



THE UNIVERSITY OF TEXAS AT AUSTIN
McCOMBS SCHOOL OF BUSINESS

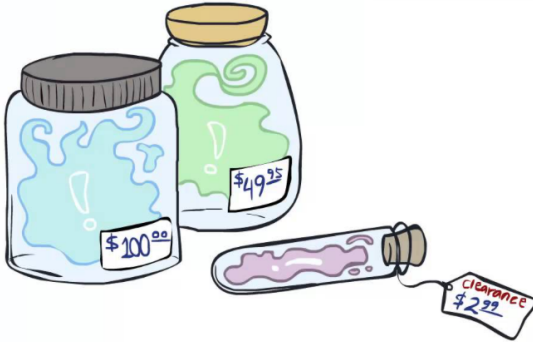
Decision Trees 2

Lecture 21

STA 371G

What Is It Worth to Know More About an Uncertain Event?

Value of Information



Key topics for today

- Value of Information

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- Value of Information
- Bevo: The Movie Example

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- Bevo: The Movie Example
- Expected Value of Perfect Information

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- Value of Information
- Bevo: The Movie Example
- Expected Value of Perfect Information
- Expected Value of Imperfect Information

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- How much is information worth, and if it costs a given amount, should you purchase it?
- The expected value of perfect information, or EVPI, is the most you would be willing to pay for perfect information.

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- Information usually comes at a price. You want to know whether the information is worth its price
- This leads to an investigation of the value of information

Example: Marketing Strategy for *Bevo: The Movie*

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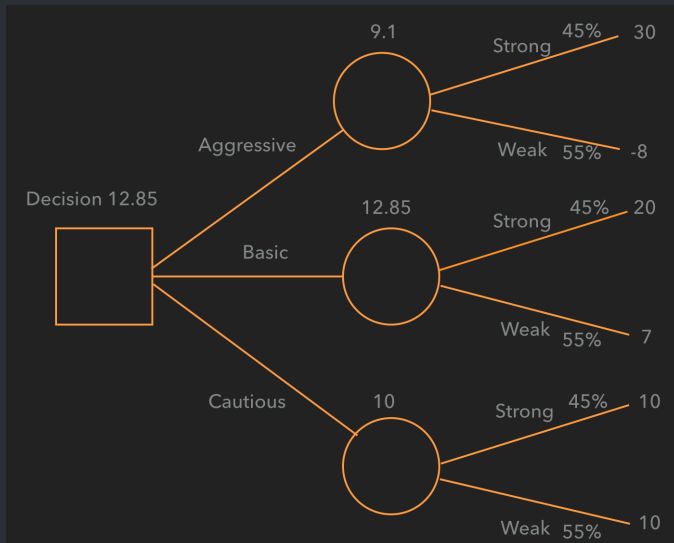
- (A) Aggressive: Large expenditures on television and print advertising.
- (B) Basic: More modest marketing campaign.
- (C) Cautious: Minimal marketing campaign.

Payoffs for *Bevo: The Movie*

The net payoffs depend on the market reaction to the film.

Decisions	Market Reaction	
	Strong	Weak
Aggressive	30	-8
Basic	20	7
Cautious	10	10
Probability	0.45	0.55

Decision Tree for *Bevo: The Movie*



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$EVPI = (EV \text{ with perfect information}) - (EV \text{ with no information})$

Finding EVPI with a payoff table

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- $EVPI = 19 - 12.85 = 6.15$

Finding EVPI with a decision tree

- Step 1: Set up tree without perfect information and calculate EV by rolling back

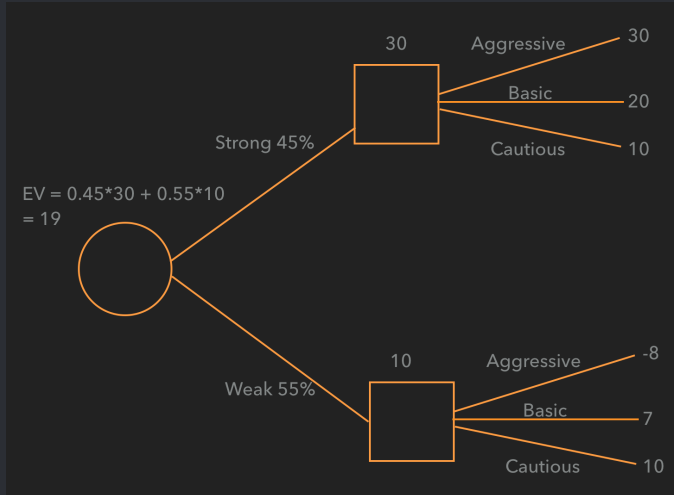
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- Step 1: Set up tree without perfect information and calculate EV by rolling back
- Step 2: Rearrange the tree to reflect the receipt of the information and calculate the new EV
- Step 3: Compare the EV's with and without the information

Finding EVPI with a decision tree



What about imperfect information?

Suppose that Myra the movie critic has a good record of picking winners.

- For movies where the audience reaction was strong, Myra has historically predicted that 70% of them would be strong.
- For movies where the audience reaction was weak, Myra has historically predicted that 80% of them would be weak.

Remember that the probability of a strong reaction is 45% and of a weak reaction is 55%.



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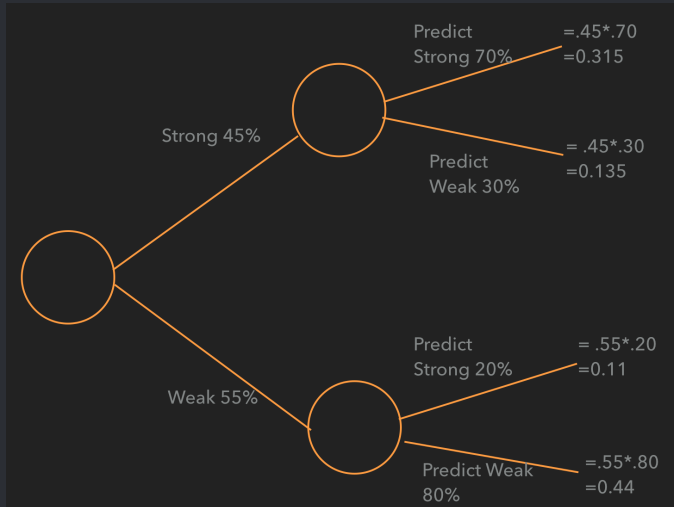
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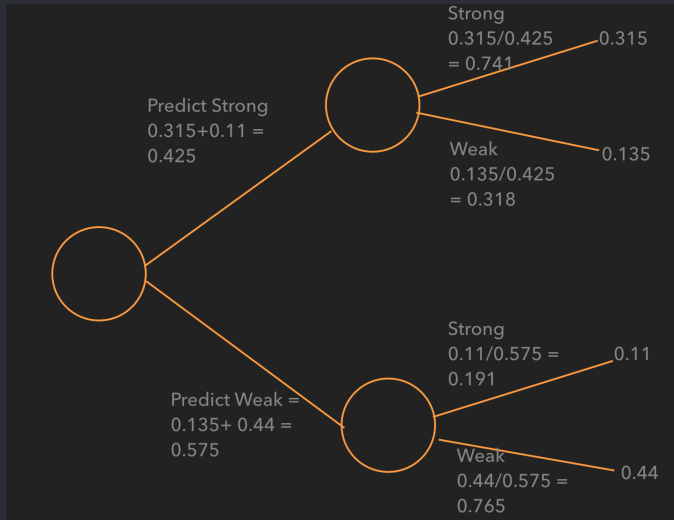
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$$P(S) = .45, \quad P(W) = .55$$

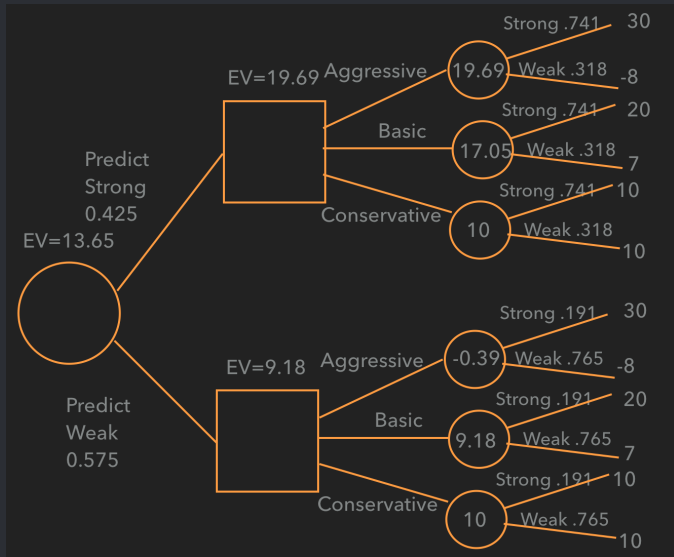
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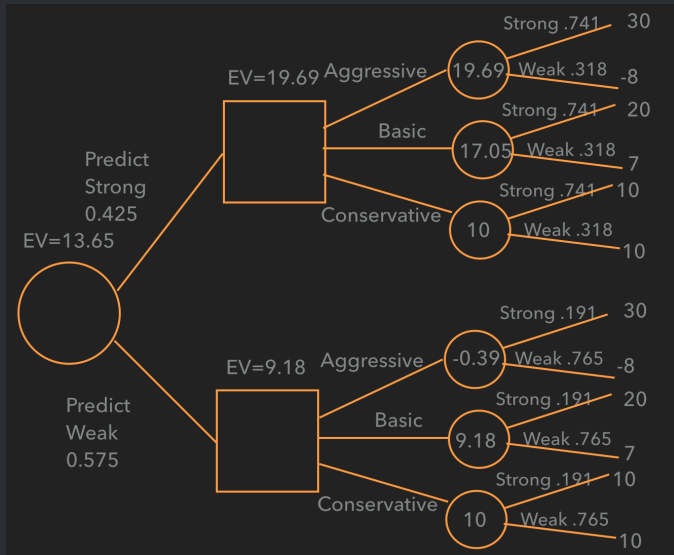


Tree with imperfect information



Myra's information is worth paying for

It changes the decision and adds $13.65 - 12.85 = 0.80$ in value



Things to remember about the value of information

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- Sometimes there is more than one correct way to draw a decision tree for a decision