

Discussion Questions

- What strategies are available to liquor retailers after the 44 *Liquormart* decision that were not available before?

- What do you expect to happen to prices in the Rhode Island liquor market? Why? Is this the “standard” prediction?

- If you were going to operate in this market, what strategies would you pursue?

- What relevance does this episode have to the possible effect of the Internet on retail markets? Explain. What do you expect to happen in those markets? What strategies should retail firms pursue?

Choice under Uncertainty

- Up to now, we've considered choice without uncertainty
- Today, a theory about choosing among uncertain outcomes

	Economy good		Economy bad	
Job	prob	Pay (X_1)	prob	Pay (X_2)
1 "sales"	0.5	500	0.5	1500
2 "gov't"	0.5	900	0.5	1100

- Which job do you prefer?

- Preliminaries: review three concepts
 - Probability
 - Expected value
 - variability
- Expected value
 - Average of potential outcomes, weighted by their probabilities of occurring
 - E.g. coin-flip game, pays \$0 if tails, \$1 if heads
 - $EV = \text{Pr}(\text{heads}) * (\text{heads payoff}) + \text{Pr}(\text{tails}) * (\text{tails payoff}) = \0.50
 - $EV = 0.5(\$1) + 0.5(0) = \0.50
 - Generally, $EV = \text{Pr}(X=X_1)X_1 + \text{Pr}(X=X_2)X_2$
 - EV of both jobs = \$1000. Which do you prefer?

- Job 2 is less “risky”
 - Less deviation between outcomes and their expected values

	prob	$X_1 - E(X)$	prob	$X_2 - E(X)$
1	0.5	-500	0.5	500
2	0.5	-100	0.5	100

- Square the gap, then weight it by probability

	prob	$(X_1 - E(X))^2$	prob	$(X_2 - E(X))^2$
1	0.5	$(-500)^2$	0.5	$(500)^2$
2	0.5	$(-100)^2$	0.5	$(100)^2$

- $\text{Var}(\text{job 1}) = 250,000$; $\text{var}(\text{job 2})=10,000$
- Job 1 is riskier

Expected Utility

- Suppose that attitudes toward risk can be described by a utility function over wealth
- Expected utility = probability-weighted sum of the *utilities* of various outcomes.

	Outcome	Prob	utility
State 1	W_1	π_1	$U(W_1)$
State 2	W_2	$\pi_2=1-\pi_1$	$U(W_2)$

- $EU = \pi_1 U(W_1) + (1-\pi_1)U(W_2)$

Examples

- What are the jobs above worth?
 - What amount of money with certainty has utility equal to the EU of a “gamble”?
 - Suppose $U(W)=\sqrt{W}$

Fire Insurance Example

		State of the world	
		No fire, P=.99	Fire, P=0.01
decision	No insurance	\$100	\$500
	insurance	\$100-prem	\$100-prem

- What are the expected utility and certainty equivalent of the uninsured state?

Attitudes toward Risk

- Different utility functions embody different attitudes toward risk
 - $U' > 0$ (more is better)
 - $U'' < 0 \Leftrightarrow$ risk-averse
 - $U'' = 0 \Leftrightarrow$ risk-neutral
 - $U'' > 0 \Leftrightarrow$ risk-loving
- The question is,
 - $pU(W_1) + (1-p)U(W_2) <?> U(pW_1 + (1-p)W_2)$
 - Risk aversion is present if the expected utility exceeds the utility of the expected value

Lottery Economics

- What is the “\$20 million jackpot” worth?
- What sort of utility function do you need to play this lottery?
 - Initial $W = \$100$, ticket costs \$1, jackpot = \$12,500,000,
 - $\Pr(\text{win}) = 1/25,000,000$
 - Family: $U(W) = W^a$