Introduction:

1. Asymmetric information?

- what is it?
- why important?
  - efficient markets
  - market "failure"
- examples?
  - canned goods
  - doctor/lawyer/mechanic/chiropractor
  - insurance
- Types of problems arising?
  - *Moral hazard*: info asymmetry arises after contract signed
  - *Adverse selection*: agent has relevant private info before contract signed

2. Principal - agent models

- one ind'l (P) hires another (A) to perform a task

- A's performance affects payoff of both

- issue: P and A each want to max own payoff

- how motivate A to act in P's interest when optimizing choices differ

examples:

a) hiring a taxi: P - min time, cost; A - max $$

- contract: "two part tariff"
  fixed fee plus $/distance
  fixed component - max # trips

- other similar examples?

b) safety inspections on cars:

- costly to check, costly to leave unsafe cars on road

- ind'ls have interest in safety of others' cars

- want scheme to provide correct incentives

  i) to drivers - inspect
  ii) to inspectors - correct diagnosis
  iii) to repairers - min'm cost

Proposed solution:

- mandate annual inspections

- inspections at private garages
  - paid by state, if "safe"
  - by owner, if "dangerous"

- repairs at inspecting garage, or elsewhere

Use market forces where competition works

3. Choice under uncertainty:

- objects of choice: *lotteries*
    - probability distribution over goods

a) simple lottery: list L = $(p_1,\ldots,p_n)$

p_i = probability outcome *i* occurs, *i*=1,…,n

$p_i \in [0,1],\ \sum_{i=1}^{n} p_i = 1$

- exhaustive; outcomes mutually exclusive
- ex: n=3, outcomes $\{x_{1,}, x_2, x_3\}$

Three possible lotteries are

$L_1 = (1,0,0)$ $L_2 = (1/4, 3/8, 3/8)$ $L_3 = (0, 1/2, 1/2)$

b) compound lottery: lottery whose prizes are lotteries

- ex: lottery L_4, with prizes the lotteries above, each with prob 1/3

Note: compound lottery can be reduced to a simple lottery over the initial three outcomes

$L_4 = (5/12, 7/24, 7/24)$

2. Preferences over lotteries:

Assume: complete, transitive, continuous
+ "independence axiom"

For all L, L', L" and α such that 0< α<1

$L \succ L' \Rightarrow \alpha L + (1-\alpha)L'' \succ \alpha L' + (1-\alpha)L''$

Remember: outcomes mutually exclusive

Given these, can represent preferences using particular functional form:

Expected Utility form:

Given lottery L=$\{p_1,...,p_2\}$ over outcomes $\{x_1,...,x_n\}$,

EU(L) = $\sum_{i=1}^{n} p_i U\left(x_i\right)$

(von Neuman Morgenstern utility function)

Important features?

- linear in probabilities
- separable in outcomes

4. Monetary outcomes:

- utility of wealth function U(w)
  (indirect utility function)

- initial wealth w_0

- outcomes: $\{x_1, x_2\}$ -

  if outcome 1, ind'l loses x_1, so $w_1 = w_0 - x_1$

  if outcome 2, ind'l gains x_2, so $w_2 = w_0 + x_2$

Important features of lottery:

a) expected utility of lottery, EU(L):

- individual's *ex ante* evaluation of lottery

- depends on U(w) function

$$EU(L) = p_1 U(w_1) + (1 - p_1) U(w_2)$$

b) expected value of lottery, EV(L):

- *ex ante* monetary value (before resolution of uncertainty)

- $EV(L) = Ew = p_1(w_0 - x_1) + (1 - p_1)(w_0 + x_2)$

$$= w_0 + x_2 - p_1(x_1 + x_2)$$

- initial wealth plus expected gain

c) utility of expected value of lottery, U(EV(L))

Acceptance of lottery - willingness to accept risk involved - depends on both EV and attitudes toward risk

- categorize by sign of EU(L) - U(EV(L))

- depends on shape of U(w)

Attitudes to risk:

- two possibilities:
  - individual indifferent to risk - cares only about expected value
  - individual cares about both EV and risk
    - risk good or bad

If U(w) is	then and	individual is
Linear: $U'(w)=k$, $U''=0$	$EU(L) = U(EV(L))$	Risk neutral
Concave: $U'(w)>0$, $U''<0$	$EU(L) < U(EV(L))$	Risk averse
Convex: $U'(w)>0$, $U''>0$	$EU(L) > U(EV(L))$	Risk loving