Dynamic Mechanism Design without Transfers

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Chapters

1. Design of Committee Search
2. School Choice with Observable Characteristics
3. Mechanism Design for Stopping Problems with Two Actions
Chapter 1
Design of Committee Search

Committee search problems that have,

1. Sequential decision,
2. Irreversible decision,
3. Private value,
4. Public allocation, and
5. No transfers.
Static Problem

Binary Mechanisms
Two-Period Problem

Ternary Mechanisms

Inside each region: continuation mechanism from $T$
Three-Period Problem
More Ternary Mechanisms

Inside each region: continuation mechanism from $T - 1$
Pareto Optimal Mechanisms

\[ v_{2,t} \quad \text{Mechanism} \quad v_{2,t} \quad \text{Value} \]

\[ \bar{v} \quad r_2 \quad r_1 \quad \bar{v} \quad \bar{v} \quad v_{1,t} \quad v_{1,t} \]
Other Boundary Mechanisms

Worse for 1, Better for 2
Other Boundary Mechanisms

Better for 1, Worse for 2
Other Boundary Mechanisms

Worse for Both
Chapter 2: School Choice with Observable Characteristics

School choice problem where,

1. Students have observable characteristics (groups), and
2. Maybe planner knows something about students’ preferences.

Focus on ordinal mechanisms that have,

1. Efficiency,
2. Within-group Envy-freeness, and
3. Within-group Symmetry.
Probabilistic Serial Mechanism

1 School

1 2 3

123 132 213 231 312 321
Modified Probabilistic Serial Mechanism

3 Schools

Chapter 1

Chapter 2

Chapter 3
To find an ordinal mechanism that maximizes cardinal utilities, the planner

1. Chooses sub-capacities (convex programming problem),
2. Runs modified probabilistic serial mechanism.
Chapter 3
Mechanism Design for Stopping Problems with Two Actions

- Principal-agent problem in which,

1. Agent observes Markov stochastic process,
2. Agent chooses when to stop and one of two actions, and
3. Principal uses transfers to implement stopping decision rules.
A Threshold Stopping Decision Rule
An Implementable Stopping Decision Rule

Example 1

Diagram showing state transition over time with initial state $X_0$ and state $\bar{X}$.
An Implementable Stopping Decision Rule

Example 2
An Implementable Stopping Decision Rule

Example 3
Conditions Required

- On the stochastic process,
  1. Monotonic transition,
  2. Continuous transition, and
  3. Full support.

- On the utility functions,
  1. Spence-Mirrlees Condition (monotonicity), and
Single Crossing Conditions

Example 1

Value

State

Value if stop and choose $a_+$

Value if continue

Value if stop and choose $a_-$
Single Crossing Conditions

Example 2

Value

State

Value if stop and choose $a_+$

Value if continue

Value if stop and choose $a_-$