What Drives Policyholders' Relative Willingness to Pay? Empirical Analysis under Default Probability and Varying Coverage

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Abstract

Based on empirical data acquired by using an online survey, we investigate which parameters are key drivers for policyholders' relative willingness to pay against the background of high insured values. Our research is conducted from the insurer's perspective to understand which policyholder groups exhibit a high relative willingness to pay or do not cover the insurer's expected expenses. We find that the certainty effect underlies for probabilistic insurance but not for underinsurance. This implies no relevant impact of the insurance coverage on the relative willingness to pay. Furthermore, the relative willingness to pay for high insured values decreases significantly with a higher default probability, higher age, lower risk aversion, or lower wealth. In addition, the average relative willingness to pay for individuals with medium financial literacy is close to 1 (fair premium), but policyholders with the highest financial literacy pay substantially less (0.621). We also find that for overinsurance and full coverage, policyholders significantly deviate from expected utility equilibria. This insight is independent of the initial wealth and the degree of risk aversion. Concerning underinsurance, the deviation is less significant or even not significant at all.

Keywords: Relative Willingness to Pay, Under- and Overinsurance, Default Probability, Financial Literacy, Risk Aversion, Expected Utility Equilibria
JEL classification: C90; D81; G22; G32

1 Introduction

Induced by increasing digitization, the collection of information about policyholders and their behavior has become a ubiquitous part of insurance activity. In this context, a necessary but not sufficient parameter for setting the optimal price of insurance contracts is the maximal willingness to pay.[1] Although a considerable amount of research has investigated policyholders' willingness to pay, a relatively small amount has focused on high insured values and a large potential damage event. Indeed, it is a core task of the insurer to protect policyholders against high damage events. Furthermore, our research approach is conducted from the insurer's and regulator's perspective. First, analysis of the willingness to pay for high insured values is important for the insurer to recognize which policyholder groups exhibit a high

[1] The optimal price setting is affected by the maximal willingness to pay and the competition of the market. Hence, knowing the maximal willingness to pay is necessary to be able to set optimal prices but not sufficient as higher competition leads to the fact that not the full willingness to pay can be absorbed.

willingness to pay or do not cover the insurer's expected expenses.[2] Second, from a regulatory perspective, it is also relevant to understand for which customer segments price regulation would be useful to protect policyholders against potential discrimination. Wakker et al. (1997) investigate the willingness to pay for high insured values against the background of default probability and find that induced by the certainty effect the willingness to pay decreases substantially for probabilistic insurance. Other papers support this outcome for lower insured values (see, e.g., Zimmer et al., 2009, 2018). We extend previous research in several ways by developing and examining 8 hypotheses derived from insights of empirical research and economic theory. As we consider different coverage levels and default probabilities, we analyze the relative willingness to pay, which is defined as the ratio between maximal willingness to pay and expected indemnity payments. Furthermore, we conduct an online survey that focuses on a hypothetical loss domain[3] and test the hypotheses based on the acquired data.

In addition to the default probability, we examine the impact of insurance coverage concerning the relative willingness to pay. More precisely, we analyze whether the certainty effect exists only for probabilistic insurance or also for underinsurance. Moreover, we investigate whether policyholders increase their relative willingness to pay for overinsurance. We also intend to determine whether policyholders' financial literacy exhibits a significant impact on the relative willingness to pay. To measure financial literacy, we use the framework introduced by Lusardi and Mitchell (2011). Similar to Holt and Laury (2002), we determine the degree of risk aversion and analyze how this influences the relative willingness to pay. Previous economic theory indicates that an increase in the willingness to pay accompanies an increasing risk aversion (see, e.g., Mossin, 1968). In addition, we consider whether age is a key driver for the relative willingness to pay. Hansen et al. (2016) analyze house insurance claims in the Danish market and find that the peak of insurance claims is reached when the policyholders are between 30 and 40 years old. Derived from the higher claims, the policyholders also pay higher premiums. However, in our case, the considered scenario is equal among all age groups. Thus, from a normative perspective, it is reasonable to suggest that age does not have a significant impact. Similar to Zimmer et al. (2018), we examine the gender effect on the relative willingness to pay. While Zimmer et al. (2018) do not find a significant impact for a low insured value, Schubert et al. (1999) recognize a gender-specific risk attitude depending on the decision framework. For a loss domain, men tend to be more risk-averse than women and vice versa. In line with economic theory, this implies that men tend to pay more for insurance than women as a loss domain is present according to insurance. As Case et al. (2005) demonstrate, increasing wealth leads to higher consumption. Therefore, we analyze the wealth effect on the relative willingness to pay. In addition, we introduce expected utility theory; in this context, we extend insights by Wakker et al. (1997) and determine whether policyholders strive for expected utility equilibria between probabilistic insurance and no default probability with different coverage levels.

[2]This insight is especially important against the background of a not fully competitive market. Hence, premiums higher than the fair premium can be realized.

[3]We consequently focus on a loss domain as insurance is connected with losses and the avoidance of losses. Some other research papers, e.g., Holt and Laury (2002), investigate a gain domain. However, as Kahneman and Tversky (1979) illustrate, changing the domain might also lead to changing behavior.

In summary, we acquire empirical data by using an online survey and use these data to investigate the impact of multiple parameters on policyholders' relative willingness to pay. Our aim is to develop a deeper understanding concerning the key drivers of the relative willingness to pay for high insured values. Furthermore, we extend expected utility theory and measure whether policyholders strive for expected utility equilibria or vary from equilibria points with different coverage levels.

This paper is organized as follows. In Section 2, we position our paper against the background of the existing literature. In this context, we provide an overview of the research related to our study. Moreover, we develop the hypotheses, the expected utility framework, and the empirical design in Section 3. The results are presented in Section 4. Based on the results, we derive economic implications in Section 5. The main points of this paper and our conclusions are summarized in Section 6.

2 Literature Review and Positioning

Initially, we connect our paper to the existing body of knowledge and refer in this context to various literature streams, such as the willingness to pay a premium against the background of default probability as well as under- and overinsurance. Furthermore, we explain in detail how these different streams are related to our research. First, we consider literature about the relation between default probability and premium. Previous empirical research in this field has documented a substantial decrease in willingness to pay when the default probability increases (e.g., from no default probability to probabilistic insurance) (see Wakker et al., 1997; Zimmer et al., 2009, 2018).[4] Moreover, under certain circumstances, policyholders might even be insensitive to a small default risk (see, e.g., Gatzert and Kellner, 2014; Eckert and Gatzert, 2018; Klein and Schmeiser, 2018b) and hence do not necessarily reduce their willingness to pay if the default probability increases.[5] For instance, a lack of default probability transparency might be why policyholders do not adapt their willingness to pay. However, since policyholders are directly confronted with the underlying default probabilities in empirical research (see, e.g., Wakker et al., 1997; Zimmer et al., 2009, 2018), it cannot be ignored. We extend previous research in the field and develop a framework that has not been examined before. More precisely, we investigate how under- and overinsurance affect policyholders' willingness to pay if a default probability and no default probability underlie. Therefore, in the next step, we provide an overview of research into the under- and overinsurance which is related to our topic.

Under- and overinsurance are comprehensively discussed in the insurance literature. Mossin (1968) analyzes the insurance coverage under rational behavior for a given risk. In this context, Mossin (1968) emphasizes that it is not optimal to take full coverage if a higher premium than the fair premium underlies. Nevertheless, Mossin (1968) also mentions that if policyholders act irrationally, they face uncertainty, or the probability distribution of the potential damage is overestimated, so this might be

[4] For a comprehensive overview of the empirical research into default probability and willingness to pay, see Klein and Schmeiser (2018a).

[5] This insensitivity is in line with the argument by Kahneman and Tversky (1979), where very unlikely events are overweighted or ignored.

why policyholders prefer full coverage rather than partial coverage. Doherty (1977) analyzes the effect of stochastic dominance models on the insurance coverage and Eeckhoudt et al. (1996) consider the impact of background risk on risk-taking behavior. Moreover, Schlesinger (1997) extends Mossin (1968) and determines the optimal insurance coverage without expected utility theory. In this regard, it might be optimal to take full coverage if the premium is higher than the actuarially fair price. Cutler et al. (2008) analyze insurance markets and the preference heterogeneity.[6] The authors argue that against the background of market inefficiencies (induced by private information), overinsurance should also be regarded additional to underinsurance related to adverse selection models. In the context of natural disasters, Kunreuther (1984) investigates reasons for underinsurance. Kunreuther (1984) argues that underinsurance is induced from the demand side if low probability events with a high impact are not considered (underestimated) by individuals or the potential loss is underestimated. More concretely, this implies that the premium, which has to be paid, is overestimated. Furthermore, the premium is widely denoted as a function of the insurance coverage (see, e.g., Smith, 1968; Viauroux, 2014; Klein, 2018). Based on the findings of previous research, in the following we analyze how insurance coverage affects policyholders' maximal willingness to pay. In this connection, we extend previous research in the field and provide empirical insights. More precisely, we measure under changing default probability whether underinsurance, full insurance, or overinsurance generates the best ratio between maximal willingness to pay and expected indemnity payments from the insurer's perspective. In practice, overinsurance is typically forbidden due to ex ante and ex post moral hazard.[7] As we consider a given probability that a damage event occurs and the value of the damage event is known, moral hazards do not underlie.

3 Hypotheses, Expected Utility Theory, and Empirical Design

3.1 Hypotheses

Derived from empirical research in the field (see, e.g., Wakker et al., 1997; Zimmer et al., 2009, 2018), it is reasonable to suggest that policyholders substantially decrease their willingness to pay for low default probabilities. In contrast to previous research, we consider a default probability that only marginally varies from 0 and analyze high insured values. Wakker et al. (1997) also investigate such high insured values, however, only between a 0 and 1 percent default probability. Furthermore, we extend previous empirical research by regarding under- and overinsurance. Derived from Kahneman and Tversky (1979), a certainty effect might underlie and hence we hypothesize the following relation:

H1: The relative willingness to pay significantly decreases for (very) low default probabilities in relation to the non-default case.

[6]For further research about heterogeneous agents, see, e.g., Crocker and Snow (2013).

[7]Overinsurance typically leads to moral hazard effects since the inpayments of policyholders are greater than the damage. However, moral hazard effects are only possible if asymmetric information can be reached between insurer and policyholders. For instance, under asymmetric information and ex ante moral hazard, the actual probability that a damage event occurs might be higher than expected by the insurer. For further research into moral hazard, see, e.g., Kihlstrom and Pauly (1971), Pauly (1974), and Holmström (1979).

In previous research, reasons for an under- or overinsurance preference are for instance induced by the individual risk itself, the wrong estimation of probability or loss functions, or missing information, which may result in uncertainty (see, e.g., Mossin, 1968; Kunreuther, 1984; Cutler et al., 2008). However, within our survey, such a reason does not underlie. Moreover, we argue that the certainty effect measured by Kahneman and Tversky (1979) directly refers to the default probability and not to the degree of insurance coverage. Previous theoretical research has emphasized that the premium consequently increases with higher coverage (see, e.g., Smith, 1968; Viauroux, 2014; Klein, 2018). For a linear relation between coverage and premium, we would reach equality for the premium-coverage ratio. Therefore, we expect the following outcome:

H2: The relative willingness to pay does not significantly deviate for varying insurance coverage.

Furthermore, we analyze financial literacy as it is done by Lusardi and Mitchell (2011). Previous research has demonstrated that individuals with high financial literacy invest to a higher degree in stocks (see, e.g., Christelis et al., 2010; van Rooij et al., 2011). One reason might be a deeper understanding of risk diversification (see also Lusardi and Mitchell, 2011). To the best of our knowledge, no research has been directly related to the willingness to pay for insurance with high insured values so far. However, we argue that financial literacy affects policyholders' behavior. Individuals with higher financial literacy exhibit a higher ability to diversify their risks and hence it is intuitive that high financial literacy leads to a maximal willingness to pay that is closer to the expected indemnity payments as it is for lower financial literacy:

H3: For individuals with high financial literacy, the average relative willingness to pay is closer to 1 (fair premium) as it is for individuals with lower financial literacy.

In addition, similar to Holt and Laury (2002, 2005), we examine the risk attitude. In previous economic theory, risk aversion affects policyholders' wealth position preference function (see, e.g., Gatzert and Schmeiser, 2012). Assuming preference equality between insurance and no insurance, we conclude that the premium increases with higher risk aversion (see, e.g., Klein and Schmeiser, 2018a). In other words, individuals with a higher degree of risk aversion accept a higher loading than those with a lower degree of risk aversion to be protected against potential damage (see also Mossin, 1968; Braun et al., 2015). Therefore, we hypothesize:

H4: The relative willingness to pay increases with a higher degree of risk aversion.

Hansen et al. (2016) analyze house insurance claims in the Danish market. The authors find that the average insurance claims reach their peak when the insured are between 30 and 40 years old. Hence, it is reasonable that the willingness to pay among this age group is higher than for older or younger policyholders. However, in our empirical framework, equal damage probabilities and damage quantities underlie. Hence, from a rational perspective, age should not influence policyholders' willingness to pay.

This results in the following hypothesis:

H5: The relative willingness to pay is not affected by policyholders' age.

In previous research, Zimmer et al. (2018) analyze whether a significant gender difference underlies the willingness to pay for probabilistic insurance. However, the authors do not find significant results based on the willingness to pay. In contrast, Schubert et al. (1999) recognize a gender-specific risk attitude depending on the decision framework. More precisely, men tend to be more risk-averse than women if a loss domain is present and vice versa. In line with economic theory, as a loss domain is present according to insurance, this implies that men tend to pay more for insurance than women. In contrast, Halek and Eisenhauer (2001) analyze the demography of risk aversion concerning life insurance. Although they investigate a loss domain, they find that women are significantly more risk-averse than men. Hence, previous research does not show unique results. As Zimmer et al. (2018) is related to our survey, we expect the following relation:

H6: The relative willingness to pay is not affected by gender.

Although a lot of theoretical research exists about utility and the utility of wealth (see, e.g., Markowitz, 1952; Pratt, 1964; Arrow, 1965), to the best of our knowledge, wealth effects have not been measured to date concerning the willingness to pay for probabilistic insurance. Previous research has documented a positive correlation between wealth and consumption (see, e.g., Case et al., 2005). More precisely, when individuals exhibit higher wealth, they tend to spend more money. We transfer this insight to the insurance industry and argue that wealth positively affects the willingness to pay for insurance. In other words, wealthy policyholders are willing to pay higher loadings than less wealthy policyholders to minimize the probability that an extreme event occurs that substantially decreases their wealth. Thus, we hypothesize:

H7: The relative willingness to pay increases with policyholder's wealth.

Expected utility theory underlies concave preference functions when policyholders are risk-averse, convex preference functions if risk-seeking behavior is present, and a linear function under risk neutrality (see, e.g., Pratt, 1964; Arrow, 1965). Wakker et al. (1997) show that the substantial decrease in willingness to pay for probabilistic insurance cannot be explained by risk aversion. Under expected utility theory, even highly risk-averse policyholders will pay substantially more than policyholders in the sample did. Concerning insurance decisions, Slovic et al. (1977) as well as Schoemaker and Kunreuther (1979) demonstrate that policyholders' behavior deviates from utility theory. In our questionnaire, the policyholders communicate their maximal willingness to pay for insurance policies with and without default probability as well as under- and overinsurance. More precisely, under expected utility theory, the policyholders would exhibit exactly the willingness to pay for insurance policies which strives to achieve expected utility equilibria among the different contracts. However, derived from the insights of Slovic et al. (1977), Schoemaker and Kunreuther (1979), and Wakker et al. (1997), we argue that this might not hold:

H8: Policyholders do not act in line with expected utility theory. Expected utility equilibria between probabilistic insurance and no default probability with different coverage levels cannot be reached since the premiums significantly vary from the equilibria points.

3.2 Expected Utility Theory

In the next step, we introduce expected utility theory, which we use to analyze potential expected utility equilibria for the different willingness to pay premiums. We consider a utility function $U(W)$ with constant relative risk aversion, which follows Holt and Laury (2002). In formal terms, we have

$$U(W) = W^{1-a}, \tag{1}$$

where W determines the wealth of the policyholders and a the risk attitude. For $0 < a < 1$ risk aversion underlies, $a = 0$ stands for risk neutrality, and $0 > a >$ -1 denotes risk affinity. We consider -1 (1) as the lower (upper) bound for the risk attitude.[8]

Scenario under Default and Full Coverage

Policyholders' expected utility under default probability and the underlying utility function is described as follows:

$$\begin{aligned} E(U_{DP}) &= E(U_{DP}(P_D)) + E(U_{DP}(1 - P_D)) \\ &= P_D \cdot (max(W_0 - \pi_{DP} - D, 0)^{1-a} \cdot DP + (W_0 - \pi_{DP})^{1-a} \cdot (1 - DP)) \\ &+ (1 - P_D) \cdot (W_0 - \pi_{DP})^{1-a}, \end{aligned} \tag{2}$$

where $W_0 \geq \pi_{DP}$, P_D stands for the probability that a damage event occurs, W_0 describes the initial wealth of the policyholder, D the damage, π_{DP} the maximal willingness to pay under default probability which in our case is equal to the premium, and DP the default probability. If a default happens, the insurer does not pay the policyholders' damage. Furthermore, the utility cannot be lower than 0. In other words, it results in a lower bound for the utility, which implies that for low initial wealth a higher default probability does not reduce the utility as it does under high initial wealth.

[8] A risk aversion of 1 implies that the individuals are insensitive to the wealth since the exponent $1 - a$ is equal to 0.

Scenario under Non-Default and Varying Coverage

If the insurance policy pays in each scenario, no default probability underlies. In this context, we reach for the expected utility under no default

$$\begin{aligned} E(U) &= E(U(P_D)) + E(U(1-P_D)) \\ &= P_D \cdot max(W_0 - \pi - D_c, 0)^{1-a} + (1-P_D) \cdot (W_0 - \pi)^{1-a}, \end{aligned} \tag{3}$$

where $W_0 \geq \pi$ and π denotes the premium for an insurance policy without default risk. Moreover, D_c defines which share of the damage is not paid by the insurer. More precisely, if $D_c > 0$, underinsurance underlies. For $D_c < 0$, we have overinsurance and for $D_c = 0$ full coverage. An expected utility equilibrium between the default and non-default case can be reached if $E(U_{DP})$ is equal to $E(U)$.

3.3 Empirical Design

Initially, we present the key elements of the questionnaire which we use to determine policyholders' willingness to pay under certain circumstances. Afterward, we explain further specifications. We consider a fire insurance contract, where the initial scenario basically follows Wakker et al. (1997). Furthermore, we examine for the insurer a non-default scenario, 0.1, and a 1 percent default probability and show in the following example the non-default and 0.1 percent default probability case. In addition, we investigate different coverage levels (including underinsurance (\$200,000; \$240,000), full coverage, and overinsurance (\$260,000)). Based on underinsurance, we illustrate in the following the scenario with \$240,000. Following Wakker et al. (1997), the different default probabilities for a given coverage are transparent for the individuals. Moreover, we randomize the order of the different coverage levels to avoid response-order effects.

Questionnaire

Imagine you own a small house. Assume that there is a risk of 5 in 1000 per year (i.e., 0.5%) that your house will be completely destroyed by fire. The value of the house is \$250,000.

What is the most you would be willing to pay (per year) for an insurance policy which will cover all damages due to fire?

Imagine that you have been offered an insurance policy which does not pay you the damage in 1 of 1000 cases (i.e., 0.1%). What is the most you would be willing to pay (per year) for this insurance policy?

What is the most you would be willing to pay (per year) for an insurance policy which will only cover $240,000 of your damage due to fire?

Imagine that you have been offered an insurance policy which will only cover $240,000 of your damage due to fire. However, in 1 of 1000 cases (i.e., 0.1%), the insurance policy does not pay anything. What is the most you would be willing to pay (per year) for this insurance policy?

What is the most you would be willing to pay (per year) for an insurance policy which will pay you $260,000 (damage + reconstruction aid) when your house burns down?

Imagine that you have been offered an insurance policy which will pay you $260,000 (damage + reconstruction aid) when your house burns down. However, in 1 of 1000 cases (i.e., 0.1%), the insurance policy does not pay anything. What is the most you would be willing to pay (per year) for this insurance policy?

In a next step, we test the numerical literacy by using the three questions introduced by Lusardi and Mitchell (2011) (for the detailed questions, see Appendix A).[9] Furthermore, we measure the risk attitude in a manner similar to Holt and Laury (2002, 2005). They consider lottery-choice decisions, where the individual must choose between two options. In total, the authors consider 10 different lottery choices. Moreover, Holt and Laury (2002, 2005) focus on positive payoffs. In contrast, we analyze how the risk attitude is related to different loss scenarios. Since we are interested in the risk attitude for high potential losses, such as when the own house burns down, we analyze the choice decisions against the background of high potential losses. Holt and Laury (2002, 2005) determine the risk attitude for relatively low values. However, we argue that individuals who are risk-averse for high loss values might be indifferent to very low losses since their (hypothetical) utility function is only marginally affected. In addition, Holt and Laury (2002, 2005) compare between real and hypothetical incentives. The authors argue that under real incentives the degree of risk aversion is higher than under hypothetical incentives. Since we consider very high potential losses, real incentives are in our case possible only if we downscale the values. However, this implies that individuals are incentivized based on low payments, but we actually want to measure the behavior according to high loss values. In addition, as Kahneman and Tversky (1979) emphasize, whether we investigate scenarios under a potential win or loss has a substantial impact on the result. We think this is misleading if we want to analyze a loss behavior but would incentivize with positive payments. Therefore, we analyze a hypothetical scenario. Furthermore, we introduce 5 choice decisions to measure the risk attitude.[10] Thus, we analyze broader risk attitude classes than in Holt and Laury (2002, 2005). Table 1 illustrates the different lottery-choice decisions. Option A denotes a probabilistic loss, where a high loss or a relatively small loss can result. The probability of the relatively small loss is substantially higher. Option B shows a certain loss. Furthermore, we enable the policyholders to be

[9]Lusardi and Mitchell (2011) define the four criteria, simplicity, brevity, relevance, and capacity to differentiate, and create based on these criteria their three questions to measure financial literacy.

[10]We limit the choice decisions to 5 because we do not want the questionnaire to take too long to complete and since the individuals may become fatigued and not fully concentrated anymore on their answers.

indifferent concerning the answers (Option C). The expected loss difference illustrates the expected value of Option A minus Option B. Table 2 shows the risk preference classification in order of choices.

Table 1: 5 Lottery-Choice Decisions with High Losses (in $)

Option A	Option B	Option C	Expected Value Difference
10% 250,000; 90% 1000	15900	indifferent	10000
10% 250,000; 90% 1000	20900	indifferent	5000
10% 250,000; 90% 1000	25900	indifferent	0
10% 250,000; 90% 1000	30900	indifferent	-5000
10% 250,000; 90% 1000	35900	indifferent	-10000

Table 2: Risk Preference Classification

Answer Distribution	Risk Preference Classification
5 times A	very risk-seeking (1)
More A than B	risk-seeking (2)
Balance between A and B	risk-neutral (3)
More B than A	risk-averse (4)
5 times B	very risk-averse (5)

Kahneman and Tversky (1979) find that individuals are risk-seeking (loss aversion) if the individuals have a choice between a probabilistic loss underlying a high loss probability and a certain loss with comparable expected values.[11] However, we also recognize that such certainty avoidance may not take place if the probability of the event is sufficiently low and the impact sufficiently high. For instance, Kahneman and Tversky (1979) demonstrate that if individuals have the option between a certain loss of 5 and a loss of 5000 with 0.1 percent, 83 percent prefer the certain loss. In our survey, risk-seeking behavior for most individuals implies a threat to existence. Therefore, we tendentially expect risk-averse behavior among policyholders, which is one reason why the insurance business model works.[12] Finally, we ask personal information of the individuals to analyze deviations among the different groups.

4 Results

We distributed the survey via a specialized provider in the United States. The individuals that completed the survey earned a fixed value by the provider. In total, 500 individuals completed the study, with 70.4

[11] For further research concerning loss aversion, see, e.g., Tversky and Kahneman (1992) and Thaler et al. (1997).

[12] The assumption of risk-averse policyholders typically underlies in various theoretical research (see, e.g., Pratt, 1964; Arrow, 1965; Mossin, 1968; Schlesinger, 1981).

percent providing usable results. We eliminated all individuals who needed 240 seconds or less[13], providing random results, and extreme outliers (willingness to pay more than factor 50 of the fair premium). Table 3 illustrates the descriptive survey statistics. Age is originally cardinally scaled. In Table 3, we build age groups to provide an overview.

Table 3: Descriptive Survey Statistics

	Quantity	Relative Value (%)
Gender		
Men	178	50.57
Women	174	49.43
Age (in years)		
< 30	34	9.66
$30 - 45$	83	23.58
$46 - 60$	78	22.16
> 60	157	44.60
Financial Literacy		
0 correct answers	31	8.81
1 correct answer	74	21.02
2 correct answers	91	25.85
3 correct answers	156	44.32
Risk Attitude		
Very risk-seeking	68	19.32
Risk-seeking	75	21.31
Risk-neutral	135	38.35
Risk-averse	51	14.49
Very risk-averse	23	6.53
Wealth (in $)		
$\leq$ 250,000	136	38.64
$>$ 250,000 - 500,000	65	18.46
$>$ 500,000 - 750,000	31	8.81
$>$ 750,000 - 1,000,000	31	8.81
$>$ 1,000,000	48	13.63
Refuse to answer	41	11.65

Concerning the descriptive survey statistics, not in line with our expectation, the number of risk-seeking individuals is higher than the number of risk-averse participants. Hence, the policyholders tendentially prefer the probabilistic scenario with a substantially higher loss instead of a certain loss. This is consistent with loss aversion (see, e.g., Kahneman and Tversky, 1979). Furthermore, Table 4 and

[13]Each pretest subject needed more than 240 seconds.

Table 5 show how default probability and coverage level influence the mean willingness to pay, the ratio of the mean willingness to pay and fair premium, and the ratio of median willingness to pay and fair premium. The ratio for the mean is substantially higher than for the median. Hence, similar to Zimmer et al. (2018), it underlies a willingness to pay distribution skewness. For each default probability level, the ratio of mean and fair premium is higher with increased coverage starting with $240,000. Moreover, the coverage level $200,000 leads to a higher ratio of mean and fair premium than $240,000.

Table 4: Willingness to Pay for Underinsurance (in $)

Default Probability (%)	0	0.1	1	0	0.1	1
Coverage	200,000	200,000	200,000	240,000	240,000	240,000
Fair Premium	1000	999	990	1200	1198.8	1188
Mean	1182.04	807.83	800.09	1310.93	939.45	871.56
Mean / Fair Premium	1.1820	0.8086	0.8082	1.0924	0.7837	0.7336
Median / Fair Premium	0.4000	0.2002	0.1843	0.4167	0.1877	0.1684
Standard Deviation	3113.74	2200.40	2338.10	3113.11	2554.74	2639.50

Table 5: Willingness to Pay for Full Coverage and Overinsurance (in $)

Default Probability (%)	0	0.1	1	0	0.1	1
Coverage	250,000	250,000	250,000	260,000	260,000	260,000
Fair Premium	1250	1248.75	1237.5	1300	1298.7	1287
Mean	1690.17	1067.39	980.82	1962.91	1304.26	1061.24
Mean / Fair Premium	1.3521	0.8548	0.7926	1.5099	1.0043	0.8245
Median / Fair Premium	0.4800	0.2002	0.1616	0.4615	0.2310	0.1904
Standard Deviation	4188.94	3200.39	3366.11	5542.25	3498.91	2973.90

In a next step, we run a multiple regression to measure which independent variable affects the relative willingness to pay in a significant way. The chosen independent variables do not exhibit strong correlations (see Appendix B).[14] Similar to Zimmer et al. (2018), we code the default probability levels as dummy variables. In addition, we notate the different coverage levels as dummy variables. The case of full coverage and no default probability is denoted as the reference category. Financial literacy is a categorical variable. Between 0 and 3 correct answers for the financial literacy questions can be reached. The financial literacy increases with the number of correct answers. In addition, the degree of risk aversion is explained by 5 categories, where category 5 is very risk-averse and category 1 is very risk-seeking (see also Table 2). As mentioned earlier, age is cardinally scaled. Moreover, female is another binary variable and the wealth is subdivided in 5 categories and "refuse to answer". The wealth increases with a higher category (see Table 3). Table 6 illustrates the regression results.

[14]In addition to the correlations, we also check the variance inflation factor. Since the variance inflation factor is for all variables smaller than 1.501, no multicollinearity underlies (greater than 10 indicates multicollinearity).

Table 6: Regression Analysis for the Relative Willingness to Pay (in $)

	(1)	(2)	(3)
Constant	1.305***	3.515***	2.945***
	(0.000)	(0.000)	(0.000)
Contract 1 (0.1% DP)	-0.421***	-0.421***	-0.402***
	(0.000)	(0.000)	(0.000)
Contract 2 (1% DP)	-0.494***	-0.494***	-0.460***
	(0.000)	(0.000)	(0.000)
Contract A ($200,000 coverage)	-0.067	-0.067	-0.013
	(0.579)	(0.564)	(0.916)
Contract B ($240,000 coverage)	-0.130	-0.130	-0.083
	(0.282)	(0.262)	(0.485)
Contract C ($260,000 coverage)	0.113	0.113	0.132
	(0.349)	(0.329)	(0.266)
Financial Literacy		-0.045	-0.082
		(0.316)	(0.073)
Risk Aversion		0.131***	0.104**
		(0.000)	(0.005)
Age		-0.038***	-0.039***
		(0.000)	(0.000)
Female		-0.238**	-0.063
		(0.004)	(0.459)
Wealth			0.209***
			(0.000)
Observations	4224	4224	3732
R^2	0.007	0.084	0.092

Note: We consider the significance levels * ($0.01 \leq p < 0.05$), ** ($0.001 \leq p < 0.01$), and *** ($p < 0.001$). For each table element, we insert the regression coefficient as well as the p-value in brackets below. According to (3), we eliminate all participants who are not interested in communicating their wealth ("refuse to answer"). In general, we cannot expect high values for R^2 as we have only one cardinally scaled variable (age) and the most variables are binary.

The existence of default probability substantially decreases the relative willingness to pay. Furthermore, coverage and financial literacy do not significantly influence the relative willingness to pay. Based on financial literacy, we provide an additional analysis in the following since we hypothesize that the average relative willingness to pay for high financial literacy is closer to 1, as it is for individuals with low financial literacy. Moreover, a higher degree of risk aversion positively affects the relative willingness to pay. Hence, our results are in line with economic theory. Surprisingly, age also provides strong significant results. Older individuals tend to exhibit a lower relative willingness to pay. For the whole set of observations, women pay less than men, while excluding those who answered "refuse to answer" gender has no relevant effect. In addition, an increase in wealth leads to a higher relative willingness to pay for the underlying insurance contracts.

In a next step, we analyze whether a higher degree of financial literacy leads to an average relative willingness to pay that is closer to 1. As Table 7 illustrates, the average relative willingness to pay increases between 0 correct answers and 1 correct answer but decreases with a higher number of correct answers. Surprisingly, individuals with the highest financial literacy have the lowest average relative willingness to pay and this is substantially lower than 1. Furthermore, we use the t-test to investigate whether the means are equal or whether based on the findings of Table 7, it results in a decision for the alternative hypothesis (see Table 8). The mean for 1 correct answer is significantly higher than for 0 correct answers. Moreover, the mean for 2 correct answers is significantly lower than for 1 correct answer. The same holds for 3 and 2 correct answers. The group with 2 correct answers is close to the fair ratio of 1.

Table 7: Relative Willingness to Pay

Financial Literacy Group	Mean	Standard Deviation
0 correct answers	0.812	1.855
1 correct answer	1.791	4.582
2 correct answers	0.989	2.658
3 correct answers	0.621	1.498

Table 8: Relative Willingness to Pay Equality Test

Financial Literacy Group	p-value	Alternative Hypothesis
0 correct answers vs. 1 correct answer	0.000***	The mean for 1 correct answer is higher than for 0 correct answers
1 correct answer vs. 2 correct answers	0.000***	The mean for 2 correct answers is lower than for 1 correct answer
2 correct answers vs. 3 correct answers	0.000***	The mean for 3 correct answers is lower than for 2 correct answers

Note: If the p-value is smaller than 0.05, the decision is for the alternative hypothesis.

Based on the previous insights, we investigate by using a one-sample t-test whether policyholders strive to achieve the expected utility equilibria between probabilistic insurance with full coverage and no default probability with different coverage levels or significantly vary from these equilibria points. We set the initial wealth W_0, the risk aversion parameter a, and the average willingness to pay by the reference category as input parameters to calculate the premium π^{EQ} that should be paid to reach the equilibrium point. Subsequently, we measure whether these premiums vary from the actually paid premium (see also Table 4 and Table 5). Table 9 illustrates the results for the reference category 0.1 percent default probability and full coverage, while Table 10 describes the case with reference category 1 percent default probability and full coverage. According to Table 9, for coverage of $\$250,000$ and $\$260,000$, and independent of the considered levels of initial wealth and degree of risk aversion, we reach strong significant results and hence the policyholders do not strive for expected utility equilibria. For $\$240,000$ coverage, the results are independent of the considered initial wealth and the risk aversion not significant. Thus, a deviation from expected utility equilibria is not statistically supported. Concerning coverage of $\$200,000$, we recognize weak significance. Only for low initial wealth and a high degree of risk-seeking behavior are the results not significant.

When the reference category changes from 0.1 percent default probability to 1 percent default probability, the p-value decreases for all analyzed combinations. Therefore, the policyholders' willingness to pay varies even more from the equilibrium point as under the lower default probability. Table 10 shows that a coverage level of $\$250,000$ and $\$260,000$ exhibits strong significance, while coverage of $\$240,000$ leads to weak significance. Only for low initial wealth and a high degree of risk aversion is the p-value not significant. Coverage of $\$200,000$ is generally connected with strong significance. However, for low initial wealth and a high degree of risk aversion, as well as high risk-seeking behavior, we find weak significance.

Table 9: Expected Utility Equilibrium Test for Reference Category 0.1% DP and Full Coverage

Default-Free Policy, $1 > a > 0$				
Coverage	W_0	a	π^{EQ}	p-value
200,000	125,000	0.9	762.88	0.012*
200,000	500,000	0.9	807.30	0.025*
240,000	125,000	0.9	1022.13	0.083
240,000	500,000	0.9	1018.72	0.079
250,000	125,000	0.9	1074.20	0.006**
250,000	500,000	0.9	1069.21	0.006**
260,000	125,000	0.9	1122.65	0.005**
260,000	500,000	0.9	1118.81	0.005**
200,000	125,000	0.1	812.12	0.026*
200,000	500,000	0.1	817.39	0.029*
240,000	125,000	0.1	1017.87	0.078
240,000	500,000	0.1	1018.63	0.079
250,000	125,000	0.1	1068.08	0.006**
250,000	500,000	0.1	1068.68	0.006**
260,000	125,000	0.1	1117.88	0.004**
260,000	500,000	0.1	1118.63	0.005**
Default-Free Policy, $0 > a > -1$				
Coverage	W_0	a	π^{EQ}	p-value
200,000	125,000	-0.1	823.72	0.032*
200,000	500,000	-0.1	819.89	0.030*
240,000	125,000	-0.1	1018.16	0.079
240,000	500,000	-0.1	1018.65	0.079
250,000	125,000	-0.1	1067.95	0.006**
250,000	500,000	-0.1	1068.60	0.006**
260,000	125,000	-0.1	1118.15	0.004**
260,000	500,000	-0.1	1118.65	0.005**
200,000	125,000	-0.9	863.57	0.056
200,000	500,000	-0.9	829.61	0.034*
240,000	125,000	-0.9	1019.53	0.080
240,000	500,000	-0.9	1018.80	0.079
250,000	125,000	-0.9	1067.72	0.006**
250,000	500,000	-0.9	1068.35	0.006**
260,000	125,000	-0.9	1119.52	0.005**
260,000	500,000	-0.9	1118.80	0.005**

Note: If the p-value is smaller than 0.05, the mean of the willingness to pay significantly varies from the premium which describes the expected utility equilibrium.

Table 10: Expected Utility Equilibrium Test for Reference Category 1% DP and Full Coverage

Default-Free Policy, $1 > a > 0$				
Coverage	W_0	a	π^{EQ}	p-value
200,000	125,000	0.9	759.38	0.011*
200,000	500,000	0.9	742.45	0.008**
240,000	125,000	0.9	998.59	0.061
240,000	500,000	0.9	969.81	0.041*
250,000	125,000	0.9	1050.41	0.004**
250,000	500,000	0.9	1020.14	0.003**
260,000	125,000	0.9	1098.63	0.004**
260,000	500,000	0.9	1069.57	0.003**
200,000	125,000	0.1	731.75	0.007**
200,000	500,000	0.1	742.42	0.008**
240,000	125,000	0.1	937.50	0.025*
240,000	500,000	0.1	943.66	0.028*
250,000	125,000	0.1	987.71	0.002**
250,000	500,000	0.1	993.71	0.002**
260,000	125,000	0.1	1037.51	0.002**
260,000	500,000	0.1	1043.66	0.002**
Default-Free Policy, $0 > a > -1$				
Coverage	W_0	a	π^{EQ}	p-value
200,000	125,000	-0.1	742.22	0.008**
200,000	500,000	-0.1	744.23	0.009**
240,000	125,000	-0.1	936.66	0.025*
240,000	500,000	-0.1	942.99	0.027*
250,000	125,000	-0.1	986.46	0.002**
250,000	500,000	-0.1	992.94	0.002**
260,000	125,000	-0.1	1036.65	0.002**
260,000	500,000	-0.1	1042.99	0.002**
200,000	125,000	-0.9	779.90	0.016*
200,000	500,000	-0.9	751.70	0.010*
240,000	125,000	-0.9	935.89	0.024*
240,000	500,000	-0.9	940.90	0.026*
250,000	125,000	-0.9	984.08	0.002**
250,000	500,000	-0.9	990.45	0.002**
260,000	125,000	-0.9	1035.88	0.002**
260,000	500,000	-0.9	1040.89	0.002**

Note: If the p-value is smaller than 0.05, the mean of the willingness to pay significantly varies from the premium which describes the expected utility equilibrium.

In the next step, we analyze whether and to what extent our hypotheses are supported by our findings.

Default Probability Hypothesis (H1):
As previous empirical research about default probability and the willingness to pay demonstrates, an underlying transparent default probability decreases policyholders' willingness to pay substantially (see, e.g., Wakker et al., 1997; Zimmer et al., 2009, 2018). Our findings support previous outcomes as the relative willingness to pay decreases highly significantly even for a very low default probability of 0.01 percent. Hence, the existence of default probability is the key driver of the relative willingness to pay reduction. However, in this context, it is important to mention that in practice the underlying default probability of an insurer is not necessarily fully transparent to the policyholders (see, e.g., Klein and Schmeiser, 2018a,b).

Coverage Hypothesis (H2):
Although the ratio between mean willingness to pay and actuarially fair premium increases independent of the default probability for an increasing coverage level (starting with coverage of $240,000; see Table 4 and Table 5), our regression analysis does not have a significant impact on the relative willingness to pay. Hence, no certainty effect exists according to the insurance coverage. Such an effect would imply that the relative willingness to pay increases for increasing coverage. In contrast, our findings support that offering higher coverage increases the willingness to pay by the same amount, which is in line with previous theoretical considerations (see, e.g., Smith, 1968).

Financial Literacy Hypothesis (H3):
Based on our regression analysis, we find that relative willingness to pay is not significantly affected by financial literacy. However, when we analyze whether the average relative willingness to pay is influenced by the different financial literacy classes, we recognize an impact. Between 0 correct financial literacy answers and 1 correct answer, the average relative willingness to pay increases substantially. In contrast, between 1 correct financial literacy answer and 2 correct answers, the average relative willingness to pay decreases significantly. Furthermore, for 2 correct answers, the average willingness to pay ratio is close to 1. However, the ratio decreases for the individuals with 3 correct financial literacy answers (highest financial literacy) to 0.621. Thus, individuals with medium financial literacy (2 correct answers) are closer to an average willingness to pay ratio of 1 than individuals with the highest financial literacy. Hence, our hypothesis is supported by the results between low financial literacy (1 correct answer) and medium financial literacy, while it is not supported by our results for the highest financial literacy.

Risk Aversion Hypothesis (H4):
First, we find that the survey participants are even with respect to existence-threatening probabilistic losses tendentially risk-seeking (see Table 3). In this context, we extend previous insights by Kahneman and Tversky (1979). Furthermore, our hypothesis is supported by our empirical findings. Individuals with higher risk aversion exhibit a significantly higher relative willingness to pay than individuals with lower risk aversion. Hence, a higher relative loading can be reached if the risk aversion increases. These

findings are in line with previous theoretical considerations (see, e.g., Mossin, 1968).

Age Hypothesis (H5):
We hypothesized that age does not significantly affect the relative willingness to pay. Surprisingly, we find a highly significant impact of age on the relative willingness to pay. More precisely, individuals with higher age tend to exhibit lower relative willingness to pay. This implies that older people relatively underweight the utility of a house in relation to younger policyholders. Furthermore, this might be explained through a changing preference structure of the policyholders over the years.

Gender Hypothesis (H6):
For the entire survey, we find that women pay significantly less than men, and when we exclude the individuals who do not communicate their current wealth situation, we do not have a relevant effect. Thus, our results partly deviate from Zimmer et al. (2018). In addition, the lower relative willingness to pay of women cannot be explained by strong correlation effects with risk aversion. The correlation between risk aversion and female is close to 0 and not significant at all (see Appendix B).

Wealth Hypothesis (H7):
Our results indicate that wealth exhibits a significant impact on the relative willingness to pay. More precisely, higher wealth implies that the relative willingness to pay increases and hence our hypothesis is supported. One reason for such behavior might be that individuals with more wealth tend to spend more money (see, e.g., Case et al., 2005). In addition, the higher willingness to pay might be reasonable since a small premium increase is relatively unimportant for individuals with high wealth when we compare this with the scenario of a high damage event.

Expected Utility Hypothesis (H8):
Between probabilistic insurance and no default probability with full coverage and overinsurance, we find strong evidence that policyholders do not strive for the expected utility equilibria. Furthermore, these findings are independent of the risk attitude and the initial wealth of the policyholders. However, for underinsurance, we find partly insignificant results or only weaker significance. Moreover, the results are more significant for a reference category of 1 percent default probability than for a default probability of 0.1 percent. Our results extend the findings by Wakker et al. (1997).

Similar to Christiansen et al. (2016), we summarize the results in relation to existing research (see Table 11).

Table 11: Empirical Result Summary in Relation to Existing Research

Hypothesis	Main Results	Existing Research
H1: Default Probability	The existence of default probabilities decreases the relative willingness to pay	Consistent with Wakker et al. (1997), Zimmer et al. (2009), and Zimmer et al. (2018)
H2: Coverage	No significant effect on the relative willingness to pay	No empirical research to date; consistent with theoretical research (see, e.g., Smith, 1968)
H3: Financial Literacy	Medium financial literacy leads to an average relative willingness to pay close to 1; individuals with the highest financial literacy have a significantly lower average relative willingness to pay (0.621)	No empirical research to date
H4: Risk Aversion	Higher relative willingness to pay with higher risk aversion	Consistent with economic theory (see, e.g., Mossin, 1968)
H5: Age	Lower relative willingness to pay with higher age	No empirical research to date
H6: Gender	Women exhibit a lower relative willingness to pay (overall sample); no significant results (partial sample)	Zimmer et al. (2018) do not find significance
H7: Wealth	Higher wealth increases the relative willingness to pay	Consistent with findings by Case et al. (2005)
H8: Expected Utility Equilibria	For full coverage and overinsurance, we reach independent of the initial wealth and the risk attitude strong significance against expected utility equilibria; for underinsurance, the results are less significant or not significant at all	Extends findings by Wakker et al. (1997)

5 Economic Implications

Our survey enables a deeper understanding of what drives the relative willingness to pay of potential policyholders for an insurance contract with a high insured value (fire insurance). Similar to Wakker et al. (1997), Zimmer et al. (2009), and Zimmer et al. (2018), as long as the individuals are aware of a potential default probability, a no default probability (certainty effect) leads to the highest relative willingness to pay ratio. Furthermore, as the coverage does not significantly affect the relative willingness to pay, striving for higher coverage results in higher premiums without decreasing the relative willingness to pay ratio. However, in practice, a moral hazard problem might underlie if the indemnity payments are higher than the damage. Since potential moral hazard avoidance is also connected with costs, the insurer should offer full coverage to increase its profits as long as the costs of moral hazard and moral hazard avoidance overcome the premium surplus of overinsurance. Surprisingly, the individuals with the highest financial literacy exhibit an average relative willingness to pay of 0.621, while potential policyholders with medium financial literacy are close to the "fair premium" 1. Slightly smaller values than 1 might be explained since individuals with the highest financial literacy may be able to "outperform the market". However, our difference is highly significant and too high to be explained by such logic. We argue for the insurer that a segmentation concerning financial literacy might be beneficial to optimize the acquired premiums. Consistent with economic theory (see, e.g., Mossin, 1968), an increasing degree of risk aversion leads to a higher relative willingness to pay. This insight is also important for the insurer to price the insurance contract appropriately. Surprisingly, we find that older people tend to pay less for an insurance contract than younger people. This implies a perceived utility shift with increasing age. Our results also indicate that gender might be a driving factor for the relative willingness to pay. Furthermore, increasing wealth substantially increases the relative willingness to pay. In summary, our findings show that multiple parameters affect the relative willingness to pay significantly and hence those parameters are essential to understand for the insurer to price insurance contracts and to comprehend the behavior of policyholders.

However, our analysis also exhibits some limitations. Consistent with Wakker et al. (1997), Zimmer et al. (2009), and Zimmer et al. (2018), we assume that the loss probability is known; however, in practice, it is widely unknown. Moreover, although our willingness to pay analysis is important to recognize what drives policyholders' behavior, in practice, the competition on the market might also affect policyholders' behavior. Thus, for future research, we see the possibility to analyze competition-driven prices. For instance, a conjoint analysis can be used to enable a setting with different options.[15]

In addition to providing insights about key drivers of policyholders' willingness to pay, we extend findings by Wakker et al. (1997) concerning expected utility theory. We reach for full coverage and overinsurance independent of initial wealth and the risk attitude strongly indicating significance against expected utility equilibria. For underinsurance, the results are less significant or not significant at all. Therefore, the coverage drives whether policyholders' behavior significantly deviates from expected utility equilibria.

[15] A conjoint analysis concerning term life insurance is, for instance, conducted by Braun et al. (2016).

6 Summary and Conclusion

In this paper, we consider the relative willingness to pay for insurance contracts with a high insured value. Our research is conducted from the insurer's and regulator's perspective. On the one hand, analysis of the willingness to pay for high insured values is important for the insurer to recognize which policyholder groups exhibit a high willingness to pay or do not cover the insurer's expected expenses. On the other hand, from a regulatory perspective, it is also relevant to understand for which customer segments price regulation is useful to protect policyholders against potential discrimination. In this context, we develop a survey and collect empirical data. Based on the data, we analyze whether default probability, coverage, financial literacy, risk aversion, age, gender, and wealth are key drivers for the relative willingness to pay. A multiple regression with dummy variables is used to determine the impact of the different independent variables. Furthermore, we investigate whether higher financial literacy leads to an average relative willingness to pay which is closer to 1, as it is for lower financial literacy. In addition, we examine whether the policyholders strive to achieve expected utility equilibria between probabilistic insurance with full coverage and insurance without default probability but varying coverage. We develop 8 hypotheses that we test with the collected data. Those hypotheses are derived from previous empirical findings and economic theory. Finally, we deduce economic implications based on our findings.

Consistent with Wakker et al. (1997), Zimmer et al. (2009), and Zimmer et al. (2018), we find that the existence of a default probability decreases the relative willingness to pay substantially. Furthermore, the coverage does not affect the relative willingness to pay significantly. Hence, increasing coverage leads to higher profits for a positive premium loading. However, in practice, some moral hazard effects induce costs. Therefore, the insurer should strive for full coverage as long as the costs of moral hazard and moral hazard avoidance overcome the premium surplus of overinsurance. In addition, we find the surprising outcome that the average relative willingness to pay for individuals with medium financial literacy is close to 1 (fair premium), but policyholders with the highest financial literacy pay substantially less (0.621). Even when we consider that individuals with the highest financial literacy might be able to "outperform the market", the results are substantially stronger than expected.

We also find that the relative willingness to pay significantly increases with a higher degree of risk aversion, which is consistent with economic theory (see, e.g., Mossin, 1968). Surprisingly, higher age leads to lower relative willingness to pay. We conclude that the perceived utility of the underlying insurance contract decreases with increasing age. Moreover, the results for our overall sample partly deviate from Zimmer et al. (2018) since women pay less than men for the insurance contract. However, gender does not exhibit a significant effect when we eliminate all individuals who do not communicate their current wealth situation. Higher wealth implies an increasing relative willingness to pay. These results are consistent with the findings that individuals with higher wealth tend to spend more (see, e.g., Case et al., 2005). We also find that for overinsurance and full coverage, policyholders significantly deviate from expected utility equilibria. These results are independent of the initial wealth and the degree of risk aversion. Concerning underinsurance, the deviation is less significant or even not significant at all.

7 Appendix

Appendix A: Financial Literacy

Suppose you had $100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow?

- More than $102
- Exactly $102
- Less than $102
- Do not know
- Refuse to answer

Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, how much would you be able to buy with the money in this account?

- More than today
- Exactly the same
- Less than today
- Do not know
- Refuse to answer

Please tell whether this statement is true or false. "Buying a single company's stock usually provides a safer return than a stock mutual fund."

- True
- False
- Do not know
- Refuse to answer

Appendix B: Correlation Coefficients Among Independent Variables

Table 12: Correlation Table for Regression Analysis (2)

	Financial Literacy	Risk Aversion	Female	Age
Financial Literacy	1	-0.171*** (0.000)	-0.113*** (0.000)	0.334*** (0.000)
Risk Aversion	-0.171*** (0.000)	1	-0.028 (0.066)	-0.030 (0.055)
Female	-0.113*** (0.000)	-0.028 (0.066)	1	-0.030* (0.048)
Age	0.334*** (0.000)	-0.030 (0.055)	-0.030* (0.048)	1

Table 13: Correlation Table for Regression Analysis (3)

	Financial Literacy	Risk Aversion	Female	Age	Wealth
Financial Literacy	1	-0.168*** (0.000)	-0.100*** (0.000)	0.341*** (0.000)	0.182*** (0.000)
Risk Aversion	-0.168*** (0.000)	1	-0.013 (0.445)	-0.014 (0.392)	0.026 (0.107)
Female	-0.100*** (0.000)	-0.013 (0.445)	1	-0.047** (0.004)	-0.137*** (0.000)
Age	0.341*** (0.000)	-0.014 (0.392)	-0.047** (0.004)	1	0.227*** (0.000)
Wealth	0.182*** (0.000)	0.026 (0.107)	-0.137*** (0.000)	0.227*** (0.000)	1

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