

Framing, Probability Distortions, and Insurance Decisions

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Abstract

A series of studies examines whether certain biases in probability assessments and perceptions of loss, previously found in experimental studies, affect consumers' decisions about insurance. Framing manipulations lead the consumers studied here to make hypothetical insurance-purchase choices that violate basic laws of probability and value. Subjects exhibit distortions in their perception of risk and framing effects in evaluating premiums and benefits. Illustrations from insurance markets suggest that the same effects occur when consumers make actual insurance purchases.

Key words: insurance decisions, biases, probability distortions, framing

Insurance purchases form the basis for an extraordinarily large industry. The industry has assets of \$1.6 trillion and employs over 2 million people (Insurance Information Institute, 1990a). Consumers are responsible for a significant proportion of this market, either directly through their own purchase decisions, or indirectly through their choices of employers, mortgages, etc. These investments are sizable and commonplace. For example, the average insured household carries over \$100,000 of life insurance, and surveys reveal that 70% of all households report having property insurance. Insurance represents, perhaps, the most significant tool for managing financial risks available to individuals.

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The last decade has seen the advent of an “insurance crisis” in the U.S. and several other countries. With respect to liability insurance, for example, there have been large increases in premiums and vanishing coverage for some risks, factors that present major problems for businesses, professionals, and consumers (Committee for Economic Development, 1989). For other classes of risk, such as floods, coverage is underpurchased by consumers, even when it is heavily subsidized. Given the solid economic theory underlying the insurance industry, these failures present a puzzle.

Insurance decisions offer a natural test bed for ideas arising from descriptive theories of choice under uncertainty. To buy an insurance policy, the consumer can be seen as assessing the probability of loss distributions for each risk and deciding if the presented policy warrants its premium. Psychologists and economists have documented biases in probability assessments and in perceptions of losses, and it seems fitting to examine insurance decisions for evidence of these biases.

This article reports the results of studies that examine consumers’ decisions about insurance. We start by offering a framework for analyzing these decisions, dividing the insurance decision into three components—the risk itself, the policy premium, and the benefit. We then examine evidence that perceptions of each component are potentially distorted or manipulable by well-known psychological mechanisms. In closing, we describe some of the implications of our research.

1. Analyzing insurance decisions

The economics of insurance is primarily a story of risk shifting. The standard story is that risk-averse individuals confronted with sizable hazards will pay a more diversified insurer to bear the risk (see Dionne and Harrington, 1992, for an introduction to this literature). Insurance companies assume risk because the law of large numbers applies to their portfolios of relatively independent events diversified over different risk categories. Failures of risk sharing occur for three reasons—moral hazard, adverse selection, and transaction costs (Arrow, 1963).

For the consumer, an insurance purchase can be conceptualized as a decision in which he or she is faced with a risk that has some distribution of losses across probabilities. To reduce this risk, the consumer pays a premium and is compensated by a benefit if the loss occurs. A rational, risk-neutral consumer would purchase coverage at an actuarially fair price that is equivalent to the expected loss. Risk aversion raises this reservation price.

In practice, the story is apparently not that simple. There is abundant evidence, although much of it is anecdotal, that consumers do not make these choices rationally. Eisner and Strotz (1961) argue that people pay far more for flight insurance than they should. Kunreuther et al. (1978) have demonstrated that people do not buy flood insurance even when it is greatly subsidized and priced far below its actuarially fair value. The recognition that consumer perceptions and decision processes are imperfect and manipulable could be used to support insurance regulation and prohibition of certain types of insurance.

Consumer errors could be attributed to distortion in any component of the insurance decision. For example, consumers may have distorted perceptions of the size or probability of the risks they face. Alternatively, they may have distorted values of the benefits or cost of the policy. While there are few direct demonstrations of such distortions in insurance decisions, there is now a sizable literature examining similar phenomena elsewhere. Our experimental goal is to demonstrate some cases where such distortions occur in close analogues to insurance decisions. In the next three sections, we review anecdotal evidence that suggests that systematic distortions may exist in insurance-purchase decisions, and we present the results of questionnaire studies that explore these hypotheses.

2. Distortions in the perception of risk

“All the big money on an accident policy comes from railroad accidents. They found out pretty quick, when they began to write accident insurance, that the apparent danger spots, the spots that people think are danger spots, aren’t danger spots at all. I mean, people always think a railroad train is a pretty dangerous place to be, or they did, anyway, before the novelty wore off, but the figures show not many people get killed, or even hurt, on railroad trains. So on accident policies, they put in a feature that sounds pretty good to the man that buys it, because *he’s* a little worried about train trips, but it doesn’t cost the company much, because it knows he’s pretty sure to get there safely. They pay double indemnity for railroad accidents.” (From *Double Indemnity*, by James Cain, New York: Random House, 1936)

In 1990, retired business consultant and self-proclaimed climatologist Iben Browning estimated that there was a .5 chance that a severe earthquake would occur on the New Madrid fault during a two-day period centered on December 3, 1990. The New Madrid fault is a known and potentially catastrophic earthquake risk, the site of an earthquake in 1811 that was the most severe North American earthquake on record. However, seismologists did not agree with the magnitude or precision of Browning’s assessment. They estimated that the probability was about one in sixty thousand and that there was not reason for the probability to vary widely from day to day, or year to year. Government and academic geologists had been trying for years to improve building standards and increase public awareness of the earthquake hazard in the area. However, there was also significant concern about potential public panic. A special conference was held to discredit Browning’s claim.

December 3rd came and went, and with the exception of hordes of reporters descending upon New Madrid, nothing unusual happened. The fault was uncommonly quiet. Largely unreported, however, was perhaps the most interesting phenomenon associated with Browning’s prediction: sales of earthquake insurance in the area skyrocketed. To quote one insurer:

More than 650,000 State Farm policyholders in the eight states near the fault added an earthquake endorsement to their homeowners policies, mostly in the two months prior to the Dec. 3 predicted date for the earthquake.

So brisk was demand that Corporate Headquarters had to make an emergency printing and distribution of earthquake endorsements in October when the regions ordered 200,000 copies, more than in all of 1989.

The number of earthquake endorsements in the eight states more than tripled from . . . year-end 1989. (State Farm, 1990)

Media reports suggest that these increases in coverage also occurred for many other companies (United Press International, 1990).

There was apparently no reason other than Browning's prediction for consumers to markedly increase their probability assessments. Of course, it is possible that increased awareness of a legitimate risk, which had not increased in likelihood, determined these purchases. However, we know that public perceptions of the frequency of risks can be systematically biased. A series of studies by Lichtenstein et al. (1978) asked people to estimate the frequency of several dozen causes of death in the United States. They found that vivid causes that killed many people during a single occurrence were overestimated, while less vivid causes were systematically underestimated. Combs and Slovic (1979) showed that these biases are highly correlated with the amount of media coverage.

Could such biases affect the desirability of certain kinds of insurance? Do apparent systematic distortions in the probability or size of a risk result in systematic distortions in the prices consumers are willing to pay?

Estimating what an individual should pay for coverage requires information that we lack—specifically, accurate estimates of that individual's perceived risks and risk attitudes. Therefore, we cannot judge whether any single choice or price is reasonable. We test instead for consistency across choices, made by different, randomly assigned groups, employing a simple principle of probability, which we term the inclusion principle.

Our approach is to ask respondents to price incrementally two individual insurance policies that provide coverage against two mutually exclusive risks. We also elicit prices for coverage against a third risk that is a superset of the first two risks. While any price could be justified for the two components, the inclusion principle states that it is an error for the sum of the prices of the components to exceed the price of the larger, inclusive risk.¹ This simply reflects the probabilistic principle that two disjoint subsets cannot be more probable than a larger set that includes both.

To illustrate, suppose a concert pianist approaches Lloyds to insure her hands against any injury that would limit her performances. Imagine that she first gives a reservation price for coverage of her right hand, and then gives the reservation price for *incremental* coverage of her left hand. We do not make any statement about how reasonable either price might be. However, we know that the sum of these two prices should exactly equal the price that she would be willing to pay for a policy covering both hands. A similar logic is employed by Tversky and Kahneman (1983), Kahneman (1986), and Kahneman and Knetsch (1992).

2.1. Flight insurance and availability

Our first question examined the willingness of consumers to pay for different types of hypothetical flight insurance, inspired, in part, by the observations of Eisner and Strotz (1961) and the ubiquity of flight insurance counters in air terminals. The question, which is reproduced in table 1, was answered along with several other unrelated insurance questions by a group consisting mostly of university-hospital employees in return for a \$2.00 payment. Each subject received one of the three versions of the questionnaire. The three versions, which differed only by the italicized phrases, were randomly distributed to respondents. We hypothesized that events associated with "terrorism" and "mechanical failure" would be more vivid and available than events suggested by the inclusive phrase "any reason."

The mean prices, standard errors, and sample sizes are shown in square brackets next to the phrase describing the coverage. The stated reservation prices for each form of insurance are all approximately equal, and do not differ from each other by simple *t*-tests. The sum of the premiums subjects offered for terrorism and mechanical failure (which are disjoint events) is \$24.43, more than twice the price subjects were willing to pay for coverage for any reason. This difference is statistically significant ($p < .001$) by a *t*-test.² Thus, the isolation of specific but quite available and vivid causes of death seems to greatly increase the perceived value of insurance. We collected a number of demographic measures for the three randomly assigned subject groups; as expected, there were no significant differences.

2.2. Disease-specific insurance

Several commonly advertised forms of health insurance have the similar characteristic of providing coverage for only specific causes of illness. These policies usually provide cash payments if the beneficiary is hospitalized due to a particular disease. Such coverage is intriguing because it relates so closely to the research reported above on misperceived causes of death. Would it be possible to make health insurance more attractive by making the cause of hospitalization more specific and available, but less likely?

Table 1. Flight insurance questions

As you know from news reports, both terrorism and mechanical failures are sources of danger to travelers. Suppose that you are planning to fly to London next week. You are offered a flight insurance policy that will provide \$100,000 worth of life insurance in case of your death due to

- | | |
|---|---------------------------------------|
| (1) <i>any act of terrorism</i> | [mean = \$14.12, s.e. = 3.36, n = 34] |
| (2) <i>any non-terrorism related mechanical failure</i> | [mean = \$10.31, s.e. = 1.99, n = 36] |
| (3) <i>any reason</i> | [mean = \$12.03, s.e. = 2.83, n = 34] |

This insurance covers you from the moment you step on the plane until the moment you exit the plane at your desired location. How much would you pay for this coverage?

We constructed an item that parallels these real-world policies, using two causes of death that are usually overestimated according to Lichtenstein et al. (1978)—diseases and accidental death. One group of 30 subjects was first asked how much they would pay for insurance against any disease. Then they were asked how much they would pay for coverage against any accident, assuming they had already bought the disease insurance at their stated price (to control for wealth and risk-attitude effects). Another group of 28 subjects was asked the same two questions in the reverse order—accident then disease. Two other groups of 30 subjects each were asked just a single question: how much would they pay for insurance for “any reason” or “any disease or accident”?

Table 2 shows the relevant text for each item, the mean reported price, the standard error, and the sample size. Responses were given using an open-ended format with anchors of \$15 for each of the components for the first two questionnaires and \$30 for the second two. Note that any anchoring effects work against our hypotheses.

The effect of isolating vivid causes appears to be quite strong. The total price reported for disease and then accident protection is more than twice that reported for protection for “any reason.” We compared the answers to each of the first two forms of the question with the third. Both differences are significant by a *t*-test ($p < .01$) as well as by a Mann-Whitney U-test for rank differences ($p < .006$), a violation of inclusion. The fourth form of the question has an average price that is higher than the third, but it is not significant.

2.3. Availability, vividness, and inclusion

As the Iben Browning story indicated, distortions in the perception of risk might be exacerbated by vivid and dramatic news. We explored a potentially dramatic increase in perceived risk of terrorism. Many of the respondents, Executive MBA students at the Wharton School, were scheduled to travel to Bangkok, Thailand, as part of their degree program. During the period that this question was administered (late February/early March 1991), the U.S. State Department issued a warning that there was a possibility of terrorist acts aimed at Americans in Bangkok. In fact the students' trip was subsequently canceled.

Table 2. Disease-specific hospitalization insurance

We are interested in your reaction to a new kind of insurance.	
Imagine that you are offered a new kind of health insurance that supplements your major medical insurance. This insurance policy covers you if you are hospitalized for	
<i>any disease</i> (followed by <i>any accident</i>)	[mean = \$89.10, s.e. = 14.60, $n = 30$]
<i>any accident</i> (followed by <i>any disease</i>)	[mean = \$69.55, s.e. = 8.84, $n = 28$]
<i>any reason</i>	[mean = \$41.53, s.e. = 4.51, $n = 30$]
<i>any disease or accident</i>	[mean = \$47.12, s.e. = 4.02, $n = 30$]
This policy will pay you \$100 a day, which you may apply to your hospital expenses or use in any other way, while you are hospitalized. . . .	

Our questionnaire examined the role of such vivid information by asking what these students would pay for \$100,000 of terrorism insurance. Again we wondered if asking for more limited, but presumably more vivid, coverage would lead subjects to generate higher prices. To exclude various real-world considerations, such as insurance provided by credit cards, the items were somewhat longer than shown here, but the relevant portions are presented in table 3.

The flight-insurance policies covered terrorist acts during flights to and from Bangkok. The first group of subjects provided estimates for each half of the trip, while a second group of subjects reported the price they would be willing to pay for roundtrip coverage. We reasoned that providing estimates for each component of the trip may be more vivid than providing estimates for the entire round trip. Note, of course, that the two legs of the trip are mutually exclusive and exhaustive subsets of the round trip.

As can be seen from table 3, subjects' responses violate inclusion. The mean reported price for the two components, \$30.82, is significantly different from the mean price for the equivalent roundtrip coverage, \$13.90. These means differ significantly by a *t*-test ($p < .01$). A Mann-Whitney U-test shows that the rank orders of the sums of the component flight-terrorism results are significantly different from the rank orders of the roundtrip flight ($p < .009$).

The travel-insurance policies covered terrorist acts either in the air or on the ground in Thailand. Again, these two components are mutually exclusive and exhaustive subsets of the inclusive coverage. The sum of the two components, \$16.42, exceeded the reported price for the inclusive coverage, \$7.44; *t*-tests show that these violations of inclusion are also significant ($p < .02$). As above, the Mann-Whitney U-test is also significant ($p < .009$).

It is worth noting that coverage for the flight back from Thailand and for ground coverage were judged to be more valuable than inclusive policies, although the difference is not significant. The imagined dangers that could occur in Thailand, or returning

Table 3. Insurance pricing, availability, and news

Imagine you are about to take a one-week trip to Thailand as part of your Wharton education. You do not have any terrorism insurance for this trip: no insurance is provided by the credit card company through which the tickets were purchased or through Wharton

This policy pays \$100,000 in case of your death due to terrorism during this part of your trip.

Results.

Flight Insurance.

Flight terrorism from the US to Thailand:	[mean = \$13.63, s.e. = 2.60, $n = 21$]
Flight terrorism from Thailand to the U.S.:	[mean = \$17.19, s.e. = 3.39, $n = 21$]
Round trip terrorism:	[mean = \$13.90, s.e. = 2.79, $n = 20$]

Travel Insurance.

Flight terrorism:	[mean = \$ 7.42, s.e. = 1.68, $n = 16$]
Ground terrorism:	[mean = \$ 9.00, s.e. = 1.57, $n = 16$]
Complete terrorism:	[mean = \$ 7.44, s.e. = 1.36, $n = 16$]

from this trip, may seem more vivid, and therefore more important to insure against. What is intriguing, however, is that these dangers may be magnified by segregating them from the entire trip and providing separate insurance protection for each component.

As a whole, this anecdotal and experimental evidence suggests that insurance decisions may be based on distorted beliefs concerning the probability and size of some potential losses. Our results are consistent with other research, most notably in the areas of societal risk perception and contingent valuation (Tversky and Kahneman, 1983; Kahneman and Knetsch, 1992).

3. Framing effects in evaluating premiums

Insurance premiums, particularly those for coverage over time, can involve complex streams of transactions. Insurers seem, implicitly, to believe that some descriptions of premiums may be more attractive than others: "Coverage for only pennies a day . . ."

A large psychological literature suggests that consumer preferences may not be invariant over such changes of description. Failures of descriptive invariance are due mainly to two factors. The first, reference dependence, suggests that evaluation is often made relative to some reference point. The second, loss aversion, suggests that decision makers are hurt more by a loss than they are pleased by a gain of the same magnitude (Tversky and Kahneman, 1991).

Many demonstrations of these framing effects exist, and there is some evidence that insurance itself imposes its own frame upon risky choice (Camerer and Kunreuther, 1989). For example, revealed risk attitudes, as assessed by a certainty-equivalence lottery, differ when the lottery is described as a gamble as opposed to an insurance policy (Hershey and Schoemaker, 1980; Hershey, Kunreuther and Schoemaker, 1982). We wondered, therefore, if such manipulations of frames would have significant effects upon revealed preferences.

3.1. Deductibles vs. rebates

Most insurance policies do not completely shift risk from the insured to the insurer. An important reason for this is moral hazard, a term that recognizes that a complete shift could lead the insured to be irresponsible because he or she bears no cost of a loss. The most common mechanism for controlling moral hazard is a deductible, in which the insured pays a fixed amount for each loss, although other mechanisms such as copayments are based on the same principle of incentive compatibility.

Consumers appear to dislike deductibles, even though policies with high deductibles can offer considerable savings.³ When Herbert Denenberg, then the Insurance Commissioner of Pennsylvania, tried to raise the minimum auto insurance deductible from \$50 to \$100, the resulting consumer outcry forced him to withdraw the request (Cummins and Weisbart, 1978). We attribute this reluctance toward purchasing policies with higher

deductibles, in part, to loss aversion. Consumers may frame the deductible as a segregated loss. In essence, the consumer, when faced with the loss, feels both 1) the cost of accumulated insurance premiums, and 2) the additional out-of-pocket cost of the deductible. It is segregated losses—the two separate costs—that are the least attractive (Thaler, 1985).

In principle, other frames could be presented by insurance firms. The deductible could, for example, be incorporated into the cost of insurance simply by raising rates. An inducement for consumers to avoid accidents could be provided by a rebate from which claims are deducted. This integration of losses should be more attractive than the segregated loss, and not easily reframed by consumers (Thaler and Johnson, 1990). Thus, insurance with a rebate should be more attractive than an equivalent but initially less expensive policy with a deductible.

Figure 1 illustrates the logic of the argument above using the Prospect Theory value function (Kahneman and Tversky, 1979) with the usual properties—reference dependence (value is measured in terms of changes from the status quo), loss aversion (the

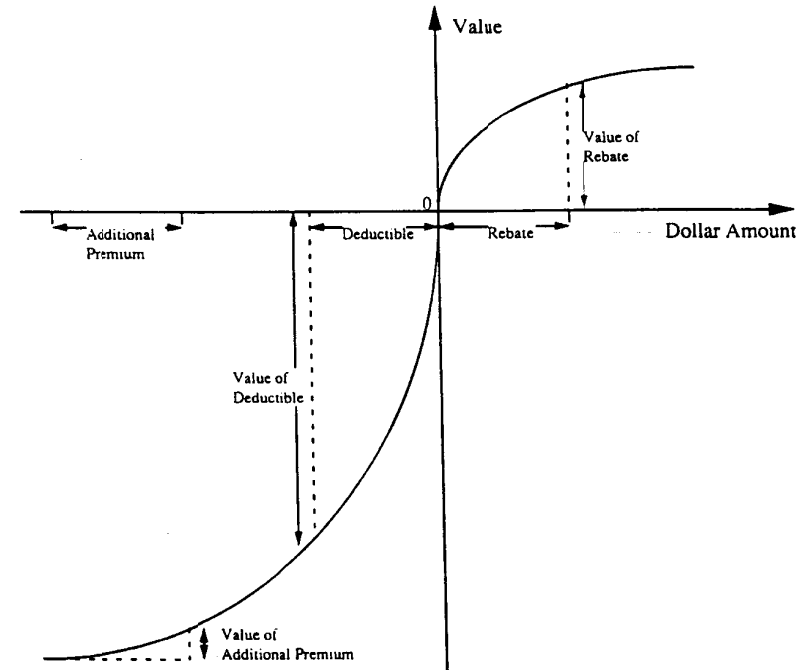


Figure 1. Deductible and rebate frames.

impact of a loss is greater than the impact of a gain of the same magnitude) and diminishing sensitivity (the incremental impact of changes in value decreases). (Also see Kahneman and Tversky, 1984; Tversky and Kahneman, 1981, 1991.) The actual monetary magnitudes for rebates, deductibles, and increased premiums are shown on the horizontal axis, and in our example they are all the same, namely, \$600. However, the values or psychological impacts of these changes in wealth, indicated by the vertical lines, differ. Note that the deductible, since it is a loss from the status quo, has the greatest impact because of loss aversion. The rebate, on the other hand, is a gain and has less impact. Finally, the additional premium necessary to offset the rebate, while a loss, may have the least impact. This is because it is measured far from the status quo.⁴

The implication of this analysis is that the rebate policy will appear more attractive whether an accident occurs or not. If an accident occurs, the additional premium seems less consequential than the segregated deductible payment the consumer must make. If no accident occurs, the negative value of the additional premium may be more than offset by the positive value of the segregated rebate the consumer receives.

Table 4 shows the text of an item we used to test this hypothesis. Note that the policy with the rebate is worse than the policy with a deductible, since the rebate is in essence a \$600 interest-free loan to the insurance company. Given any positive discount rate for money, the consumer is worse off choosing the rebate policy. However, respondents were more likely to take the rebate policy than the deductible (chi-square significant at $p < .001$).

Table 4. Auto insurance, deductibles, and rebates

Imagine that you have just bought a new \$12,000 car and are buying insurance for your car. The insurance package described below includes all coverage mandated by the state including comprehensive and collision insurance. Suppose you are offered the policy described below.

[Deductible frame]

This policy has a deductible of \$600 which will be subtracted from the total claims against the policy. In other words, if you make any claims against the policy, the company will give you the total amount of the claims minus the deductible. If your claims in one year total less than \$600, the company will pay nothing. If your claims exceed \$600, the company will pay all of the amount above \$600.

Would you pay a premium of \$1000 for one year of this coverage? [44.3% yes]

[Rebate frame]

With this policy, a rebate of \$600 minus any claims paid will be given to you at the end of the year. In other words, if you have no claims against the policy, the company will give you \$600 back at the end of the year. If you do file one or more claims, you will get back \$600 minus the amount the company paid out for your claims. Should your total claims exceed \$600, the company will give you no rebate but will pay the claims.

Would you pay a premium of \$1600 for one year of this coverage? [67.8% yes]

[n = 187]

3.2. Disability insurance with rebates

We wondered if we could create differences in the attractiveness of disability policies based upon the presence of a rebate alone. In other words, we wondered if simply segregating a rebate from the stream of premium payments would make a policy more attractive. Recall that in figure 1 the positive value of the rebate can more than offset the negative value of the additional premium. Thus, we would predict that isolating the rebate would make the policy more attractive, particularly when rebates are small compared to relatively high premiums.

We constructed two policies. One policy is a standard disability contract. The second, which is \$20 per month more expensive, offers a rebate equivalent to the sum of these additional premiums (\$1200) if no disability claim is filed in five years. Table 5 shows the two policies. The policy without the rebate should be preferred, both because of the time value of money and because the rebate would not be paid in the case of a claim.

Our respondents, 100 people, mostly university-hospital employees, first chose between the two policies. Subjects were then prompted with smaller or larger monthly premiums, depending on their preference, until they were indifferent between the policies. We randomly varied which of the two policies was held constant and which was adjusted. No differences were found, so the results from the two groups were pooled. We also asked respondents to estimate the chance that in the next five years they would have an injury or sickness that would restrict their ability to do their normal work for more than 30 consecutive days; we found no significant differences as a function of choices.

The rebate policy, which was preferred by 57% of the respondents, had an average premium that was \$21.65 higher than the average premium for the no-rebate policy. The standard deviation was 11.1. Even if consumers were sure they would not become disabled, this implies a negative discount rate. At the .05 level, the average premium difference is significantly higher than a premium difference of \$19.82 (one-tailed), which implies a return of less than 1%, far less than the rate consumers should demand. Since we found that the average estimated probability of collecting disability payments on the policy, and hence not receiving some or all of the rebate, was 3.6%, this result becomes even more striking.

In sum, the evidence provided by these two examples suggests that the way that premiums are framed can determine the attractiveness of coverage. These findings are consistent with research on framing effects in other domains. Furthermore, policies similar

Table 5. A disability policy with and without a rebate

Suppose that you have just started a new job. You are considering buying disability insurance. This insurance provides you with an income if you have an injury or sickness that restricts your ability to do your normal work for more than 30 days.

You are considering purchasing one of two policies. Both policies pay $\frac{1}{3}$ of your salary for as long as you are disabled.

Policy A will refund \$1200 to you if you do not file a claim within five years. The monthly cost of Policy A is \$90.

Policy B has no refund. The monthly cost of Policy B is \$70.

to these do exist in the marketplace. Mutual of Omaha offered a popular disability insurance policy that refunded the entire premium if the insured did not make a claim on the policy from inception to reaching age 65. Maccabees Life Insurance Company offers a disability policy that refunds as much as 80% of premiums paid every 10 years if the insured does not become disabled. The existence of such policies, even when moral-hazard considerations are minimal, suggests that insurers understand the appeal of rebates.

4. Framing effects in evaluating benefits

4.1. Status quo effects

A number of states have changed or are considering changing their automobile liability insurance laws to give consumers more choice (Insurance Information Institute, 1990b). One approach to reform that has gained favorable attention in several states is to give motorists a choice between a “full-priced” policy that includes the right to sue for any auto-related injury and a less expensive policy that places certain restrictions on the right to sue. With restricted rights, motorists may sue for pain and suffering when they sustain severe injuries in an accident, but they may not sue for pain and suffering if their injuries are not serious. In all cases, they can still sue for economic damages and medical costs.

The choice between the two options (wealth and budget effects aside) should be the same whether the consumer currently has the full right to sue or the limited right. However, if the status quo serves as a reference point, the right to sue might be valued more when it is given up than when it is being acquired.

We asked 136 university employees to tell us what the right to sue was worth. They were randomly assigned to three groups and were all asked to imagine that they were moving to a new state. Table 6 shows the three versions of the questionnaire. About a third of the respondents, the “Full Right” group, were told that the state’s standard auto insurance policies had no restrictions on the bearer’s right to sue. They had the option of forgoing their right to sue in exchange for a 10% reduction in their auto insurance premium.⁵ If they chose not to exercise the option, they were asked to indicate a percentage decrease in premium that would be just large enough that they would give up the right to sue. If they chose to exercise the option, they were asked to indicate a percentage decrease in the premium that would be just small enough that they would not give up their right to sue.

Another third of the subjects, the “Limited Right” group, were told that the state’s standard auto insurance policies restricted the bearer’s right to sue. Subjects had the option of *acquiring* the right to sue for pain and suffering in all accidents in exchange for an 11% increase in their auto insurance premium (which is equivalent to the 10% decrease described to the Full Right group). As with the Full Right group, subjects first made a choice and then answered a follow-up question that asked for a premium difference that would make the options equally attractive.

Table 6. Auto insurance, the status quo, and limited right to sue

There is currently some debate in the U.S. over the causes of the recent rise in auto insurance premiums. One theory places blame on an excessive number of court cases resulting from minor accidents. Another theory blames the profiteering of the insurance industry. A third theory claims the rise is merely a temporary fluctuation inherent in the insurance industry. One method for lowering auto insurance rates that has already been implemented in several states consists of placing restrictions on one’s right to sue for pain and suffering. Pain and suffering awards provide monetary compensation to the injured for pain and suffering.

Imagine that you are moving to a new state. In this state, standard auto insurance policies . . .

[Full Right Group]

. . . do not restrict the bearer’s right to sue for pain and suffering resulting from a car accident. Note that you would also be able to recover for all losses other than pain and suffering (e.g., medical bills, lost wages, etc.)

However, you have the option of forgoing your right to sue for pain and suffering in exchange for a reduction in your auto insurance premium . . . All other features of the two policies’ coverage are exactly the same. This option decreases the price of your annual premium by 10%.

[Limited Right Group]

. . . restrict the bearer’s right to sue for pain and suffering resulting from a car accident. Note that you would still be able to recover for all losses other than pain and suffering (e.g., medical bills, lost wages, etc.) . . .

However, you have the option of acquiring your right to sue for pain and suffering in exchange for an increase in your auto insurance premium . . . All other features of the two policies’ coverage are exactly the same. This option increases the price of your annual premium by 11%.

[Neutral Group]

. . . come in two different versions. Version 1 restricts the bearer’s right to sue for pain and suffering resulting from a car accident . . . Version 2 does not restrict the bearer’s right to sue for pain and suffering . . . All other features of the two policies’ coverage are exactly the same . . . Version 2 costs 11% more than version 1.

The final third, the “Neutral” group, were given the same choice, but no information was provided about the standard policies in the state. Again, subjects reported both their choice and the premium difference that would make the two options equally attractive.

In the Full Right group, 53% of the respondents ($n = 62$) preferred to retain the right to sue. Only 23% of the Limited Right group ($n = 74$) chose to acquire the full right. On average, the subjects in the Full Right group were willing to pay 32% more for full coverage than for limited coverage. In contrast, the Limited Right subjects would pay no more than an 8% average increase to acquire the right. Both the differences in choices and in premium amounts are statistically significant ($p < .001$).

The results for the Neutral group fell between the other two groups. Forty-eight percent of the subjects ($n = 67$) preferred the full right to sue, and these policies were worth 23% more than a policy with limited rights. Overall, the three distributions differ by a chi-square test ($p < .006$), and the rank-order test (Kruskal-Wallis, three levels) is also significant ($p < .0001$).

In sum, the value of the right to sue was highly dependent on whether that right was presented as the standard option or one that had to be chosen actively. Why is this the case? Many theses from behavioral decision research predict this result. The simplest is a framing explanation: the two versions of the question describe the options relative to a different reference point. Because of loss aversion, framing the limited right as a loss from the full right increases the relative attractiveness of the full right.

More generally, Samuelson and Zeckhauser (1988) describe a "status quo bias" in decision making to summarize the results of their experiments demonstrating that people show a strong and robust tendency to stick with what they have, the status quo, even when it is randomly determined. Ritov and Baron (1992) argue that this preference for the status quo is largely due to different perceptions of errors of omission and errors of commission. In a series of experiments they show that decision makers' aversion to errors of commission is much stronger than any attachment to an original state of affairs. Similar explanations describe differences between the willingness to pay to acquire an object and the amount demanded to sell the same object (Kahneman, Knetsch, and Thaler, 1990).

4.2. *Limited torts and the status quo: A natural quasi-experiment*

Recent changes in the insurance laws in Pennsylvania and New Jersey provide an opportunity to see if our result carries over to real choices. Both states have recently introduced the option of a reduced right to sue, accompanied by lower insurance rates. The laws in the two states differ in several ways, but one critical difference is that the two states give consumers different default options. New Jersey motorists have to acquire the right to sue actively, at an additional cost. In Pennsylvania, the default is the full right. Our questionnaire study preceded the implementation of the Pennsylvania law. We wondered if the differences we observed in our questionnaire study would be replicated.

When offered the choice, only about 20% of New Jersey drivers chose to acquire the full right to sue, while approximately 75% of Pennsylvanians retained the full right to sue (Insurance Information Institute, 1992). This difference is in fact somewhat larger than that observed in the hypothetical questionnaire study.

This last example illustrates that framing can have sizable economic consequences. Attributing part of the differences in the adoption rate in the two states to differences in frames suggests that the financial repercussions may be in the tens or hundreds of millions of dollars. What may have seemed to some legislators as insignificant changes in wording turned out to have important effects. If we assume that Pennsylvanians would have adopted limited tort at the same frequency as New Jersey residents, if limited tort had been the default, Pennsylvanians would have paid over \$200 million dollars less for auto insurance.

5. Discussion and conclusions

5.1. *Summary and limitations*

Our central argument is that consumers' decisions about insurance can be affected by distortions in their perceptions of risk and by alternative framing of premiums and benefits. In our survey studies, these effects led subjects to make inconsistent choices and

to violate basic principles of probability and value. Real-world observations suggest that these phenomena occur in insurance markets.

Our work has several limitations. First, the studies do not explore systematically the mechanisms that produce these effects. For example, the risk-distortion results could be due to a number of related mechanisms, including availability (Lichtenstein et al., 1978) or distortions in perceptions of small probabilities (Kahneman and Tversky, 1979). To understand how decisions can be improved, researchers, consumers, and policy makers need to understand which of these mechanisms is at work.

A second limitation is that our survey questions did not have real-world consequences for respondents, and are therefore open to doubts about whether the results will generalize to decisions with real financial consequences for consumers. This is an important discussion point in the expanding dialogue between economists and psychologists. We ensured that subjects were real insurance consumers, questions were derived from real insurance products, and many prices quoted for hypothetical policies were based on market prices. Furthermore, we found examples of actual insurance products that have traits that seem to reflect our survey findings. Still, our research was based on responses to hypothetical questions. We encourage more field studies of actual insurance decisions.

5.2. *Distortions and insurance markets*

If consumers exhibit systematic biases, insurance markets may fail to operate efficiently. For example, if consumers perceive deductible policies to be less attractive than more expensive rebate policies, as our subjects did, they may pay more for some insurance than they should. To take another example, the risk of flood losses seems to be underestimated systematically by homeowners in hazard-prone areas. If insurers offer actuarially "fair" coverage, residents will perceive it to be overpriced, and will remain uninsured. Homeowners would have to be sufficiently risk averse so that their concern with losses would be great enough to induce them to purchase a policy.

The surveys reported here suggest that individuals will exhibit judgmental biases and are influenced by how problems are framed. Other studies suggest that insurance firms may behave in ways that are inconsistent with normative models of choice. Surveys of actuaries and underwriters indicate that insurers price policies for ambiguous events, such as earthquakes and leakage of underground storage tanks, higher than would be suggested by expected-utility theory or profit-maximization models. These pricing decisions could be due primarily to biases similar to those exhibited by consumers, or they may be explained by other factors such as imperfect capital markets and capacity constraints due to insurers' limited liability (Kunreuther, Hogarth, and Meszaros, 1993; Winter, 1991).

5.3. *Conclusions*

Two criticisms of behavioral experiments such as the ones described in this article are often heard. One concern is that the effects are explained primarily by the artificiality of experimental settings. According to this argument, people may behave one way in

laboratories and in questionnaire studies, but when their choices really matter to them, they will take more care, reframe the questions in their minds before making any decisions, and behave in a manner that is consistent with normative models. A second argument is that, even if these effects occur in real contexts, market discipline will eliminate any systematic effects except for those that have trivial economic consequences.

The experience with limited torts and automobile insurance provided an opportunity to address both of these concerns. By varying the status-quo or default option for individuals who would be making a choice of whether to accept the limited tort option in the near future, it was possible to show that loss-aversion framing effects affected motorists' choices. A similar effect was found in the real world in the contrasting experiences of New Jersey and Pennsylvania. This suggests that framing makes a difference in a real world as well as experimental setting.

In Pennsylvania, just as in New Jersey, limited-tort policies were offered in order to provide economic relief to many of the consumers who felt overburdened by high automobile insurance rates. The considerably lower premium associated with the limited-tort policy was designed to encourage consumers to take advantage of this option. However, status-quo framing apparently led many drivers to accept the default option, even though it was more expensive than the alternative. Framing thus had a systematic and predictable effect on market behavior that produced significant economic consequences.

Notes

1. In some of our questions, the price for the second component is not conditioned on previous coverage for the first component. In these cases, it might be justified to give a price for the inclusive risk that is smaller than the sum of the prices for the individual risks because of utility considerations. However, the magnitude of the effects we observe would not be expected.
2. Because we do not know how between-subject responses covary, our variance estimate for the *t*-test assumes perfect correlation between the answers to the first two questions, the most conservative assumption we can make.
3. This reflects the fact that premiums reflect the fixed costs of settling any claim, and that small claims require approximately the same paperwork as large ones (Pashigian et al., 1966).
4. This analysis also depends upon the probability of a loss occurring, because of possible distortions in probabilities. For example, the attractiveness of rebates will be enhanced if the probability of receiving them is low, because this probability will be overweighted according to prospect theory's probability weighting function.
5. Specifically, subjects were told that they would forgo their right to sue for pain and suffering unless the injury was extreme. Extreme injury was defined as serious impairment of an important body function that prevents the injured from performing substantially all usual and customary activities during at least 90 of the 180 days following the accident. This definition parallels the conditions of several states' laws.

References

- Arrow, K. J. (1963). Uncertainty and the Welfare Economics of Medical Care," *American Economic Review* 53, 941-969.
- Camerer, C. and H. Kunreuther. (1989). "Experimental Markets for Insurance," *Journal of Risk and Uncertainty* 2, 265-300.

- Combs, B. and P. Slovic. (1979). "Newspaper Coverage of Causes of Death," *Journalism Quarterly* 56, 837-843.
- Committee for Economic Development. (1989). *Who Shall be Liable?* New York: Committee for Economic Development.
- Cummins, D. and S. Weisbart. (1978). *The Impact of Consumer Services on Independent Insurance Agency Performance*. Glenmont, NY: IMA Education and Research Foundation.
- Dionne, G. and S. Harrington. (1992). "An Introduction to Insurance Economics." In G. Dionne and S. Harrington (eds.), *Foundations of Insurance Economics*. Boston, Kluwer Academic Publishers.
- Eisner, Robert, and Robert H. Strotz. (1961). Flight Insurance and the Theory of Choice," *Journal of Political Economy* 69, 355-368.
- Hershey, J. and P. Schoemaker. (1980). "Risk Taking and Problem Context in the Domain of Losses." *Journal of Risk and Insurance* 47, 111-132.
- Hershey, J., H. Kunreuther, and P. Schoemaker. (1982). "Sources of Bias in Assessment Procedures for Utility Functions," *Management Science* 28, 936-954.
- Insurance Information Institute. (1990a). *1990 Property/Casualty Insurance Facts*. New York: Insurance Information Institute.
- Insurance Information Institute. (1990b). *No-Fault Auto Insurance*. New York: Insurance Information Institute.
- Insurance Information Institute. (1992). *No-Fault Auto Insurance*. New York: Insurance Information Institute.
- Kahneman, D. (1986). "Comments on the Contingent Valuation Method." In R. G. Cummings, D. S. Brookshire, and W. D. Schulze (eds.), *Valuing Environmental Good: An Assessment of the Contingent Valuation Method*. Totawa, NJ: Rowman & Allanheld.
- Kahneman, Daniel and Jack L. Knetsch. (1992). "Valuing Public Goods: The Purchase of Moral Satisfaction," *Journal of Environmental Economics and Management* 22, 57-70.
- Kahneman, Daniel, Jack L. Knetsch, and Richard Thaler. (1990). "Experimental Tests of the Endowment Effect and the Coase Theorem," *Journal of Political Economy* 98, 1325-1348.
- Kahneman, D. and A. Tversky. (1984). "Choices, Values, and Frames," *American Psychologist* 39, 341-350.
- Kahneman, D. and A. Tversky. (1979). "Prospect Theory: An Analysis of Decision Under Risk," *Econometrica* 47, 263-291.
- Kunreuther, H., R. Ginsberg, L. Miller, P. Sagi, P. Slovic, B. Borkin, and N. Katz. (1978). *Disaster Insurance Protection: Public Policy Lessons*. New York: Wiley.
- Kunreuther, H., R. Hogarth, and J. Meszaros. (this issue). "Insurer Ambiguity and Market Failure," *Journal of Risk and Uncertainty*.
- Lichtenstein, S., P. Slovic, B. Fischhoff, M. Layman, and B. Combs. (1978). "Judged Frequency of Lethal Events," *Journal of Experimental Psychology: Human Learning and Memory* 4, 551-578.
- Pashigian, B., L. Schkade, and G. Menefee. (1966). "The Selection of an Optimal Deductible for a Given Insurance Policy," *Journal of Business* 39, 35-44.
- Ritov, I. and J. Baron. (1992). "Status-Quo and Omission Biases," *Journal of Risk and Uncertainty* 5, 49-61.
- Samuelson, W. and R. Zeckhauser. (1988). "Status Quo Bias in Decision Making," *Journal of Risk and Uncertainty*, 1, 7-59.
- State Farm. (1990). *1990 State Farm Year*. Bloomington, IL: State Farm.
- Thaler, R. (1985). "Mental Accounting and Consumer Choice," *Marketing Science* 4, 199-214.
- Thaler, Richard and Eric J. Johnson. (1990). "Gambling with the House Money and Trying to Break Even: The Effects of Prior Outcomes on Risky Choice," *Management Science* 36, 643-660.
- Tversky, A. and D. Kahneman. (1981). "The Framing of Decisions and the Psychology of Choice," *Science* 211, 453-458.
- Tversky, Amos and Daniel Kahneman. (1983). "Extensional Versus Intuitive Reasoning: The Conjunction Fallacy in Probability Judgment," *Psychological Review* 90, 293-315.
- Tversky, A. and D. Kahneman. (1991). "Loss Aversion and Riskless Choice: A Reference Dependent Model," *Quarterly Journal of Economics*, 106, 1039-1061.
- United Press International. (1990). "The New Madrid Fault and the Prophecy of Iben Browning," September 13, 1990.
- Winter, R. (1991). "The Liability Insurance Market," *Journal of Economic Perspectives* 5, 115-136.