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FEATURE ARTICLE

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Pricing strategies in the German term life insurance market: An empirical analysis

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Abstract

The life insurance sector is highly regulated. Areas of regulation include not only solvency requirements but also product pricing. In most industries, companies aim to increase producer rents by using information regarding the customer's willingness to pay (WTP), which allows them to endeavor price discrimination if no perfect competition prevails. In this article, we investigate the pricing behavior in the German Term Life insurance market by analyzing market prices, actuarial fair pricing, and the WTP for eighteen customer groups and three product categories. The results show that premiums charged for budget Term Life insurance products are in some cases even below the actuarially fair price. For term life insurance products with additional services, regulation, and market conditions hinder insurance companies from employing advanced strategies of price discrimination and the employment of the WTP.

1 | INTRODUCTION

Insurance companies are subject to a comprehensive regulatory framework designed to protect the rights of policyholders. An important regulatory requirement for life insurers is the so-called "principle of equal treatment" that can be found in

[Correction added on 4 April 2022, after first online publication: Introduction (line 3) - "sso-called" has been updated to "so-called"]

various countries.[1] The principle of equal treatment requires that premiums and benefits are set according to the same rules for policyholders with the same conditions. As a result, the premium is a direct function of the production costs. From a technical perspective, it is composed of the actuarially fair premium and a loading p $(= a + b + c)$ where p is generally positive. The actuarially fair premium is derived from the discounted expected indemnity payments to the beneficiary. The loading p is the sum of a (= the price for bearing the risk), b (= the profit loading) and c (= the insurer's administration costs and additional frictional costs such as taxes).

In establishing this principle, regulators must assume that markets are not fully competitive. Otherwise, and whether or not such a regulatory principle is applied to the market, competition would force insurers to offer prices equal to the full cost of production. Therefore, market premiums should be equal to the actuarially fair premium plus a and c, thus always fulfilling the principle of equal treatment. Suppose this principle was applied to a noncompetitive market; in that case, the result would be that premiums would still be based on the actuarially fair premium. However, companies could set $b > 0$ and still be in compliance with the regulation as long as the loading p is identical for every policyholder with the same risk characteristics. This would result in policyholders with higher risks paying higher premiums, as required by the principle. In this case, premiums could be set significantly higher than the actuarially fair premium, and insurers could skim off parts of the customer rent. The principle of equal treatment is to some extent contradictory to the EU-wide deregulation of the insurance market since 1994, according to which private insurance companies are supposed to be free to set their own prices. Similar laws can only be found in markets with explicit price regulations or in the social insurance sector. In addition, there are other laws that affect the pricing of life insurance. For example, the German Insurance Contract Act (§153 Versicherungsvertragsgesetz, VVG) regulates the surplus sharing of life insurance companies and thus influences the prices and returns of insurers. Articles 3–8 of the Minimal Payback Directive (Mindestzuführungsverordnung, MindZV), on the other hand, stipulate the share of investment returns, underwriting profit, and other surpluses that insurers must repay to policyholders.

In the case of imperfect competition, companies in other industries usually try to set the loading factor b individually for different groups of customers and thus skim off their willingness to pay. Therefore, the principle of equal treatment might prevent insurers from accounting for the policyholders' WTP in their pricing. To examine this aspect in more detail, we analyze the relationship between WTP, actuarially fair premium, and market price in the German term life insurance (TLI) market. We explicitly chose TLI for several reasons. First, with over EUR 4.2 billion in annual premiums paid and 7.6 million policies in force, term life insurance policies represent a significant part of the German life insurance industry (Gesamtverband der Deutschen Versicherungswirtschaft e. V., 2019). Second, as shown by Kahneman and Tversky (1979), policyholders are expected to overestimate their expected indemnity payment, leading to a significant difference between the actuarially fair premium and their WTP. Consequently, TLI is believed to offer insurers great potential for active revenue management. Moreover, due to the nature of the product, renewals appear to occur

[1]Examples, among others, include Germany (Article 138 (2) of the Law on the Supervision of Insurance Undertakings (Versicherungsaufsichtsgesetz, VAG)), Switzerland (Article 120 and 122 of the Law on the Supervision of Insurance Undertakings (Versicherungsaufsichtsgesetz, VAG)), and parts of Canada (Article 1 (1/2) of the Insurance Act, Ontario Regulation 7/00: Unfair or Deceptive Acts or Practices)).

infrequently, so the effects of the so-called price walking phenomenon do not affect the analysis.[2]

The remainder of this article is structured as follows. We start our discussion with a brief literature review in Section 2, while the data and the methodology used are described in Section 3. The fourth section contains our analyses, and Section 5 discusses the results and implications for insurance companies and policyholders. In the final section, we provide a summary of our results and draw our conclusion.

2 | LITERATURE REVIEW

2.1 | WTP in the context of insurance

In the academic literature, research on customers' WTP is diverse: While some authors aim to determine consumer and producer rents, others focus on the evaluation of different pricing strategies. In insurance practice, it is vital to approximate the WTP for a new product beforehand to assess, whether potential customers are willing to pay a price that exceeds the provider's costs.

In the context of insurance, several articles empirically examine WTP in developing countries for crop insurance (see, e.g., Bulte et al., 2019; Freudenreich & Mußhoff, 2018; Wang et al., 2020), health insurance (see, e.g., Bonan et al., 2014; Delavallade, 2017), livestock insurance (see, e.g., Castellani & Vigan`o, 2017), different types of index and microinsurance in different parts of the world (see, e.g., Elabed & Carter, 2015), flood insurance (see, e.g., Botzen & Bergh, 2012), and weather insurance (see, e.g., Fraser, 1992; Musshoff et al., 2008). For developed countries, analyses of WTP for insurance tend to focus on public social systems. For instance, there is an extensive strand of literature that concentrates on WTP for health insurance in the United States (see in particular Bosworth et al., 2015; Drake, 2019; Finkelstein et al., 2019), Germany (see Bock et al., 2016, 2017) and many other regions (for on overview, see Braun et al., 2016). Unemployment (Hendren, 2017) and long-term care insurance (see, e.g., Akaichi et al., 2020; Braun et al., 2019) have also been studied in the past. For instance, Hendren (2017) shows that even though the WTP for private unemployment insurance treaties in the US market seem to be higher than estimated in early studies, frictions imposed by the policyholders' private information do not allow providers to offer such contracts in a profitable manner. Braun et al. (2019) demonstrate in an experimental study that individuals in frail and/or low-income risk groups do not purchase long-term care insurance because the cost of insuring exceed their WTP. Also, the take-up rates for more wealthier individuals are rather small because of transaction costs and problems of adverse selection.

Private insurance products, have been rather seldom the subject of research. One of the few examples is Hansen et al. (2016), who examine the WTP of auto, home, and household insurance in Denmark. To date, few authors have focused on life insurance policies. Among these, the theoretical work of Gatzert et al. (2012) assesses WTP for participating life insurance contracts, while Braun et al. (2016) draw on choice-based conjoint analysis to derive the WTP for German TLI products. In Gatzert et al. (2012), the fair price of participating life insurance

[2]The price walking phenomenon describes the increase in price over time for longer contracts, resulting in a difference between the premiums paid by new and existing customers for the same product.

contracts based on risk neutral valuation is compared with the WTP of normative-rational policyholders with μ/σ-preference. In particular, the authors derive fair-priced combinations of investment guarantees, annual profit participation rates, and terminal participation rates that maximize the policyholder's utility for fixed degrees of risk aversion. Braun et al. (2016) run a choice-based conjoint (CBC) analysis for term life insurance on a sample of 2.017 German customers using data from a web-based experiment. Individual-level part-worth profiles are estimated and relative attribute importance as well as different WTP measures are derived. Branding, critical illness covers and the underwriting procedure are on average the most important product attributes from the customer's point of view. If a term life insurance contract comprises such favored specifications, customers accept substantial premium markups. On simplified market assumptions, the authors show that utility-driven product optimization helps to increase the insurer's market share and profitability.

In Luca et al. (2021), preferences of 1180 German consumers for investment guarantees in financial products by means of choice-based conjoint and latent class analysis are analyzed. Based on the segment-level part-worth utility profiles, the most important product features are identified. In a stylized market environment, consumer's demand is examined and it is tested to which degree individual purchasing behavior can be connected to various socioeconomic characteristics. Although the willingness to buy an investment guarantee for a fair price (based on risk-neutral valuation) varies widely within different consumer groups, the degree of heterogeneity with respect to the individual guarantee attributes and guarantee levels is rather small.

This overview shows that the research employing WTP is widely present in public welfare literature, accepted in the field of marketing research, and frequently used in the context of insurance. For developed countries, scholars put their emphasis strongly on insurances belonging to the social systems. But for privately offered products, the WTP has been investigated less frequently. However, in other industries, WTP-analyses are very common, also for privately offered products (Goldberg et al., 1984; Kohli & Mahajan, 1991; Sichtmann,2011; Venkatesh & Mahajan, 1993; Ward, 1990). For instance, Goldberg et al. (1984) focus on the pricing and the customers' willingness to pay for hotel amenities in the US market. Thereby, the authors' emphasize on the question of how conjoint analysis can be modified to account for correlated attributes (like the product price) and bundling problems (price ad-up for each amenity vs. the price ad-up for various bundles of amenities).

In summary, we clearly see the necessity for more extensive WTP research for life insurance products. Furthermore, the reported literature focuses on a presentation of the WTP for a certain product and does not reflect the findings to regulatory requirements, the given market structure, and the product costs. The aim of this paper is to close this gap in the sector of term life insurance contracts in the German term life insurance market.

2.2 | Measurement of WTP

According to Breidert et al. (2015), the various approaches to measuring WTP can be divided into indirectly revealing and directly stated preference measurements. The former include methods such as analyses of market data and experiments such as auctions, while the latter include indirect or direct survey methods. Direct survey measures explicitly ask about the WTP for a particular good. Customer surveys or judgments by experts fall into this category. Indirect surveys such as conjoint analyses and discrete choice analyses work quite differently. In a first

step, the survey participants have to rank different products with different characteristics or choose between several product alternatives. This preference information is then used to derive the WTP.

In the past, practitioners and researchers have mostly used customer surveys to determine the WTP of insurance products. However, especially for life insurance policies, policyholders have difficulty capturing the value of these abstract, seldomly purchased products. As a result, customer surveys tend to inadequately estimate WTP (see, e.g., Backhaus et al., 2005; Miller et al., 2011; Voelckner, 2006). Thus, in this paper, we use data collected using choice-based conjoint analysis, a special form of conjoint analysis. In the latter, respondents do not rank all displayed products but, rather, choose one product over its alternatives. This procedure makes the results even more precise because it lowers the cognitive demands and puts respondents in a situation that resembles a real purchase decision (Huber, 1997).

3 | PRODUCT TYPES, CUSTOMER GROUPS, AND DATA

Our methodological approach consists of three steps. Firstly, to consider the full range of representative TLI products, we define three hypothetical policies, ranging from a budget product to a classic product to a premium product. Secondly, we assess key policyholder characteristics to determine TLI prices and form customer groups based on these characteristics. Finally, we collect information on policyholders' WTP, market prices, and actuarially fair premiums for each customer group and product type.

3.1 | Product types

Braun et al. (2016) consider six different so-called product attributes that characterize TLI policies. In addition to the sum insured, these are the (i) insurance premium, the (ii) term insured, the (iii) sales channel, the (iv) underwriting procedure, the (v) brand of the insurance provider, and the (vi) availability of critical illness coverage. The underwriting procedure describes the type of medical examination used to assess the health status of the potential policyholder. Critical illness coverage, on the other hand, is an additional option that pays a policyholder who is diagnosed with a predefined fatal illness a predetermined amount of money immediately after the diagnosis. Following Braun et al. (2016), we draw on these attributes to define three hypothetical products. Regarding the term insured, we assume an identical contract period of 15 years.

The so-called budget product is characterized by the lowest price available in the market. This product can only be purchased over the internet and the underwriting consists of 10 questions about the potential policyholder's health. The insurer is an unknown brand and the contract does not include coverage for critical illnesses. Our classic product is in the middle price range and can be purchased through an intermediary. Before the policy is underwritten, potential policyholders must undergo a fully fledged medical examination. The insurance company is a well-known brand, but the policy does not provide coverage for critical illnesses. Finally, the premium product is at the upper end of the price range, can be purchased through an agent or online, and is offered by a well-known insurance brand. To be insured, policyholders only have to answer three questions about their health. In addition, the premium product includes critical illness coverage.

3.2 | Customer groups

During the registration process, insurance companies ask for a large amount of personal information. This information affects the risk assessment and, thus, the premium of the policy. However, for simplicity, we focus on the two most important variables for determining the price: the customer's age and smoking status. Since the demand for TLI is usually only present in midlife, we form customer groups for customers between 20 and 55 years of age. Each group spans four years and includes either only smoking or nonsmoking policyholders. Thus, we have a total of 18 customer groups (i.e., nine age categories and two smoking statuses).

3.3 | Data collection

For the calculation of the WTP, we draw on the raw data set from Braun et al. (2016), while all market prices (expressed in monthly premiums) are taken from the German online comparison portal "Verivox". The actuarially fair premiums, on other hand, are based on a mortality table published by the German Association of Actuaries (DAV) (Deutsche Aktuarvereinigung e. V., 2008a).

3.3.1 | Willingness to pay

The willingness to pay is calculated based on a survey conducted by Braun et al. (2016). In 2015, they surveyed 2017 German consumers who claim themselves as insurance decision-makers. Have of the respondents do own a term insurance contract. The study's participants were between 20 and 54 years old and are population representative in respect to gender and domicile state. Out of these 2017 data records, 1995 meet the requirements for further assessment. The study setups ten groups and select the respondents to age classes and smoking habits. After a short explanation of the supposed buying situation, the concept of a term life insurance, and the embedded product attributes, participants were confronted with twelve choice tasks describing complete policy profiles. In addition, a no-choice option is offered. While the attribute order within each conjoint stimulus remained fixed, the pairwise comparisons were automatically generated using the so-called balanced overlap method (cf. Sawtooth Software (2013)). The interviewees were given various reference prices, adequate for their respective characteristics (like age class and smoking habits). Subsequently, they were asked about their WTP for several TLI products with certain attribute specifications. Due to this setting, it is possible to calculate the WTP for all possible combinations of product attributes. Using the distribution of the WTP giving the feedback of all respondents for specific products and product features, we calculated various statistical figures like the 60%-highest density interval (HDI), the median or expected values for the WTP.

3.3.2 | Term life insurance market premiums

The market prices have been collected from "Verivox", a German online comparison portal and broker that offers the largest selection of insurance brands of all German online broker platforms. We collected premium data according to the following approach. First, we assume

that the representative policyholder is an office worker with 60% in-office work. Second, we set the height of the policyholder to 180 cm and the weight to 71 kg.[3] Moreover, the insured sum is EUR 100,000, the term insured is 15 years, and the payments are made on a monthly basis. The data have been recorded in November 2019, and the insurance term starts on December 1, 2019. However, while insurers advertise monthly net premiums for their term life offerings, the respective contracts are still based on the gross monthly premiums.[4] The latter corresponds to the maximum price the insurer can charge at any time during the contract period if there is no surplus sharing.[5]

To collect the market data, we obtained quotes for the youngest and oldest possible policyholders in each group, and we average their net and gross premiums to approximate the market price. Moreover, we resort to the product with the lowest quoted price as the estimate for the predefined budget product and the product with the highest available price as the estimate for the predefined premium product. The average of the two forms is the estimate for the classic product. For the budget product, for example, the market premium is the average of the product with the lowest net price and its gross price for the youngest possible policyholder and the product with the lowest net price and its gross price for the oldest possible policyholder in the respective customer group.

3.3.3 | Actuarially fair premiums

The actuarially fair premiums are calculated on the basis of the mortality tables published by the German Association of Actuaries (Deutsche Aktuarvereinigung e. V., 2008a). These tables are used by German insurers to calculate their TLI premiums. In the present article, we calculate fair premiums exclusively on the basis of the expected payments to policyholders. The first-order mortality table is based on historical mortality data of actual life insurance policyholders and includes only general safety loadings for (i) random risk, (ii) parameter and model risk, and (iii) risk of change. Nevertheless, expected changes in mortality were not included in the calculation, and a prudent zero trend is assumed (c.f. Deutsche Aktuarvereinigung e. V., 2008b). Overall, neither premium loadings for risk-bearing nor administration costs of the insurer are considered here. Insurers also request information about a customers' health status and lifestyle factors prior to underwriting. This may impact the selection of policyholders who are allowed to purchase a certain policy and may result in a selection effect: For example, only people with a better health condition than in the overall population would be admitted to the budget product. In consequence, the actuarially fair premium for the budget product will be lower than when considering the overall population. How we adjust for this effect is explained in the following paragraph. We further assume a flat term structure with an interest rate of 0% for the contract term. By equating expected premium income with expected indemnity payments, we calculate a fair monthly premium for smokers and nonsmokers for each age.

The average actuarially fair premium for all individual ages within each of our 18 customer groups is assumed to be the actuarially fair premium for the classic product for each of the

[3]Note that these values result in the mean of the optimal Body Mass Index score for men and women in Germany.
[4]The net premiums offered to anticipate the excess profits of the former period.
[5]One should note that there are special regulatory requirements for the German insurance market with regard to the profit participation of policyholders.

defined groups. Following Braun et al. (2016), we further assume that insurers realize a 15% cost saving from better cost structures, higher rejection rates, and stricter risk classification for budget products. Premium products, on the other hand, are associated with 30% higher costs due to the included critical illness coverage, better service offering, relaxed medical examination, and stronger brand reputation of the provider, among other factors (c.f. Braun et al., 2016).

3.4 | Similarity of hypothetical products with products in the market

Before running our analysis, we test for similarity by comparing hypothetical characteristics to actual market characteristics for a range of customer groups based on age and smoking status. As described in Section 3.1, the TLI policies are fully defined by six product attributes. However, since the term insured and the premium are either fixed (term insured) or determined by the product category (premium), we examine only the similarity of the characteristics: sales channel, underwriting procedure, brand, and critical illness coverage. In this regard, we assume that a product in the market is very similar to the hypothetical product if at least three of the four characteristics are the same. If two features are identical, we assume medium similarity, and if one or zero features are identical, we assume no similarity.

The results illustrate that 72.5% of all cases are highly similar, while the remaining cases (27.5%) have a medium similarity. Since the highest and lowest priced products in the market often differ for different customer groups, the product characteristics also differ. Considering these arguments, the hypothetical products are a good proxy for the actual products offered in the market for TLI.

4 | EMPIRICAL FINDINGS

Of all 1995 respondents, 824 individuals have a positive WTP for the budget product, 921 for the classic product, and 1177 for the premium product (c.f. Braun et al., 2016). Thus, per customer group, 9–124 individuals have a positive WTP. The minimum WTP is EUR 0.08 for the budget product, EUR 0.03 for the classic product, and EUR 0.06 for the premium product, while the maximum WTP is EUR 610.26 for the budget product, EUR 643.39 for the classic product, and EUR 968.31 for the premium product. In the following sections, we analyze the average WTP, the median WTP, the 60% HDI of the WTP, the market price, and the actuarially fair premium for all defined customer groups.

4.1 | Budget product

As illustrated in Figure 1a, the average WTP of non-smokers for the budget product is U-shaped. In the younger age groups, the average WTP is around EUR 40 per month, which is more than 10 times the actual market price or actuarially fair premium. A comparison of average and median WTP suggests that this high average WTP is mainly driven by a few extremely high WTPs. For potential middle-aged policyholders, on the other hand, the average WTP shrinks to a level of EUR 12–30, but it is still well above the market price and the actuarially fair premium. For older age groups, the average WTP lies between EUR 40 and EUR

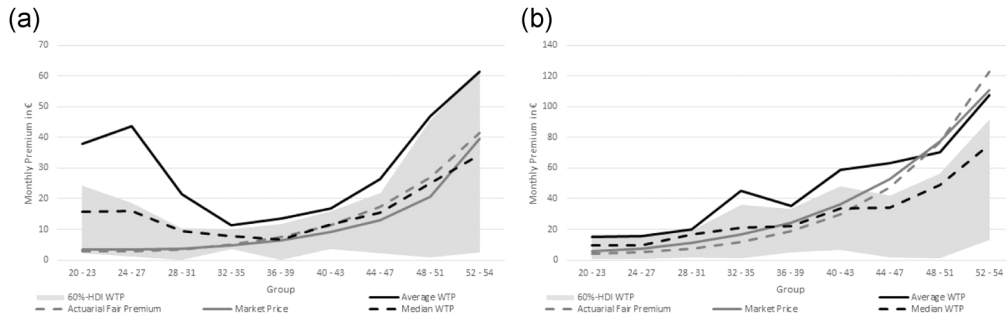

FIGURE 1 Market prices, costs, and willingness to pay (WTP) for the "Budget" product. The market prices are derived from the online platform Verivox. Product costs are based on the actuarially fair premium. Median, average WTP as well as the 60%-highest density interval (HDI) are calculated using the empirical data set of Braun et al. (2016)

61, while the corresponding market price is between EUR 20 and EUR 40. The median WTP is initially well above the market price and the actuarially fair premium, but it converges to these two values in the medium age groups and is below the actuarially fair premium for all groups from age 40–43. It is notable that, starting in the 36–40 age group, the market price is below the actuarially fair premium. Both the market price and the actuarially fair premium start at the lower bound of the 60%-HDI, grow continuously with age relative to the 60%-HDI, and are in the upper half for all age groups above 40–43 years.

For smokers, the results look quite similar (c.f. Figure 1b). That is, the average WTP is high compared to the market price and actuarially fair premium for young and middle-aged groups. However, for customers ages 48–51 and older, the average WTP is lower than the market price and the actuarially fair premium. Similar to nonsmokers, for smokers the median WTP starts above the market price and actuarially fair premium for young age groups and approaches both lines for middle age groups, then falls below the market price beginning with the 36–39 age group and below the actuarially fair premium beginning with the 44–47 age group. Again, the market price and actuarially fair premium start at the lower boundary of the 60%-HDI and continue to rise in this range as age increases. However, at ages above 44–47, both lines exceed the upper boundary of the 60%-HDI. The fact that the market price appears to be lower than the actuarially fair premium in some cases is probably because life expectancy has increased in the insurers' portfolios compared with the 2008 DAV mortality tables, which assume no trend in mortality. An alternative explanation may also be found in the underwriting process. Insurance companies ask their prospective customers about their current health status and specific lifestyle factors to better estimate the risk of death within the contract period. This information leads to selection effects by the insurer. In consequence, the average customer typically exhibits ceteris paribus a lower death probability than the general population. We could see in Verivox that in particular providers in budget products are more restrictive in the application process than insurance companies with contracts we allocated to other product groups. Due to this effect, the actuarially fair premium of the budget product may be lower for actual insurers than in our estimation. However, as the weighting of the health assessment, lifestyle factors, and concrete acceptance rates are not publicly disclosed, we are not able to estimate the correct size of this effect. Finally, Koijen and Yogo (2015) find that during financial crises, insurers tend to

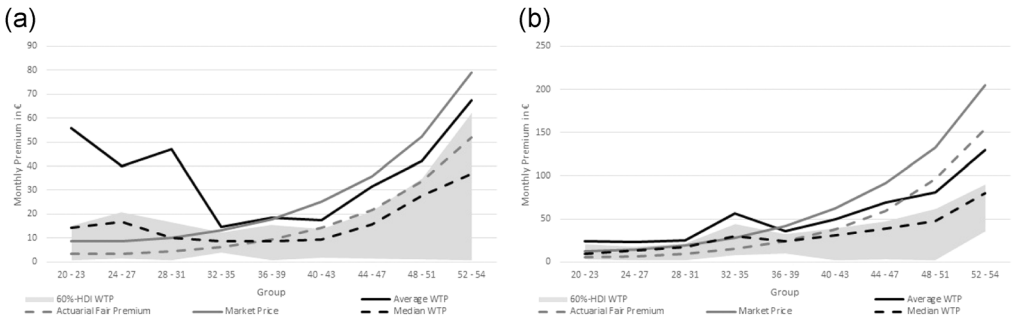

FIGURE 2 Market prices, costs, and willingness to pay (WTP) for the "Classic" product. The market prices are derived from the online platform Verivox. Product costs are based on the actuarially fair premium. Median, average WTP as well as the 60%-highest density interval (HDI) are calculated using the empirical data set of Braun et al. (2016)

sell long-term life insurance policies below the actuarially fair price due to financial and regulatory frictions such as relaxed reserving regulations.

4.2 | Classic product

At first glance, Figure 2 looks similar to Figure 1. In particular, the average WTP of the nonsmokers is predominantly U-shaped (Figure 2a), while the WTP of the smokers tends to increase continuously Figure 2b. In turn, the young nonsmokers show an extremely high average WTP (EUR 39.90–56.01) compared to market prices and actuarially fair premiums. In contrast to the budget product, the market price starts in the middle of the 60%-HDI. For young age groups, the median WTP is also well above the market price and actuarially fair premium. However, for middle age groups and above, the market price rises above the average and median WTP as well as above the 60%-HDI. Furthermore, we note that the actuarially fair premium also rises sharply relative to the other variables and is above the median WTP and at the upper limit of the 60%-HDI from the middle age groups onward.

4.3 | Premium product

Among smokers (Figure 2b), the average WTP (EUR 23.96) is slightly less than twice the market price (EUR 12.19) and four times the actuarially fair premium (EUR 5.26) for the 20–23 age group. For the 36–39 age group, the market price exceeds the average and median WTP and increases exponentially. For the oldest group, the market price (EUR 204.89) is almost 2.5 times higher than the median WTP (EUR 79.79) and more than 2.2 times higher than the upper limit of the 60%-HDI (EUR 90.17). The actuarially fair premium crosses the median WTP in the 40–43 age group and the average WTP in the 48–51 age group.

The average WTP of potential nonsmoking policyholders of the premium product has a reduced U-shape (cf. Figure 3a). For young potential policyholders, the average WTP is twice the market price. Nevertheless, the market price for this group is very close to the median WTP. Starting in the middle age groups, the market price is significantly higher than all WTP

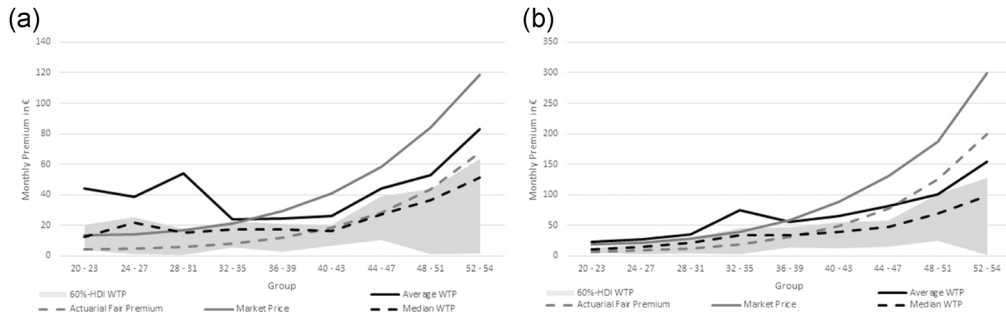

FIGURE 3 Market prices, costs, and willingness to pay (WTP) for the "Premium" product. The market prices are derived from the online platform Verivox. Product costs are based on the actuarially fair premium. Median, average WTP as well as the 60%-highest density interval (HDI) are calculated using the empirical data set of Braun et al. (2016)

variables and the actuarially fair premium exceeds the median WTP starting in the 44–47 age group and the 60%-HDI in the 52–54 age group.

Looking at the costs, price, and WTP for the premium product for smokers, similar patterns compared to the nonsmokers are observed (cf. Figure 3b). For the young age groups, the average WTP is close to the market price, and beginning in the 36–39 age group the market price lies above all WTP figures. That is, the market price already starts more than 40% above the upper limit of the 60%-HDI and remains above this line for all but two groups. The actuarially fair premium, on the other hand, starts at the lower limit of the 60%-HDI. For the middle-aged groups, the actuarially fair premium crosses the median WTP and also the upper limit of the 60%-HDI. Finally, the actuarially fair premium is 56% above this line for the oldest group.

A comparison of the profit margins of all three product categories (i.e., defined as market price minus actuarially fair premium above market price), excluding administrative costs, reveals structural differences. Across all age groups, the average profit margin for the budget product is only 3.45%, while it is 44.0% for the classic product and 51.9% for the premium product.

5 | DISCUSSION

Figures 1–3 underline that the WTP, measured by its expected value or the median, varies largely between different products and age groups. Young policyholders in particular have high average WTPs compared with the market price and the actuarially fair price. This finding is in line with the results of Braun et al. (2016) and Hansen et al. (2016), who conclude that the observed average WTP in the market is often disconnected from the market price. At first glance, the large gaps between actuarial prices and mean WTP would potentially allow for active revenue management. While the mean WTP often takes a U-shaped form, market prices follow a parallel, strictly monotonous growth with no swings in the direction of the mean WTP. This suggests that German TLI providers do not or cannot base their pricing strategy on the policyholders' WTP. The parallel movement between actuarially fair premiums and market prices seems to be independent of whether the mean WTP is smaller or larger than

the market price. In general, setting the price to the average or median WTP is not per se a profit-maximizing strategy. However, the parallel evolution of the actuarial price and the market price indicates that the insurance segment in focus is primary focusing on product costs. There are several possible reasons why the WTP seems not to have a major impact on pricing in the German term life insurance market: (1) insurers may not have proper and stable information about the policyholders' WTP; (2) strict regulations, and in particular the requirement of equal treatment, prevent insurers from taking WTP into account in their pricing; (3) the TLI market in Germany is highly competitive and thus profit loadings are rather low. Certainly, also combinations of (1)–(3) are possible. In addition, other aspects may play a role: Term life insurance contracts fulfill important social assignments and hence, customers may not except the use of the WTP to the same extent as one can see it in other areas. Hence, to avoid reputational losses, insurance companies could detain to make extensive use of the policyholders' WTP. In what follows, we want to discuss the raised aspects (1)–(3) in more details.

5.1 | Unknown willingness to pay

Outside the insurance industry, companies usually conduct market surveys before the launch of new products or services (Anderson et al., 1992). Despite some new contract features, term life insurance is a traditional insurance product with a long history. Thus, it is not known to us whether or to what extent insurers also conduct conjoint analyses or similar customer surveys in the German term life insurance market.

5.2 | Strong regulation in Germany

The German insurance industry has traditionally been characterized by a highly regulated environment, with three acts, in particular, requiring compliance. First, according to Article 20 of the General Equal Treatment Act (Allgemeines Gleichbehandlungsgesetz–AGG), no policyholder may be treated differently on the grounds of religion, age, disability, sexual identity, or gender. Differences in premiums or benefits on these grounds must be justified by recog- nized principles of risk-adequate ratemaking, in particular by an actuarially determined risk assessment using statistical data. Second, Article 153 of the Insurance Contract Act (Versicherungsvertragsgesetz – VVG) regulates the surplus sharing of life insurance companies and thus affects the product performance from the point of view of a TLI provider. The explicit profit sharing is regulated in the Minimal Payback Directive (Mindestzuführungsverordnung – MindZV). That is, Articles 3–8 of the MindZV stipulate that TLI companies must return at least 90% of their investment returns and underwriting surpluses as well as at least 50% of other surpluses. Third, the Law on the Supervision of Insurance Undertakings (VAG) also has explicit implications on the pricing strategies of insurers: The so-called "Principle of Equal Treatment" in Article 138 (2) VAG requires that premiums and benefits must be calculated according to the same principles for policyholders with the same prerequisites. This article in particular challenges insurers to take into account the individual WTP potential of policyholders when setting premiums.

Given this regulation prohibiting the direct use of WTP, insurers would need, on the one hand, to identify other objective metrics for individuals that not only correlate highly with WTP

but also have an actuarially demonstrated impact on the risk the individual poses to the insurer. On the other hand, the insurer could use the WTP of policyholders when additional services are involved that are not part of the pure risk-covering insurance contract. However, Article 138 (2) VAG presents a strong reason why insurers do not consider the WTP of potential policyholders. Since similar groups of insureds must receive the same terms and conditions, pure WTP is not accepted as a means of differentiating between subgroups. In addition, the effect of the Minimal Payback Directive (Articles 3–8 MindZV) is that even if insurers were to consider WTP and earn additional returns, they would have to repay a significant profit share to their policyholders. In conclusion, we believe that VAG and MindZV limit the potential profit margin b[6] (as part of the overall premium loading p[7]).

5.3 | High competition in the German TLI market

The assessment of the German TLI market has revealed several indications that the market structure resembles a polypoly. In 2019, 85 life insurance companies in Germany were offering this rather homogeneous product (Bundesanstalt für Finanzdienstleistungsaufsicht, 2020). Search and comparison costs are low, as all details as well as contract conclusions can be done via online channels and online brokerage websites. According to economic theory, a perfect polypoly would result in all companies offering exactly the same price equal to marginal costs. Actuarial fair premiums are a good estimate of marginal costs, and, at least for the budget product, the product costs are very close to the market price (hence, the profit loading *b* is close to zero). This is a clear indicator of strong competition. For the other products, the premium loading *p* is larger. It is reasonable to assume that positive profit margins are possible outside of the budget products, since the costs of bearing risk and the general transaction and frictional costs should not differ for the product types considered.

However, there are still some major price differences between companies that cannot be attributed to the product category. Although we cannot conclusively assess the reason for not directly focusing on the WTP, two main conclusions emerge from the analysis and discussion. First, the WTP for the budget product does not affect an insurer's pricing, because competition in this market segment appears to be too high. For this reason, market prices are even more favorable to the insured than the General Equal Treatment Act could do alone (i.e., the profit loading is approximately zero). In this regard, the deregulation of the insurance market in the European Union, which started in 1994, could be called success from the policyholders' viewpoint. Second, looking at the classic and the premium product, we find that the profit loading is set differently for the three stereotypical products. Nevertheless, the market prices here are higher than the average WTP and the 60%-HDI of the WTP, especially for the middle age groups. Presumably, this results in rather few classic and premium contracts. Also, the strictly monotonous growth of the market price suggests that the General Equal Treatment Act is still fulfilled for these products. The fact that there is less competition in this segment would theoretically allow for price discrimination using the WTP. Since this would violate the General Equality Treatment Act, it appears that this law actively prevents insurers from engaging in price discrimination and ultimately reduces insurer profits in this segment. Hence, it seems

[6]As explained in the Introduction, b represents the profit loading.
[7]As explained in the Introduction, p represents the sum of all loadings (the loading for risk-bearing, the profit loading and the insurer's administration costs, and additional frictional costs such as taxes).

more of a general political question whether it is efficient to regulate the pricing of fairly advanced TLI products, when insurers already meet the socio-political need for a fairly priced TLI product (the budget product) for all. However, should policymakers want TLI prices to be set close to the actuarially fair premium, even for the advanced products, our results show that the law as it currently works cannot achieve this goal per se.

From the insurer's point of view, it seems advantageous to offer services beyond pure risk coverage, as is the case, for example, with the classic and premium products. Although these services are sold with the term life policy, technically they are not part of the pure insured risk, and thus they make it possible to circumvent the Principle of Equal Treatment. The prices for these additional services can be determined without any restriction and calculated on the basis of the WTP. Choice-based conjoint analysis shows that policyholders have a higher WTP for the more advanced products with additional services and are therefore willing to pay more for certain benefits. To offer the latter as effectively as possible, the WTP for each service should be considered separately. In addition, a high degree of product customization may increase skimmed WTP for the insurer. That is, policyholders could choose more options separately rather than buying predefined packages whose benefits they only partially need. At the same time, policyholders receive insurance contracts with the most optimal additional services according to their individual preferences.

6 | CONCLUSION

Price discrimination is a popular concept for increasing corporate profits. In parallel with the ongoing digitization of many industries, the scope and impact of price discrimination are increasing as more and more information about customers becomes available and is collected. The ability to use these data adequately will be one of the biggest competitive advantages in the future. The WTP of specific customer groups is one of the most valuable pieces of information that companies can obtain.

This article investigates whether this information is used by German term life insurers in their pricing strategies. We find no evidence that TLI providers consider their policyholders' WTP. The failure to take WTP into account could be because insurers are not aware of policyholders' WTP, because the regulations that prevail specifically in the life insurance industry are too strict, or because the competitive pressure among insurers is too high. While this study cannot make a conclusive statement about the decisive reason, it is noteworthy that, due to the competitive market structure in the low-price segment, competition already leads to a cost-covering price. Thus, the General Equal Treatment Act is superfluous in this context, and the 1994 deregulation has achieved its goal of improving the position of all insured persons in this market. The markets for classic and premium products are less competitive, as prices are on average up to 51% higher than the actuarially fair price. In this segment, the General Equal Treatment Act works similar to a profit regulation for the insurance industry and thus prevents the use of the on average high WTP of, for example, young policyholders. However, insurers might consider offering individualized additional benefits around and beyond pure risk coverage to skim the WTP of policyholders, since the Principle of Equal Treatment does not apply to these separate contract components.

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