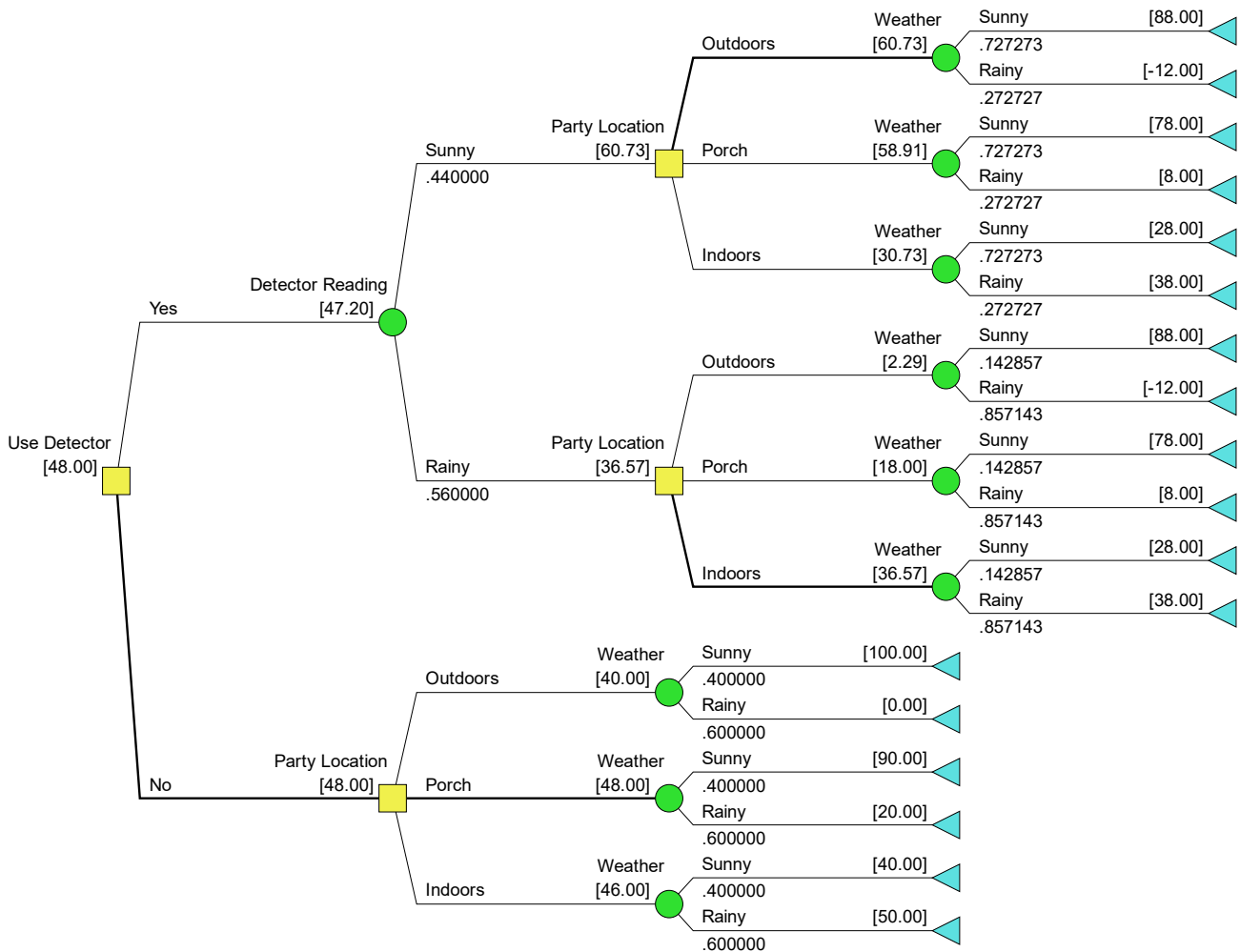# Chapter 4.extra

How to draw risk profile of initial alternatives when there are multiple sequential decisions
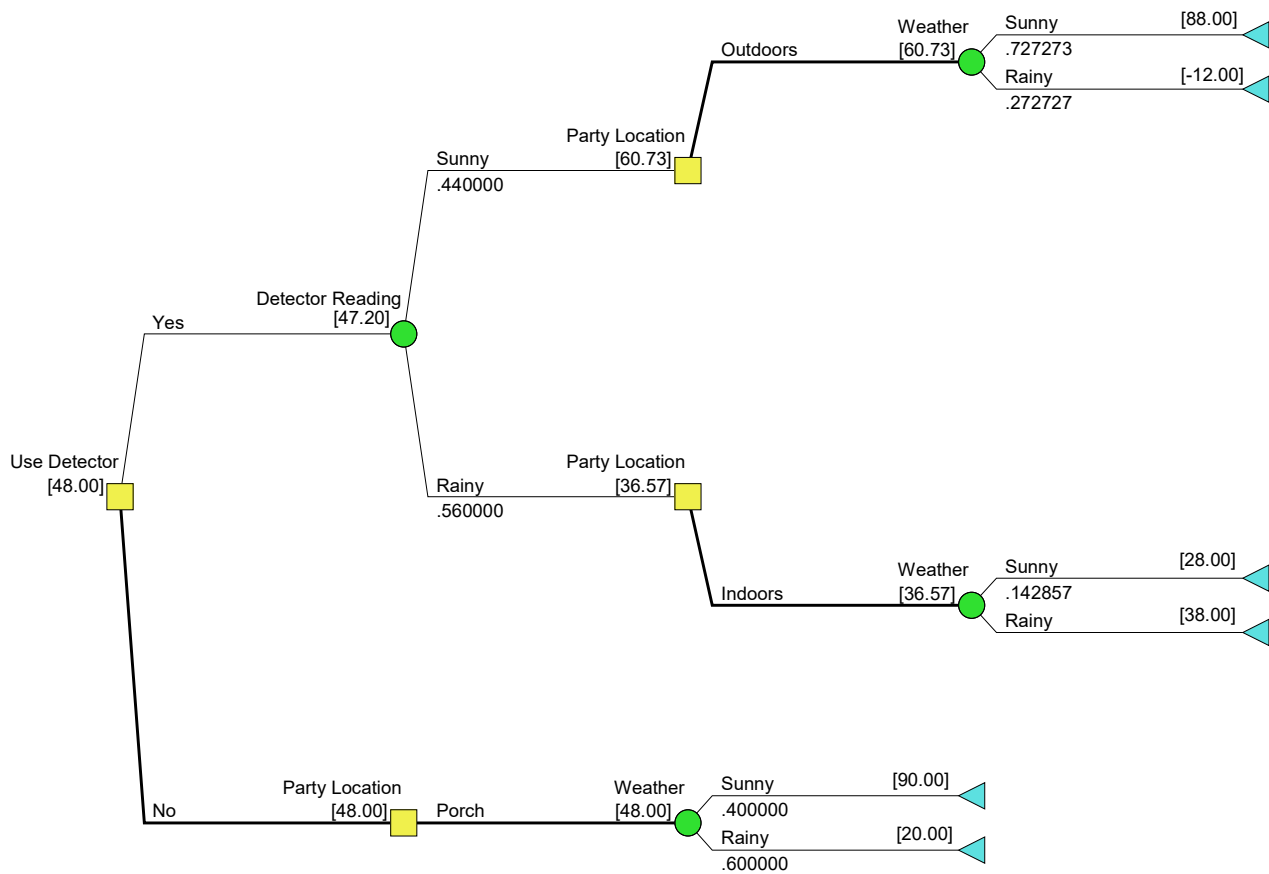
Example:

Consider Jane's Party Problem with decision to use at rain detector at $12 or not.

1. Generate Optimal Decision Policy Tree:

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2. Prune None Optimal Decision Sub-Trees.

```
                                                              Weather    Sunny          [88.00]
                                                              [60.73]   .727273         ◁
                                                    Outdoors    ●━━━━━  Rainy          [-12.00]
                                                                        .272727         ◁
                                            Party Location
                                  Sunny        [60.73]
                                  .440000        ▢
                      Detector Reading
                          [47.20]
            Yes            ●
                                            Party Location
                                  Rainy        [36.57]
                                  .560000        ▢
   Use Detector                                          Weather    Sunny          [28.00]
    [48.00]                                              [36.57]   .142857          ◁
       ▢                                       Indoors     ●━━━━━  Rainy          [38.00]
                                                                                    ◁

                Party Location       Weather    Sunny          [90.00]
     No            [48.00]   Porch    [48.00]  .400000          ◁
      ━━━━━━━━━━━━━━━▢━━━━━━━━━━━━━━━━━●━━━━━  Rainy          [20.00]
                                               .600000          ◁
```

3. Extract end-point probabilities and values

Initial Alternative: Use Detector

End point	Probability	Value
1	0.44 × 0.727272727 = 0.32	88
2	0.44 × 0.272727273 = 0.12	-12
3	0.56 × 0.142857143 = 0.08	28
4	0.56 × 0.857142857 = 0.48	38

Initial Alternative: No detector

End point	Probability	Value
1	0.4	90
2	0.6	20

4. Sort probabilities table by value:

Initial Alternative: Use Detector

End point	Probability	Value
1	0.44 × 0.272727273 = 0.12	-12
2	0.56 × 0.142857143 = 0.08	28
3	0.56 × 0.857142857 = 0.48	38
4	0.44 × 0.727272727 = 0.32	88

Initial Alternative: No detector

End point	Probability	Value
1	0.6	20
2	0.4	90

5. Plot Risk Profiles of Initial Decision Alternatives:
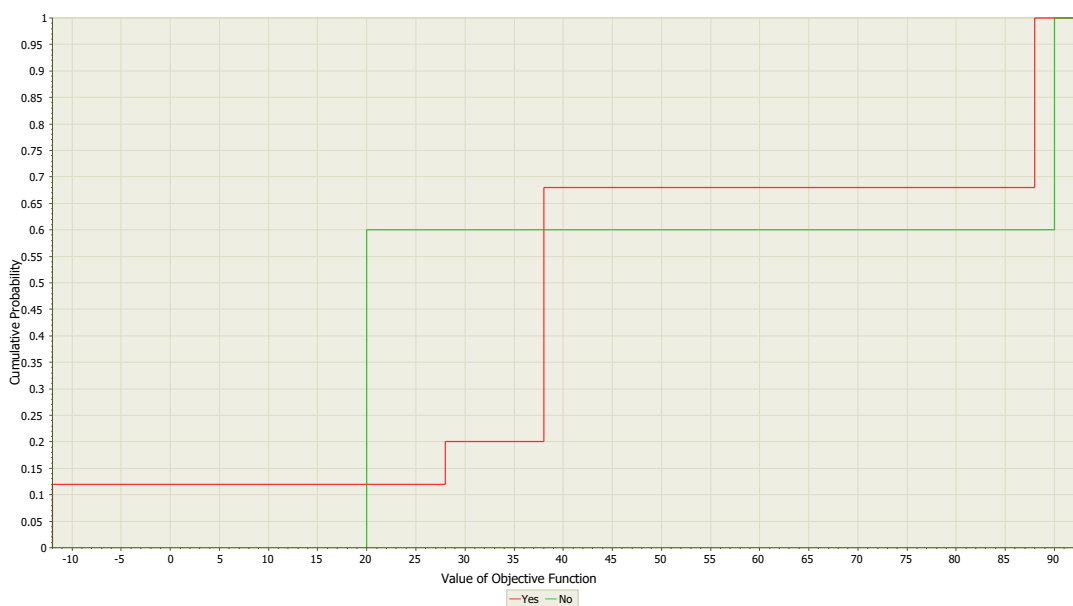
6. Check for Second Order Stochastic Dominance
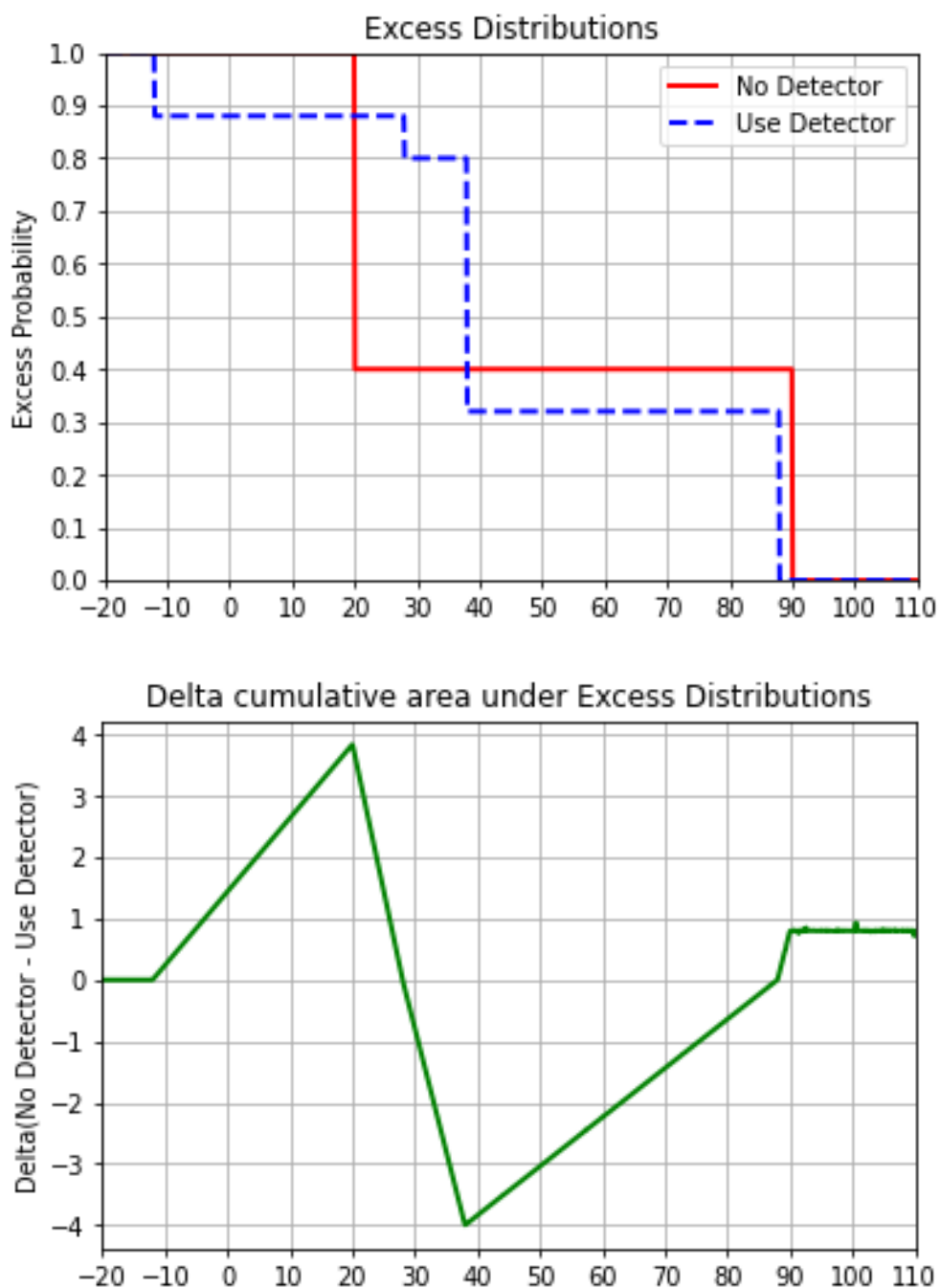
Result: No Detector does not 2SD Use Detector.