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AN EXPERIMENTAL STUDY OF THE FULL-COVERAGE PUZZLE

Itzhak Venezia
Yale School of Management
Zur Shapira
New York University

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by

Zur Shapira
Stern School of Business
New York University

Itzhak Venezia*
School of Management
Yale University

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Abstract

One of the most intriguing questions in insurance is the preference of consumers to buy low or no deductible insurance policies. This stands in sharp contrast to the theorem, proved by Mossin, 1968, that when the price of insurance is higher than its actuarial value, then under quite reasonable assumptions full coverage is not optimal.

We show in a set of experiments that amateur subjects tend to underestimate the value of a policy with a deductible and that the degree of underestimation depends on the level of the deductible. This implies that a policy with a deductible priced according to the true expected payments may seem "overpriced" to the insured and therefore may not be purchased. Since the values of full coverage policies are not underestimated the insured may find them as relatively better "deals".

An Experimental Study of the Full-Coverage Puzzle

I. Introduction

In a seminal paper, Mossin (1968) showed that even under quite nonrestrictive assumptions, full-coverage insurance is not optimal. More precisely, he demonstrated that if the price of insurance is proportional to, but higher than, the expected payments made by the insurer and if the insured is risk averse, then full coverage is sub optimal. He also showed that there exists a policy, with a strictly positive deductible, which dominates the full-coverage policy.

Mossin's normative logic is not corroborated by the high actual demand for full-coverage policies and policies with very low deductibles. For example, almost all liability insurance policies provide full coverage or a zero deductible. Consider also collision damage insurance for rental cars. While specific rates vary by location, a typical collision damage waiver (CDW) costs \$20 per day, which is equal to \$7200 on an annual basis. In stark contrast, comprehensive automobile insurance for one's own car does not cost more than \$1000 per year in most locations. The difference in price is clearly nontrivial. Why are people willing to pay such high rates for CDW when renting a car?

Another example arises from deductibles on automobile insurance policies. The deductible on automobile insurance is often as low as \$100 and almost always below \$500, which means that consumers are insured against losses of \$500 or less. Cummins and Weisbart (1978) report that when Herbert Denenberg, Pennsylvania's Insurance Commissioner during the 1970s, tried to raise the minimum auto insurance deductible from \$50 to \$100, he was forced to withdraw this idea by massive consumer outcry.

Merchants who sell various electrical products such as cell phones costing \$200 or less also offer insurance against loss, for a non-trivial additional cost. Consumer purchases of such insurance do not seem to be rational, even when those policies include a service component.

The situation is even more salient in medical insurance. For example, the U.S. Bureau of Labor Statistics reports that during the years 1994-1997, 34% percent of full time employees in the private sector enrolled in non-HMO medical care organizations had no deductibles in their medical plans. This percentage rose to 42% for “Preferred provider organizations.” (U.S. Department of Labor, 1999)

One attempt to explain the preference for full coverage was offered by Pashigian, Schkade, and Menefee, (1966), who used U.S. aggregate data as well as detailed data of automobile insurance purchases in Missouri. They find that the levels of deductibles chosen by clients are too low to be explained by expected utility theory. According to Pashigian et. al. these deductibles can be reconciled with expected utility only if the insureds anticipate two or more accidents per year. This figure is considerable higher than the number of accidents actually expected by the average driver. Pashigian et. al. conclude that: “the observed selection of deductibles can be explained [only] if there is a systematic tendency to overestimate the objective probabilities of an accident greater than the deductible.” (p.40).

Ben-Arab, Briys, and Schlesinger (1996) try to explain “excessive” insurance purchasing by assuming a multi-period habit-formation utility function. This type of utility function introduces a greater (than a “usual” one-period utility) desire to smooth consumption over time. It therefore gives rise to a higher incentive for insurance purchasing, and tolerance of lower deductibles.

It is often argued that the full-coverage puzzle can be explained by risk aversion. However, Pashigian, Schkade, and Menefee, (1966) show that an extreme degree of risk aversion is required to explain such behavior. Slovic et. Al. (1977) demonstrate that (contrary to utility theory explanations of insurance) small expected damage, coupled with a high probability, is seen as more troubling than high expected damage with a small probability of occurring. Schoemaker (1976) demonstrates that when faced with decisions described as insurance against hypothetical losses, subjects chose full coverage alternatives over those with deductibles. Nonetheless, when the same choices were framed as lotteries, their choice pattern was reversed.

Schoemaker's findings imply that framing affects the way people evaluate insurance alternatives. Likewise, in an elaborate experimental design, Johnson, Hershey, Meszaros and Kunreuther (1993) find that students preferred insurance alternatives framed as "rebates" rather than as policies with a deductible.

Framing clearly affects the way people make choices between insurance alternatives. However, there may be other factors affecting the ways people evaluate the monetary value of alternative insurance policies. For example, Shapira and Venezia (1999) find that insureds have difficulty calculating the price of policies with a deductible. They attempt to do so by some transformation of the policy price and the deductible and are often incorrect.

In this paper, we propose a new approach to explaining the full coverage puzzle, as well as results of experimental tests in support of our theory. We argue that the task of evaluating a policy with a deducible is computationally more difficult than that of evaluating a full coverage policy. Insureds tend to err more in the evaluation of policies with a deductible than in the assessment of full coverage policies. Moreover, the higher the deductible, the higher the underestimation of the value of the policy. Therefore, insureds shun high-deductible policies and choose instead those with low or no deductibles. To motivate our discussion we first review Mossin's theorem.

Mossin's Theorem:

If the premium is both proportional and higher than the expected payments made by the insurer, and if the insured is risk averse, then the optimal deductible is strictly positive. Denote the damages of the insured by X, and the deductible by D (if D = 0, this is full coverage). If the insured holds a policy with a deductible and suffers some damage, the insurer pays:

$$\begin{cases} 0 & \text{if } X \leq D \\ X-D & \text{if } X \geq D \end{cases}$$

The expected payments are therefore:

E [payments] = E [Max (X – D, 0)]

The premium is equal to

Premium = (1+k) E [Max (X – D,0)], where k is the insurer's markup ("loading factor").

The insured's final wealth is given by:

$$\begin{cases} W = W(X,D) = W_0 - \text{Premium } (D) - X & \text{if } X < D, \text{ and} \\ W = W(X,D) = W_0 - \text{Premium}(D) - D & \text{if } X \geq D \end{cases}$$

The consumer's welfare is measured by:

E [u (W(X,D)], where u is the consumer's utility function, and W_0 is his/her initial wealth.

Suppose that the insurer is indifferent among all policies (i.e., all levels of D) which provide a markup of k, where k > 0. Mossin showed that the consumer's utility is maximized when D > 0. The Pareto optimal policy therefore cannot be of full coverage. If k = 0, the optimal D is, of course, D = 0, since the insured recoups the expected damage and pays a fair price.

An example: Suppose potential damages are:

$$\begin{cases} X = 0 & \text{Probability } 0.9 \\ X = 10{,}000 & \text{Probability } 0.1 \end{cases}$$

If the insured buys a full coverage policy (FC), then her final wealth is guaranteed to be

$W = W_0 - \text{Premium (D=0)}$

If the insured buys a policy with a deductible of, say, 100, her final wealth is uncertain. It is represented by

$$W = \begin{cases} W_0 - \text{Premium (D=100)} & \text{if } X = 0 \\ W_0 - \text{Premium (D=100)} - 100 & \text{if } X = 10{,}000 \end{cases}$$

Assuming k = .5 (which is the average profit margin for insurance firms), then

Premium (D = 100) = 9900 * 1.5 * 0.1 = 1485

Premium (D = 0) = 10000* 1.5* 0.1 = 1500

If the insured buys full coverage rather than the policy with a $100 deductible, she pays $15 to eliminate a "lottery" with expected value of 10, with maximum possible loss of $100. This implies an unreasonably high level of risk aversion.

The effects of anchoring on pricing policies with a deductible:

Several studies have shown that when considering the purchase of insurance policies, people do not behave in a rational manner (see, e.g., Kunreuther et. al. 1977) and that their choices are affected by framing (Johnson et. al, 1993). Shapira and Venezia, (1999) show that subjects do not calculate expected damages properly. Granted, at times the evaluation of a policy with a deductible may not be easy. A person renting a car may find it difficult to determine what is covered by his own insurance provider and/or by her credit card company. In such a situation, paying for a few days of collision damage insurance doesn't seem to be too expensive and simplifies the decision. As Kahneman and Tversky (1979) reasoned, the attractiveness of "probabilistic insurance" is related to the desire of people to insure against worries rather than against actual damages. One of the aspects in their discussion is the inability to conceive of the potential situations that may arise if one doesn't have full coverage. Consequently, full coverage policies provide an anchor for thinking about insurance problems because such policies are easy to envision and calculate. When offered a menu of policies with different deductibles, people may find it feasible to think about policies with small deductibles; these are close in price to a full coverage policy. With high deductibles, people may exhibit an anchoring bias; that is, they anchor on the full coverage policy and then adjust the deductible policy. However, as the deductible increases in value, people still refer to their anchor but they do not adjust sufficiently (cf. Tversky and Kahneman, 1974).

We conducted three sets of experiments to test our conjecture. In all these experiments, we asked subjects to play the role of insurance sellers and to price policies with and without a deductible. Their objective was to set prices to maximize their profits. We compare the prices the subjects set relative to the true expected damages under each policy. Under our approach, if individuals underestimate the value of a policy with a deductible, the prices they set for policies with a deductible will be low relative to the expected damages covered under full coverage policies.

In the first set of experiments, subjects were amateur insurance consumers. In the second set of experiments, the subjects were professionals in the field of insurance. In both contexts, subjects were restricted to pricing a policy of full coverage and a policy with a specific deductible (D = 100). In the third set of experiments, subjects could choose any deductible level they wished in pricing their policies.

The paper is structured as follows. In the next section, we present a simple model of policy pricing with exogenous deductibles. In Section III, we present the first set of experiments (amateurs, exogenous deductible). In Section IV, we describe the second set of experiments (professionals, exogenous deductibles). Section V presents the results of the third set of experiments (amateurs, endogenous deductibles), and Section VI concludes.

II. Policy pricing with exogenous deductibles

We develop a simple model of price setting for two policies: a full coverage (FC) policy and a policy with a deductible (DED). Assuming that the seller obtains information on the distribution of damages of the potential buyers, the goal is to set a profit-maximizing price for each contract.

Consider the pricing of a policy of type m, (m = DED, FC) by subject i, (i = 1,…,n). This subject would choose P_i^m so as to maximize her profits from selling this policy. Her expected profits, denoted by $E[\pi_i^m]$, can be written as:

$$E[\pi_i^m] = n_i^m\ (P_i^m, P_i^a)\ [P_i^m - C_i^m], \qquad (1)$$

Where n_i^m , P_i^m, P_i^a and C_i^m denote respectively the number of buyers, the price, the price of all other policies sold by competitors, and the expected payment each of the policies purchased, In determining the prices, each seller has to take into account the prices set by other sellers. Predicting the theoretical equilibrium pricing in this setting is not necessary for our purpose. For ease of exposition, it is assumed that the seller is risk neutral and that the pricing of one type of policy (say, DED) has only a negligible effect on the pricing of the other (i.e., FC). We specify the following necessary conditions for maximization: by differentiating (1) with respect to P_i^m and equating the derivative to 0, one obtains:

$$\delta\, E[\pi_i^m]/\delta\, P_i^m) = n_i^m\ (P_i^m, P_i^a) + [\delta n_i^m/\ \delta\, P_i^m\ ]\ (P_i^m\ - C_i^m)\ = 0 \qquad (2)$$

Since $\delta n_i^m/\delta P_i^m < 0$, it is necessary that $P_i^m\ - C_i^m\ > 0$ for an equilibrium. The above expression simply states that price must be higher than marginal cost, as the marginal costs of selling one more policy are the expected costs of this policy. Thus, a necessary condition for rational decision-making is $(P_i^m - C_i^m) > 0$.

$(P_i^m - C_i^m)$ can be viewed as the mark-up the seller sets. From (2) we obtain:

$$(P_i^m - C_i^m) = -n_i^m (P_i^m, P_i^a) / [\delta n_i^m / \delta P_i^m] \quad (3)$$

and the relative markup is given by:

$$(P_i^m - C_i^m)/P_i^m = -[n_i^m (P_i^m, P_i^a) / P_i^m] / [\delta n_i^m / \delta P_i^m] = \eta^m \quad (4)$$

where η^m is the elasticity of the demand per policy with respect to changes in price.

The mark-up of different policies can stem from differences in the elasticities of demand for the different policies. We conducted computer simulations to create a competitive market for the policies priced by the subjects (see description below). Since we constructed the simulations with similar elasticities of demand for the two policies, and since there is no a priori reason to assume different (let alone radically different) elasticities of demand for the two policies, extreme discrepancies in mark-up between the two policies provide a further indication of mispricing.

III. Study 1: Pricing of policies by amateurs (exogenous deductibles)

Two experiments, entitled 1.1 and 1.2, comprise this study. The experiments differed in their location, but the age and education profile of the subjects in both were similar.

Subjects: Eighty-nine Master of Business Administration students enrolled in a course on risk management and insurance at the Hebrew University participated in Experiment 1.1, while fifty-four students taking a similar course at the Tel Aviv branch of Manchester University participated in Experiment 1.2. Prior to taking the course and participating in the experiment, the students completed several courses in economics and statistics, and at least one course in finance. In both experiments, students were told that they would receive a bonus towards their grade based on the profits they generated in the experiment. Specifically, they were told that the 6 students with the highest profits would receive respectively 4,4,2,2,1,1 points toward their final grade (on a 100- point scale). Since the students were highly motivated by grades, there rewards were quite attractive.

Method: The task facing the subjects was framed in the context of selling renter insurance policies and is described in Table 1. Subjects were requested to determine prices

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Insert Table 1 about here
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for two possible policies, FC (providing full coverage, i.e., a zero deductible, D=0), and DED (with a deductible D=$100). They could have elected to price only one policy or none at all. We explained how deductibles work, and reminded them that lower prices induce higher demand, but are less likely to cover losses and provide a profit. We carefully explained to the subjects that their decisions would enter into a simulated market. The clients in the simulated market have damages and claims as described in Table 1. Subjects were told that based on their prices, the prices of the competitors (the other subjects in the experiment), and the decision of the simulated clients, we would compute profits for each of them. The students were told that the demand was not perfectly elastic, that lower prices would attract higher demand, but that the lowest price would not attract all customers. The profits were calculated as the difference between total revenues (the number of policies sold of each type multiplied by their respective prices) and total claims (simulated by using the number of clients of each type who bought each policy, and their distribution of claims).

For each policy, we calculated the ratio of price to true expected value of the policy. If individuals tend to underestimate the expected damages under the deductible policy, this ratio should be higher for the policy without a deductible.

Such a higher ratio could also occur because of risk aversion, since the policy with a deductible is riskier. To eliminate this possibility, we explored the patterns of pricing and the magnitude of differences between the prices of policies with and without deductibles. A common error in evaluating a deductible policy is calculating its value by subtracting the deductible from the value of a full coverage policy (the true value is obtained by subtracting the expected value of deductible non-payments from the value of a full coverage policy). Thus, we counted the number of subjects for whom the difference in price was larger than or equal to the deductible. If the subjects did not err in the calculation, the difference should have been closer to the expected value of the deductible non-payments.

Results and discussion: Tables 2 and 3 present the summary statistics of the pricing of all policies for Experiments 1.1, and 1.2. We present the average price, P, the maximum price, and the minimum price determined for the two policies the subjects were required to price: policy FC (full coverage, or 0 deductible), and policy DED (with a $100 deductible). In each section of the experiment, we divided the subjects into two samples A and B (differing in the composition of clients the subjects were facing; Sample A contained more risky clients). Hence, the results are also divided according to these categories. We split each section into two samples to test for screening and self selection (cf., Shapira & venezia, 1999). We then present in these tables the expected payments, E, the insurers (subjects) had to make under each type of policy. Since there were two types of clients for each sample, the subjects could actually price policies so as to screen among the consumers. Based on these variables, we calculated the expected profitability ratio EPR (P/E), that is, the average price relative to expected payments.

Insert Table 2 and 3 about here

The EPRs exhibited by the subjects support our hypothesis of under-valuation of the policies with a deductible. Note that for the two experiments and the two samples A and B, the EPR of the policies with a deductible is less than 1, whereas the EPR for the full coverage policy is higher than 1 (See Table 2). The under-pricing of the policies with a deductible is quite pronounced. The EPRs range from 0.57 in sample A of experiment 1.1 to 0.71 in sample B of that experiment. Assuming subjects set prices so as to at least cover their costs, these EPRs imply that on average subjects undervalued the expected payments they had to make under the deductible policies by percentages ranging from 29% to 43%. If the subjects tried just to cover costs then the underestimates would range exactly between 29% and 47%. Since we do not know the what margin level they required, we have only those lower bounds of underestimation and those are significant for our hypothesis. In contrast to such striking under-valuation of the policies with a deductible, the prices of the full coverage policies were more in line with expected payments: the EPRs are all above 1, ranging from 1.07 to 1.48. This indicates that subjects underestimated the payments under the policies with a deductible, but were not, or at least less, inclined to such under-valuation for policies with full coverage.

We observe the following common error in valuation. Subjects calculated expected payments under the policy with a deductible by computing the payments of the full coverage policy first, and then subtracting the deductible of $100. This underestimated the expected payments since only the expected non-payments of the deductible should have been subtracted from the value of the full coverage policy. To demonstrate how pervasive this error was, we calculated the proportion of subjects for whom the difference in price between the full coverage and the deductible policy, ΔP, was at least \$100 (equal to the deductible). Since the true difference in expected payments between the two policies could not be higher than \$30 (which is the difference between \$140, the expected payment to a type A buyer under full coverage, and \$110, the payment to a type A or a type B client buying a policy with a \$100 deductible), it is safe to attribute a ΔP higher than or equal to 100 to the aforementioned error. From tables 2 and 3, we see that the proportions of subjects who fall in this category range between 35% and 64%, indicating that this error is quite frequent.

We also calculated the proportion of subjects for whom the difference between the full coverage and the deductible policy was exactly 100. This proportion was considerable, ranging from 25% to 35%.

To test further for under-valuation of the policy with a deductible, we calculated the proportion of subjects who priced this policy as less than 110 (no client, either a type A or type B had expected claims lower than 110). A large proportion of the subjects ranging from 48% to 84% priced the deductible policies at less than \$110. In contrast, the proportion of subjects who priced the full coverage policy by less than the expected payments under that policy ranged from 6% to 14%, indicating that subjects are much more likely to underestimate the value of a policy with a deductible than to underestimate a full coverage policy.

IV. Study 2: Pricing of policies by professionals (exogenous deductibles)

Subjects: All 26 subjects participating in this study were insurance practitioners, ranging in age from 30 to 55 years and possessing at least 5 years of experience in the industry. Their job titles included insurance agent, supervisor of insurance agents, underwriter, and owner of an insurance agency. The subjects were enrolled in classes at the College of Insurance in Tel-Aviv, pursuing advanced courses in Insurance. They completed the task during the first 30 minutes of a regular class session.

Method: The method essentially replicated the method of the first set of experiments.

Results and discussion: The results are presented in Table 4.

Insert Table 4 about here

The table presents the same statistics as Tables 2 and 3. In the case of the professionals, deductible policies are not as underestimated (if underestimated at all) as in the case of amateurs. None of the EPRs of the policies with the deductible are lower than 1. Moreover, the difference between the EPR of both policies is much lower for the professionals than for the amateurs (0.14 in sample H and 0.25 in sample L compared with 0.86 in sample H and 0.44 in sample L in experiment 1.1, and 0.18 in sample H and 0.34 in sample L in experiment 1.2).

The proportions of subjects for whom $\Delta P>100$ was smaller among the professionals, ranging between 25% and 31%. A similar pattern was also observed when comparing the proportion of subjects with $\Delta P=100$. Nevertheless, we did find some subjects (about 11%) for whom $\Delta P=100$, indicating that some professionals made the same evaluation error so common among amateurs. Apparently, even professionals are not immune from basic evaluation errors.

Pricing of the policies below the expected payments was less prevalent among professionals. Regarding policies with a deductible, the proportions of prices less than \$110 were clearly lower than in the case of amateurs (25% for sample H and 30% for sample L).

It appears that professionals are less likely to undervalue policies with a deductible, and that they do not err in evaluating such policies by much more than they err in evaluating policies of full coverage. Amateurs, on the other hand, are much more likely to err in evaluating policies with a deductible than when evaluating full coverage policies.

V. Study 3: Pricing of Policies amateurs (endogenous deductibles)

In the above experiments, subjects could use either a full coverage policy and/or a policy with a \$100 deductible. The task was somewhat complicated by the fact that the subjects faced two types of insureds. In this experiment, we presented the subjects with just one type of clients and requested them to price only one policy. On the other hand, this experiment was more demanding in that we asked subjects to determine the deductible on their own (full coverage is the special case where the deductible is 0).

This experiment is important as it eliminates a major complication (the existence of two types of clients), while introducing a more realistic scenario by allowing the subjects to choose any deductible. It also provides some insights about the subjects' perceptions of client risk aversion and insurance demand.

Subjects and method: Twenty-seven graduate students enrolled in a Risk Management and Insurance seminar at The Hebrew University. The method was similar to the one described in Experiment 1. The difference is that the subjects were asked to offer only one policy and set its deductible (see Table 5).

Insert Table 5 about here

Results and discussion: In Table 6 we present the deductibles and prices offered by the subjects. The policies offered are arranged in ascending order by the deductible. Next to each policy we show the expected damages according to the policy.

Insert Table 6 about here

A significant portion of the subjects (19%) chose a deductible of 0 (i.e., full coverage). Of these subjects, all chose a price higher than the expected damages. On the other hand, 32% of the subjects that offered a non-zero deductible charged a price lower than expected claims.

Most deductibles were rather low (less than $100) with a significant number of full coverage policies. This indicates that subjects anticipated a reluctance of buyers to buy policies with high deductibles, perhaps due to high-risk aversion. As in the former experiments, the above results show that there is a higher chance of underestimating the value of a policy with a deductible than the value of a full coverage policy.

VI. General discussion

Our results show that amateur subjects tend to underestimate the value of policies with a deductible. This bias occurs because subjects are inclined to estimate the value of such policies by calculating the value of an equivalent full coverage policy, and then subtracting the deductible. In this case, the higher the deductible, the higher the under-valuation of the policy. This bias emanates from subjects' tendency to anchor on the price of a full coverage policy but to adjust insufficiently for the size of the deductible. The findings suggest that in purchasing insurance policies subjects' behavior is affected by the anchoring heuristic (Chapman and Johnson, 2002; Kahneman, 1992; Tversky and Kahneman, 1974), leading consumers to purchase insurance with low or no deductibles.

We also find that professionals are less likely to exhibit the above bias than are amateurs. Professionals are likely to value and price deductible policies correctly (i.e., according to the true expected payments), whereas the general public (amateurs) may find the prices the professionals set to be too high compared to their own underestimated expected payments.

The professionals in our studies had a similar academic background to the amateurs. Yet, the professionals' experience helped them to perform better than the amateurs in the present quantitative experimental setting. Possibly, the professionals' expertise in the field minimizes their need to anchor on full coverage policies when evaluating policies with deductibles.

The preference of subjects for low deductibles is often interpreted as an indication of high-risk aversion. In this study, it is shown that such behavior can also result from computational biases. While the anchoring bias may be perceived as an error that may not have significant effects on market behavior the truth may be the opposite. Even if professional insurance sellers are (relatively) immune from this bias, the fact that amateur consumers are affected by it has direct implications as the two sides are needed for market transactions. The failed attempt of the Pennsylvania's Insurance Commissioner during the 1970s to raise the minimum auto insurance deductible from $50 to $100 attests to this possibility. The current findings may also be useful in analyzing behavior in other areas where high risk aversion is suspect, such as the issue of the risk premium puzzle (Mehra and Prescott, 1985). Future research should examine whether bounded rationality and computational limitations can further our understanding of behavior in other financial puzzles.

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Table 1

Selling insurance *

Assume that you are an insurance agent. You were offered an opportunity of making a bid for insuring rental apartments through a large organization in the city (N=1000). Basically, if your bid is accepted you'll be able to sell policies to these 1000 employees (who will buy personal insurance from you) covering their personal belongings in the apartments they rent, against fire and theft.

Assume that the probabilities of damages that these employees may incur (based on their previous insurance records) come from the following two distributions:

A		B	
Loss($)	Probability	Loss ($)	Probability
0	0.70	0	0.9
100	0.20	100	0
1200	0.1	1200	0.1

You cannot know which distribution a particular employee "comes" from; the company told you that 75% of the employees "come" from distribution A and 25% from distribution B.

* For about half of the subjects, sample H, the table reads as above, for the other half the table says that 25% of the employees “come” from A and 75% from B.

Table 1

(cont'd)

What would be the prices you'd charge? Recall that there is competition (other agents can come with more attractive offers). At the same time, in setting the price of the policy you should not forget the potential claims. Expected claims are affected by the policy an employee buys as well as the distribution he "comes" from. Employees are free to choose between the offered policies and may also decide not to buy any policy.

Please note that if you price the policy(ies) too high you may have no demand. On the other hand, if you price them too low you may eventually lose money. This potential deal is very important to you as insurance business is declining. Think and decide!

Policy 1:	A deductible of $100
Policy 2:	A deductible of $0

Decision:

Policy 1	**sell/no sell at price $_____each**
Policy 2	**sell/no sell at price $_____each**

Please explain your decision:

Table 2

Summary statistics of prices of policies of full coverage (D = 0) and of policies with a deductible, (D =100), Experiment 1.1, Amateurs, Hebrew University

	Sample H		Sample L	
	D=0	D=100	D=0	D=100
N (number of subjects)	14	16	17	16
Average price (P)	145	73	134	69
Maximum price	200	190	150	132
Minimum price	130	20	115	20
Standard deviation of prices	19	53	10	44
Expected payments (E)	135	110	125	110
EPR (P/E)	1.07	0.66	1.07	0.63
ΔP	72		65	
ΔP / ΔE	2.88		4.33	
N (ΔP > 100)	9 (64%)		8 (50%)	
N (ΔP =100)	4 (29%)		5 (31%)	
N (P_{DED} <110)	10 (63%)		8 (50%)	
N (P_{FC} < E)	2 (14%)		1 (6%)	

Notes:

1: ΔP and ΔE denote is the difference between the price and the expected payments, respectively of the full coverage and the deductible policy.

2. N (ΔP>100), N (ΔP =100), N (P_{DED} <110), and N (P_{FC} <E) denote the number of subjects with ΔP >100, the number of subjects with ΔP =100, the number of subjects with price of the deductible policy <110, and the number of subjects with the price of the full coverage policy less than its expected value.

Table 3

Summary statistics of prices of policies of full coverage (D = 0) and of policies with a deductible, (D =100), Experiment 1.2, Amateurs, Manchester University

	Sample H		Sample L	
	D=0	D=100	D=0	D=100
N (number of subjects)	31	31	23	23
Average price (P)	153	63	131	78
Maximum price	250	200	170	140
Minimum price	75	20	90	23
Standard deviation of prices	29	40	17	50
Expected payments (E)	135	110	125	110
EPR (P/E)	1.13	0.57	1.05	0.71
ΔP	90		53	
ΔP / ΔE	3.6		3.53	
N (ΔP > 100)	19 (61%)		8 (35%)	
N (ΔP =100)	11 (35%)		2 (9%)	
N (P_{DED} <110)	26 (84%)		11 (48%)	
N (P_{FC} < E)	2 (6%)		3 (13%)	

Notes:

1: ΔP and ΔE denote is the difference between the price and the expected payments, respectively of the full coverage and the deductible policy.

2. N (ΔP>100), N (ΔP =100), N (P_{DED} <110), and N (P_{FC} <E) denote the number of subjects with ΔP >100, the number of subjects with ΔP =100, the number of subjects with price of the deductible policy <110, and the number of subjects with the price of the full coverage policy less than its expected value.

Table 4

Summary statistics of prices of policies of full coverage (D = 0) and of policies with a deductible, (D =100), Experiment 2, Professionals

	Sample H		Sample L	
	D=0	D=100	D=0	D=100
N (number of subjects)	14	16	8	10
Average price (P)	210	156	156	110
Maximum price	550	500	280	200
Minimum price	120	25	60	28
Standard deviation of prices	114	118	68	58
Expected payments (E)	135	110	125	110
EPR (P/E)	1.56	1.42	1.25	1
ΔP	54		46	
ΔP / ΔE	2.16		3.07	
N ($\Delta P > 100$)	5 (36%)		2 (25%)	
N ($\Delta P = 100$)	2 (14%)		1 (13%)	
N ($P_{DED} < 110$)	4 (25%)		3 (30%)	
N ($P_{FC} < E$)	1 (7%)		1 (13%)	

Notes:

1: ΔP and ΔE denote is the difference between the price and the expected payments, respectively of the full coverage and the deductible policy.

2. N ($\Delta P>100$), N ($\Delta P = 100$), N ($P_{DED} < 110$), and N ($P_{FC} < E$) denote the number of subjects with $\Delta P > 100$, the number of subjects with $\Delta P = 100$, the number of subjects with price of the deductible policy <110, and the number of subjects with the price of the full coverage policy less than its expected value.

Table 5

Selling insu rance-endogenous deductibles

Assume that you are an insurance agent. You were offered an opportunity of making a bid for insuring rental apartments through a large organization in the city (N=1000). If your bid is accepted you'll be able to sell policies to these 1000 employees (who will buy personal insurance from you) covering their personal belongings in the rented apartments against fire and theft.

Assume that the probabilities of damages that these employees may incur (based on their previous insurance records) come from the following distribution:

Damage	Probability
0	89%
100	10%
10000	1%

You need to decide which policy to offer. That is, you need to determine whether to sell a full coverage policy or a policy with a deductible (A full coverage policy is a policy with a zero deductible), and given the deductible you chose, you must determine the price of the policy.

What would be the policy you will offer and at what price? Recall that there is competition (other agents can come with more attractive offers). At the same time, in setting the type of the policy and its price you should not forget the potential claims. Expected claims are affected by the amount of the deductible and by the distribution of damages. Employees are free to choose between the offered policies and may also decide not to buy any policy.

Note that if your price and deductible combination is not attractive enough you may have no demand. On the other hand, if you price your policy too low you may eventually lose money. This potential deal is very important to you as insurance business is declining. Think and decide!

Policy Offered : Deductible: ------------ (a zero deductible is full coverage)

Price: ------------------

Table 6

Deductibles, Prices, and Expected Claims, Experiment 3

Deductible	Price	Expected Claims	Does price cover Expected claims?
0	110	110	Yes
0	110	110	Yes
0	111	110	Yes
0	112	110	Yes
0	112	110	Yes
0	119	110	Yes
0	120	110	Yes
0	140	110	Yes
5	15	109.45	No
10	112	108.9	Yes
18	105	108.02	No
20	110	107.8	Yes
20	134	107.8	Yes
25	150	107.25	Yes
30	30	106.7	No
30	150	106.7	Yes
35	110	106.15	Yes
40	109	105.6	Yes
50	18	104.5	No
55	60	103.95	No
70	55	102.3	No
80	150	101.2	Yes
100	101	99	Yes
100	299	99	Yes
250	600	97.5	Yes
2000	85	80	Yes
9000	25	10	Yes

N, Number of subjects	27
N (D=0), number of subjects with D= 0	8
N (P<E / D=0)	8
N (D>0)	19
N (P<E/ D>0)	6

Note: N (P<E / D=0) denotes the number of subjects of those offering a full coverage, determining a price lower than the expected claims.
N (D>0) denotes the number of subjects offering a positive deductible, and N(P<E/ D>0), denote the number of those subjects determining a price lower than the expected