to subfigure 5(d), it can be concluded that shares of preferences are taken mostly from the budget product when the price level is lowered. Likewise, the classic product offered at low price levels attracts respondents who otherwise would not have been in the market. A price increase, on the other hand, reduces the classic proportion in favor of the budget as well as the premium product until the share of preferences approaches virtually zero. However, in contrast to the results for the budget product, the total market size remains almost constant above 40%.

Since the initial innovative price equals the one of the classic product, we can extract the base case in subfigure 6(a) from the low level as well. By lowering the innovative price, a significant increase in the
Figure 5: Effects from Price Variations of the Budget and Classic Product

This figure shows the effects from varying prices of the budget and classic product, respectively. From subfigures (a) and (c) it can be extracted how the five price levels affect the shares of preferences of all products as well as the none-option. The switching effects towards the respective remaining products are denoted in percentage points (PP) and displayed in subfigures (b) and (d).

share of preferences is detected. However, large price increases result in a disappearance of the innovative product from our hypothetical market. Again, the budget product experiences major impacts by varying innovative prices as can be seen in subfigure 6(b). Across the innovative price range, we detect a decrease in total market size by approximately -16.6%. Finally, from subfigure 6(c), the shares of preferences resulting from changed premium prices can be extracted. For the relatively low price levels, the premium product reaches shares of preferences between approximately 23% and 43%, from which in particular both the budget and innovative products suffer. However, subfigure 6(d) reveals that a significant proportion of respondents enters the market for such low premium prices. In contrast to the competitor products, even for the highest price level a share of preferences of approximately 5% remains. Hence, the premium product is available in our hypothetical market independent from the scenario under consideration.
Due to its very low price level, the budget product is the major beneficiary from price increases of the other products. Furthermore, as it has been indicated by the results contained in Table 5, the budget and the innovative product are the closest competitors. Increased budget premiums result in high gains by the innovative product and vice versa. From the discussion of Table 3, this observation may be traced back to the positive MWTP of the company with a non-insurance brand vs. the unknown insurer (see product designs in Table 4). Following Orme (2010), market simulations may also reveal substitutability effects (e.g., cannibalism) between different brands. Given our product designs, such an effect should, if at all, be expected for the classic and the premium product. However, by drawing on our results, no evidence can be found. An explanation might be that the existing CI cover as well as the medical underwriting with 3 health questions overcompensate such an effect in favor of the premium product.
A further insight is that lower prices of the classic, innovative, and premium product lead to the so-called market expansion effect. Compared to the base case scenario, the low prices attract new respondents who enter the market. For the budget product, on the other hand, we observe a reversed effect: price increases cause respondents to leave the market instead of switching to a competitive product. In a softer form, respondents also leave the market by increased classic and premium prices. As it has been already mentioned above, the innovative product loses its customers mainly to the budget product. Finally, we observe different price sensitivities of the respondents depending on the product purchased. Regarding the budget, classic, and innovative products it can be observed that high price increases cause the respondents to leave the market or to switch to the other products offered. Hence, as a consequence, the shares of preferences of these products are virtually approximating zero. On the other hand, due to its favorable design regarding the preferences of the average respondent, the premium product suffers less from high price levels. Even at the highest price level, a share of preferences significantly higher than zero can be detected. Therefore, it can be concluded that the respondents buying the premium product at this level are less price-sensitive compared to those buying the other products and leaving the market or switching to other offerings, respectively.

3.4 Revenues and Profits

From the results in the previous section, it could be observed how the shares of preferences change due to varying price levels in the hypothetical market setting. Therefore, it may be reasoned that the lowest price level should be chosen to attract the largest possible number of buyers. Generally, since the pricing of products in a market is based mainly on cost considerations, however, such a strategy is impossible in reality. Hence, in this subsection, we introduce the cost side associated with our four dummy products in order to provide reliable statements regarding the optimal price levels. Moreover, we draw on the term life market in Germany and derive empirical scaling factors aiming at giving an indication of the total market size measured in revenues and profits, respectively.

First of all, a total of four cost structures (each per product) is needed. Similar to the prices, the costs depend both on the respondents’ health status and age. In order to keep consistency, we chose a similar approach to derive the costs as in the case of the prices (see Table 2). The quotes provided by the German online comparison platform www.check24.de are taken as a starting point. More in detail, we determined the lowest quoted price both for the minimum and maximum as well as the average age per age bracket. Since the prices shown on this platform are final offerings by the insurers, a correction for the profit loading is needed. According to interviews with market experts in Germany, the latter has been set to 3%. After the correction, we arrived at the net costs of the respective health and age group. However, given the diverse product designs, further adaptions are needed. Firstly, the addition of a CI cover is associated with a 30% mark-up. Secondly, a mark-up of 30% is added to the premium product, while the budget product receives a discount of 15%. By this approach, it is ensured that both

33 Among the non-smoking 20-29 year olds, for example, the average age is 26 years.
34 With respect to the product compositions, this mark-up applies to the innovative and premium products only (see Table 4).
the low-end and high-end claims of these products (see Section 3.3) are adequately reflected in the costs. The final product costs per health and age group are given by the means of the costs associated with the minimum, average, and maximum age per group and are shown in Table 6.

In order to derive the total revenues per product, a relation between our sample size (1,995 respondents) and the actual number of term life products in Germany is required. For 2013, the global reinsurance company Swiss Re estimates the latter to be approximately 7.5 million contracts. Armed with this information, the scaling factors can be derived in two steps. Firstly, we draw on the shares of preferences as shown in Figures 5 and 6 to determine the total number of buyers in the market at the respective price levels. In the second step, the scaling factors are calculated as ratios between policies sold in our hypothetical and the real term life market. In the next step, these scaling factors are employed to determine the total number of buyers in each health and age group. The total revenues and costs are then obtained by multiplying the buyers by the respective premium and cost structures. Finally, the profits are nothing but the differences between the revenues and the costs. Subfigure 7(a) displays the revenues for the four products, while the corresponding profits are shown in subfigure 7(b).

![Figure 7: Revenues and Profits in the Hypothetical Term Life Market](image)

In this figure both the profits and revenues (in Euro millions) for each of the products are shown. The dashed horizontal line in subfigure 7(b) marks the break-even point.

At a first glance, subfigure 7(a) shows that the premium product generates the highest revenues across all price levels, which can be explained by the favorable product design. For the relatively low price levels, the innovative revenues are highest followed by the budget and the classic product. With increasing prices, however, the revenues strive against each other until almost no remarkably difference remains. From these three products, the high innovative revenues are caused by the CI option, while the full medical examination depresses the classic revenues. With its entry-level design, the budget revenues

---

35 In case of our initial state, for example, the sum of the shares of preferences (42.1% of 1,995 respondents) corresponds to 840 term life products sold (see the first row in Table 5). Hence, a scaling factor of approximately 0.0112% is obtained.

36 Please note that the price level “very high” has been omitted from the analysis since the results do not bear further insights.
<table>
<thead>
<tr>
<th>Health</th>
<th>Age Bracket</th>
<th>Age</th>
<th>Floor</th>
<th>Budget</th>
<th>Classic</th>
<th>Innovative</th>
<th>Premium</th>
<th>$\odot$ Budget</th>
<th>$\odot$ Classic</th>
<th>$\odot$ Innovative</th>
<th>$\odot$ Premium</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>20-29</td>
<td>20</td>
<td>2.88</td>
<td>2.38</td>
<td>2.80</td>
<td>3.63</td>
<td>4.73</td>
<td>2.51</td>
<td>2.95</td>
<td>3.84</td>
<td>4.99</td>
</tr>
<tr>
<td></td>
<td>26</td>
<td>2.97</td>
<td>2.45</td>
<td>2.88</td>
<td>3.75</td>
<td>4.87</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>29</td>
<td>3.28</td>
<td>2.71</td>
<td>3.18</td>
<td>4.14</td>
<td>5.38</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>30-39</td>
<td>30</td>
<td>3.44</td>
<td>2.84</td>
<td>3.34</td>
<td>4.34</td>
<td>5.64</td>
<td>3.97</td>
<td>4.67</td>
<td>6.08</td>
<td>7.90</td>
</tr>
<tr>
<td></td>
<td>35</td>
<td>4.70</td>
<td>3.88</td>
<td>4.56</td>
<td>5.93</td>
<td>7.71</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>39</td>
<td>6.30</td>
<td>5.20</td>
<td>6.12</td>
<td>7.95</td>
<td>10.34</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>40-44</td>
<td>40</td>
<td>6.80</td>
<td>5.61</td>
<td>6.60</td>
<td>8.58</td>
<td>11.16</td>
<td>6.71</td>
<td>7.90</td>
<td>10.27</td>
<td>13.34</td>
</tr>
<tr>
<td></td>
<td>42</td>
<td>8.00</td>
<td>6.60</td>
<td>7.77</td>
<td>10.10</td>
<td>13.13</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>44</td>
<td>9.60</td>
<td>7.92</td>
<td>9.32</td>
<td>12.12</td>
<td>15.75</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>47</td>
<td>12.40</td>
<td>10.23</td>
<td>12.04</td>
<td>15.65</td>
<td>20.35</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>49</td>
<td>15.10</td>
<td>12.46</td>
<td>14.66</td>
<td>19.06</td>
<td>24.78</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>50-54</td>
<td>50</td>
<td>16.70</td>
<td>13.78</td>
<td>16.21</td>
<td>21.08</td>
<td>27.40</td>
<td>17.55</td>
<td>20.65</td>
<td>26.84</td>
<td>34.89</td>
</tr>
<tr>
<td></td>
<td>52</td>
<td>20.80</td>
<td>17.17</td>
<td>20.19</td>
<td>26.25</td>
<td>34.13</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>54</td>
<td>26.30</td>
<td>21.70</td>
<td>25.53</td>
<td>33.19</td>
<td>43.15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Health</th>
<th>Age Bracket</th>
<th>Age</th>
<th>Floor</th>
<th>Budget</th>
<th>Classic</th>
<th>Innovative</th>
<th>Premium</th>
<th>$\odot$ Budget</th>
<th>$\odot$ Classic</th>
<th>$\odot$ Innovative</th>
<th>$\odot$ Premium</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>20-29</td>
<td>20</td>
<td>4.73</td>
<td>3.90</td>
<td>4.59</td>
<td>5.97</td>
<td>7.76</td>
<td>4.57</td>
<td>5.38</td>
<td>6.99</td>
<td>9.08</td>
</tr>
<tr>
<td></td>
<td>26</td>
<td>5.90</td>
<td>4.87</td>
<td>5.73</td>
<td>7.45</td>
<td>9.68</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>29</td>
<td>5.98</td>
<td>4.93</td>
<td>5.81</td>
<td>7.55</td>
<td>9.81</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>34</td>
<td>9.88</td>
<td>8.15</td>
<td>9.59</td>
<td>12.47</td>
<td>16.21</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>39</td>
<td>16.40</td>
<td>13.53</td>
<td>15.92</td>
<td>20.70</td>
<td>26.91</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>40-44</td>
<td>40</td>
<td>18.10</td>
<td>14.94</td>
<td>17.57</td>
<td>22.84</td>
<td>29.70</td>
<td>18.57</td>
<td>21.84</td>
<td>28.40</td>
<td>36.92</td>
</tr>
<tr>
<td></td>
<td>42</td>
<td>22.20</td>
<td>18.32</td>
<td>21.55</td>
<td>28.02</td>
<td>36.43</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>44</td>
<td>27.20</td>
<td>22.45</td>
<td>26.41</td>
<td>34.33</td>
<td>44.63</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>45-49</td>
<td>45</td>
<td>30.20</td>
<td>24.92</td>
<td>29.32</td>
<td>38.12</td>
<td>49.55</td>
<td>31.11</td>
<td>36.60</td>
<td>47.58</td>
<td>61.86</td>
</tr>
<tr>
<td></td>
<td>47</td>
<td>37.10</td>
<td>30.62</td>
<td>36.02</td>
<td>46.83</td>
<td>60.87</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>49</td>
<td>45.80</td>
<td>37.80</td>
<td>44.47</td>
<td>57.81</td>
<td>75.15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>50-54</td>
<td>50</td>
<td>51.10</td>
<td>42.17</td>
<td>49.61</td>
<td>64.50</td>
<td>83.84</td>
<td>53.85</td>
<td>63.35</td>
<td>82.36</td>
<td>107.07</td>
</tr>
<tr>
<td></td>
<td>52</td>
<td>63.87</td>
<td>52.71</td>
<td>62.01</td>
<td>80.61</td>
<td>104.80</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>54</td>
<td>80.79</td>
<td>66.67</td>
<td>78.44</td>
<td>101.97</td>
<td>132.56</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 6: Cost Structures in the Hypothetical Term Life Market

This table shows the cost structures for the budget, classic, innovative, and premium product per health and age group. The profit loading has been set to 3%, while the CI cover mark-up amounts to 30% and applies to the innovative and premium product. Finally, a budget discount of 15% and a premium mark-up of 30% have been applied.
are located in between. Another interesting point is that the maximum revenues of the innovative, classic, and budget products are realized at the lowest price level. The premium product, on the other hand, has the highest revenue at the intermediate price between very low and low. Lastly, as it has been expected, the revenues are falling with increasing prices.

With regard to the profits shown in subfigure 7(b), a completely different picture arises. Generally, for all products in the market, the prices maximizing the revenues do not correspond to the prices maximizing the profits. The dashed curve representing the premium product indicates that the maximum profits can be earned at the high price level. This observation is in accordance with previous results regarding the MWTP for specific product features as well as the identified price-insensitivity of the premium buyers. Furthermore, it can be seen that the premium product cannot be offered at the low prices since negative profits would result. Although designed as entry-level product, the budget generates the highest profits at the intermediate price stage between “very low” and “low”. Due to its advantageous cost structure, the profits are significantly higher than those of the classic and innovative product, respectively. The former reaches the maximum profit at the medium price, whereas the latter at the intermediate level between “low” and “medium”.

In summary, our results exhibit a considerable practical relevance. Firstly, in conformity with Figures 5 and 6, the highest share of preferences lead to the highest possible revenue for the budget, classic, and innovative product. Regarding the premium product, on the other hand, it can be observed that the loss in buyers is compensated by the increased price level. As a result, the maximum revenue can be achieved at an intermediate price level between “very low” and “low”. Secondly, the highest revenues do not result in the highest profit for any product. In case of the premium term life, for example, the maximum profit is associated to the high price level, i.e., three price levels above the lowest one. Regarding the competition between the budget and the innovative product, it can be revealed that the former is able to generate higher profits across almost all price ranges. A similar result is obtained from the classic curve: the brand insurer offering this term life policy should choose the medium price in order to realize the second highest profits. Finally, the findings from Figures 5 and 6 has to be interpreted with caution. From the perspective of the classic and innovative supplier, a price war at the “very low” level is useful only when a competitor should be forced out of the market. In terms of profits, however, such a strategy will lead to a bankruptcy over the long term.

4 Summary and Conclusion

We run a CBC analysis for term life insurance contracts with a sample of 2,955 German consumers, for which data has been collected through web-based discrete choice experiments. Individual-level part worth utility profiles are estimated by means of a HB model. Drawing on the elicited preference structures, we compute relative attribute importances and different WTP measures. In addition, we present compre-

\[37\text{In this respect, the shares of preferences shown in Figure 6 for low premium prices should be regarded as purely hypothetical scenarios.}\]
hensive simulation results for a realistic market setting with four generic term life contracts, based on which it is possible to predict demand effects and derive price-revenue as well as price-profit curves.

Brand, CI cover, and medical underwriting were found to be the most important non-price attributes of term life contracts from the consumers’ perspective. As a consequence, the market is prepared to accept a significant markup in the monthly premium, if the product is provided by a well-known insurance company or includes the innovative CI rider. Similarly, we revealed a noteworthy positive marginal WTP for a relaxation in the underwriting process away from full medical examinations. While the direction of these effects could have been expected, a rather surprising finding is that individuals tend to have a higher reservation price for shorter terms assured. Apart from that, we were able to document a clearly ordered maximum WTP for our considered four product types. However, in each case, we also identified a very large fraction of individuals with a WTP close to zero. This alludes to a two-step decision making process: if, in a first step, the consumer does not detect a need for coverage, then he will not be interested in term life insurance at all. Finally, based on the estimated demand sensitivities and approximated product costs, it could be shown that a contract’s profit-maximizing price may substantially differ from the price that generates the highest market share and premium revenues.

Owing to state-of-the-art methodology and comprehensive sample size, our findings convey an accurate and reliable picture of expectable consumer behavior in the German term life market. In addition, they entail viable management implications and thus also exhibit practical relevance. An obvious area of application is product design, where it is advisable to focus on the aforementioned key attributes to maximize demand. Building a strong brand, e.g., will likely pay off in terms of premium revenues. At the same time, it may be well worthwhile to forgo some medical information and compensate the corresponding cost disadvantages by mainly offering ten year contracts. However, the perhaps most important conclusion for insurance companies is that a paradigm shift with regard to the pricing of term life products may finally be necessary. Those who turn away from the purely cost-based perspective and begin to set premiums based on an in-depth understanding of consumer preferences, will be able to collect substantial economic rents.

Our work raises at least three questions for future research. Firstly, although the conducted simulations rely on a realistic setting, various other market scenarios may be of interest to an insurer selling term life policies. Therefore, it could be instructive to confirm our main findings with a more intricate configuration of product offerings and cost structures. In this regard, one might even conceive of attempting to incorporate strategic reactions of competitor firms such as product relaunches or price wars. Secondly, the individual-level part-worth profiles can be employed to develop a benefit segmentation for the term life market, i.e., to differentiate consumer types according to their preferences. By doing so, it would be possible to further optimize an insurance market product and pricing strategies. Lastly, further insights into the actual decision making process for term life insurance are needed. More specifically, it is still unclear how consumer characteristics, such as sociodemographic factors and latent constructs, influence the WTP.
References


