3 Branches of economic theory:
- Game theory
- Mechanism design
- General equilibrium theory

What happens if we introduce some private information into general equilibrium theory?

Idiosyncratic risk - cannot be insured against due to incomplete markets.

Why does Bill Gates have such an undiversified portfolio?
 └ Not a huge principal-agent problem here

Prescott and Townsend incorporated IC constraints in GE theory.
 └ GE with indivisibilities
  └ Lotteries solve the ex ante IC issue.

Lotteries are very important in asset markets. It is very easy to construct any gamble in those asset markets.

Goals:
- Rich face incentive constraints
- Poor face participation constraints
- Don't observe insurance for workers against market conditions

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Continuum of ex ante identical individuals

c_j - consumption of good j, $j = 1,2$

$U = \tilde{u}_1(c_1) + \tilde{u}_2(c_2)$ 50% chance of being in state $s = 1,2$.

$\omega_1(2) > \omega_1(1)$; $\omega_2(2) = \omega_2(2)$

Maximize utility at $\frac{\omega_1(1) + \omega_1(2)}{2}$ of good 1 and ω_2 of good 2

First-best allocation. But what about IC constrained equilibria

- Equalize MRS b/t the two goods for the two types

Mechanism design:

Ex ante, want to purchase $x_1(1) > 0$ in exchange for $x_1(2) < 0$

Spse low endowment types cannot misrepresent

The only interesting IC is:

$$\hat{u}_1(\omega_1(2) + x_1(2)) + \hat{u}_2(\omega_2 + x_2(2))$$
$$\geq \hat{u}_1(\omega_1(2) + x_1(1)) + \hat{u}_2(\omega_2 + x_2(1))$$

Here, the contract is a 4-vector: $\{(x_1(1), x_1(2), x_2(1), x_2(2))\}$

almost certainly, we can sustain trade in equilibrium.

Two critical elements:

1. Ex ante contracting
2. Need to monitor transactions

There is a literature on interim contracting (where contracts are made after some information is revealed)

If 1 and 2 hold, then the welfare theorems hold.

Lotteries and IC constraints

- X [space of type-contingent net trades restricted to the set of feasible net trades (ie ones that satisfy IC constraints.)]

Two problems: X may not be convex.

- Sunspot contracts fix the convexity issues.
- They also weaken ICs:

$$E|_2[\hat{u}_1(\omega_1(2) + x_1(2)) + \hat{u}_2(\omega_2 + x_2(2))] \geq E|_1[\hat{u}_1(\omega_1(2) + x_1(1)) + \hat{u}_2(\omega_2 + x_2(1))]$$

I types $i=1,\dots,I$ of households

$h \in H^i = [0,1]$ individual households

J goods $j=1,\dots,J$

sunspot variable $\sigma \sim unif[0,1]$, S^i states

$x^i_j(s,\sigma,h) \in \mathbb{R}$ amt of good j delivered to household h of type i when state is s and sunspot state is σ.