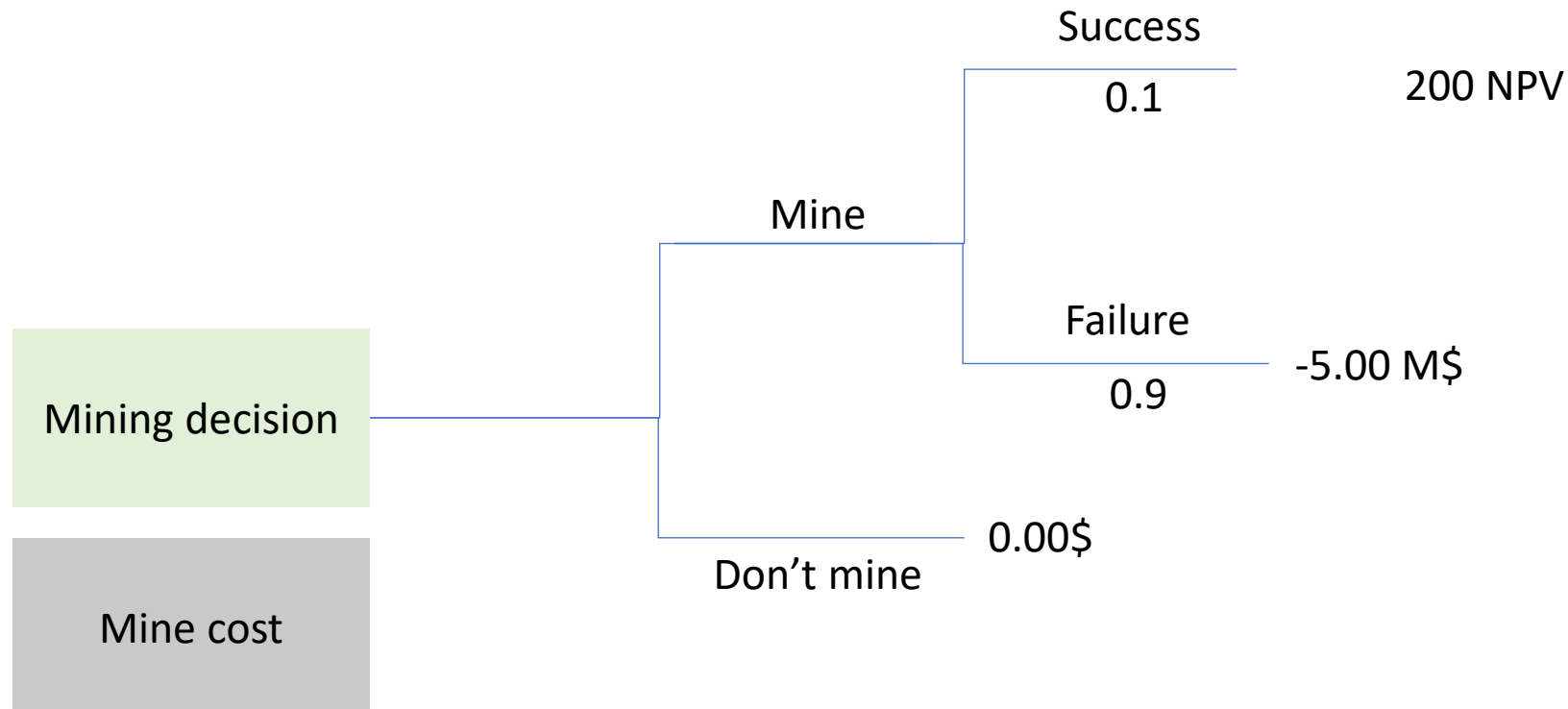# Review
Week 10

Question

- If we are analysing (making) an investment decision with two possible outcomes of success or failure, how we get the NPV of success? How about the probabilities of success and failure?

Answer

NPV is the mean of probability distribution of NPV. It can be calculated by using Monte Carlo simulation. It is a risk weighted average around possible outcomes when the project is successful (low, high, or medium)

The probabilities are estimated according to the historical data that we observed in the past. Other sources of information such as market analysis or soil condition assessment can be used to modify the probabilities.
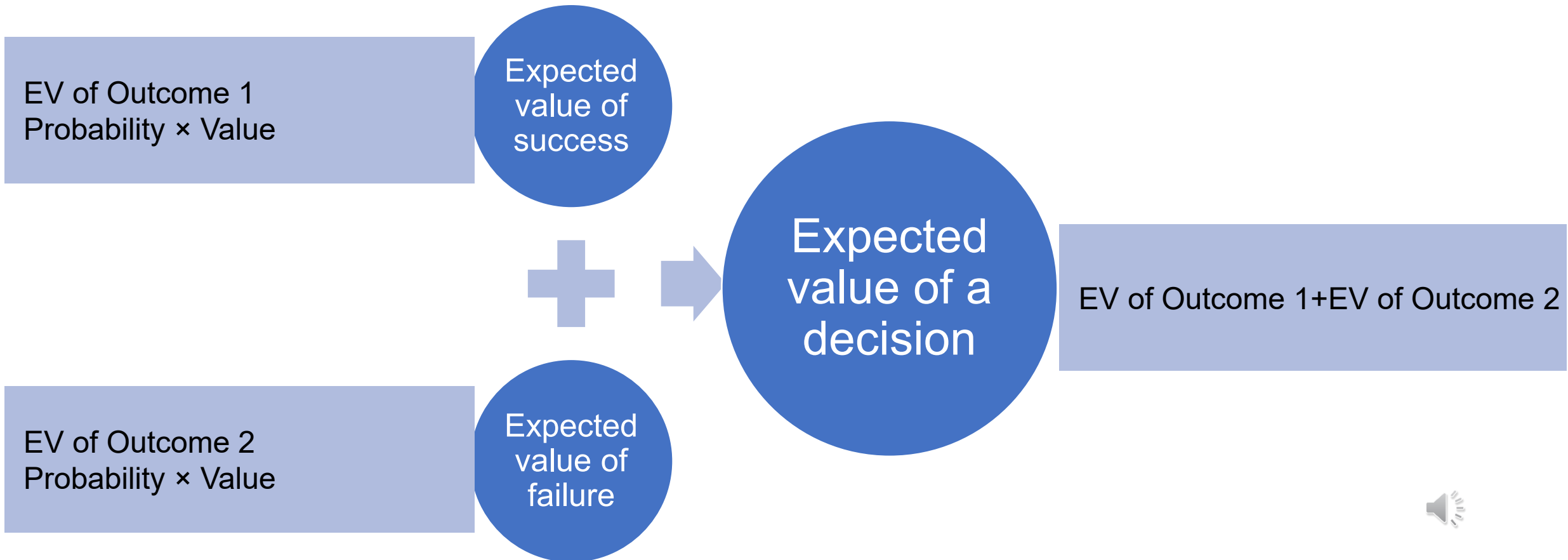
Question

What is the expected value of a risky decision?

Answer
Expected value of a decision

EV of Outcome 1
Probability × Value

Expected value of success

EV of Outcome 2
Probability × Value

Expected value of failure

➕ ➡️ Expected value of a decision

EV of Outcome 1+EV of Outcome 2

Answer

Outcome 1:
0.1 ×200=20

Expected value of success

Outcome 2: 0.9 × (-5)=-4.5

Expected value of failure
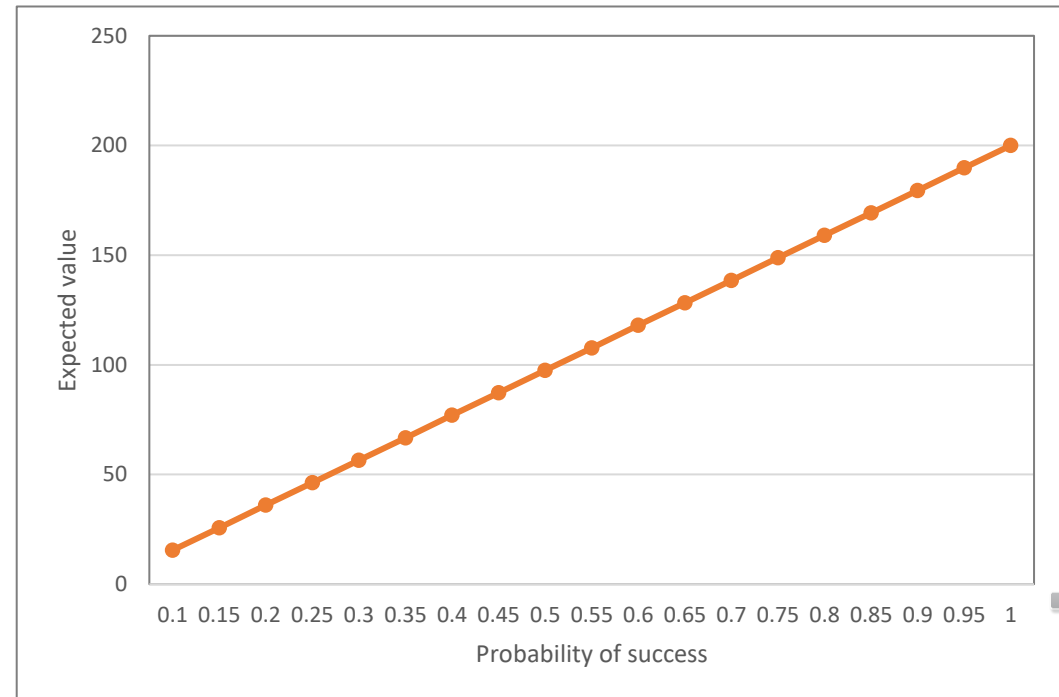
Expected value of mining decision

20-4.5=15.5 M

Question

How to analyse the EV of a risky decision without having the probabilities?

Answer
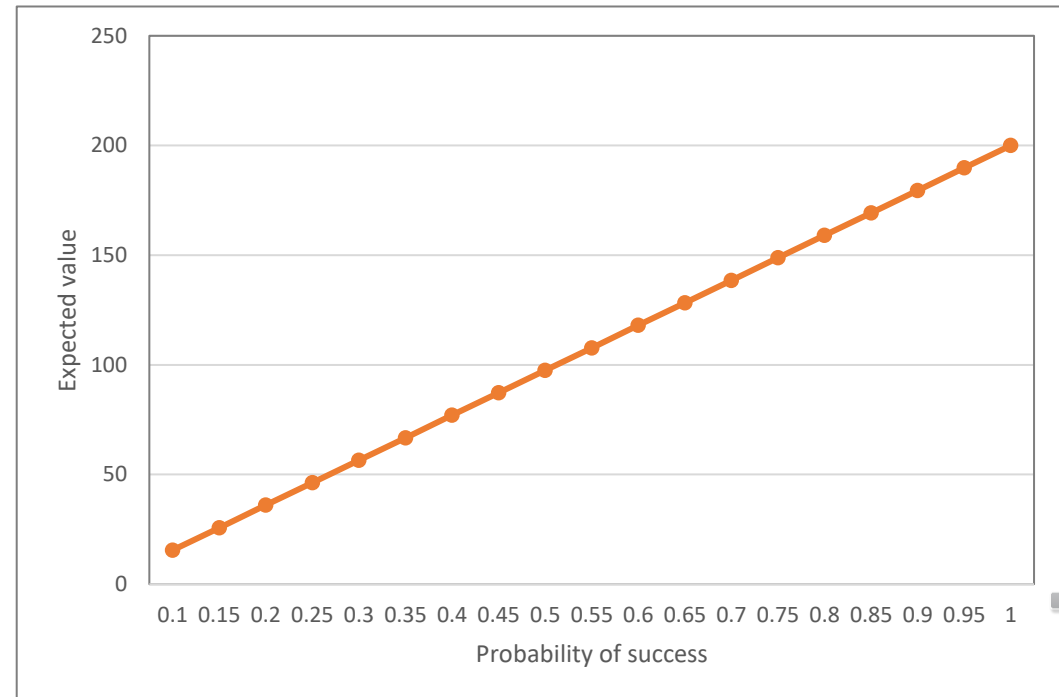
- Construct the EV equation as a function of probability of success.

- EV= $p_{Success}$*(value of success)+(1- $p_{Success}$)*(value of failure)

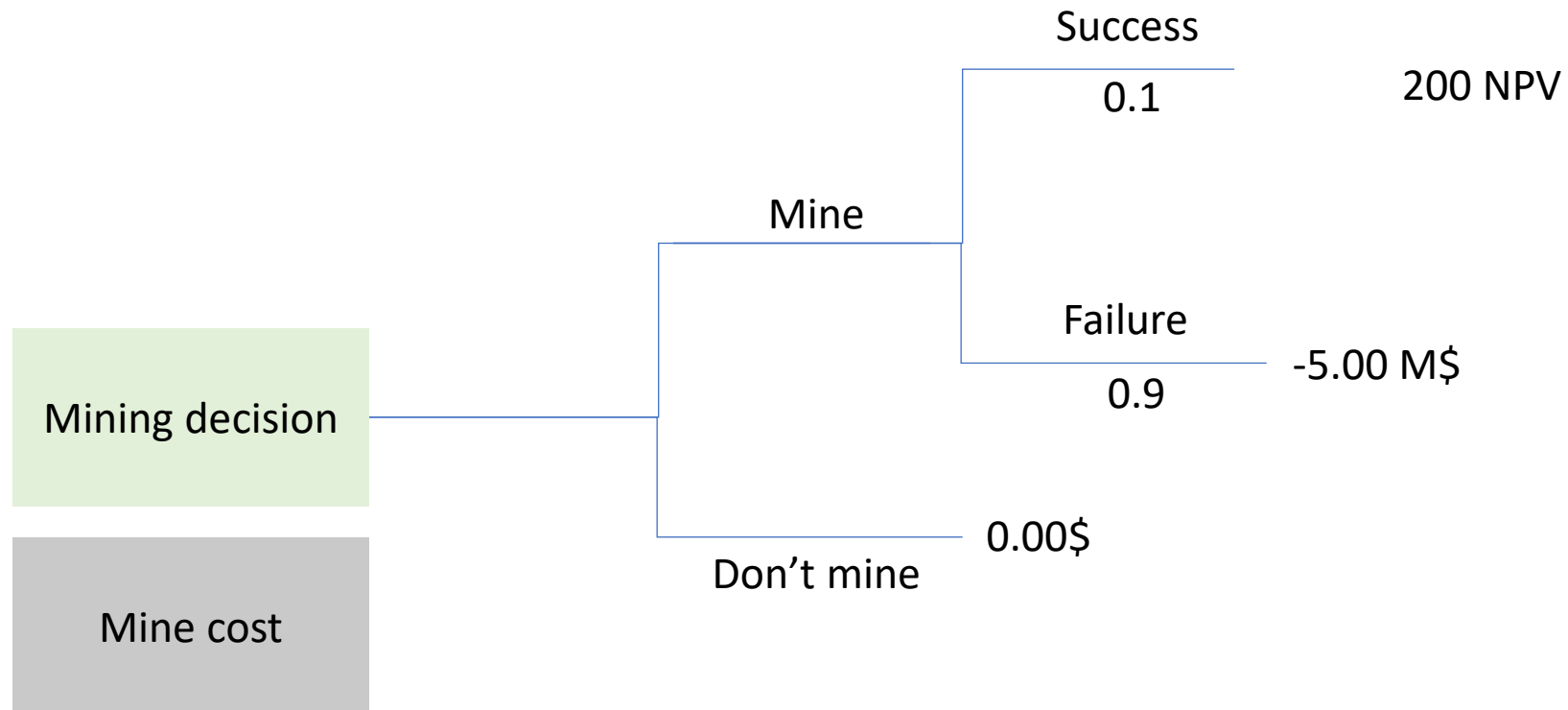- EV= $p_{Success}$*200 + (1- $p_{Success}$)*(-5)

- EV=205* $p_{Success}$-5

Answer

- Construct the EV equation as a function of probability of success.

- EV= $p_{Success}$*(value of success)+(1- $p_{Success}$)*(value of failure)

- EV= $p_{Success}$*200 + (1- $p_{Success}$)*(-5)

- EV=205* $p_{Success}$-5

Question

- What is breakeven point probability of success? How we can find it?

Answer

- The point that EV changes its sign from negative to positive (as a function of the $p_{Success}$).

- EV= $p_{Success}$*(value of success)+(1- $p_{Success}$)*(value of failure)=0

- $p_{Success-breakeven} = \dfrac{-value\ of\ faliure}{value\ of\ success-value\ of\ failure}$

- EV=250* $p_{Success}$-5 =0

- $p_{Success-breakeven}=\dfrac{5}{200-(-5)}$

- $p_{Success} = 0.02$
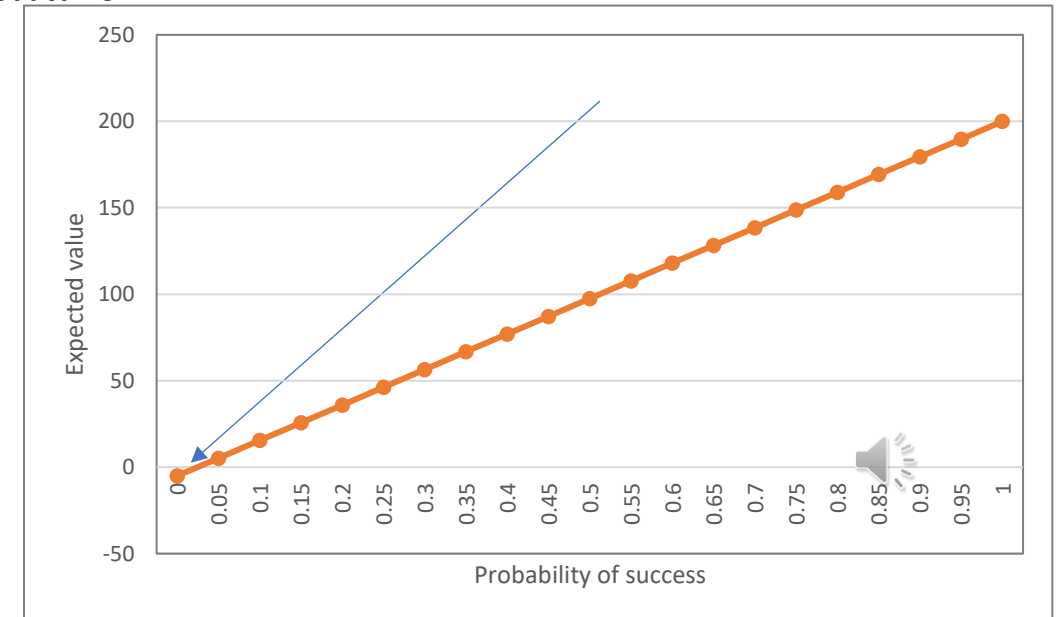
Question

What is a possible approach to share the risk of a risky project with another company? Explain
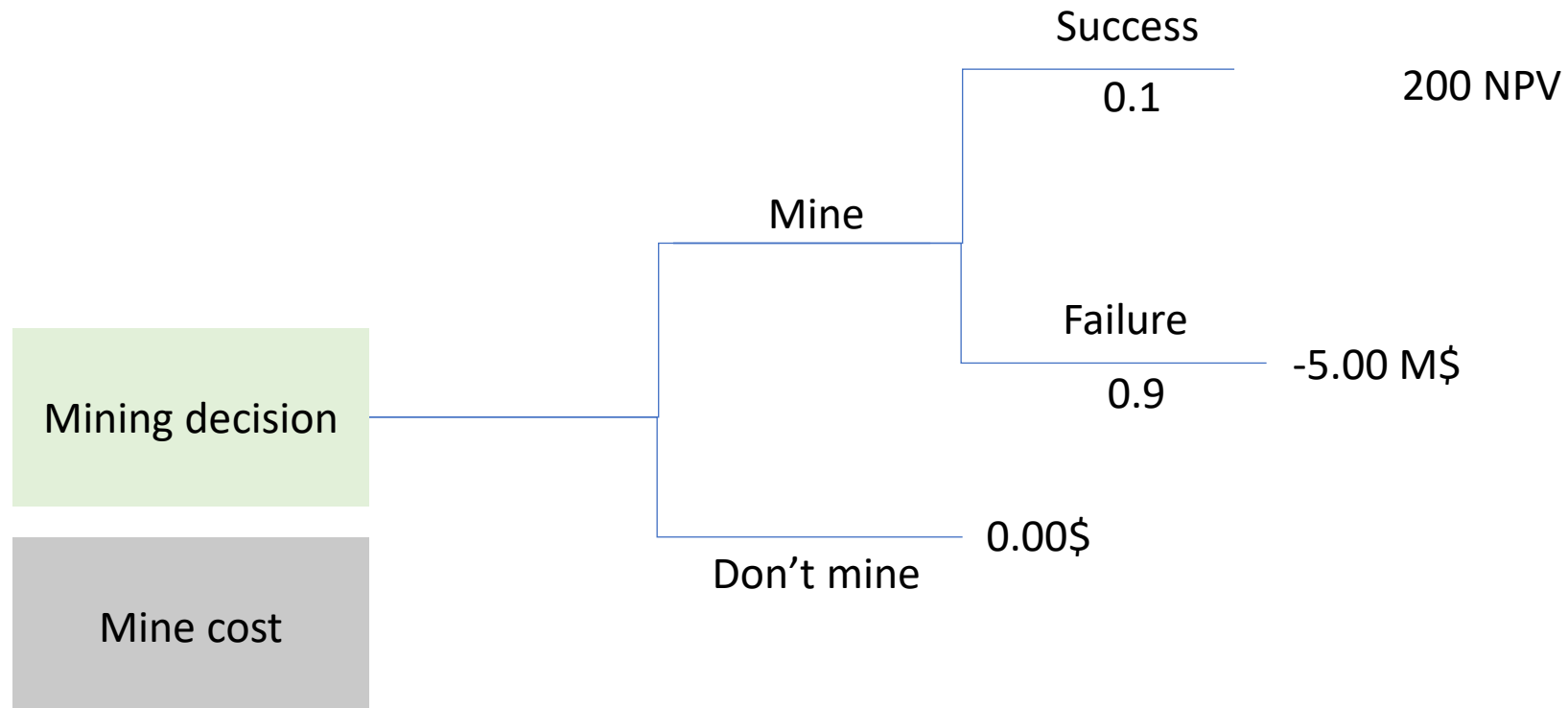
Risk sharing

- **farm-out agreement:**
  An entity (the farmor) agrees to provide a working interest in a property to a third party (the farmee), provided that the farmee makes a cash payment to the farmor and/or incurs certain expenditures on the property to earn that interest.

Question

- How we calculate the shares in a farmout agreement?

Answer

- $EV_{farmout} = EV_{No-Farmout}$

- $EV_{farmout} =$ (Value of success$\times P_{success}$) $\times$(1- (share of farmee)+($P_{failure} \times 0$)

- $EV_{No-Farmout} =$ (Value of success $\times P_{success}$) + (value of failure $\times P_{failure}$)

- (200-(-5))*0.1*(1- (share of farmee)+0=200*0.1+0.9*(-5)

- 20.5-20.5* (share of farmee)=20-4.5

- Share of farmee=0.24 or 24%

- $EV_{farmout} = EV_{No-Farmout}$

- $EV_{farmout} =$ (Value of success$\times P_{success}$) $\times$(1- (share of farmee)+($P_{failure}$ $\times$0)

- $EV_{No-Farmout} =$ (Value of success $\times P_{success}$) + (value of failure $\times$ $P_{failure}$)

- (200-(-5))*0.1*(1- (share of farmee)+0=200*0.1+0.9*(-5)

- 20.5-20.5* (share of farmee)=20-4.5

- Share of farmee=0.24 or 24%