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The Effects of Statistical Information on Risk and Ambiguity Attitudes, and on Rational Insurance Decisions

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This paper presents a field study into the effects of statistical information concerning risks on willingness to take insurance, with special attention being paid to the usefulness of these effects for the clients (the insured). Unlike many academic studies, we were able to use in-depth individual interviews of a large representative sample from the general public ($N = 476$). The statistical information that had the most interesting effects, "individual own past-cost information," unfortunately enhanced adverse selection, which we could directly verify because the real health costs of the clients were known. For a prescriptive evaluation this drawback must be weighted against some advantages: a desirable interaction with risk attitude, increased customer satisfaction, and increased cost awareness. Descriptively, ambiguity seeking was found rather than ambiguity aversion, and no risk aversion was found for loss outcomes. Both findings, obtained in a natural decision context, deviate from traditional views in risk theory but are in line with prospect theory. We confirmed prospect theory's reflection at the level of group averages but falsified it at the individual level.

Key words: risk attitude; ambiguity; health insurance; adverse selection
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1. Introduction

In many countries, health insurance is only partly government-funded, and clients have to decide on how much extra coverage they want to obtain by purchasing supplemental private insurance (Bundorf and Simon 2006). For making this decision, information about the risks and health expenses is useful. Thus, Winter et al. (2006, pp. 7933–7934) wrote, in a study on the Medicare Part D program for elderly clients introduced in the United States on January 1, 2006, where private insurance companies and health maintenance organizations (HMOs) have to compete to offer supplemental insurance:

> If the market component of Medicare Part D is to be successful, in the sense that it provides choices that consumers want, and achieves the efficiencies it seeks, it will probably be necessary for Medicare to expand its effort to reach all consumers and provide them with information and assistance in making wise choices. ... If elders are to be given sound advice on the merits of enrollment and alternative plans, community-based, privately financed advocacy organizations are likely to have to take the initiative. ... At present, even the most basic information on transition probabilities for pharmacy bills and health conditions that is needed for careful calculation of the value of insurance plans is not publicly available.

McFadden (2006, p. 23, concluding paragraph) gave the same arguments. Developments similar to those in the United States simultaneously took place in The Netherlands, the country where our study was conducted. Plans to abolish complete public coverage for health insurance were developed in 1995, when this study was initiated by the Dutch health insurance company Zorg en Zekerheid, and were finally implemented on January 1, 2006.

This paper reports on a field study into providing clients with statistical information about health costs. We study the effects of such information on the clients' willingness to take insurance (WTT), for a sample of $N = 476$ subjects representative of the lower two-thirds income class of the Dutch population. Our main interest concerns the desirability of such effects for the clients, i.e., whether it enhances the choices

they want. In addition, our study provides descriptive insights into risk and ambiguity attitudes.

Clients of the Dutch health insurance company Zorg en Zekerheid (with compulsory insurance so that there was no selection bias) were asked for their WTT both before the receipt of information about statistics of health expenses and after. This meant that the effect of the statistical information could be measured. We were also informed about the health expenses of the clients by the insurance company. Thus we could measure how the WTT, and the effect of statistical information on WTT, depended on both risk aversion and health expenses. The extra statistical information that clients received entails a reduction of ambiguity in its technical decision-theoretical sense, so that our data also give insights into ambiguity attitudes.

There is a wide interest in risk and ambiguity attitudes of the general public, rather than of the often-studied students (Donkers et al. 2001, Hartog et al. 2002, Harrison et al. 2007, Harrison and List 2004, Starmer 2000). Our collaboration with Zorg en Zekerheid provided a unique opportunity to obtain such data. Common academic budgets do not allow for large-scale intensive experiments with representative samples from a population scattered across several cities and with each subject interviewed individually in his home, as was possible in this study. Thus, we could obtain a refined measurement of risk attitudes from the general public. Because risk aversion is rarely measured at the individual level in insurance studies, its positive impact on WTT, although widely assumed, has rarely been verified empirically (see Barsky et al. 1997). The information about individual health expenses that we had is also rarely available. This information allowed an empirical verification of adverse selection at the individual level.

The effects of risk information on WTT are of interest from the marketing perspective, for example, if an insurer seeks to maximize revenues and profits. We will, indeed, formulate recommendations for such applications. The main research question of this study, raised by Zorg en Zekerheid, was, however, a prescriptive one, to be considered from the perspective of the clients of Zorg en Zekerheid: To what extent do the effects of risk information help clients make insurance decisions that better fit their own preferences, and which form of statistical information is optimal for this purpose? We will obviously separate the empirical facts inferred from our experiment, and relevant to empirical applications, from the prescriptive interpretations added later. The design, definition of indexes, and statistical analyses will, however, be primarily oriented towards those aspects of the data that serve to solve our main research question.

The effect of risk information on risky decisions of the general public, and the prescriptive desirability thereof, is of general interest beyond the context of insurance. It is, for instance, relevant for preventive health care, traffic safety, counseling for risky medical treatments, and banks informing clients about risk profiles of financial portfolios.

We considered WTT for supplemental insurance against a deductible of Dfl. 200 (approximately \$140 in 1997) per year, the deductible envisioned in 1995 when the subjects were interviewed. The deductible introduced in The Netherlands in 2006 is somewhat lower (€100), and it is higher (\$250) for the Medicare part D program in the United States. The supplemental insurance considered in the experiment of this paper provides reimbursement for any deductible paid, so that full coverage is obtained after all.

Our empirical findings originate from a natural environment and concern choices commonly faced by people when interacting with their insurance company. They shed new light on some controversial empirical questions, such as whether the general public is risk averse or risk seeking for losses, and whether ambiguity aversion and prospect theory's reflection effect hold for the general public. Since Keynes (1921), Knight (1921), and Ellsberg (1961), there have been many studies into the difference between risk (known probabilities) and uncertainty or ambiguity (unknown probabilities); see Gilboa (2004). These studies commonly considered artificial constructions of ambiguity, such as through urns with numbers of balls deliberately kept secret. Our natural stimuli will reveal phenomena different from those found with the commonly used artificial stimuli.

Further specific research questions addressed in this paper concern whether the effects of the various forms of statistical information on WTT interact with the risk aversion of the clients, and with their health expenses. We discuss from various perspectives (marketing, societal, client) whether the interactions found are desirable, as well as which form of statistical information is most desirable from the various perspectives.

2. Method

Details of our experiment, in particular concerning the hypothetical and subjective nature of the survey questions, are discussed in §5 and in Appendix A.

2.1. Participants

$N = 496$ clients of Zorg en Zekerheid were sampled, all with Dutch as native language, aged 18–69 years. The sampling was done sequentially, maintaining representativeness regarding age, gender, and income for the various subgroups of interest in this research.

Table 1 Risky Choices for Gains

	G1	G2	G3	G4	G5	G6	G7
Risky prospect	(0.50, 300)	(0.50, 200)	(0.01, 200)	(0.05, 100)	(0.50, 96)	(0.95, 72)	(0.95, 100)
Safe option	20	100	10	14	39	55	78
Proportion of risky choices	0.72	0.31	0.19	0.24	0.50	0.60	0.63

Notes. In G1 the choice is between a fifty-fifty prospect yielding Dfl. 300 or nothing and a safe option yielding Dfl. 20 for sure. In prospect choice G1, 72% of the clients chose the risky fifty-fifty prospect of Dfl. 300 or nothing, and 28% chose the safe option of Dfl. 20 for sure.

The clients all participated in the national health service, which means that they belonged to the lower two-thirds income class of the Dutch population. For our clients, insurance is compulsory so that being insured did not generate self-selection. The clients predominantly did not have an academic training, which makes them complementary to the participants recruited in most academic studies. The clients in our study were well motivated because the research was organized by their own health insurance company, and the general public is in general willing to contribute to health investigations (Bleichrodt and Pinto 2007).

2.2. Procedure

Thirty professional interviewers were hired. They received a day's training as preparation and visited all clients at their private homes. Interviews lasted approximately one hour per client, of which half an hour was dedicated to questions regarding the research reported here, and the other half hour was dedicated to another research regarding insurance for dental care. Clients were called by phone after the interview to verify that the procedures had been carried out correctly prior to the interviewers being paid. No interviewer had to be discarded.

2.3. Stimuli; General

We describe only the variables relevant to this research. The stimuli were tested in a pilot study consisting of 10 clients and were approved by a patients' interest group (Regionaal Patiënten/Consumenten Platform Leiden). In short, the independent variable is the form of statistical information given to the clients, and the dependent variable is the effect of information on WTT. Further factors are risk attitude and costs. We will describe these stimuli in detail.

2.4. Risk Attitude

Fourteen hypothetical choice questions concerning gambling for money were mailed to the clients before the interview, so that they could prepare themselves. These questions were discussed in the beginning of the interview. In each question, a choice had to be made between a risky prospect and a sure amount of money. The first seven choices concerned gains, i.e., nonnegative amounts of money, and were described as wheel-of-fortune questions to the clients. The last seven choices concerned losses and were described as wheel-of-misfortune questions. Both the gain questions and the loss questions were preceded by one practice question. Appendix B presents the visual displays of two choices. Tables 1 and 2 display the probabilities and outcomes of the prospects. Only the nonzero outcomes and their probabilities are denoted. To save space, the tables also display choice proportions that will be discussed in the Results section.

Choices G1 and L1 serve to detect extreme risk aversion, for clients who invariably choose the sure amount no matter how favorable the risky prospect is. In choices G2 and L2, the sure outcomes are the expectations of the risky options. These choices provide benchmarks for whether clients are risk averse, risk neutral, or risk seeking. The other prospects were taken from Tversky and Kahneman (1992, G3, G4, G7, L3, L4, L5, L6, L7) and from Birnbaum et al. (1992, G5, G6). The particular outcomes and probabilities were chosen because in each of these choices the aforementioned references found a 50% preference for either prospect, suggesting that they optimally distinguish between individuals. For pragmatic reasons, we matched dollars (the unit used in the references mentioned) and guilders (the unit used in our experiment)

Table 2 Risky Choices for Losses

	L1	L2	L3	L4	L5	L6	L7
Risky prospect	(0.05, −200)	(0.50, −200)	(0.01, −200)	(0.05, −100)	(0.10, −50)	(0.10, −200)	(0.95, −100)
Safe option	−75	−100	−3	−8	−8	−23	−84
Proportion of risky choices	0.76	0.47	0.54	0.56	0.54	0.50	0.33

Notes. In L1 the choice is between a prospect yielding a loss of Dfl. 200 with probability 0.05 and no loss otherwise, and a safe option yielding a loss of Dfl. 75 for sure. In prospect choice L1, 76% of the clients chose the risky prospect of losing Dfl. 200 with probability 0.05, and 24% chose the safe option of losing Dfl. 75 for sure.

Table 3 Prospect Choices in an Insurance Context

	I1	I2	I3
Premium	132	144	180
Average costs	125	144	150
Mean willingness to buy	0.45	0.55	0.51

Notes. Three insurance choice questions with annual premium and average costs specified. In I1, the choice is between insurance at premium 132 or no insurance with average costs 125. In I1, the mean subjective willingness to buy was 0.45.

numerically, and not in value. We incorporated various levels of probability because there will be various levels of health among our clients and, correspondingly, various probabilities of costs.

We also asked three questions concerning risky choices that were framed as insurance decisions. In each of the questions, an annual premium was specified and a, never higher, annual average of costs for the case of no supplemental insurance. The clients were asked to express their subjective willingness to buy supplemental insurance on a scale from 1 (surely will not buy) to 7 (surely will buy). Table 3 displays the questions. Again, to save space, the table also displays results ([0, 1]-normalized) of mean willingness to buy that will be discussed in the Results section.

2.5. Information Provision; Three Groups of Clients, and Three Summary Statistics per Client

Table 4 displays the forms of information considered in this paper, which will now be explained. A 3×3 between–within design will result. The clients were divided into five groups. Each group received information about a different summary statistic. Two summary statistics, "badnews probabilities" of costs exceeding Dfl. 0 and costs exceeding Dfl. 200, and "goodnews probabilities" of costs not exceeding these levels ($n = 203$), did not yield significant effects. Apparently, two such probabilities do not entail enough information to affect choice. For brevity, these results will not be reported. Three summary statistics (the between-subjects variable in our 3×3 design) remain:

(A) *Total costs*: Average annual health care costs, which is the sum of the costs specified in (B) hereafter.

(B) *Specified costs*: Average annual costs specified for seven health care services: (a) Hospital care; (b) physician; (c) paramedical care (physiotherapy, speech therapist, remedial therapy, etc.); (d) prescription drugs; (e) ancillary equipment; (f) obstetrics and maternity care; (g) transportation.

(C) *Probabilities ("probabilistic information")*: The probability of each of the following four events: Dfl. 0 costs, costs between Dfl. 0 and Dfl. 100, costs between Dfl. 100 and Dfl. 200, costs exceeding Dfl. 200.

Per client, the information about the summary statistics was provided at three levels of aggregation:

(1) Population (throughout this paper: all clients of Zorg en Zekerheid).

(2) Reference group, i.e., clients of the same gender and age interval (18–29, 30–39, 40–49, 50–59, and 60–69 years).

(3) Individual.

The level of aggregation is the within-subjects variable in our 3×3 design. At the individual level, clients were informed about their personal costs over the previous year. This information does not comprise randomness and, hence, was not provided to the clients who received probabilistic information. Thus, in total, $3 \times 3 - 1 = 8$ forms of information were considered, displayed in Table 4. The clients always received the three aggregated levels of information sequentially, first about the population, then about the reference group, and finally, if relevant, at the individual level.

Table 4 Eight Different Forms of Information about Costs, with Respect to Various Summary Statistics (Rows) and Various Levels of Aggregation (Columns)

	Within subjects		
Between subjects	Level of aggregation given first: population	Level of aggregation given second: reference group	Level of aggregation given last: individual
Total costs	+	+	+
Specified costs	+	+	+
Probabilistic information	+	+	−

Note. Each client answered all questions in one row.

2.6. Costs

Unlike most other studies, we did not derive costs indirectly from (subjective) assessments of clients (Finkelstein 2004). Instead, for the clients who received information about their health costs over the preceding year (1994; total or specified), this information was also provided to us by the insurance company. Thus, we have the exact real costs available at the individual level.

2.7. Subjective Willingness to Take Supplemental Insurance

Clients were asked to express their willingness to take supplemental insurance on a scale from 1 to 7. Contrary to prior plans, we did not specify a premium for reasons explained in Appendix A. The resulting scale, normalized to a 0–1 scale, is used as the index of the willingness to take supplemental insurance in the main analysis and is denoted as *WTT* henceforth.

WTT was measured before the provision of information, and after each of the three forms of information that was provided to each client.

2.8. Subjective Evaluations of the Information

For each form of information received, four subjective evaluation questions were asked of the clients. The questions concerned (a) clarity, (b) comprehensibility, (c) general usefulness, (d) usefulness in decisions, and (e) whether the statistic was higher or lower than expected, each on a seven-point scale. The clients were also asked at which level of aggregation they would most like to receive information in the future.

2.9. Analyses

The *effect of a form of information* was defined as the WTT directly after receipt of that form of information, minus the first WTT that was measured before any receipt of information. For example, the effect of individual-cost information for a client was the fourth WTT elicited from the client minus the first. Order effects are discussed in §5.

Clients with costs exceeding Dfl. 405 (the median cost) were classified as *high-cost*, the others as *low-cost*. We received the information about individual costs only for subjects who were given cost information (total or specified; $n = 184$). Because the cost variable was higly skewed, we used a transformation for correlational analyses, as follows: $0 \to 1$ (16.8%), $(0, 100] \to 2$ (15.8%), $(100, 200] \to 3$ (10.3%), $(200, 1000] \to 4$ (26.6%), and $(1000, \infty) \to 5$ (30.4%), with percentages of clients indicated between parentheses. The thresholds were chosen because of their psychological meaning, where 200 is particularly important because it is the level of the deductible.

A *risk-aversion index*, ordering clients regarding their degree of risk aversion, was constructed as the average of three scores: (a) The number of safe choices in the gain prospects; (b) the number of safe choices in the loss prospects; (c) the willingness to buy in the insurance context. All of these variables were normalized to a 0–1 scale before their average was taken. In this manner, the risk-aversion index is automatically normalized too.

For the main research question of this paper, which *single* form of information gives the best effect, we used paired t tests to compare WTT before and WTT after receipt of information.[1] Wilcoxon ranked signs tests revealed the same patterns and are not reported. We use the following abbreviations for two-tailed paired t tests: ms, $p \leq 0.10$ (significant if one-tailed); *, $p \leq 0.05$; **, $p \leq 0.01$; ***, $p \leq 0.001$.

[1] We did not use analysis of variance because we were interested in single forms of information; only single forms of information will be implemented. The asymmetric role of WTT before receipt relative to the WTTs after receipt further illustrates that analysis of variance is not suited to answering our main research questions.

3. Results on Risk Attitudes and Effects of Information

Twenty clients were dropped because, as a result of lack of understanding or for other reasons, they were unable to answer the questions; 476 remained. The main results will concern the interactions of the effects with risk aversion and costs. They are presented in §3.4.

3.1. Risk Attitudes

Tables 1 and 2 in the preceding section already gave the proportions of risky choices in the prospect choices. Choice G2 exhibits risk aversion (chi = 65.8, df = 1, $p < 0.001$), and choice L2 risk neutrality (chi = 1.58, df = 1, $p = 0.21$). For the three risk-attitude questions framed as insurance, Table 3 in the preceding section gave the means of subjective willingness to buy, normalized to a 0–1 scale.

We tested the internal consistency of the risk aversion scale by means of a reliability analysis. Cronbach's alpha was 0.75, which exceeds the common acceptability cutoff point of 0.70 (Nunnally and Bernstein 1994). No removal of any item except L7 (see Appendix A) improved reliability.

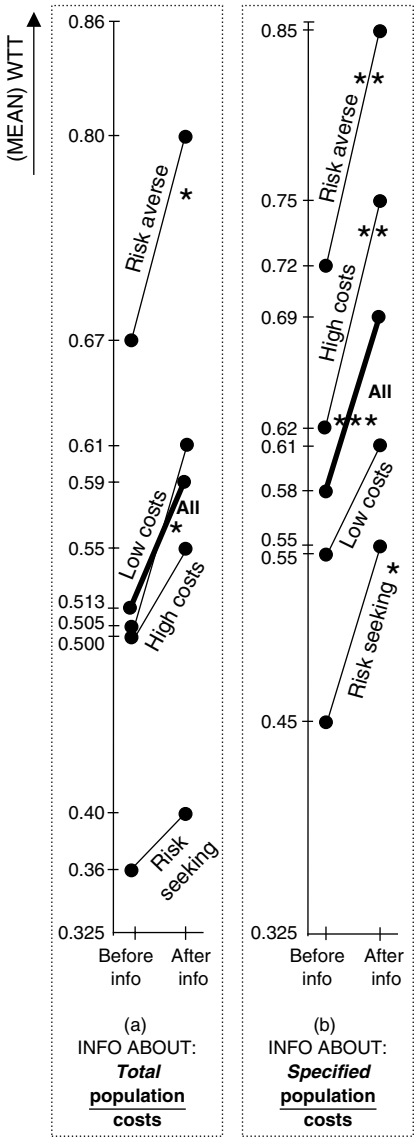
The results of the prospect questions L2 and L6 suggest that slightly more than 50% of our sample is risk averse for the relevant outcome domain. Because our—obviously debatable—policy recommendations in §6 will primarily concern risk-averse clients, we used a conservative criterion for classifying clients as risk averse: The more risk-averse half of our sample was classified as risk averse and the other half as risk seeking. Besides correlational results, we also report analyses based on median splits.

The median of the risk aversion index constructed from the gains, losses, and insurance questions was 0.51.[2] The index was between 0 and 0.50 for 225 clients, who were classified as risk seeking. The index exceeded 0.50 for 232 clients who were classified as risk averse. This classification is used in our main analysis and is discussed further in §4.

In agreement with common findings (Barsky et al. 1997), there was a positive relation between risk aversion and being female, having a low income, a large family, a low education, and a high age, but the relation was significant only for the latter two variables ($r = 0.12$, $p = 0.01$ for both). These relations were the same for gains as for losses, though usually stronger for gains. The risk aversion index for gains (G1–G7) was positively related to the index for losses (L1–L7;

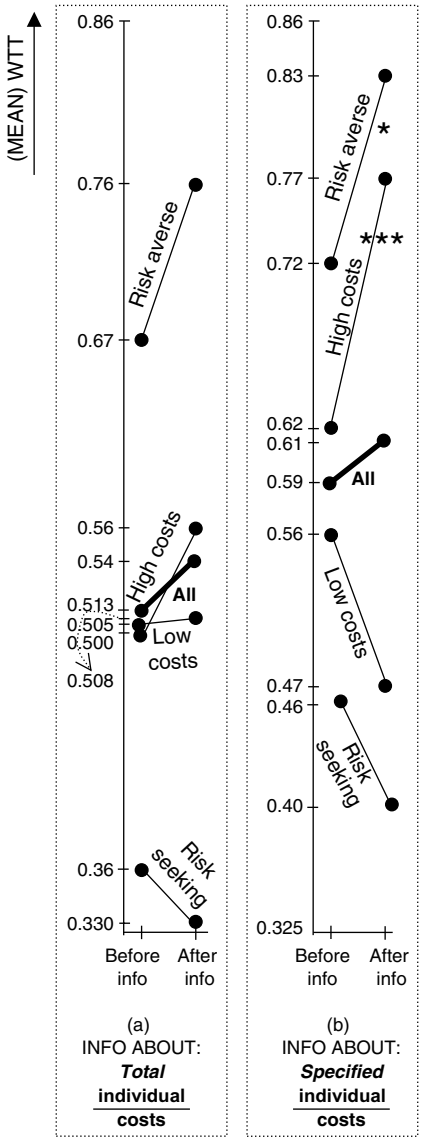
[2] It is a coincidence that this median happens to lie almost exactly at the 0.50 level of the risk aversion index.

Figure 1 **Effects of Information Provision on WTT (Willingness to Take Insurance) for Population Costs**



Note. In the group that received total population-cost information (a), the mean of WTT of the risk-averse was 0.67 before the receipt of information and 0.80 after, generating an effect significiant at the 0.05 level.

Figure 2 **Effects of Information Provision on WTT (Willingness to Take Insurance) for Individual Costs**



$r = 0.55$, $p < 0.001$). Risk aversion strongly influences WTT ($r = 0.36$, $p < 0.001$), as will be further illustrated in Figures 1 and 2. WTT also correlates positively with the risk-aversion index for gain-prospect choices ($r = 0.10$, $p = 0.03$) and the risk-aversion index for loss-prospect choices ($r = 0.12$, $p = 0.02$).

3.2. Effects of Information on WTT; Results of the Whole Sample

Table 5 gives numerical statistics, displaying the WTT before and after the receipt of information. It, thus, shows the effects of information on average WTT for the whole sample of clients. The most interesting results will also be depicted in Figures 1 and 2.

The three forms of information about reference groups had effects similar to the information about the population, but less pronounced. For brevity, these forms of information will not be analyzed further. Neither information about individualized costs nor information about probabilities has much effect on group means. These forms of information will, however, reveal interesting effects in detailed analyses described later, unlike the forms just excluded. The difference in $\text{WTT}_{\text{before}}$ between total and specified costs is due to between-group randomness and is nonsignificant under an independent samples t test ($t_{186} = 1.13$, $p = 0.26$).

3.3. Brief Discussion of Whole-Sample Results

The increases of average WTT for the whole sample generated by population-cost information may be

Table 5 Mean and Standard Deviation of WTT Before and After the Receipt of Information of the Whole Sample

	Population	Reference group	Individual
Total costs	WTT_{before}: 0.51 (0.43) WTT_{after}: 0.59* (0.43)	WTT_{before}: 0.51 (0.43) WTT_{after}: 0.56 (0.42)	WTT_{before}: 0.51 (0.43) WTT_{after}: 0.54 (0.44)
Specified costs	WTT_{before}: 0.58 (0.40) WTT_{after}: 0.69*** (0.38)	WTT_{before}: 0.58 (0.40) WTT_{after}: 0.64ms (0.39)	WTT_{before}[a]: 0.59 (0.40) WTT_{after}: 0.61 (0.42)
Probabilistic	WTT_{before}: 0.54 (0.40) WTT_{after}: 0.59ms (0.36)	WTT_{before}: 0.54 (0.40) WTT_{after}: 0.56 (0.36)	

Notes. Significant effects (=changes in WTT) are underlined.
[a]WTT_{before} is not constant in the second row because of different missing subjects.

of interest from the marketing perspective of maximizing revenues of insurance policies. They, however, give no clear information about our main research question, being how to help clients make decisions that are optimal for themselves. There is no prior reason why it would be good or bad for clients to take more or less insurance. Information relevant to the prescriptive perspective will be revealed by analyses of subgroups, presented in the following subsections and in Figures 1 and 2.

3.4. Interaction Effects of the Five Most Interesting Forms of Information

As explained in §3.2, five forms of information remain, about population costs or individual costs, each specified either per seven services or only as the sum total of these, and, fifth and last, probabilistic information (always referring to the population and not to the reference group henceforth). We examine the dependence of the effects of information on risk aversion and costs. Table 6 presents correlations and partial correlations. Unfortunately, information about costs during the preceding year was not available for the group that received probabilistic information.

Most effects do not correlate significantly with risk attitude or costs. It is only for specified individual costs that there are significant nonzero correlations of effects with risk aversion and with costs. These correlations are positive, i.e., the more risk averse people are, and the higher their costs, the more their WTT *increases* because of the new information.

The effects of costs and risk aversion are uncorrelated ($r = 0.09$, $n = 174$, nonsignificant). Partial correlations, controlling for the other factor, are virtually identical to uncontrolled correlations, and the beta-weights of risk aversion and costs in a regression are almost identical to their correlations.

The interaction between effect and high or low risk aversion is marginally significant for total individual costs ($F_1 = 2.843$, $p = 0.10$) and probabilistic information ($F_1 = 3.224$, $p = 0.08$) and significant for specified individual costs ($F_1 = 5.094$, $p = 0.03$). The interaction between effect and high or low costs is significant ($F_1 = 10.584$, $p = 0.002$).

The above claims are supported by analyses of subgroups. Table C1 in Appendix C gives complete numerical results. The first four forms of information, about costs, are also depicted in Figures 1 and 2. These figures, although complex at first sight, serve well to convey the overall patterns in our data, as is explained next. Line segments connect WTT before receipt of information with WTT after receipt of information, so that their increases and decreases reflect the effects of information. Each panel illustrates a form of information. In each panel, a thick line displays the average WTTs and effects for the whole group. The risk-averse subgroup always has thehighests WTTs and, thus, generates the highest line segments, and the risk-seeking group generates the lowest. The high-cost group always generates the second-highest line segments, and the low-cost group generates the second-lowest. All line segments in Figure 1(a) increase. Hence, total population-cost information increases WTT for all subgroups considered and, obviously, also for the whole group. Asterisks indicate that the increases are significant only for the whole group and for the risk-averse group, but not for the other subgroups in Figure 1(a). Figure 1(b) displays similar results for the group that received information specified per health service. The changes are all in the same direction as in Figure 1(a), but to a more pronounced degree, and higher levels of significance are reached.

Figure 2 displays the results of individual-cost information instead of population-cost information.

Table 6 Correlations of Effect with Risk Aversion and with Costs for Each of the Five Forms of Information

	Total population costs	Specified population costs	Total individual costs	Specified individual costs	Probabilistic
Risk aversion	0.02 ($n = 81$)	0.05 ($n = 97$)	0.07 ($n = 81$)	0.22* ($n = 96$)	0.18 ($n = 82$)
Costs	−0.11 ($n = 81$)	0.08 ($n = 103$)	0.08 ($n = 81$)	0.27** ($n = 102$)	—
Risk aversion controlling for costs	0.02 ($n = 76$)	0.07 ($n = 92$)	0.06 ($n = 76$)	0.19ms ($n = 91$)	—
Costs controlling for risk aversion	−0.12 ($n = 76$)	0.05 ($n = 92$)	0.07 ($n = 76$)	0.26* ($n = 91$)	—

Note. The correlation of risk aversion with effect is 0.22 for the specified individual-cost information and is 0.19 if controlling for costs.

Table 7 Effects Exhibited by Figures 1 and 2; Summary of Effects of Information

		Increases WTT[b]	Differentiates individuals[c]
		Population	Individual
Enhances effects[a]	Total cost	Figure 1(a)	Figure 2(a)
	Specied costs	Figure 1(b)	Figure 2(b)

[a]Compare Figure 1(b) with Figure 1(a), and compare Figure 2(b) with Figure 2(a).
[b]See Figures 1(a) and 1(b).
[c]See Figures 2(a) and 2(b), with increases in WTT for risk aversion and also for high costs, and not for others.

Figure 2(a) concerns total-cost information and suggests differential effects, with increased WTT for the risk-averse clients and for the high-cost clients, and not for others. The effects are not significant though. Figure 2(b) concerns specified costs. The information again differentiates between individuals, but now to a more pronounced degree. Specifying costs amplifies the effects of total costs in both figures.

Table 7 summarizes the effects found. We presented the subgroup information in Figures 1 and 2 because the effects summarized in Table 7 are more easily inferred from visual inspection of these figures than from the numerical Table C1 in the appendix.

Furthermore, probabilistic information (data given in Table C1) also increased the WTT of risk-averse clients, and not of risk-seeking clients, as did individual-cost information. Costs and interactions with these costs could not be observed for probabilistic information.

3.5. Subjective Evaluations

The normalized means and standard deviations of the questions about clarity and comprehensibility are $M = 0.80$, $SD = 0.24$, and $M = 0.83$, $SD = 0.21$, respectively. These questions gave similar results for all three summary statistics (being total costs, specified costs, and probabilistic information) and are not discussed further. The two questions about usefulness distinguished more clearly between summary statistics. We took the normalized average of these two questions as a usefulness scale. Its means (standard deviations) are 0.74 (0.28) for specified costs, 0.58 (0.32) for total costs, and 0.58 (0.28) for probabilistic information. The judged usefulness of specified costs is significantly higher than that of the other summary statistics ($p \leq 0.001$ in each case); no other difference is significant.

For each summary statistic, the clients were asked which level of aggregation they preferred. Table 8 displays the results for the summary statistics regarding costs. The summary statistic giving probabilistic information (which could not be given at the individual level) exhibited a similar pattern, with preference increasing with individualization. These results suggest a preference for specified costs and for individualized information.

Table 8 Proportions of Preferences for Levels of Aggregation

	No preference	Population	Reference group	Individual
Total costs	0.40	0.05	0.15	0.40
Specified costs	0.22	0.10	0.21	0.47

Note. For specified costs, 47% of the clients prefers to receive the information at the individual level, 21% at the reference group level, etc.

4. Discussion of the Findings, and Results on Ambiguity

4.1. Risk Attitude

Our finding of considerable risk seeking for losses deviates from the universal risk aversion often assumed in the economics and insurance literature. In our domain of losses with moderate to high probabilities, risk seeking is predicted by prospect theory (Abdellaoui 2000, Hershey and Schoemaker 1985, Kahneman and Tversky 1979, Payne et al. 1980, Tversky and Kahneman 1992). It can be explained theoretically by an inverse-S shaped probability transformation, which has been confirmed in many empirical studies (Abdellaoui 2000, Bleichrodt and Pinto 2000, Gonzalez and Wu 1999). Such probability transformations do predict risk aversion for small-probability losses, which is indeed the common case in insurance. Prospect theory, thus, predicts prevailing risk aversion in insurance, which mostly concerns small-probability losses, and suggests risk seeking only for moderate-to-high-probability losses such as in our data set. Similar risk seeking was found by Marquis and Holmer (1996) in a re-analysis of the RAND study of Manning et al. (1987).

The major factor underlying risk aversion is probably loss aversion (Fischer et al. 1986, Langer and Weber 2001, Pennings and Smidts 2003), which concerns the overweighting of losses relative to gains. Loss aversion plays no role in our domain where no exchanges between gains and losses are involved. Hence, we avoided mixed prospects, yielding both gains and losses, in our measurements of risk attitudes, and we do not consider loss aversion.

On average, we find risk neutrality for the loss prospects (questions L2 and L6). Therefore, risk seeking is less frequent than suggested by prospect theory. This may be caused by the context of insurance in our experiment, even if not stated explicitly in the prospect choice questions. It is well known that an insurance context enhances risk aversion (Hershey

et al. 1982, pp. 949–950; McClelland et al. 1993). Let us repeat that health insurance was compulsory for the clients of the insurance company Zorg en Zekerheid so that they are no more risk averse than the average lowest two-thirds income part of the Dutch population.

Our risk-attitude index comprises some insurance-related questions, and it is, therefore, obvious that this index correlates positively with WTT. Less trivial, but not surprising either, is the positive relation between WTT and the risk attitudes for the gain- and loss-prospect choices. Empirical verifications thereof have, however, been virtually absent from the literature so far. The reason is that risk attitude is usually unobservable in insurance studies. Besides Barsky et al. (1997), discussed later, we are aware of only Vistnes and Banthin (1997/1998). They asked about agreement with the claim "I'm more likely to take risks than the average person," and found a negative relation between this index of risk seeking and demand for insurance.

Relative to the participants of Tversky and Kahneman (1992), our clients deviate from the predictions of cumulative prospect theory (Tversky and Kahneman found 50% risky choices in questions G3, G4, G7, L3, L4, L5, L6, and L7), all in the direction of ("rational") expected value maximization. This deviation may be caused by the different population, being average non-rich civilians instead of students. There is more agreement with the findings of Birnbaum et al. (1992), who found 50% risky choices in questions G5 and G6.

Prospect choices for gains have been studied extensively in the literature, although mostly for students. In our sample we find a considerable majority of risk aversion for gains, in agreement with the common findings in the literature. This risk aversion is most clearly seen in questions G2 and G5. There have not been many empirical investigations into prospects with loss outcomes. These prospects are, however, central in our study because they concern the relevant outcome domain, i.e., losses ranging from 0 to 200.

Kahneman and Tversky (1979) found reflection, with attitudes for losses mirroring those for gains, at the level of group averages, and there we roughly confirm their findings. Reflection should not be expected to hold in a very strict sense. Attitudes for losses do not completely and exactly mirror those for gains but are usually less pronounced and closer to expected value. For a review of empirical evidence on the latter point, see Köbberling et al. (2007). There is no evidence to support strict reflection at the individual level in the sense that very risk-averse clients for gains will be very risk seeking for losses. Thus, Cohen et al. (1987) found no relation between risk attitudes for gains and those for losses at the individual level. Our evidence provides even stronger counterevidence, with risk aversion for gains correlating *positively* with risk aversion for losses rather than negatively.

4.2. Ambiguity Attitude

An interesting phenomenon appears in the group of 103 clients who received specified population-cost information. For these clients, the cost information that they received was usually lower than expected: For the average of the subjective questions with values 7 (costs of health service are much higher than expected) to 1 (costs are much lower than expected) over the seven health services, the mean was significantly below the neutrality level 4 ($t_{102} = -2.01$, $p < 0.001$). Hence, likelihood effects through an increased belief in bad outcomes cannot explain the increased preference for safety in this group. This is unlike the group of 83 clients who received total population-cost information. For the latter group, the costs that they were informed about were usually higher than expected ($t_{82} = 3.95$, $p < 0.001$), and likelihood effects could explain the increased preference for safety.

For the 103 clients who received specified population-cost information, not only likelihood effects are implausible, but also strategic considerations are (with average costs as a signal of price). This holds even more so because the insurance company is a nonprofit organization and screening is not permitted.

More information about the probability distribution, i.e., a reduction of ambiguity in the technical decision-theoretical sense, while not systematically affecting beliefs, did systematically decrease the preference value of the uncertainty. By the current conventions of decision theory, this finding must be interpreted as ambiguity seeking, which is contrary to the hypothesis of universal ambiguity aversion that is most popular in decision theory today. We suggest that attitudes towards ambiguity (being closer or farther away from objective statistical probabilities) are less central in human decision making than commonly thought and that other aspects generated our finding. The situation with the extra statistical information is less natural for the clients than the situation without it, because insurance decisions that people make many times in their lives and that they are familiar with are virtually always made without statistical information available. Thus, people prefer natural situations, where they can better justify their decisions to others.

In general, naturalness of the decision situation, rather than remoteness from an objective-probability state of knowledge, affects preference. In the classical Ellsberg (1961) paradoxes, a gamble on urns with compositions kept secret is less natural than on one

with a known composition, and this fact rather than remoteness to the objective-probability state drives preference (Viscusi and Magat 1992, p. 380). Many studies have argued for the importance of emotional aspects of uncertain information other than ambiguity (Chow and Sarin 2001; di Mauro and Maffioletti 2002; Fox and Tversky 1995, 1998; Fox and Weber 2002; Heath and Tversky 1991; Kilka and Weber 2001; Tversky and Fox 1995; Wakker 2004). The difficulty in controlling for likelihood effects explains why studies of ambiguity attitudes have been restricted almost exclusively to artificial setups with information kept secret such as Ellsberg urns, setups that are systematically biased against the ambiguous events.

Another effect that can underly our finding concerns the reflection effect for ambiguity at the group level. It entails that prevailing ambiguity aversion for gains is combined with prevailing ambiguity seeking for losses. Most studies of ambiguity have considered gains, and little is known about ambiguity for losses. Keren and Gerritsen (1999) found ambiguity aversion for losses, as commonly assumed in theoretical studies, and contrary to the reflection effect. Several other studies, however, found ambiguity seeking for high-probability losses (di Mauro and Maffioletti 2002; Goldsmith and Sahlin 1983; Ho et al. 2002; Hogarth and Kunreuther 1985, 1989; Kahn and Sarin 1988; Viscusi and Chesson 1999), in agreement with the reflection effect. Mixed results are in Cohen et al. (1987), Dobbs (1991), Einhorn and Hogarth (1986), and Mangelsdorff and Weber (1994). The empirical findings of ambiguity seeking for losses agree with our findings and cast further doubt on the universal ambiguity aversion commonly assumed in theoretical studies.

4.3. Emotional Factors

Many recent studies in decision theory have emphasized the importance of emotional factors in decision making (Elster 1998). Emotional factors may explain the stronger effects found after specified-cost information and the increased WTT after population-cost information at the end of §3. Clients may react more strongly to specified costs simply because these costs attract more attention and, thus, arouse more negative emotions (Hsee and Kunreuther 2000). Similar "splitting effects" have been observed in other fields (Bateman et al. 1997, Carson et al. 1992, Starmer and Sugden 1993, Weber et al. 1988).

The increased WTT that we found under risk aversion and not under risk seeking is opposite to regression to the mean: the group with a higher-than-average prior WTT exhibits an even higher WTT posterior. A psychological explanation could be the confirmation bias (reviewed by Klayman 1995), a phenomenon known under various other names (Suen 2004). It entails that people select only that part of new information that confirms their previous viewpoints, leading to more extreme viewpoints. The confirmation bias would, however, suggest similar effects for population-cost information, contrary to our findings.

4.4. Policy Implications

The observed increase in WTT for high-cost clients, which enhances adverse selection,[3] may be desirable from the client's short-term perspective but is undesirable from the societal perspective in the context of insurance (Hirshleifer 1971, Rothschild and Stiglitz 1976). Information about risks usually decreases the willingness to share these risks. Adverse selection can lead to a premium spiral and the breakdown of insurance (Akerlof 1970, Finkelstein 2004).

The positive relations that we found between effect and risk aversion seem to be desirable. Risk aversion is usually considered the normative basis for insurance. When consumers are risk averse there can be a market for insurance with benefits for all, if moral hazard and transaction costs are not too high. The domain of this research, however, concerns small losses, ranging up to Dfl. 200, that occur with moderate to high probabilities. For example, 83.2% of the clients in our sample had nonzero costs, and 57.1% had costs exceeding Dfl. 200. Contrary to what theoretical studies of insurance often assume, empirical studies have found considerable risk seeking in such domains. We suggest desirability of insurance only for the risk-averse clients in our sample. For risk-neutral and risk-seeking clients, their risk attitude provides an argument against insurance. Stability of expenses and the solidarity principle (helping risk-averse clients to take insurance) remain as arguments in favor of insurance for such clients.

The normative debate becomes more fundamental if the observed risk attitudes are not taken as given, but are opened to debate. It can be argued that risk neutrality is rational for the small stakes considered in this investigation. We assumed, however, that risk attitudes are to be taken as they are. The normative discussions of optimal decisions in McFadden (2006, pp. 20–21) and Winter et al. (2006, p. 7932) did not consider subjective risk attitudes of clients, but used expected-value maximization.

[3] Adverse selection usually arises from asymmetric information. In our study, the insurance company possesses the information about individual expenses and it might seem that adverse selection cannot arise. However, the insurance company should specify premiums in a uniform manner beforehand and is not permitted to use the cost information to adjust premiums. Such a use of information would constitute a violation of the privacy rights of clients. Thus, screening is excluded (Shapira and Venezia 1999), and adverse selection can occur here as it does in cases of asymmetric information (Bundorf and Simon 2006).

For a practical implementation of the provision of information about individual costs, legal guarantees for privacy protection of clients would be the major concern. This topic lies outside the scope of this paper.

5. Discussion of Methods

For gains, the median number of risky choices was 4, which, under expected utility with power utility ("constant relative risk aversion"), corresponds with a utility function $U(x) = x^r$ for any $0.77 \leq r < 1$. Thus, the median risk aversion index $1 - r$ is between 0 and 0.23. For losses, the median number of risky choices was 3, which, under expected utility with power utility, corresponds with a utility function $U(-x) = -(-x)^r$ for any $1.097 \leq r \leq 1.186$. This function is close to linear and is slightly concave. We could similarly have related the number of risky choices of every individual to powers of utility and risk aversion indexes. Such indexes and analyses are, however, based on expected utility theory. There is much empirical evidence that this theory is violated descriptively (Starmer 2000), and for this reason we preferred not to use indexes as just described.

Besides correlational analyses, we also used median splits for the risk aversion index and the cost variable. Median splits reduce statistical power. Their results are, however, best suited for the policy recommendations where the risk-averse subgroup plays a special role. Another reason to use median splits is that the cost variable is highly skewed. Because the independent variables, risk aversion and the cost variable, are uncorrelated median splits are not problematic (MacCallum et al. 2002).

Our main conclusions are based only on the following two assumptions regarding risk attitude: (a) Questions L2 and L6 provide a risk neutrality benchmark; (b) Individuals are more risk averse as they choose more safe options. Because these assumptions are uncontroversial, we did not need to resort to models such as prospect theory (Tversky and Kahneman 1992) that are descriptively better than expected utility but are analytically more complex to use and are less widely known.

Because population-cost information always preceded reference-group information, which always preceded individual information, order effects and interactions may obviously have arisen. These may explain the weak effects of reference-group information. The individual-cost information was sufficiently different to suggest independent factors. Because of the large numbers of forms of information to be examined,[4] there were not enough clients for a counterbalanced setup. Given that sequential information could not be avoided, the chosen order of information, progressively individualized, is most natural (which was also a reason for not considering randomized orders). If order and interaction effects are deemed crucial, the effects of individual-cost information should be reinterpreted as effects of individual-cost information joint with the preceding information.

One explanation for the general increase of WTT after population-cost information may be that, given the skewed nature of health expenses, for most clients the population averages will be larger than their own expenses, so that this information makes them more pessimistic, thereby generating an increase of WTT. Our primary research interest, however, does not concern the marketing perspective of maximizing WTT. Instead, it concerns the prescriptive purpose of helping clients to make decisions that are optimal for them. For the latter, results differentiating between individuals are important, and this differentiation is not affected by general increases or decreases of WTT such as those possibly generated by the order effects generated by prior information about averages—information that does not differentiate between individuals. Some other order effects cannot be excluded either because of the fixed order of other questions in this research. For example, the risk-attitude questions were always asked in the beginning of the interview and thereby always preceded the WTT questions. Our main conclusions are based on differences within ("effects") and between individuals, and these are not affected by fixed biases generated by such order effects.

An important step forward was made in experimental economics when the importance of real and performance-contingent incentives, rather than hypothetical ones, became widely understood (Binmore 1999, Smith 1982). Unfortunately, we were able to measure WTT only through hypothetical survey questions because of practical limitations. It would be preferable to elicit WTT from real choices, such as in the famous RAND study (Manning et al. 1987), and this is a topic for future research.

Neither did we use real incentives in the measurement of risk attitude, even though they could have been implemented easily there. Here we omitted them deliberately, for the following reasons. First, our clients, taken from the general population, participated voluntarily to help their insurance company and thereby were intrinsically motivated. We expected that the clients' motivation would be negatively affected (crowded out) by monetary rewards.

[4] Five between-subject levels of summary statistics (3 reported), and risk-averse/risk-seeking and high-costs/low-costs, yields $5 \times 4 = 20$ subgroups. The insurance company Zorg en Zekerheid wanted as many forms of information to be tested as possible. By accepting order effects, we could test three times as many forms of information.

The latter holds even more so because a health insurance company such as Zorg en Zekerheid—the company that initiated this research—is supposed to provide security and not to engage its clients in frivolous gambling for money. Frey and Jegen (2001) extensively discussed crowding-out effects. In Bleichrodt and Pinto (2007), two-thirds of the subjects participating in a health experiment did not accept the €12 flat payment offered to them and preferred to participate for free. In general, many health investigations are funded by charity donations, underscoring the support of the general public for such investigations.

The second reason for not using real incentives in our measurement of risk attitude is that, for the insurance questions considered in this experiment, the relevant outcomes are losses, and the implementation of losses is problematic. Third, for the simple choices with moderate stakes considered here, it has mostly been found that the presence or absence of real incentives does not affect clients' choices much, although real incentives do generate more risk aversion and reduce noise (Camerer and Hogarth 1999, pp. 8, 34; for insurance decisions, see Irwin et al. 1992; see also Hertwig and Ortmann 2001).

Barsky et al. (1997) used survey questions to measure the risk attitudes of $N = 11{,}707$ participants in the Health and Retirement Study of 1992. The participants were given a hypothetical choice between a stable income for the rest of their lives, or a fifty-fifty chance of either two or x times this income. In a first question, $x = 2/3$ was chosen and, depending on the answer, either $x = 1/2$ or $x = 4/5$ was chosen in a second question. In this manner, four classes of increasingly risk-averse participants could be distinguished, containing 64.6%, 11.6%, 10.9%, and 12.8% of the participants. Unlike our study, Barsky et al. did have information about real behavior. They found that the hypothetical survey questions about risk attitude predicted actual behavior regarding health insurance, smoking, drinking, choosing risky employment, and investments.

6. Conclusions

The risk attitudes that we observed lay between the predictions of prospect theory and expected value maximization. In particular, we found no risk aversion for loss outcomes, contrary to the classical economic predictions. Customer satisfaction was improved by information, the most by specified individual-cost information.

A reduction of ambiguity seemed to decrease rather than increase the value of uncertain options, suggesting ambiguity seeking rather than aversion. Apparently the more familiar option, rather than the one with known probabilities, is preferred, contrary to the common interpretation of the Ellsberg paradox. In most real-life decisions probabilities are unknown. We therefore conjecture that no special aversion to unknown probabilities holds in real-life decisions.

The following policy recommendations result from our study, where specification of costs per health service always reinforces the effects of total-cost information. From the marketing perspective of maximizing the number of insurances sold, population-cost information is optimal. From the (short-term) individual perspective of the client, individual-cost information seems to be most desirable because it enhances insurance taking for risk-averse clients and for clients with high costs. From the societal perspective, individual-cost information is interesting. Its drawback of adverse selection is probably too serious to be compensated by the advantages of favorable interaction with risk attitude, increased customer satisfaction, and increased awareness of medical expenses among the general public.

Prospect theory played a crucial role in this study. First, it explains why we did not find universal risk aversion in the risk-attitude questions for the relevant outcomes in this investigation. Second, it explains why additional information about probabilities led to higher risk aversion even if there were no apparent increases in perceived likelihoods of losses. Finally, we followed its recommendation that, for the measurement of risk attitude for insurance, mixed gambles with both gains and losses are better avoided. The pronounced risk aversion found in mixed prospects is due to loss aversion rather than to the risk attitude for losses as relevant for insurance. Thus, descriptive insights from prospect theory served to derive prescriptive implications in this study.

We hope that this field study, carried out with a large sample of nonacademic clients and dealing with natural choices, can contribute to a further understanding of risk attitudes, ambiguity attitudes, the use of descriptive theories such as prospect theory for prescriptive applications, the effects of risk information on consumer decisions, and, finally, to the usefulness of statistical information to help clients make better insurance decisions.

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Appendix A. Discussion of Our Constructions of Scales

Questions L2 and, to some extent, L6, although allowing a direct calibration of risk aversion versus risk seeking at the group level, in isolation are not very reliable indexes of risk aversion at the individual level. We, therefore, used the risk

aversion index based on 17 items to order clients regarding their risk aversion. Given that findings on risk attitudes for losses are controversial, we included the gain questions in our experiment primarily to verify that our design in itself does not contain deviations from common designs. In addition, gain questions are easier to understand for participants. We decided to include these items in the risk aversion index so as to increase reliability, supported by the significantly positive correlation between the gain and loss risk aversion indexes and between the gain index and WTT. A drawback is that gain questions concern outcomes different from the losses considered in insurance.

For the scale of risk attitude, we added the choices framed as insurance decisions for reasons of validity. Stability of costs constitutes an important motive, especially for our clients who have low incomes, to take supplemental insurance against an unforeseen payment of Dfl. 200, and is an essential component of their risk aversion, but static questions do not measure it. This motive contributes to the higher risk aversion found in insurance decisions than in other risky choices (Hershey et al. 1982, pp. 949–950). We similary maintained question L7 even though it reduced reliability, because high-probability losses such as in L7 are relevant to many clients.

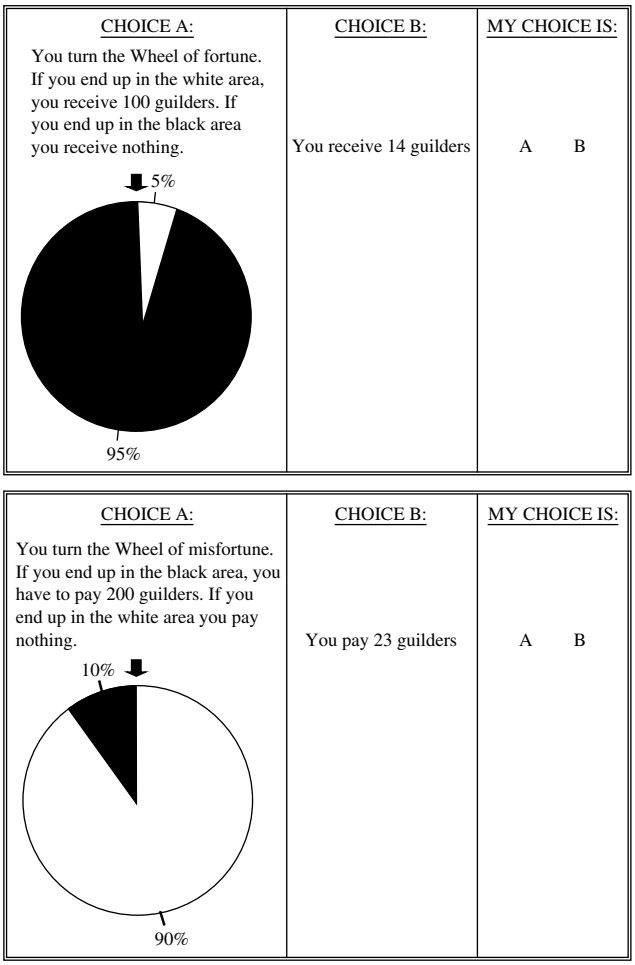
Because the willingness to take supplemental insurance is central in our analysis, we measured it in several ways in a pilot experiment. Besides the WTT question used in our analyses,[5] the same question was asked but with the planned premium specified (Dfl. 11 per month). Furthermore, in a willingness-to-pay question, clients stated which premium they were willing to pay for supplemental insurance, both per month and per year.

The WTT question without a premium specified appeared to be easiest for the clients and gave the best results. In debriefings at the end of our pilot studies, clients adhered more to the results of these questions than to those of the other questions and expressed preference for these questions. This finding first came as a surprise to us. From an economic perspective, the decision to buy insurance cannot be sensibly made without the premium being specified. Psychologically, however, the evaluation of a commodity is more basic than, and prior to, a decision of whether or not to buy the commodity at some specific price. A disadvantage of WTT with a premium specified is that the problem is then perceived as a dichotomous decision problem, where the insurance has to be bought or not. For WTT without a premium specified, clients differentiated their evaluations better. Willingness-to-pay questions are notorious for their empirical problems. In view of these findings we decided, contrary to our prior plans, to use WTT without premium specified in the main study. Obviously, the higher the WTT, the higher the premium that a client is willing to pay. This was confirmed in statistical analyses not reported here.

[5] The formulation of the question (translated from Dutch): "Imagine that a deductible will become compulsory within the near future. Would you then like to take supplemental insurance, so that you need not pay the first 200 guilders yourself? 1: certainly not . . . ; 7: certainly yes." The question was read to the client by the interviewer.

For the averages of total and specified costs, only the averages of costs truncated at Dfl. 200 are relevant to the decision problem faced by the clients, the deductible being Dfl. 200.[6] We nevertheless used averages of untruncated costs because these are easier to understand for the clients and because an additional purpose of the provision of information was to make the clients more aware of health expenses in general.

Appendix B. The Visual Display of Prospect Choices G4 and L6



Explanation of the Questionnaire "The Wheel of Fortune"

The questionnaire consists of seven questions. Each time, you can choose between two options (choice A and choice B).

Choice A:

If you choose choice A, you have a chance of gaining an amount of money and a chance to win nothing. The "wheel of fortune" indicates how large your probability is of winning a specific amount of money.

Choice B:

If you choose choice B, you are sure to win a specific amount of money.

[6] The average population cost truncated at Dfl. 200 was Dfl. 125 per year. The planned premium was approximately Dfl. 132 per year.

Appendix C. Complete Numerical Results of Subgroups

Table C1 Mean WTT Before and After Receipt of Information, for Five Forms of Information and for Risk-Averse, Risk-Seeking, High-Cost, and Low-Cost Clients

	Total population costs	Specified population costs	Total individual costs	Specified individual costs	Probabilistic
Risk averse	Before: 0.67 (0.41) after: 0.79* (0.35)	before: 0.72 (0.33) after: 0.85** (0.25)	before: 0.67 (0.41) after: 0.76 (0.37)	before: 0.72 (0.33) after: 0.83* (0.27)	before: 0.65 (0.38) after: 0.76* (0.30)
Risk seeking	Before: 0.36 (0.39) after: 0.39 (0.40)	before: 0.45 (0.42) after: 0.55* (0.43)	before: 0.36 (0.39) after: 0.33 (0.40)	before: 0.46 (0.42) after: 0.40 (0.43)	before: 0.44 (0.39) after: 0.44 (0.33)
Costs high	Before: 0.50 (0.44) after: 0.55 (0.44)	before: 0.62 (0.37) after: 0.75** (0.35)	before: 0.50 (0.44) after: 0.56 (0.45)	before: 0.62 (0.37) after: 0.77*** (0.35)	—
Costs low	Before: 0.50 (0.41) after: 0.61ms (0.42)	before: 0.55 (0.42) after: 0.61 (0.41)	before: 0.50 (0.41) after: 0.51 (0.44)	before: 0.56 (0.42) after: 0.47 (0.43)	—
Risk averse & costs high	Before: 0.68 (0.40) after: 0.70 (0.41)	before: 0.71 (0.31) after: 0.87** (0.24)	before: 0.68 (0.40) after: 0.73 (0.40)	before: 0.71 (0.31) after: 0.92*** (0.15)	—
Risk averse & costs low	Before: 0.64 (0.43) after: 0.89 (0.26)	before: 0.71 (0.37) after: 0.83 (0.26)	before: 0.64 (0.43) after: 0.79 (0.36)	before: 0.71 (0.37) after: 0.70 (0.35)	—
Risk seeking & costs high	Before: 0.33 (0.41) after: 0.41 (0.43)	before: 0.50 (0.44) after: 0.62 (0.43)	before: 0.33 (0.41) after: 0.40 (0.44)	before: 0.50 (0.44) after: 0.58 (0.45)	—
Risk seeking & costs low	Before: 0.37 (0.34) after: 0.34 (0.35)	before: 0.42 (0.43) after: 0.49 (0.42)	before: 0.37 (0.34) after: 0.23* (0.33)	before: 0.44 (0.43) after: 0.28ms (0.38)	—

Note. Significant changes (effects) are underlined.

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