Exercise CN-201

A single choice between certain and uncertain outcomes

The Economic Skills Project

1 Problem

Problem

An individual is choosing between two actions, A and B. Action A has a certain payoff of $100. Action B is uncertain: there's a 10% chance the payoff will be high (H) and equal to $500, a 20% chance it will moderate (M) and equal to $200, and a 70% chance it will be low (L) and equal to $30. If the individual is risk-neutral and cares only about expected value, which option will she choose, and what will her payoff be?

2 Answer

Answer

She'll choose option B and have an expected payoff of $111.

3 Method

**Solution method**

Here's one approach:

1. Draw the decision tree.

2. Repeatedly evaluate the nodes from right to left.

4 Solution

4.1 Step 1

Draw the decision tree

Her decision tree is shown below. The initial node is a choice between the two options and has one branch for each. The uncertain outcome of B is represented by the subsequent chance node. It has one branch for each outcome, and the branches are labeled with both the outcome and its probability.
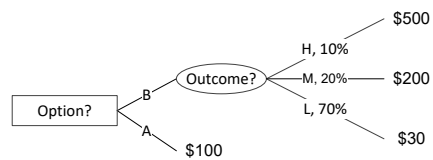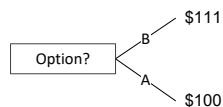

4.2 Step 2

Evaluating the nodes from right to left

The node furthest to the right is the outcome of action B. Since it's a chance node and the individual is risk-neutral, it should be evaluated by computing its expected value:

$$EV = 0.1 \cdot \$500 + 0.2 \cdot \$200 + 0.7 \cdot \$30 = \$111$$

Using this, the tree can be simplified:

Evaluating the nodes from right to left, continued

In the revised tree, the node furthest to the right is the choice of actions A and B. Since it's a choice node, it should be evaluated by picking the action with the highest payoff. That's action B and its payoff is $111. Since there are no remaining nodes, the problem is finished.

Done!