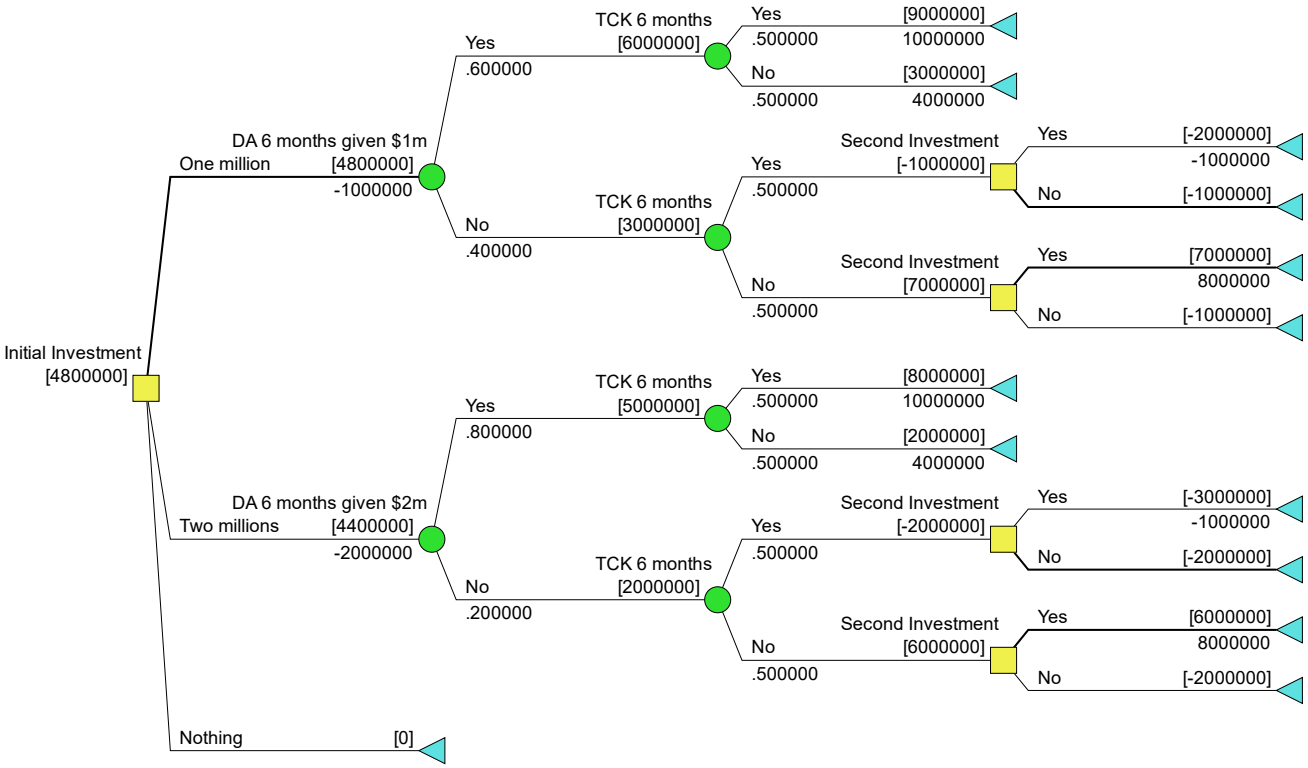
IE5203 Decision Analysis
Solutions to Assignment 1

(*a*) Decision tree for DA Company:



Optimal Decision Policy:

- Invest $1 million now.
- If the product is not launched in 6 months

  If TCK launches in 6 months

  Do not invest another $2 million, i.e., terminate the project.

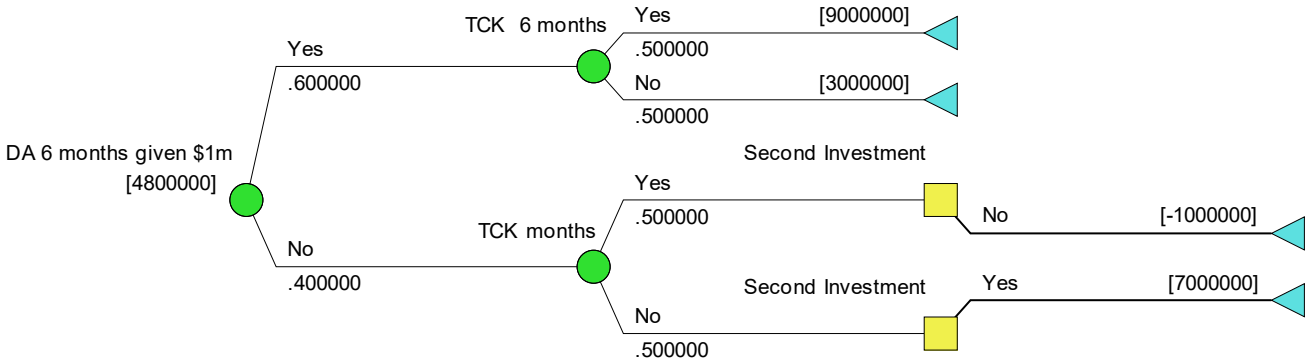
  Else

  Invest another $2 million and complete the product in 3 more months.
- Certainty Equivalent (Expected Value) of optimal policy = $4.800 million.

(*b*) Generating Risk Profiles for the two investment alternatives:

Alternative: Invest $1 million

Removing sub-optimal decision branches:

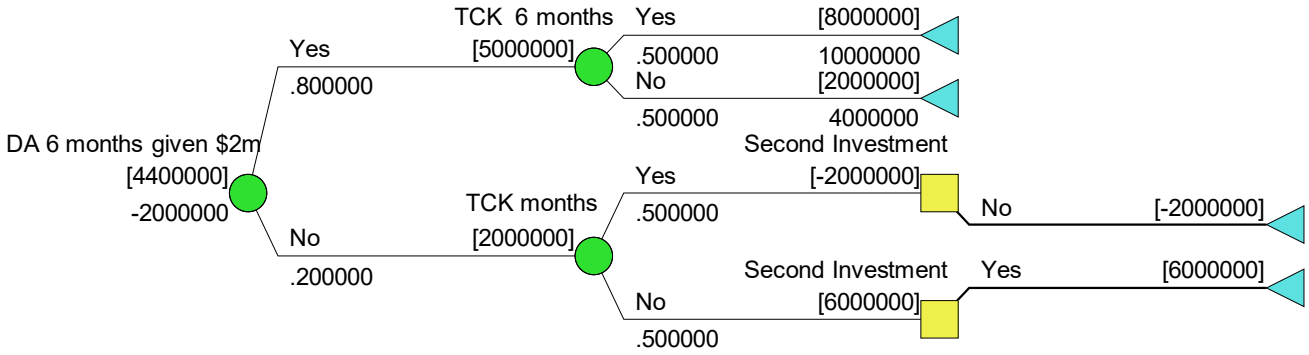


Probability distribution of end-point outcomes:

Outcome	Probability
-$1 million	0.4 × 0.5 = 0.20
$3 million	0.6 × 0.5 = 0.30
$7 million	0.4 × 0.5 = 0.20
$9 million	0.6 × 0.5 = 0.30

Alternative: Invest $2 million:

Removing sub-optimal decision branches:



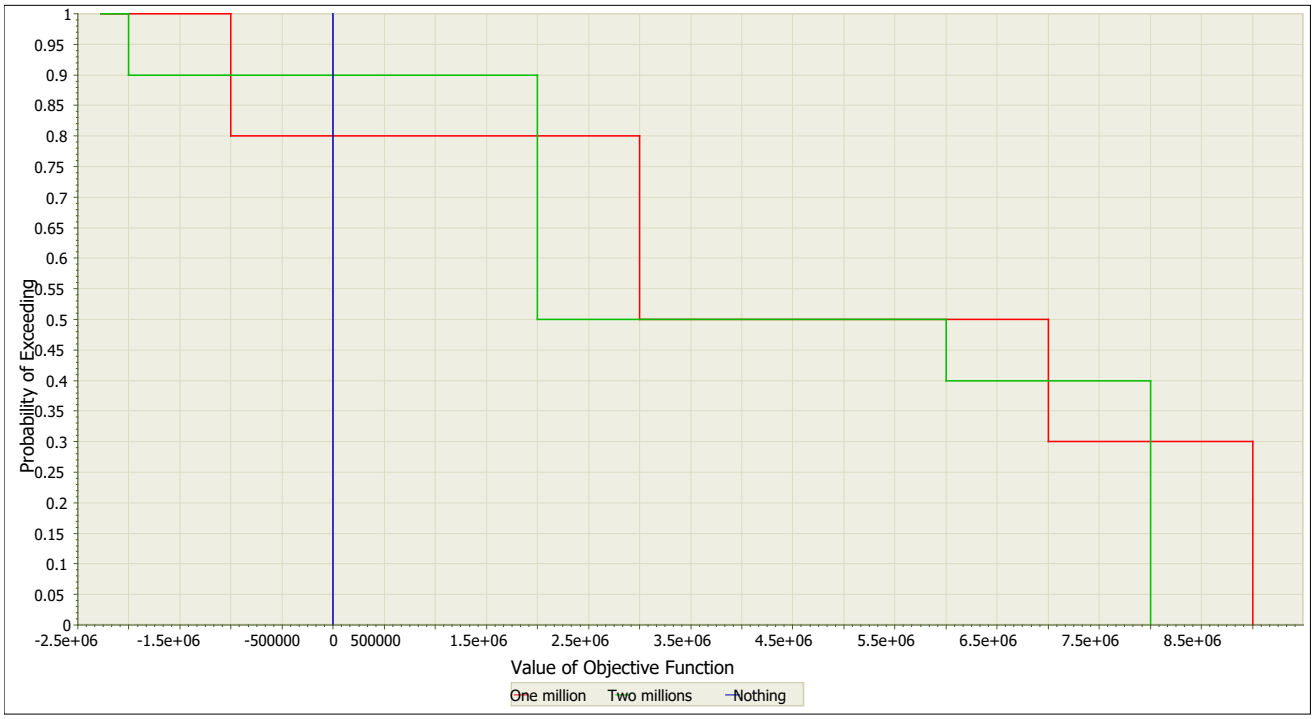
Probability distribution of end-point outcomes:

Outcome	Probability
-$2 million	0.2 × 0.5 = 0.10
$2 million	0.8 × 0.5 = 0.40
$6 million	0.2 × 0.5 = 0.10
$8 million	0.8 × 0.5 = 0.40

Alternative: Invest nothing:

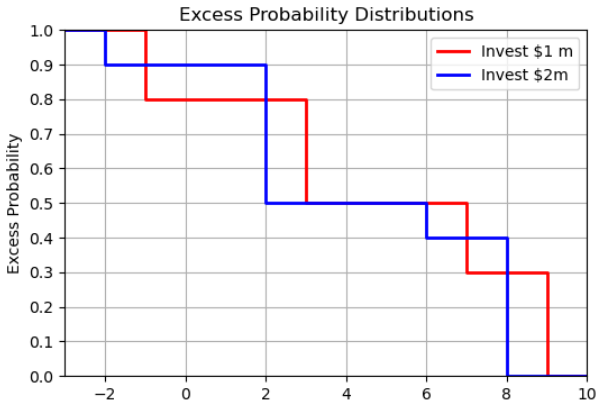
Outcome	Probability
$ 0	1

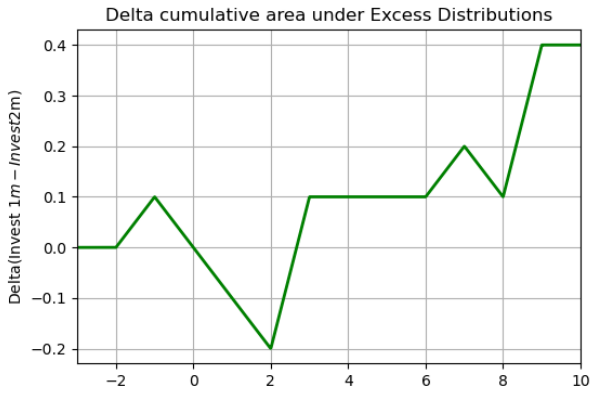
The Risk Profile in Excess Probability Distribution:



(*c*) Stochastic Dominance Analysis:

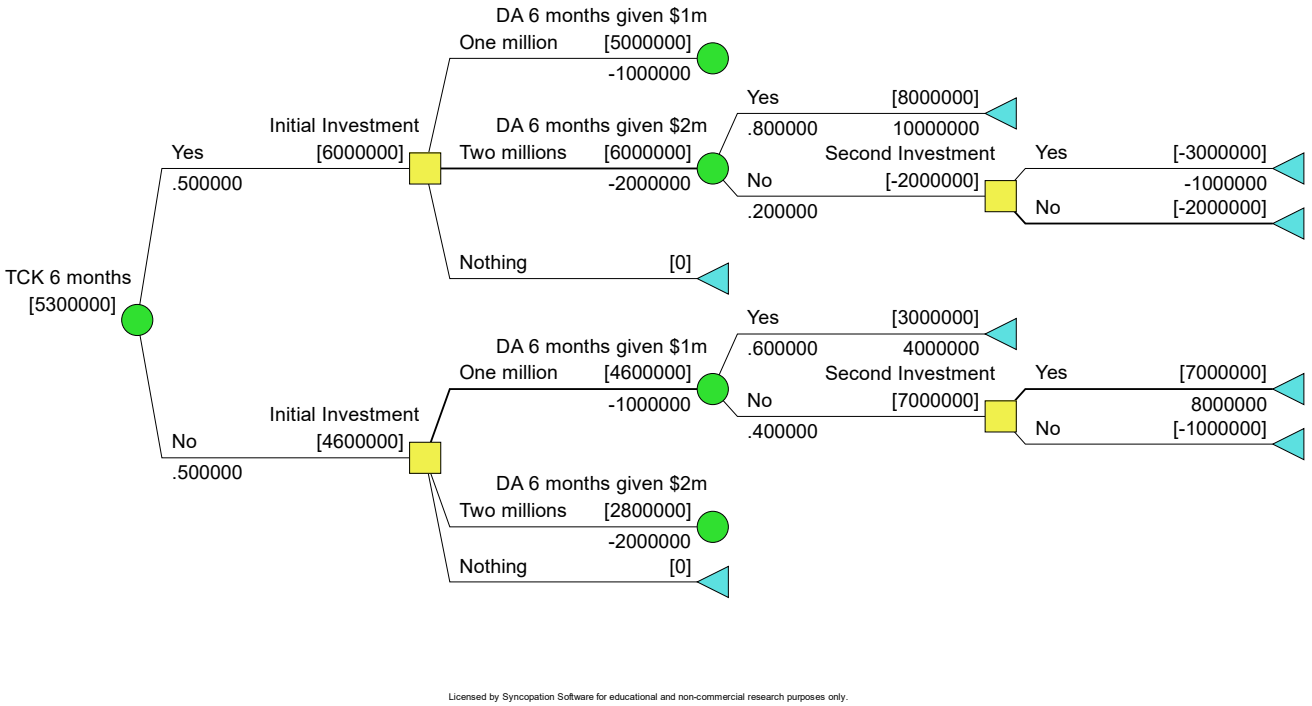
- There is no 1st order stochastic dominance among the three alternatives as all the risk profiles cross each other.
- Second-order stochastic dominance:





Invest $1 m does not 2SD Invest $2m

(*d*) Decision tree with free perfect information on whether TCK launches in 6 months:

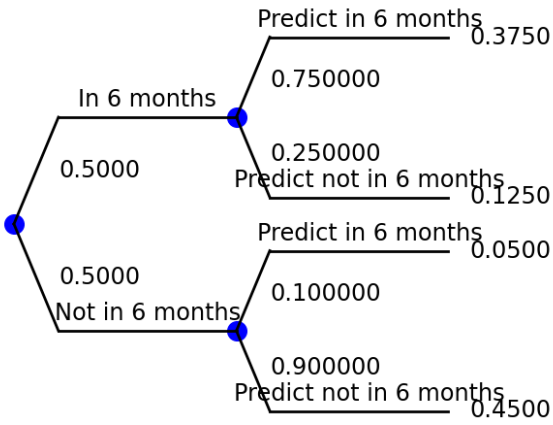


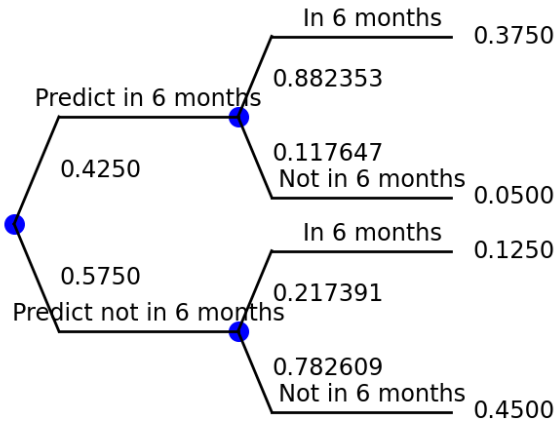
- CE with free perfect information = \$5,300,000
- CE with no information from part (*a*) = \$4,800,000

- Hence Expect Value of Perfect Information = \$5,300,000 - \$4,800,000 = **<u>\$500,000.</u>**

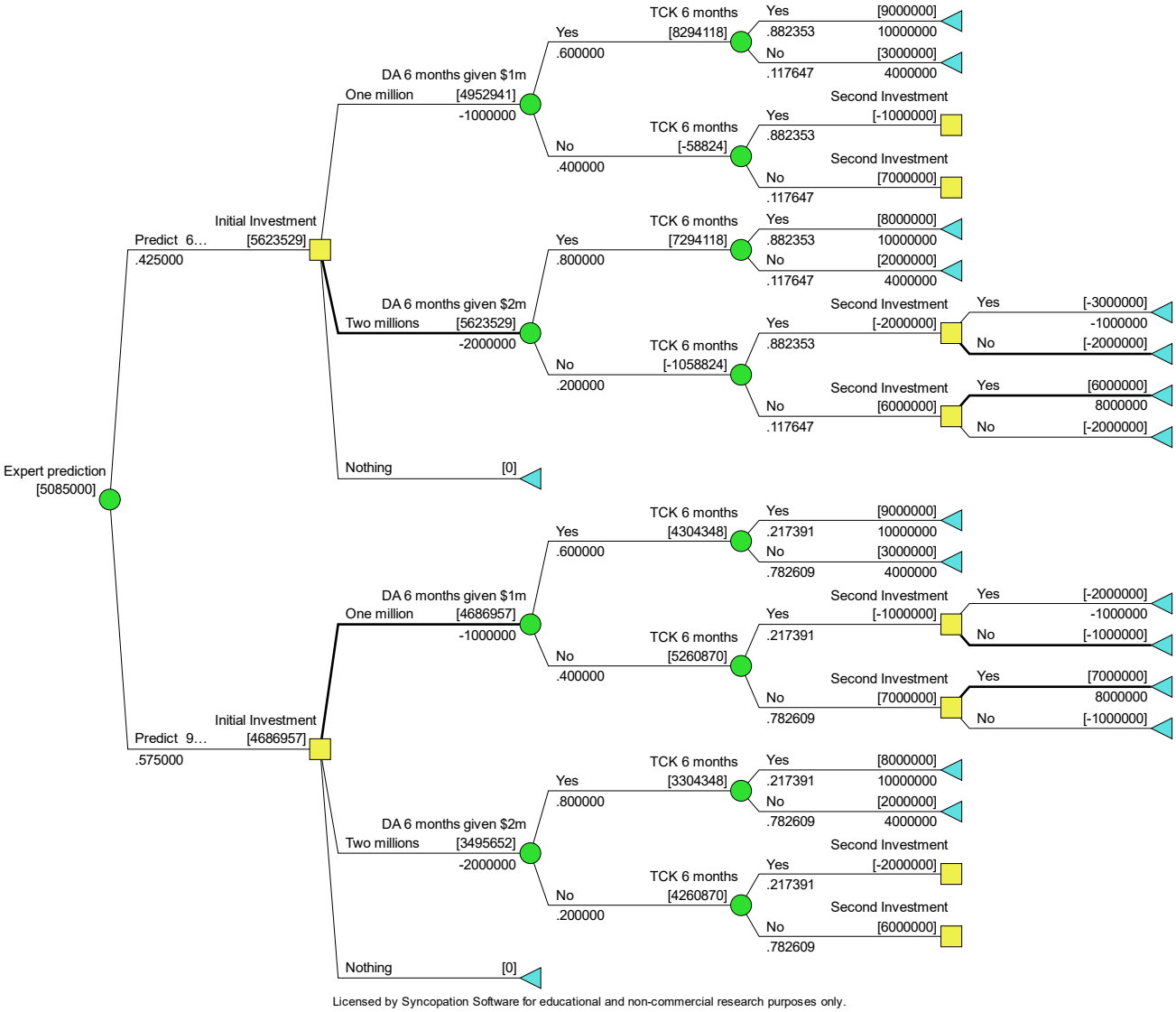
(*e*)

Flip the Tree:





Decision Model with free expert prediction:



CE with free prediction = $ 5,085,000

CE with no information from part (*a*) = $ 4,800,000

Hence Expect Value of Information = $ 5,085,000 - $ 4,800,000 = $ 285,000

Hence, the expert prediction is worth up to **$285,000** to the company.

Decision Policy:

If the prediction is “TCK launches in 6 months”
    Invest $2 million
    If DA fails to launch in 6 months
        If TCK successfully launches in 6 months
            Terminate project
        Else
            Invest another $2 million and launch in 3 more months.

Else (prediction is “TCK does not launch in 6 months”)
    Invest $1 million
    If DA fails to launch in 6 months
        If TCK successfully launches in 6 months
            Terminate project
        Else
            Invest another $2 million