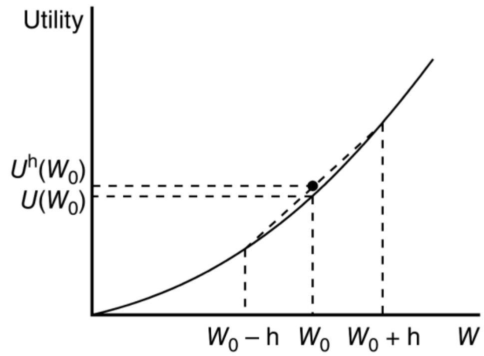
7.2 See graph.



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

7.3 a. *Strategy One*

Outcome	Probability
12 Eggs	.5
0 Eggs	.5

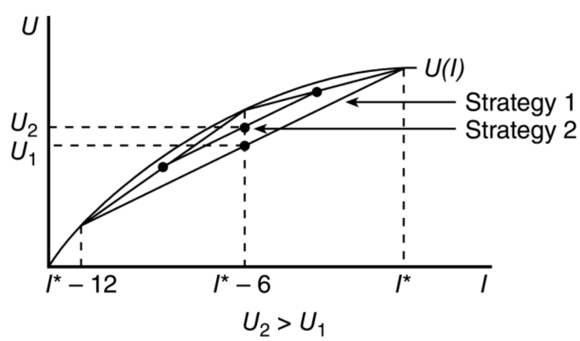
Expected Value = $.5\,(12) + .5(0) = 6.$

Strategy Two

Outcome	Probability
12 Eggs	.25
6 Eggs	.5
0 Eggs	.25

Expected Value = $.25\,(12) + .5(6) + .25(0) = 3 + 3 = 6.$

b.



where the last inequality follows from the formula given for the Taylor series approximation. So, a fine is more effective.

The calculations are even more transparent in the special case of logarithmic utility: $U(W) = \ln W$. Then expected utility is

$$EU = p\ln(W - f) + (1 - p)\ln W.$$

Computing elasticities,

$$e_{EU,p} = \left[\ln(W - f) - \ln W\right] \cdot \frac{p}{EU} \approx \frac{-pf/W}{EU}$$

$$e_{EU,f} = -\frac{p}{U(W - f)} \cdot \frac{f}{EU} = \frac{-pf/(W - f)}{EU}.$$

Following the logic from above,

$$\frac{e_{U,p}}{e_{U,f}} = \frac{W - f}{W} < 1.$$

7.7 a. The farmer will plant corn since

$$U(\text{wheat}) = .5\ln(28{,}000) + .5\ln(10{,}000) = 9.7251.$$

$$U(\text{corn}) = .5\ln(19{,}000) + .5\ln(15{,}000) = 9.7340.$$

b. With half in each, $Y_{NR} = 23{,}500$ and $Y_R = 12{,}500$.

$$U = .5\ln(23{,}500) + .5\ln(12{,}500) = 9.7491.$$

The farmer should plant a mixed crop. Diversification yields an increased variance relative to corn only, but takes advantage of wheat's high yield.

c. Let α = percent in wheat.

$$\begin{aligned} U &= .5\ln\left(28{,}000\alpha + 19{,}000(1-\alpha)\right) \\ &\quad + .5\ln\left(10{,}000\alpha + 15{,}000(1-\alpha)\right) \\ &= .5\ln\left(19{,}000 + 9{,}000\alpha\right) + .5\ln(15{,}000 - 5{,}000\alpha). \end{aligned}$$

Taking the first-order condition,

$$\frac{dU}{d\alpha} = \frac{4{,}500}{19{,}000 + 9{,}000\alpha} - \frac{2{,}500}{15{,}000 - 5{,}000\alpha} = 0.$$

Rearranging,

$$45(150 - 50\alpha) = 25(190 + 90\alpha),$$

implying $\alpha = .444$. Plugging α into the utility function yields

$$U = .5\ln(22{,}996) + .5\ln(12{,}780) = 9.7494.$$

This is a slight improvement over the 50-50 mix.

d. If the farmer plants only wheat, $Y_{NR} = 24,000$ and $Y_R = 14,000$.

$$U = .5\ \ln(24,000) + .5\ \ln(14,000) = 9.8163.$$

Availability of this insurance will cause the farmer to forego diversification.

7.8 a. $E(v^2) = \sum_{i=1}^{2} p(x_i) f(x_i) = 0.5(-1)^2 + 0.5(1)^2 = 1.$

b. $E(h^2) = 0.5(-k)^2 + 0.5(k)^2 = k^2.$

c. If $U(W) = \ln(W)$, then for $W > 0$,

$$r(W) = -\frac{U''(W)}{U'(W)} = \frac{1/W^2}{1/W} = \frac{1}{W}.$$

d. $p = 0.5E(h^2)r(W) = 0.5k^2 \frac{1}{W} = \frac{k^2}{2W}.$

Calculate p when W=10

k	p
0.5	0.0125
1	0.05
2	0.2

Calculate p when W=100

k	p
0.5	0.00125
1	0.005
2	0.02

Risk premium is higher when the level of initial wealth is lower. The greater the size of risk faced (larger the k), higher will be the risk premium. Because k enters as a quadratic, increasing k and W in the same proportion will increase p.