Demand for Insurance: Full vs. Partial Coverage

by James R. Garven*

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The insurance economics topic showcases a practical application of expected utility theory and provides a related context for the course topic which follows, which is asymmetric information.

1 State-Contingent Wealth Under Different Contract Types

In order to determine expected utility of wealth under various insurance strategies, state-contingent wealth (W_s) must first be calculated. The determinants of state-contingent wealth include initial wealth W_0, the premium for (i.e., price of) a given insurance contract, and the client's net exposure to loss under such a contract. Net exposure to loss under the i^{th} contract type is given by $L_s - I_{i,s}$, where L_s is the state-contingent loss and $I_{i,s}$ is the state-continent indemnity paid by the insurer.[1] Net exposure to loss under different types of indemnity schedules can be summarized as follows:

1. Full Coverage Contract: Under a full coverage contract, $L_s = I_s$; i.e., there is no exposure to loss, since the client transfers the entire loss to the insurer.
2. Partial Coverage Contracts:[2]
   (a) Coinsurance: $I_s = \alpha L_s$, where α is the coinsurance rate. Coinsurance implies proportional risk sharing between client and insurer; specifically, the proportion α of the loss is transferred to the insurer, whereas the client retains the proportion $1 - \alpha$ of the loss. Thus, under coinsurance, net exposure to loss, $L_s - I_s = (1 - \alpha)L_s$.[3]
   (b) Deductible: $I_s = \max(0, L_s - d)$, where d is the insurance deductible. Deductible insurance implies non-proportional risk sharing between client and insurer. Thus, under deductible insurance, net exposure to loss is $L_s - I_s = L_s - \max(0, L_s - d)$.

*James R. Garven is the Frank S. Groner Memorial Chair in Finance and Professor of Finance & Insurance at Baylor University (Address: Foster 320.39, One Bear Place #98004, Waco, TX 76798, telephone: 254-307-1317, e-mail: James_Garven@baylor.edu).

[1] The word "indemnity" derives from the Latin word "indemnis", which means unhurt or free from loss. An insurance contract specifies terms and conditions under which insurers indemnify, or contractually commit themselves, to paying clients for incurred losses according to a pre-determined indemnity formula, or schedule.

[2] The descriptions of partial insurance contracts given here implicitly characterize contract features as mutually exclusive. However, real world insurance contracts often feature combinations of contract features. For example, in personal property (e.g., auto and home) insurance, contracts typically combine deductibles and upper limits, whereas health insurance contracts typically combine deductibles with coinsurance and stop-loss provisions.

[3] Here, $\alpha = 0 \Rightarrow$ self-insurance, $0 < \alpha < 1 \Rightarrow$ partial coverage, and $\alpha = 1 \Rightarrow$ full coverage.

(c) Upper Limit: Net exposure to loss under an upper limit contract $L_s - I_s = L_s - \min(U, L_s)$, where U represents the contract's upper limit. Thus, under an upper limit insurance contract, the client is fully insured for smaller (up to the upper limit U) losses but uninsured for larger losses that exceed the upper limit U.

2 Actuarially Fair and Unfair Insurance

Last Thursday, we also discussed the concepts of actuarially fair and actuarially unfair insurance. If insurance is actuarially fair, this implies that the premium for (i.e., price of) the i^{th} insurance contract is equal to the expected value of its indemnity; i.e., $P_i = E(I_i)$. According to the Bernoulli Principle, if insurance is actuarially fair, then full coverage contracts are strictly preferred to partial coverage contracts, a result that holds for all (arbitrarily) risk averse clients. The reason this result obtains is because expected utility is always the highest for the full coverage policy, and this holds true *irrespective* of the degree to which the client is risk averse. However, if the premium for the i^{th} insurance policy *exceeds* the expected value of its indemnity; i.e., if $P_i = E(I_i)(1+\beta_i) > E(I_i)$, where $\beta_i > 0$, then the premium for such a policy is actuarially unfair, and Mossin's Theorem implies that the client will prefer partial to full coverage.