Uncertainty

Suppose a lottery yields the following outcomes with the following probabilities.

$100 with probability 0.2

$250 with probability 0.5

$300 with probability 0.3

The expected value of the lottery is

$$E[L] = 0.2 \cdot 100 + 0.5 \cdot 250 + 0.3 \cdot 300 = 20 + 125 + 90 = \$235$$

A risk averse person would not pay $235 to play the lottery. A risk averse person receives more utility from the $235 with certainty than $235 without certainty.

A risk averse person would accept $235 instead of playing the lottery. A risk averse individual facing two lotteries with the same expected payout will choose the lottery with the smallest variance.

An individual has a utility function of the form $U = M^{1/2}$ and faces a situation in which income is $36 with probability ½ and $100 with probability of ½.

We can calculate the payoff with certainty at which they are indifferent to the gamble.

$E[L] = 0.5 \cdot 36 + 0.5 \cdot 100 = \$68$

$U(36) = 6$

$U(100) = 10$

$U[L] = \frac{1}{2}6 + \frac{1}{2}10 = 8$

The certainty equivalent is $8^2 = \$64$

We can calculate the risk premium associated with this gamble.

The risk premium is $E[L] - 64 = \$4$. This is the same amount the individual would be willing to pay to avoid taking risk.

The price this individual is willing to pay to fully insure is $100 - 64 = \$36$

If this person is offered, for $32, full insurance for the $64 potential loss they will purchase the insurance. They are willing to pay a maximum of $36.