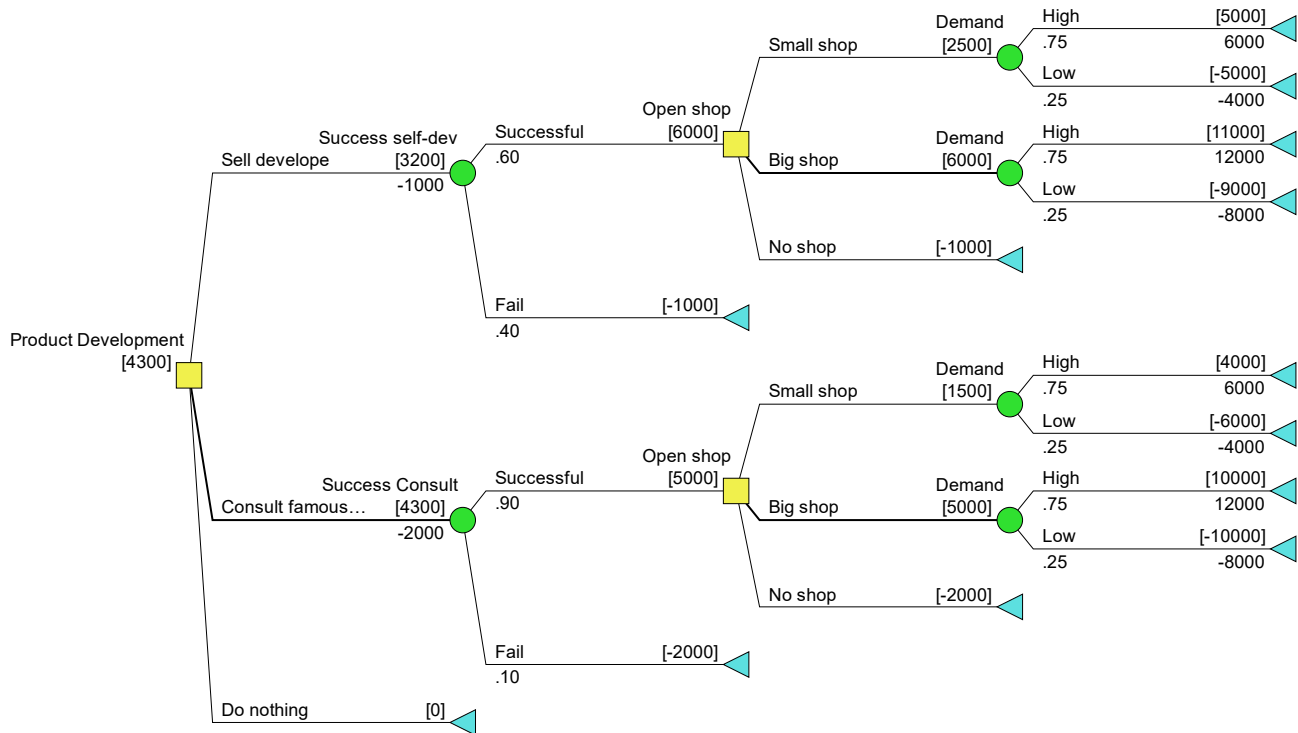


TIE4203 Decision Analysis in Industrial Operations and Management Solutions to Assignment #2

(a) Base Model Analysis

- Decision tree representing Mabel's decision problem:



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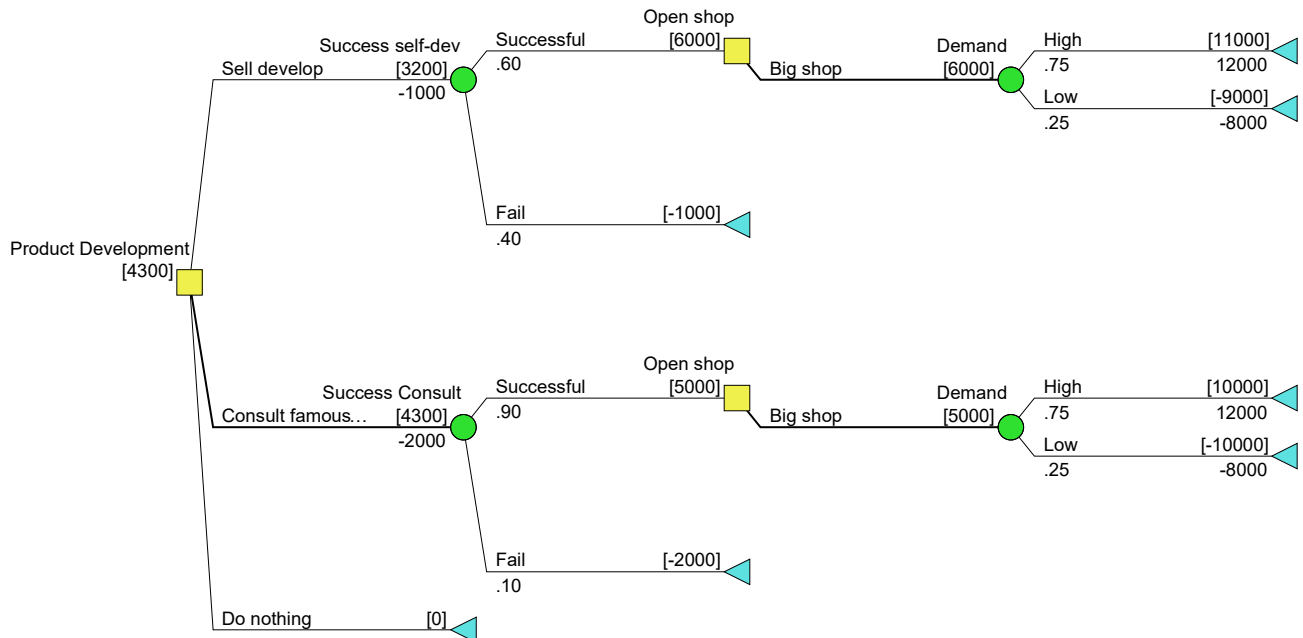
- Mabel's optimal decision policy is:

Consult Famous Baker.
If Product Development is successful:
 Open Big Shop.
Else
 Terminate project.

- Optimal Certainty Equivalent = \$4,300.00

(b) Initial Alternatives Risk Profile Plotting

- Prune the none optimal sub-decision trees:



- End-points Values and their Probabilities for the three initial alternatives:

Self-develop:

Value	Probability
11,000	$0.6 \times 0.75 = 0.45$
-9,000	$0.6 \times 0.25 = 0.15$
-1,000	0.4

Value	Probability
-9,000	0.15
-1,000	0.40
11,000	0.45

Consult famous baker:

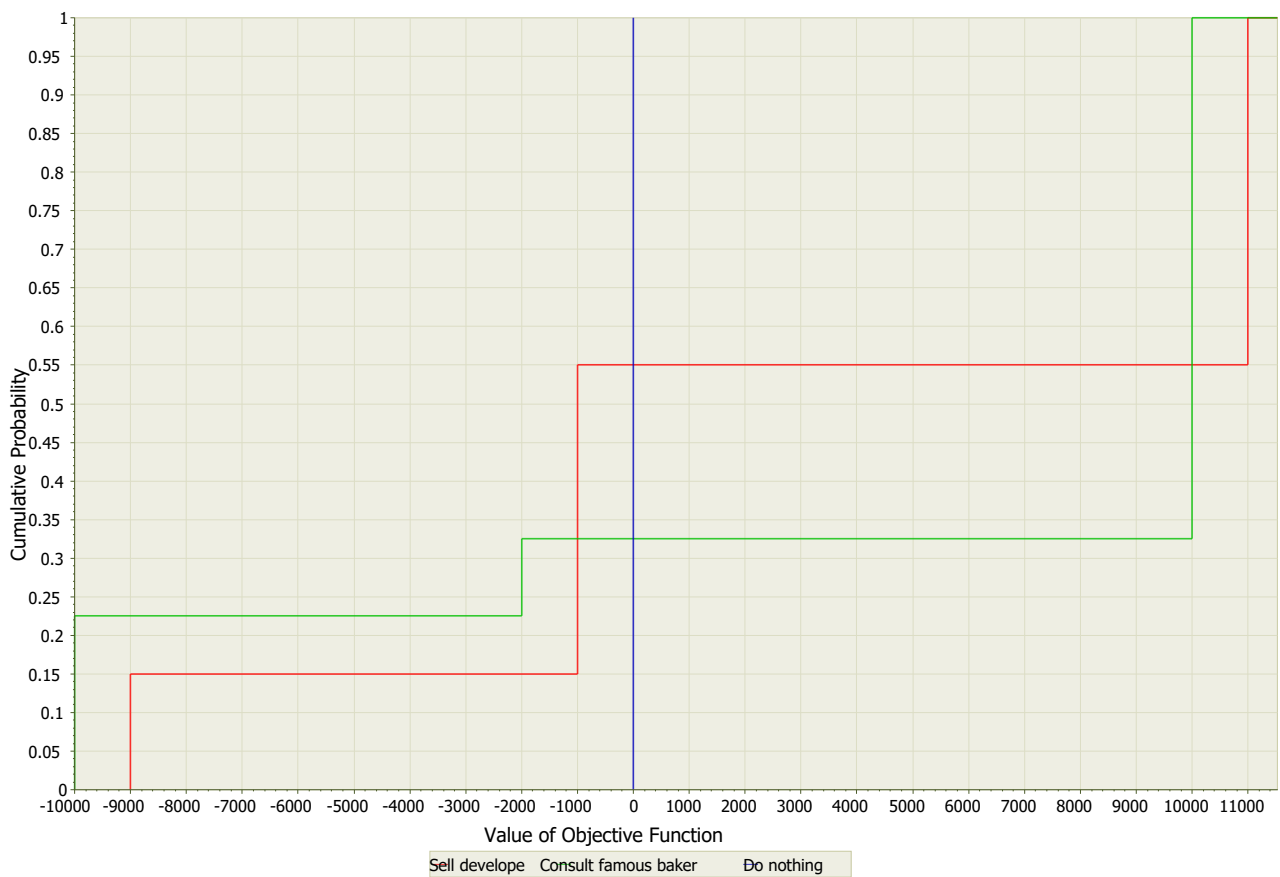
Value	Probability
10,000	$0.9 \times 0.75 = 0.675$
-10,000	$0.9 \times 0.25 = 0.225$
-2,000	0.1

Value	Probability
-10,000	0.225
-2,000	0.100
10,000	0.675

Do Nothing:

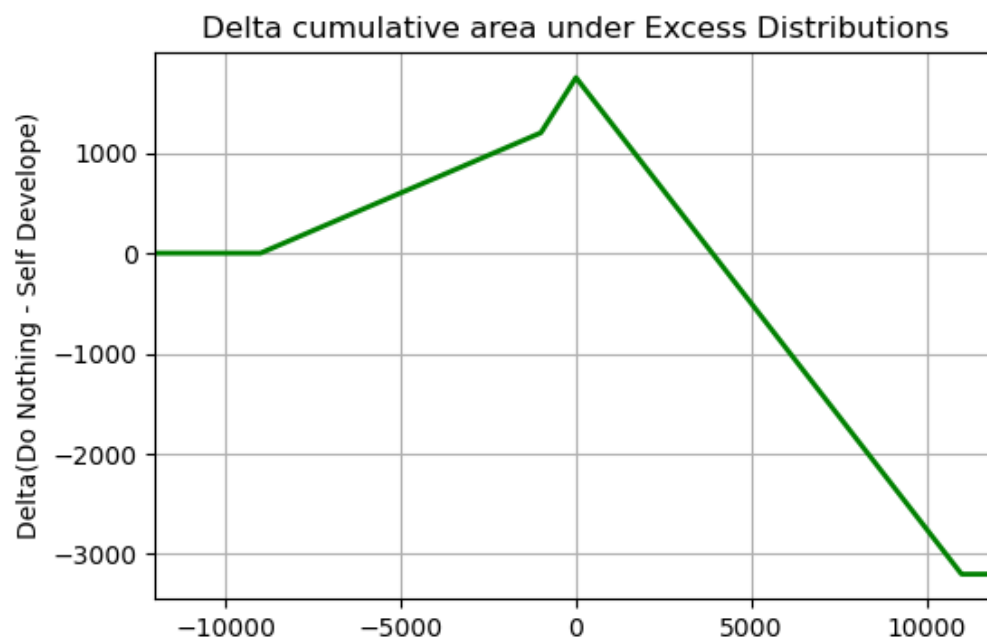
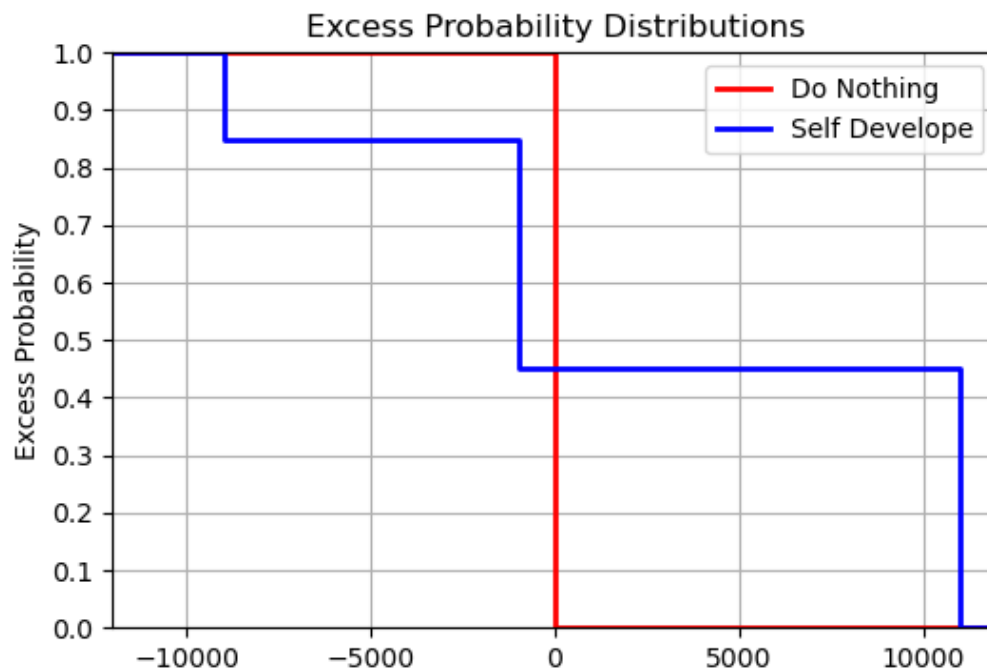
Value	Probability
0	1

- Risk Profiles for the three initial alternatives:

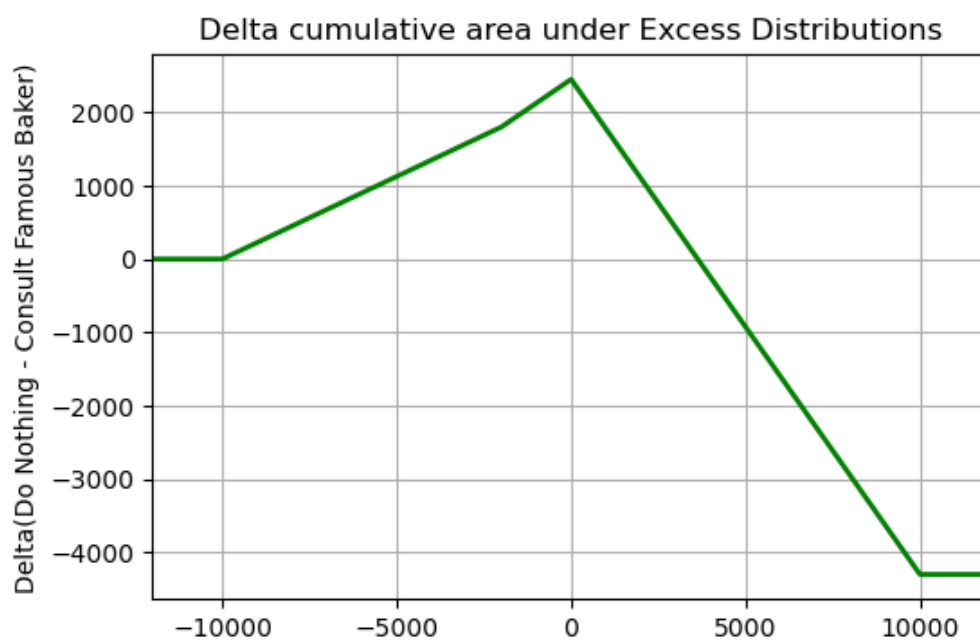
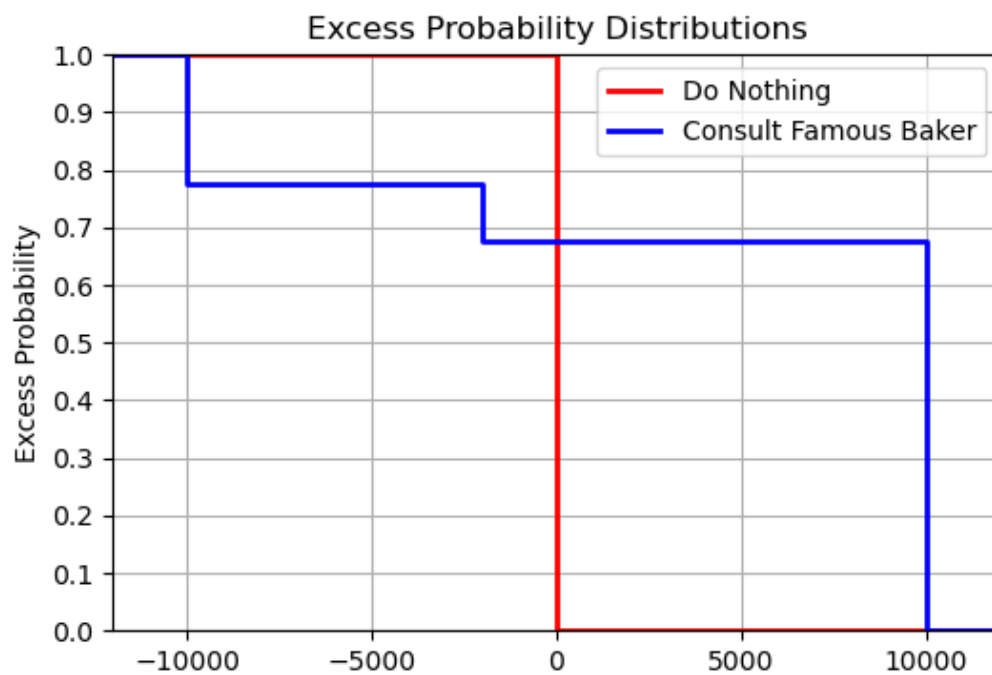


(c) **Stochastic Dominance Analysis**

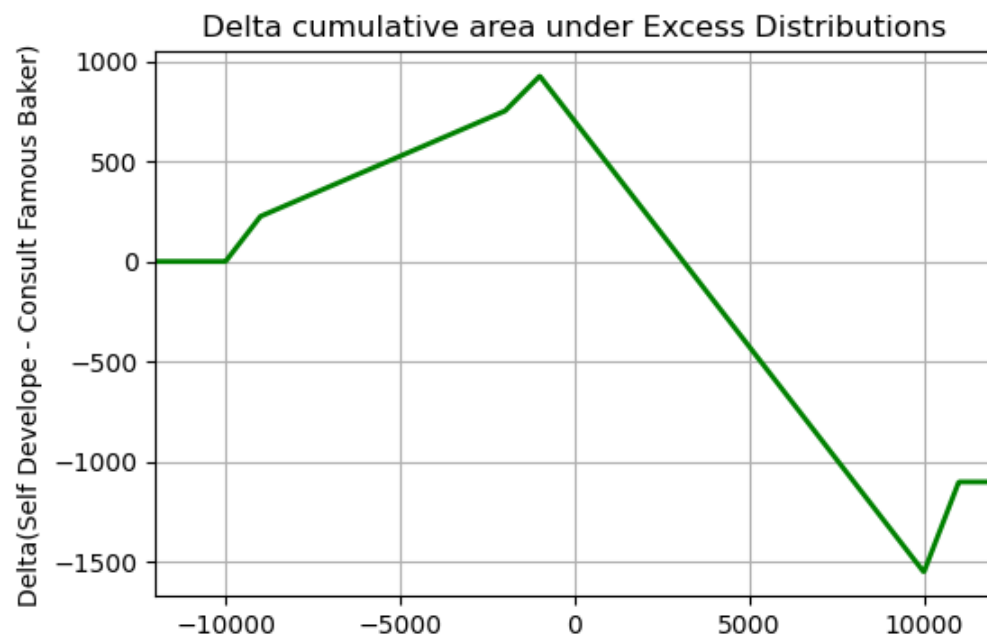
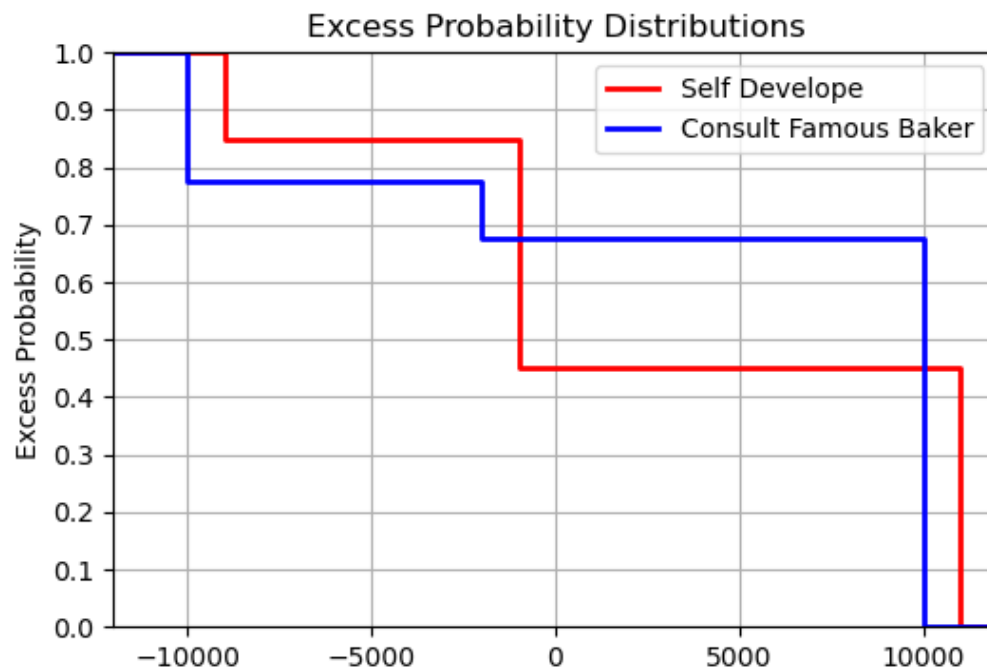
- There is no first and second order stochastic dominance between Do nothing and Self-develop:



- There is no first and second order stochastic dominance between Do nothing and Consult famous baker:

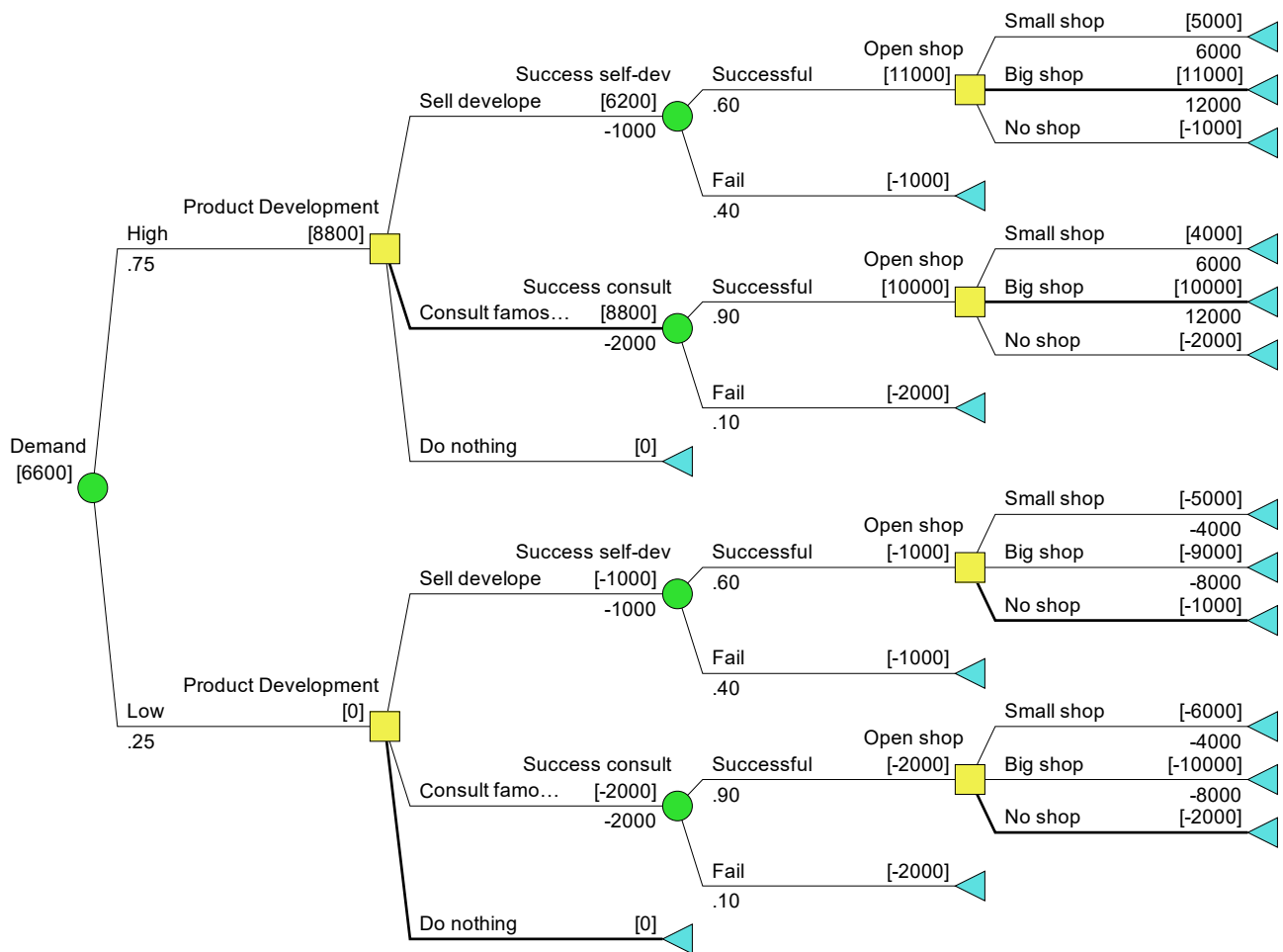


- There is no first and second order stochastic dominance between Self developpe and Consult famous baker:



(d) Expected Value of Perfect Information Analysis

- Decision model with free perfect information on product demand before Mabel's initial decision to pursue the bakery business or not.

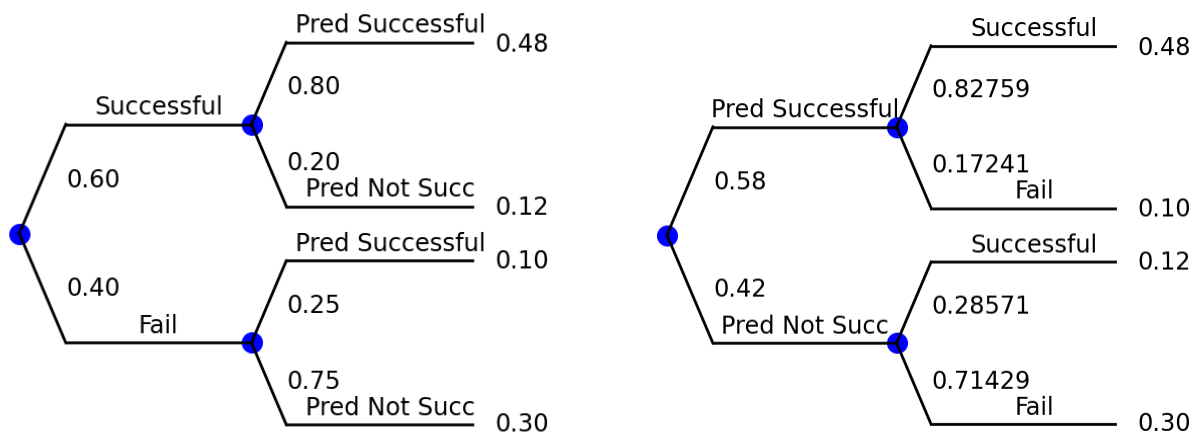


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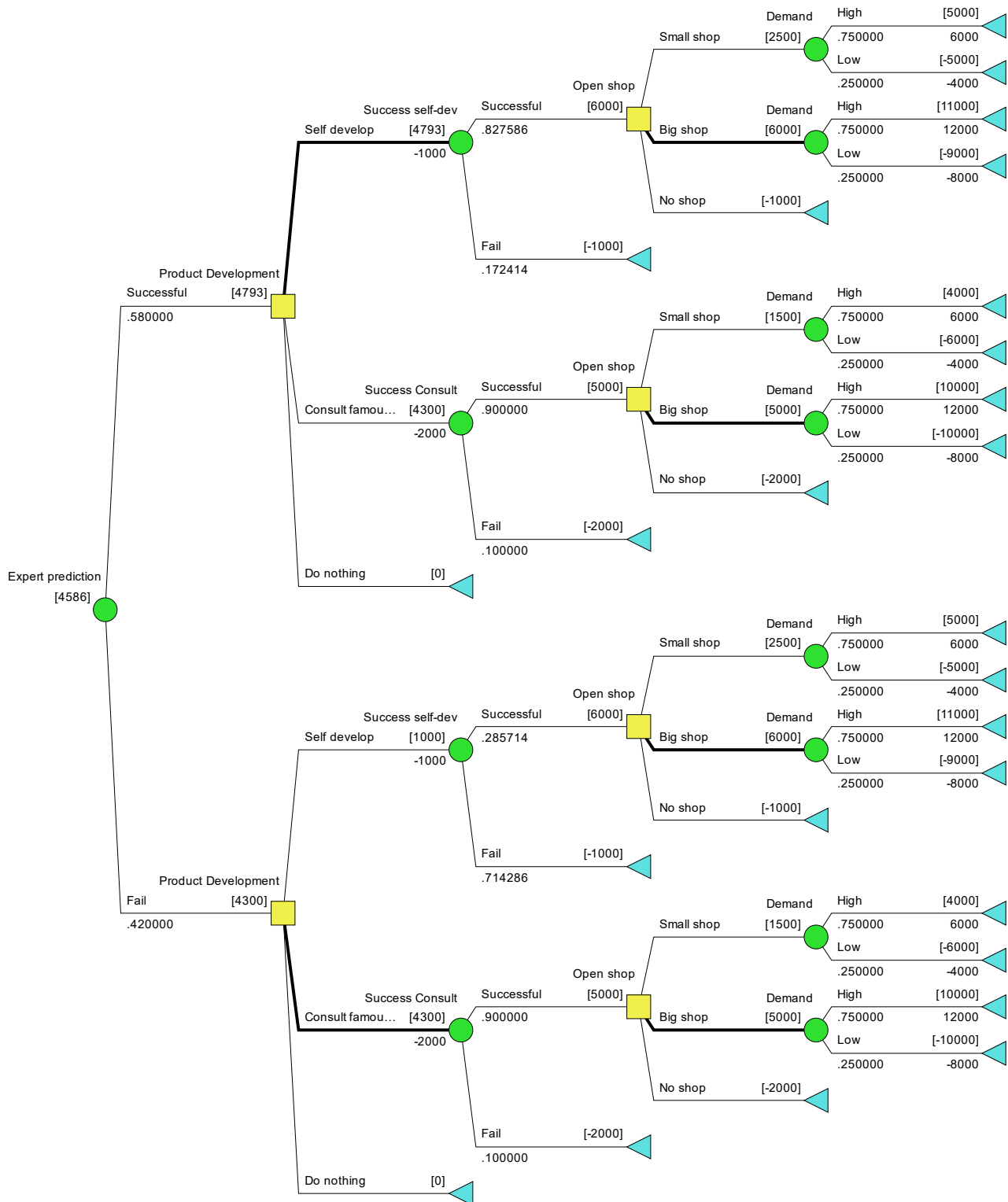
- Certainty Equivalent with free perfect information = \$6,600
- Certainty Equivalent with no information = \$4,300
- Hence Expected Value of Perfect Information on whether the current pipe will break or not
 $= \$6,600 - \$4,300 = \underline{\$2,300}$

(e) Expected Value of Imperfect Perfect Information Analysis

- Flip the probability tree on the expert prediction on self-develop results:



- Decision Model with free imperfection prediction on self-develop result:



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- Certainty Equivalent with Free Prediction = \$4,586.00
- Certainty Equivalent with no prediction = \$4,300.00
- Expected value of imperfect prediction = \$4,586.00 – \$4,300.00 = **\$ 286.00**
- Hence the maximum that Mabel is willing to pay the expert = **\$ 286.00**

Optimal Decision Policy upon prediction by the expert:

If Prediction = “Successful”:

Self-develop product.

If Successful:

Open Big shop

Else:

Terminate

Else if Prediction = “Fail”:

Consult famous baker.

If Successful:

Open Big shop

Else:

Terminate