Risk Decision-Making & Risk Behaviour

The theory of marginal utility is used to explain why people make the consumer choices they do…it does not provide guidance on the decisions people should make.

Decision Theory

Is it always optimal to maximize expected utility? (from a risk management perspective)
Decision Theory
Expected Value

<table>
<thead>
<tr>
<th>State</th>
<th>Insure</th>
<th>Retain</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. No Loss</td>
<td>€1500 x 0.99</td>
<td>€0 x 0.99</td>
</tr>
<tr>
<td>2. Loss Occurs</td>
<td>€1500 x 0.01</td>
<td>€100,000 x 0.01</td>
</tr>
<tr>
<td>Maximum Loss</td>
<td>€1500</td>
<td>€1000</td>
</tr>
</tbody>
</table>

Is it appropriate to use expected value as the only criteria in decision-making?

Decision Theory
Minmax Regret Strategy

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The decision maker attempts to minimize the maximum loss or maximum regret.

Risk & Uncertainty

Risk Behaviour
...implies something other than rational!
Risk & Uncertainty

Measurable uncertainty = risk

Unmeasurable uncertainty

\[ \text{Knight (1921)} \]

Probability

Weight of Evidence

\[ \text{Keynes (1921)} \]

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Ambiguity Aversion

Experiment

Draw a poker chip at random from a bag and receive $100 or nothing depending on the outcome.

<table>
<thead>
<tr>
<th>Bag A – ‘Clear Bet’</th>
<th>Bag B – ‘Vague Bet’</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 red chips</td>
<td>? red chips</td>
</tr>
<tr>
<td>50 black chips</td>
<td>? black chips</td>
</tr>
<tr>
<td>100 total chips</td>
<td>100 total chips</td>
</tr>
</tbody>
</table>

Preference for known rather than unknown probabilities.

\[ \text{Ellsberg (1961)} \]

Decision-making is affected not just by probability, but also by the level of ambiguity.

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Ambiguity Aversion

- Results help us understand human behaviour
  - Preference for risk over ambiguity.
- Why is this relevant for risk management?
- It should help us understand understanding behaviour within the insurance/financial system.
- Provides a better understanding of decision making.

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Ambiguity Aversion

Heath & Tversky (1991)

Willingness to bet on uncertain events depends on feelings of competency/knowledge.

[Also relevant for risk management!]

Bet 1
Results of the 1988 Presidential Election in various states.

Bet 2
Results of various professional football games.

Bet 3
Results of random draws from an urn with a known composition of chips.
Ambiguity Aversion

Heath & Tversky (1991)
Ambiguity aversion driven by ‘contrast between states of knowledge’.

Comparative Ignorance Hypothesis.

Ambiguity Aversion

Fox & Tversky (1995)
Extended the study of ambiguity aversion under different conditions.

Previous literature had found that ambiguity aversion is driven by feelings of incompetence – they set out to discover what produces this state of mind.

Ambiguity Aversion

Fox & Tversky (1995)
“...propose that people’s confidence is undermined when they contrast their limited knowledge about an event with their superior knowledge about another event...

...or when they compare themselves with more knowledgeable individuals”.

Ambiguity Aversion

Kaufman Broad Homes (KBH) is one of the largest home sellers in America. Their stock is traded on the New York Stock Exchange.

1 Do you think that KBH stock will close higher or lower on Monday than it did yesterday? (Circle one)
   - KBH will close higher
   - KBH will close lower

2 Which would you prefer? (Circle one)
   - Receive $50 for sure
   - Receive $150 if my prediction about KBH is correct.

Note: This question was presented in a non-comparative context.
Ambiguity Aversion

The same question was then posed in a comparative context, where the following item was inserted between questions 1 and 2:

“We are presenting this survey to undergraduates at San Jose University, graduate students in economics at Stanford University, and to professional stock analysts.”

Subjects were then asked to rate their knowledge of the item on a scale of 0 to 10.

Ambiguity Aversion & Risk Management

How does this research relate to the practice of risk management?

1. People avoid ambiguity
2. Preference for allocating a number (probability) on risks.
3. Findings suggest that people have a preference for bets (risks) they are familiar with.
4. Insurance underwriters more comfortable putting a price on risks they have experience dealing with.

Ambiguity Aversion & Risk Management

Available on www.johnfgarvey.com

Risk Decisions!

1. Don’t risk more than you can afford to lose…
   …the possible severity must be reduced to a manageable level or the risk must be transferred.

2. Consider the odds.
   e.g. You estimate that a loss event has a 70% likelihood of occurring.

3. Don’t risk a lot for a little.
   …there should be a reasonable relationship between the cost of transferring the risk and the value that accrues to the transferor.
Decision Theory

Risk Characteristics as Determinants of the Tool

<table>
<thead>
<tr>
<th></th>
<th>High Frequency</th>
<th>Low Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High Severity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avoidance &amp; Reduction</td>
<td>Insurance</td>
<td></td>
</tr>
<tr>
<td><strong>Low Severity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retention &amp; Reduction</td>
<td>Retention</td>
<td></td>
</tr>
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</table>

Decision Theory in Risk Management

- **Risk Control** refers to techniques that reduce the frequency and severity of losses.
  - Avoidance
  - Loss Prevention
  - Loss Reduction

Risk Financing refers to techniques that provide the funding of losses.

- Retention
- Noninsurance transfers
- Commercial insurance
- Active or Passive
- Why retain risks?

Paying Losses
- Current net income
- Unfunded reserve
- Funded reserve
- Captive Insurer

Risk Transfer Through Insurance

A priority ranking for insurance expenditures:
- **Large-Loss Principle:** Essential Coverages First
- Insurance as a Last Resort: Optional Coverages
- Advantages of Deductibles

(The deductible is the amount the insured is obligated to pay in an insurance contract.)
Principles of Risk Management

In-Term Exam (Week 7)

15 Multiple Choice Questions (Correct, +2; Incorrect, -0.5)
Complete on Sulis between Tuesday, 11am and Thurs, 11am
30 minutes (approx two minutes per question)
Calculator required