

Modeling Preferences - 1

Decision Supports Systems 2017/18, Lecture 06

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Modeling Preferences

Risk Attitudes

- in decision under uncertainty, the fundamental trade-off question is
 - **How much risk is a decision maker willing to take?**

Modeling Preferences

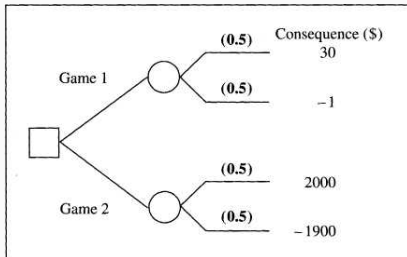
- in decision under uncertainty, the fundamental trade-off question is
 - **How much risk is a decision maker willing to take?**
- we will learn how to model our risk attitude
 - through the concept of a utility function
 - the utility function reflects personal expected gain (as opposed to the expected monetary value)

Modeling Preferences

Risk Attitudes

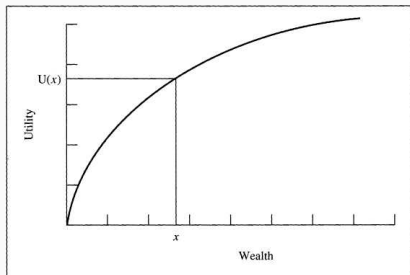
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- example
 - you can play one of the two games at the time
 - Game 1: EMV = 14,50
 - Game 2: EMV = 50,00
 - EMV says to choose Game 2
 - most people would choose Game 1
- EMV does not capture risk attitudes



Utility function

- a utility function models the expected utility (of a decision maker) against possible outcomes
- $U(x)$, where x are the possible outcomes
- decision makers can be:
 - afraid of risk (risk averse): $U(x)$ is concave, e.g. $U(x) = \log(x)$
 - risk neutral, e.g. $U(x) = k \cdot x$
 - risk-seeking: $U(x)$ is convex, e.g. $U(x) = x^2$



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 - Win \$500 with probability 0.5
 - Lose \$500 with probability 0.5
- Would you pay to get out of this situation? How much?
- $EMV = 0$

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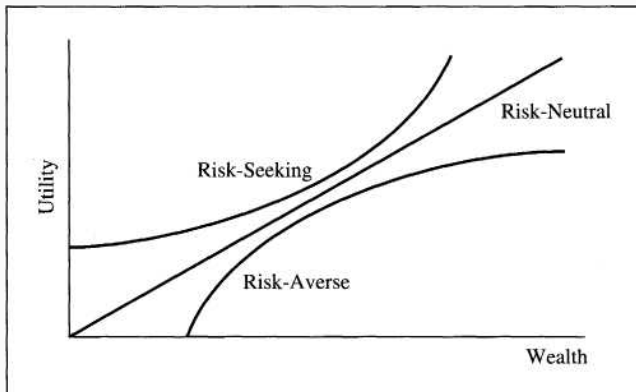
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- if you would not do anything you are risk-neutral
 - maximizing utility = maximizing EMV

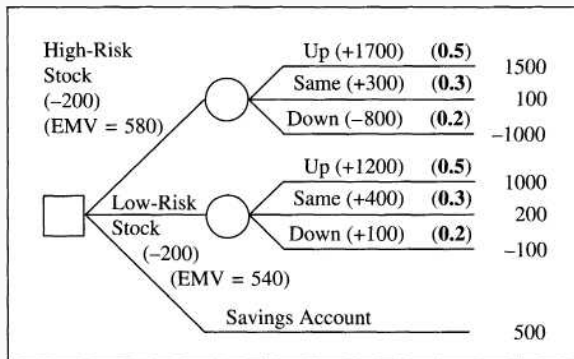
Risk attitudes



- The whole idea of a utility function is that it should help to choose from among alternatives that have uncertain payoffs.
- Instead of maximizing expected value, the decision maker should maximize expected utility.

Stock Market Example

- let's consider a stock market example
 - savings account yields 500
 - making an investment costs 200 (broker fee)
 - last column is net gain (fees included)



- a risk-neutral person would maximize EMV, hence would choose the risky path

Stock Market Example

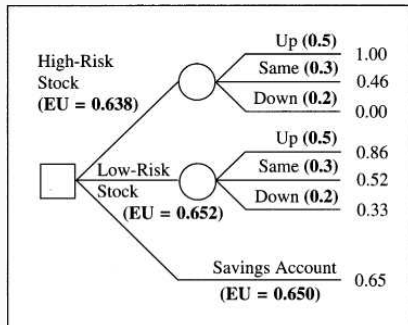
Money	Utility
1500	1.00
1000	0.86
500	0.65
200	0.52
100	0.46
-100	0.33
-1000	0.00

- the utility function re-ranked the preferences

$$EU(\text{High-Risk Stock}) = 0.638$$

$$EU(\text{Low-Risk Stock}) = 0.652$$

$$EU(\text{Savings Account}) = 0.650$$



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- Robert Clemen, Making Hard Decisions, 2nd Edition, 1996, Brooks Cole Publishing
- <https://web.stanford.edu/~jdlevin/Econ%20202/Uncertainty.pdf>