

Overinsuring a Modest Risk

a toy model, after Sydnor (2010)

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Offered a lower deductible on their home insurance, most people take it, paying about \$100 more a year to cut the deductible from \$1,000 to \$500. A claim arrives in fewer than 5 percent of years, so the lower deductible is worth under \$25. Sydnor (2010) looks at thousands of these choices and asks what they say about risk aversion. The answer, seen through expected utility, is that people act far more afraid of a few hundred dollars than any sensible model allows. This note builds the one-decision version and recovers the coefficient of risk aversion the choice implies.

1 The choice

A consumer with wealth W and an increasing, concave utility u insures her home. Two policies differ only in the deductible she pays when she files a claim. The high-deductible policy sets it at $D_H = \$1,000$; the low-deductible policy sets it at $D_L = \$500$ but costs $\Delta = \$100$ more in premium. A claim arrives with probability $p = 0.05$, and the loss then exceeds the deductible, so she pays the deductible in full. Writing $w \equiv W - \pi_H$ for her wealth net of the high-deductible premium, the policies leave her at

	probability	high deductible	low deductible
no claim	0.95	w	$w - 100$
claim	0.05	$w - 1,000$	$w - 600$

The low deductible costs \$100 for sure and returns \$500 in the claim state, so its expected monetary value is

$$p D_L - \Delta = 0.05(500) - 100 = 25 - 100 = -75.$$

She pays \$100 for an expected saving of \$25, giving up \$75 in expected wealth. A risk-neutral consumer keeps the high deductible; only risk aversion can justify the low one.

2 What the choice implies

The \$75 is a risk premium: the amount above fair value she pays to shed a small gamble, a loss of \$500 that strikes with probability 0.05. Arrow and Pratt connect a risk premium to the curvature of utility. For a small risk with mean m and variance σ^2 , the certainty equivalent is

$$CE \approx m - \frac{1}{2} A \sigma^2, \quad \text{where } A \equiv -\frac{u''(w)}{u'(w)}$$

is the coefficient of absolute risk aversion. The gamble the low deductible removes is the extra \$500 she pays under the high deductible when a claim arrives: a loss of 500 with probability $p = 0.05$ and 0 otherwise. Its mean and variance are

$$m = -p D_L = -0.05(500) = -25, \quad \sigma^2 = p(500)^2 - (p 500)^2 = p(1-p)(500)^2 = 0.05(0.95)(250,000) = 11,875.$$

The most she would pay to remove the gamble is $-CE = -m + \frac{1}{2}A\sigma^2 = 25 + \frac{1}{2}A\sigma^2$. She pays $\Delta = \$100$, so

$$100 = 25 + \frac{1}{2}A(11,875) \implies 75 = 5,937.5A \implies A = \frac{75}{5,937.5} = \frac{150}{11,875} \approx 0.0126.$$

A numerical example. The coefficient of relative risk aversion is $\gamma = AW$. At any plausible wealth it lands in the hundreds: for instance, at $W = \$50,000$, $\gamma \approx 0.01263 \times 50,000 \approx 632$.

Wealth W	Implied $\gamma = AW$
\$25,000	316
\$50,000	632
\$100,000	1,263

Table 1. The relative risk aversion needed to justify the low deductible ($A \approx 0.0126$). Sensible values lie between 1 and 5.

Figure 1 makes the gap plain. Substituting $A = \frac{\gamma}{W}$ into the willingness to pay, at $W = \$50,000$,

$$WTP = 25 + \frac{1}{2} \frac{\gamma}{50,000} (11,875) = 25 + 0.11875 \gamma,$$

which rises with risk aversion from its fair value of \$25. Setting $WTP = 100$ gives $\gamma = \frac{75}{0.11875} \approx 632$, far to the right of the range any reasonable utility occupies: at $\gamma = 5$, the consumer would pay only $25 + 0.59 \approx \$26$.

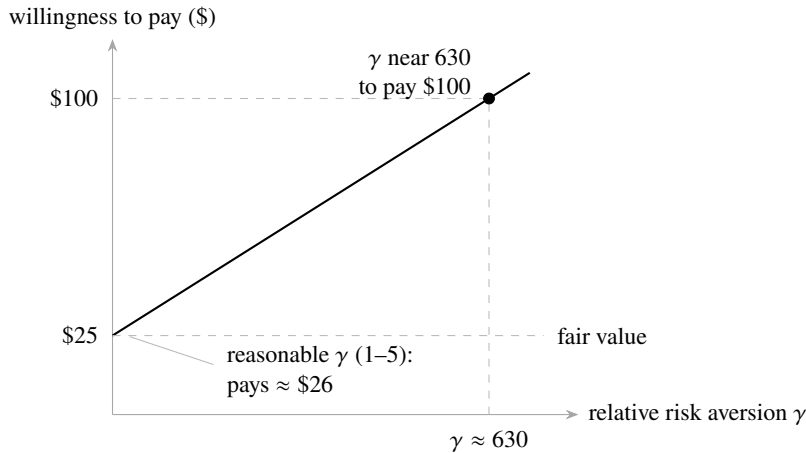


Figure 1: Willingness to pay for the lower deductible against relative risk aversion (at wealth \$50,000). It starts at the fair value of \$25 and reaches the \$100 she pays only near $\gamma = 630$, far beyond the sensible range of 1 to 5.

Lesson: A low deductible looks like prudence, but set against the risk it removes it reveals a risk aversion no reasonable utility function can carry. Over modest stakes people act as if far more afraid of a small loss than expected utility, calibrated to their large decisions, can explain. The choice points past the model, to a claim felt as likelier than it is, or a \$500 loss that looms large because it is salient. □

References

Sydnor, J. (2010) “(Over)insuring Modest Risks.” *American Economic Journal: Applied Economics* 2(4): 177–199.