Last lecture on mechanism design.

Durable mechanisms: (Never will there be unanimous agreement to change)

If a mechanism is determined by the agents in it, after they learn their types, what kinds of mechanisms emerge?

2 agents: 1 and 2

Each can be type $\theta_i \in \Theta_i = \{a, b\}$

Four possible combinations $\Theta_1 \times \Theta_2 = \{(a,a),(a,b),(b,a),(b,b)\}$

- Equally likely

Decision from $K = \{A, B, C\}$

	u_{1a}	u_{1b}	u_{2a}	u_{2b}
A	2	0	2	2
B	1	4	1	1
C	0	9	0	-8

Let $M(1a, 2a) = A$
$M(1b, 2a) = C$
$M(1a, 2b) = B$
$M(1b, 2b) = B$

- Type 2a will get A or C if truthfully reports
  - will get B if lies.
- Suppose agent 1 is type a.
  - $\Rightarrow$ M is incentive feasible, but there is an improvement. (ie $M(\theta_1, \theta_2) = A \;\forall \theta_1, \theta_2$)

- What if agent 1 says "I want to use M"?
  - Type 2 concludes that $\theta_1 = b \Rightarrow$ 2 doesn't want to use M.
- Not durable.

Defn: We say that an incentive compatible mechanism M is uniformly incentive compatible iff $u_i(M(\theta),\theta) \geq u_i(M(\theta_{-i},\hat{\theta}_i),\theta)$ $\forall i$, $\forall \theta \in \Theta$ and $\forall \hat{\theta}_i \in \Theta_i$.

- Want to announce truthfully if you know everyone else's type and that they were telling the truth.
- This is now referred to as ex-post incentive compatible.

Result1: Suppose a mechanism M is uniformly incentive compatible and interim incentive feasible. Then M is durable.

Result2: $\exists$ a nonempty set of mechanisms that are both durable and incentive efficient.

Question: are there mechanisms that are durable but not incentive efficient?

answer: Yes.

$K = \{A, B\}$

$u_1(A,\theta) = u_2(A,\theta) = 2 \quad \forall \theta$

$u_1(B,\theta) = u_2(B,\theta) = 3 \quad$ if $\theta = (1a, 2a)$ or $(1b, 2b)$

$u_1(B,\theta) = u_2(B,\theta) = 0 \quad$ if $\theta = (1a, 2b)$ or $(1b, 2a)$

This can be shown to be durable but not incentive efficient

Robust Mechanism Design

(Bergemann-Morris, Econometrica 2005)

Side note:

- Mertens and Zamir (1985) - universal type space
  - "completely unreadable"
  - Brandenberger-Dekel (Econometrica, 1993): much more readable.
- $\Theta = \Theta_1 \times \ldots \times \Theta_I$ payoff type space (did not contain information about higher order beliefs)
  - not a universal type space

What happens to Bayesian implementation if we do not work in the universal type space.

- ie what if we do not have a common prior?

In which situations is the payoff type space "as general" as the universal type space.

Separable Environments

1] Quasilinear preferences with no restrictions on transfers. (ie not worrying about budget balancing.)

2] where the social choice correspondence is actually a social choice function.

Let F be a social choice correspondence.
In separable environments, the following are equivalent:

1] F is interim implementable on all type spaces.
2] F is interim implementable on all common prior type spaces.
3] F is interim implementable on all payoff type spaces.
4] F is interim implementable on all common prior payoff type spaces.
5] F is ex post implementable.