Chicago Lecture

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Every individual...neither intends to promote the public interest, nor knows how much he is promoting it...he intends only his own security; and by directing that industry in such a manner as its produce may be of the greatest value, he intends only his own gain, and he is in this, as in many other cases, led by an invisible hand to promote an end which was no part of his intention.


The natural effort of every individual to better his own condition...is so powerful, that it is alone, and without any assistance, not only capable of carrying on the society to wealth and prosperity, but of surmounting a hundred impertinent obstructions with which the folly of human laws too often encumbers its operations.


What improves the circumstances of the greater part can never be regarded as an inconveniency to the whole. No society can surely be flourishing and happy, of which the far greater part of the members are poor and miserable.

The Wealth of Nations, Book I Chapter VIII, p. 96, para. 36.
\[
\begin{array}{c|c|c|c}
    & \text{P} & \text{E} \\
\hline
\text{P} & 1,1 & 3,0 \\
\text{E} & 0,3 & 2,2 \\
\end{array}
\]
What Does Game Theory Have to Say?

Nash Program

Rubinstein – Stahl

Efficiency and Determinacy : $1/1+d, \; d/1+d$
A Bayesian Exchange Problem

| Seller          | Buyer  
|-----------------|--------
|                 | $v = 2$ | $v = 10$ |
| $c = 8$         | .5     | .5      |
|                 | $c = 0$ |         |
|                 | .5     |         |

First Best Surplus  = 7/2
A Bayesian Exchange Problem

<table>
<thead>
<tr>
<th>Seller</th>
<th>Buyer</th>
<th>v = 2</th>
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</thead>
<tbody>
<tr>
<td>c = 8</td>
<td>.5</td>
<td>No</td>
<td>b</td>
</tr>
<tr>
<td>c = 0</td>
<td>.5</td>
<td>a</td>
<td>c</td>
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</tbody>
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First Best Surplus = $7/2$

$0 \leq a \leq 2$
$8 \leq b \leq 10$

$a + c \geq b$, and
$(10 - b) + (10 - c) \geq 10 - a$ or $-b - c \geq 10 - a$

$\therefore a - b \geq -10 + b - a$
$\therefore 2(b - a) \leq 10 \text{  } \times$
Social Choice and Incentive Problems (cont.)

<table>
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<th>v = 10</th>
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<tbody>
<tr>
<td></td>
<td>c = 8</td>
<td>.5</td>
<td>(5/6)</td>
</tr>
<tr>
<td></td>
<td>no trade</td>
<td></td>
<td>p = 8</td>
</tr>
<tr>
<td>c = 0</td>
<td>(5/6) p = 2</td>
<td></td>
<td>p = 5</td>
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<tr>
<td></td>
<td>p = 5</td>
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Second Best Surplus:
\[= \frac{7}{2} - \frac{1}{6}\]

Most Efficient Direct Mechanism:

Myerson-Satterthwaite establishes necessary inefficiency

Loss is 1/6
Time Lost to Strikes in Various Countries

US: about 20 minutes per worker/year.

Canada: about 1/3 day per worker/year.

Spain: less than 1/3 day per worker/year.

(Kennan 2005)
Contrast with: *Getting to Yes* (Fisher and Ury 2001)

- People want different things.
- Invent options for mutual gain.
- Get past the idea that there is a fixed sum.
- Think about a way to satisfy the other in a way that is good for you.
- Think about what you would like to walk out of the meeting with.
- Place multiple items on the table.
- Broaden your options and the options available to the other party.
Let’s Think about

S: 8, 0, 8, 0, 8, 0, 8, 8, 0, 0, 8, 8
B: 10, 2, 2, 10, 10, 2, 2, 10, 10, 2, 10, 2

• Poor knowledge of what should be exchanged
• Better knowledge of overall gains from trade: approx known surplus

Building theories for this world

• We could trade one by one: highly inefficient!
• Jackson-Sonnenschein (2007) mechanism and knowledge
### Known Surplus: A Simple Example

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\]

24 with same surplus

Demonstration of Jackson-Sonnenschein
But Where Does the Mechanism Come From?
Can a Negotiation Get you There?
How About Surplus Not Known?

(0, 8) or (8, 0) meets (2, 10) or (10, 2)

<table>
<thead>
<tr>
<th></th>
<th>(2, 10)</th>
<th>(10, 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(0, 8)</td>
<td>Both at 12</td>
<td>First at 5</td>
</tr>
<tr>
<td>(8, 0)</td>
<td>Second at 5</td>
<td>Both at 12</td>
</tr>
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A Bargaining Approach With Discounting

• Alternating offers
• A first protocol
• Share demanding offers
• A Sequential Equilibrium: immediate trade and efficiency
• All Sequential Equilibrium outcomes are the same
Abstract Theorem on Efficiency and Uniqueness

Theorem

*With known surplus 1, under any bargaining protocol that has share-demanding offers, in all sequential equilibria, with prob.1*

- agreement is reached in the initial period,
- the full surplus is realized,
- payoffs are the Rubinstein shares:
  \[
  \frac{1}{1+\delta} \text{ for the first mover, and } \frac{\delta}{1+\delta} \text{ for the second.}
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A Second Protocol with ShareDemanding Offers
Almost Known Surplus

Known surplus in the limit:
A sequence of bargaining problems indexed by $m = 1, 2, \ldots$ satisfies (*) if

$$S^m(\cdot) \xrightarrow{p} 1, \text{ as } m \to \infty$$

as in the example with iid.

Desired Theorems: Consider a sequence of bargaining problems indexed by $m$ and satisfying (*). There exist bargaining protocols, s.t. subject to certain "modeling requirements", the following limiting result obtains
For any $\varepsilon > 0$ and $\delta < 1$, there exists $m_0$ such that if $m > m_0$:

1. There exist (perfect) Bayesian equilibria in the $m$-th problem

2. In all equilibria, with probability at least $1 - \varepsilon$
   - agreement is reached in the initial period,
   - realized surplus is at least $(1 - \varepsilon)$; and
   - $\frac{\text{expected payoff}}{\text{Rubinstein share}} \in (1 - \varepsilon, 1 + \varepsilon)$

The protocols are to be judged by the adequacy of their description.

The “modeling requirements” deal with various modeling challenges.
Various Modeling Challenges

Sequential Equilibrium is not uhc.

Example 1 (single item, alternate-offer, $\delta = 0.8$)

- “S asks for 10 and rejected” can occur with 100% in the initial period in some sequential equilibrium
- Supported by off-path belief $\Pr(S \text{ has 0}) = 1$
Various Modeling Challenges

Substantial inefficiency can occur even with $\delta$ close to 1

Claim: There is a SE with at least $20\%$ loss of surplus, in particular:

- Pick the smallest $T$ such that $\delta^T < 0.8$
- “S asks for 18, B asks for 0, all rejected” occurs with $100\%$ in the first $T$ periods on path
- Supported by off-path belief $\Pr(S \text{ has 0}) = 1$ and $\Pr(B \text{ has 18}) = 1$
Various Modeling Challenges

Example 2 (signaling game)

Imposing “no-updating off-path” does not recover USC

- $\alpha = 1$: unique SE (In, In, Accommodate, $\beta = 1$);
- $\alpha < 1$: (Out, In, Fight, $\beta = 0$) is a SE; (with no “off-path”!)
Various Modeling Challenges

Forced Trembles as a "cure". But message space may grow

Another Protocol

Experiment