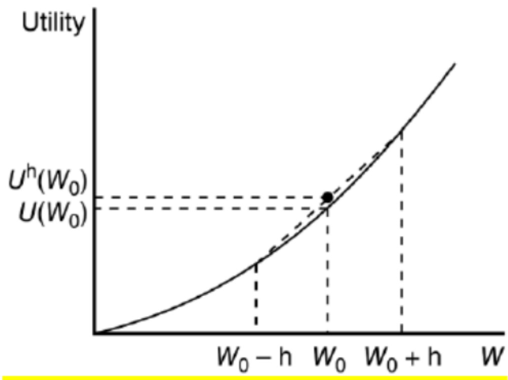
7.1

George is seen to place an even-money \$100,000 bet on the Bulls to win the NBA Finals. If George has a logarithmic utility-of-wealth function and if his current wealth is \$1,000,000, what must he believe is the minimum probability that the Bulls will win?

p must be large enough so that expected utility with bet is greater than or equal to that without bet: $p\ \ln(1{,}100{,}000) + (1 - p)\ln(900{,}000) > \ln(1{,}000{,}000)$ $13.9108p + 13.7102(1 - p) > 13.8155$, $.2006p > .1053$ $p > .525$

7.2

Show that if an individual's utility-of-wealth function is convex then he or she will prefer fair gambles to income certainty and may even be willing to accept somewhat unfair gambles. Do you believe this sort of risk-taking behavior is common? What factors might tend to limit its occurrence?



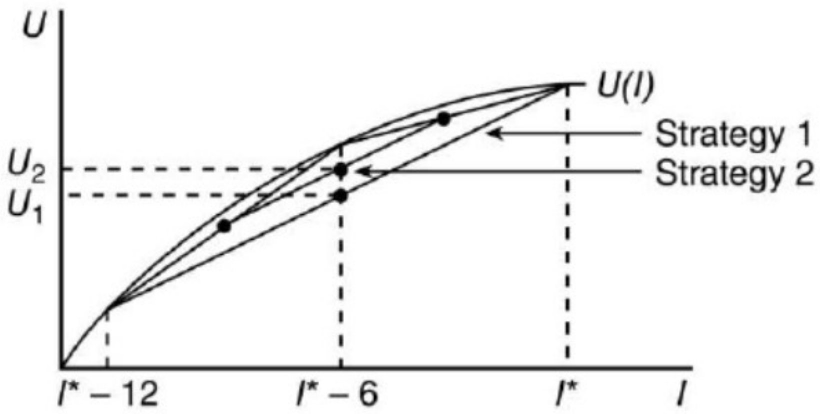
This would be limited by the individual's resources: he or she could run out of wealth since unfair bets are continually being accepted.

7.3

An individual purchases a dozen eggs and must take them home. Although making trips home is costless, there is a 50 percent chance that all the eggs carried on any one trip will be broken during the trip. The individual considers two strategies: (1) take all 12 eggs in one trip; or (2) take two trips with 6 eggs in each trip.

a. List the possible outcomes of each strategy and the probabilities of these outcomes. Show that, on average, 6 eggs will remain unbroken after the trip home under either strategy.
b. Develop a graph to show the utility obtainable under each strategy. Which strategy will be preferable?
c. Could utility be improved further by taking more than two trips? How would this possibility be affected if additional trips were costly?

	Outcome	Probability
Strategy One	Outcome	Probability
	12 Eggs	.5
	0 Eggs	.5
Expected Value =	$.5 \bullet 12 + .5 \bullet 0 = 6$	
Strategy Two	Outcome	Probability
	12 Eggs	.25
	6 Eggs	.5
	0 Eggs	.25
Expected Value	$= .25 \bullet 12 + .5 \bullet 6 + .25 \bullet 0$	
	$= 3 + 3 = 6$	



b. $U_2 > U_1$

7.4

Suppose there is a 50–50 chance that a risk-averse individual with a current wealth of $20,000 will contract a debilitating disease and suffer a loss of $10,000.

a. Calculate the cost of actuarially fair insurance in this situation and use a utility-of-wealth graph (such as shown in Figure 7.1) to show that the individual will prefer fair insurance against this loss to accepting the gamble uninsured.

b. Suppose two types of insurance policies were available:

(1) a fair policy covering the complete loss; and

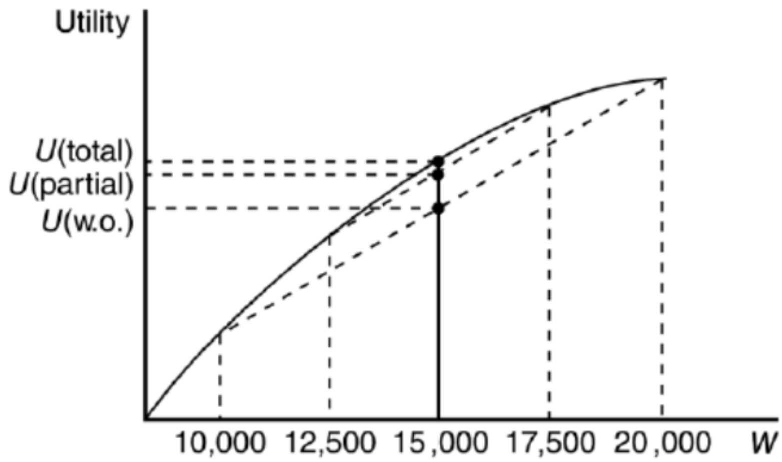
(2) a fair policy covering only half of any loss incurred.

Calculate the cost of the second type of policy and show that the individual will generally regard it as inferior to the first.

a. $E(L) = .50(10{,}000) = \$5{,}000$, so

Wealth = $15,000 with insurance, $10,000 or $20,000 without.

b. Cost of policy is .5(5000) = 2500. Hence, wealth is 17,500 with no illness, 12,500 with the illness.



7.5

Ms. Fogg is planning an around-the-world trip on which she plans to spend \$10,000. The utility from the trip is a function of how much she actually spends on it (Y), given by

$$U(Y) = \ln Y.$$

a. If there is a 25 percent probability that Ms. Fogg will lose \$1,000 of her cash on the trip, what is the trip's expected utility?
b. Suppose that Ms. Fogg can buy insurance against losing the \$1,000 (say, by purchasing traveler's checks) at an "actuarially fair" premium of \$250. Show that her expected utility is higher if she purchases this insurance than if she faces the chance of losing the \$1,000 without insurance.
c. What is the maximum amount that Ms. Fogg would be willing to pay to insure her \$1,000?

a. $E(U) = .75\ln(10{,}000) + .25\ln(9{,}000) = 9.1840$

b. $E(U) = \ln(9{,}750) = 9.1850$

Insurance is preferable.

c. $\ln(10{,}000 - p) = 9.1840$

$10{,}000 - p = e^{9.1840} = 9{,}740$

$p = 260$