information in health care markets, and the variation of health care among various markets.

MEANING OF INSURANCE

Consider the demand for insurance without all of the detailed trappings (deductibles, premiums, coinsurance, etc.) that accompany modern insurance plans. Start with a club with 100 members. The members are about the same age, and they have about the same interests and lifestyles. About once a year one of the 100 members gets sick and incurs health care costs of 5,000FRS. The incidence of illness seems to be random, not necessarily striking men, women, the old, or the young in any systematic fashion. Club members, worried about potential financial losses due to illness, decide to collect 50Frs from each member and put the 5,000frs in the bank for safekeeping and to earn a little interest. If a member becomes ill, the fund pays for the treatment. This, in a nutshell, is insurance. The members have paid 50frs to avoid the risk or uncertainty, however small, of having to pay 5,000frs. The "insurer" collects the money, tries to maintal and/or increase its value through investment, and pays claims when asked.

This example thus illustrates several desirable example this insurance arrangement.

- The number of insured shall be large, and the should be independently exposed to the potential loss.
- The losses covered should be definite in time, place, and amount.
- The chance of loss should be measurable.

• The loss should be accidental from the viewpoint of the person who is insured.

Insurance generally reduces the variability of the incomes of those insured by pooling a large number of people and operating on the principle of the law of large numbers. That is, although out- lays for a health event may be highly variable for any given person in the insurance pool, the average outlays for the group can be predicted fairly well. The law of large numbers shows that for a given probability of illness, the distribution of the average rate of illness in the group will collapse around the probability of illness as the group size increases.

This chapter considers the theory and practice of health care insurance. It shows the necessity of quantifying risk, as well as attitudes toward risk. With those ideas, we consider the structure of insurance policies and how markets evolve to provide them.

Insurance Versus Social Insurance

(with utility of 200), or \$10,000 (with utility of 140), and a risky expected wealth of \$19,000. Insurance will guarantee her wealth to be \$19,000. If she does not fall ill, her wealth will be \$20,000 less the \$1,000 insurance premium; if she falls ill, her wealth will be \$10,000 plus the \$10,000 payment for the loss of health, minus the \$1,000 premium—again \$19,000.

- If insurance companies charge more than the actuarially fair premium, people will have less expected wealth from insuring than from not insuring. Even though people will have less wealth as a result of their purchases of insurance, the increased wellbeing comes from the elimination of risk.
- The willingness to buy insurance is related to the distance between the utility curve and the expected utility line. If Elizabeth is very unlikely to become ill, (near point *B*), then her expected utility will be almost identical to her certainty utility, and her gains from insurance will be small. If Elizabeth's probability of illness in reases to 0.5 (point *C*), her expected wealth will be \$15,000 and her expected utility will be 170. She will accrue significant gains by insuring as not to by the distance *C D*. However, if Elizabeth is almost certain to fall all supervalues of the setter off "self-insuring," by putting the (clines) \$10,000 away coreay for her almost certain illness rather than incuring the transactions costs of buying insurance and then filing claims
 THE DEMAND FOR INSURANCE

If risk-averse people choose to purchase insurance, how much will they purchase? The next two sections present a classic model introduced by Mark Pauly in 1968 to consider the fundamental demand and supply decisions regarding insurance.

How Much Insurance?

We have discussed why Elizabeth would choose to buy insurance so we now consider how much insurance she would choose. Recall that Elizabeth's expected utility involves her wealth when ill, with a probability of 0.10, or when healthy, with a probability of 0.90. If ill, her wealth will fall from \$20,000 to \$10,000.

We address Elizabeth's optimal purchase by using the concepts of marginal benefits and marginal costs. Consider first a policy that provides insurance covering losses up to \$500. Although it might hardly seem worth buying a \$500 insurance policy when Elizabeth will lose \$10,000 if she falls ill, it is a useful place to start.

The goal of maximizing total net benefits provides the framework for understanding her health insurance choice. She benefits from health insurance only when she is ill and receives the insurance benefit payments. She still pays the insurance premiums when ill, received level Q_2 free, with the position she would attain if she paid the market price for all the medical care she consumed.

Assume again that the probability of illness p equals 0.5. Consider first a policy containing a deductible, which requires Elizabeth to pay the risk premium plus the first \$500 of her medical care (expenses indicated by rectangle $0P_1BQ_1$), after which all additional care is free. Elizabeth will buy this policy because it protects her from risk and allows her to purchase Q_2 units of medical care for \$500. Her gain is the triangle under the demand curve, Q_1BQ_2 .

Suppose now that the insurance company raises the deductible from \$500 to \$700. Will Elizabeth continue to buy the insurance? Recall that without insurance, Elizabeth would have purchased amount Q_1 of health services; the \$700 deductible yields amount Q_3 . When ill, Elizabeth is paying more for the amount $(Q_3 - Q_1)$ of incremental health care than she believes the value of incremental care to be. The incremental costs are rectangle Q_1BDQ_3 ; the incremental benefits are the area under her demand Crive (trapezoid Q_1BFQ_3). The difference is triangle *BDF*, and this represented welfare loss to Elizabeth. However, after paying the deductible, she can active much additional health care as she wants at zero cost, and she will buy quantities Q_2 . This yields yelfare gain triangle Q_3FQ_2 (incremental benefits less zero incremental costs). In Q_3FQ_2 (her welfare gain) is larger than *BDF* (her welf Q_3FQ_2 , in 250 xceeds the gain, and Elizabeth is better off selfinsuring and spending P_1Q_1 (in this example, \$500) with probability 0.5.

Hence, the deductible has two possible impacts. A relatively small deductible will have no effect on individual usage, here Q_2 . A large deductible makes it more likely that individuals will self-insure and consume the amount of care they would have purchased with no insurance, here Q_1 .

A wide range of coinsurance coverages have developed. Many analysts have considered how to formulate them to lead to more economically efficient outcomes

HEALTH INSURANCE AND THE EFFICIENT ALLOCATION OF RESOURCES

This section examines the impact of health insurance on health care demand. Economists commonly examine the efficient allocation of resources, which occurs when the incremental cost of bringing the resources to market (marginal cost) equals the valuation in the market to those who buy the re- sources (marginal benefit). If the marginal benefit is greater (less) than the marginal cost, one could improve society's welfare by allocating

services that are most inelastic.

• Insurance policies lead to increased costs to society because they lead to increased expenditures on health services. They provide increased benefits through the reduction of risks.

DISCUSSION QUESTIONS

- 1. Discuss the difference between cardinal and ordinal utility. Why is cardinal utility necessary for the analysis of risk and insurance?
- 2. What does the term *moral hazard* mean? Give examples.
- 3. The deductible feature of an insurance policy can affect the impact of moral hazard. Explain this in the context either of probability of treatment and chamount of treatment demanded.
- 4. Describe the benefits to society from purchace Distrance. Describe the costs. Define and discuss the welfare gains from changes in insurance coverage.
- 5. If only risk-average be will buy health interance, why do many people who buy health interance also buy there interactive activity more consistent with risk aking)? Speculate on the differences and similarities.