Prospect Theory

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Problem Motivation

Utility theory used as a means of evaluating consequences of decisions.

However, the utility of some consequences does not necessarily follow the axioms of Utility Theory according to some subject matter experts.

Prospect Theory

According to Hastie and Dawes (Page 294), Prospect Theory has three major characteristics:

1. Reference level dependence.
2. Gain and loss satiation.
3. Loss aversion.

Problem Description

Goal: Analyze the second characteristic of "Gain and Loss Satiation" in Prospect Theory.

Problem can be looked at from two angles:

1. Determine a constant *a* such that a person's value function is approximately equal to $v(x) = x^a$ for all $x > 0$.
2. For the null hypothesis that v(x) is a linear function, consider the alternative hypothesis that is not linear.

Example: Take $2*v(x_1)$ and $v(2*x_1)$.

Hypothesis

$$H_0: mean_1 - mean_2 = 0$$
$$H_1: mean_1 - mean_2 > 0$$

where $mean_1$ is the mean from 2*U(lower gain) and $mean_2$ is the mean from the U(two times the lower gain)

$$H_0: mean_1 - mean_2 = 0$$
$$H_1: mean_1 - mean_2 < 0$$

where $mean_1$ is the mean from 2*U(lower loss) and $mean_2$ is the mean from the U(two times the lower loss)

Data Collection

- Created a survey online consisting of four questions.
  - Two questions deal with the utility of two positive events
  - Two questions deal with the utility of two negative events
  - Assigned a group of questions randomly to the participants.
- Distributed the survey via social networking sites
- Received 47 responses

Data Analysis

$$t = \frac{(\overline{x}_1 - \overline{x}_2) - d_0}{\sqrt{\frac{{s_1}^2}{n_1} + \frac{{s_2}^2}{n_2}}},$$

Used the T Test for testing the difference between two means with unknown variances within Excel 2007.

	Higher Gain	*Two Lower Gains*
Mean	139.8617021	192.1489362
Variance	5569.779371	5130.651249
Observations	47	47
Hypothesized Mean	0	
df	92	
t Stat	-3.465324985	
P(T<=t) one-tail	0.000403217	
t Critical one-tail	1.661585397	
P(T<=t) two-tail	0.000806434	
t Critical two-tail	1.986086272	

	Larger Loss	*Two Smaller Losses*
Mean	167.4468085	92.46808511
Variance	14472.68733	312.7326549
Observations	47	47
Hypothesized Mean	0	
df	48	
t Stat	4.227368804	
P(T<=t) one-tail	5.26738E-05	
t Critical one-tail	1.677224197	
P(T<=t) two-tail	0.000105348	
t Critical two-tail	2.010634722	

Conclusions

Results from the T test suggest that there is enough evidence to reject the null hypothesis in support of the alternative hypothesis.

Given the fact that questions were monetarily based, there could be a bias or other factors that might have played into the answers.

Future Work

- Test the results from the survey for the alpha and lamba value given in Hastie and Dawes (Page 294).
- Test different questions for a comparison to work related problems

Questions

References

Hastie, Reid, and Robyn M. Dawes. *Rational Choice in an Uncertain World: the Psychology of Judgment and Decision Making* . Thousand Oaks, Calif.: Sage, 2001. Print.