

ECO 199 – GAMES OF STRATEGY  
Spring Term 2004 – March 4  
ASYMMETRIC INFORMATION

## DIRECT COMMUNICATION

Works if players have identical interests, for example  
in assurance-type games can achieve good outcome

Rousseau's Stag Hunt game		Barney	
		Stag	Rabbit
Fred	Stag	2 , 2	0 , 1
	Rabbit	1 , 0	1 , 1

Now consider game with two stages (mixed sequential–simultaneous)

Stage 1. Fred can make an announcement "Stag" or "Rabbit", or not

Stage 2. Fred and Barney make choices

Consider strategies –

Fred – Stage 1. Announce "Stag"

Stage 2. Action = Announcement, Rabbit if no announ.

Barney – Choose "Stag" at Stage 2 if Fred has

announced "Stag" at Stage 1, else choose "Rabbit"

These yield a subgame-perfect equilibrium

This is called a "cheap-talk" game – the Stage 1 announcement  
has no direct effect on payoffs (including no direct cost),  
only an indirect effect by selecting Stage-2 outcome

But can also have a "babbling equilibrium"

for example one with strategies

Barney – choose Rabbit, ignoring Fred's announcement

Fred – Make an arbitrary announcement at Stage 1

Choose Rabbit at Stage 2

Cheap talk does not work if players' interests strictly opposed,  
so game is zero-sum (or constant-sum)

		Cops	
		City	Suburb
Robbers	City	20	70
	Suburb	80	30

If two stages where Robbers make announcement at Stage 1  
 No subgame perfect equilibrium where Cops' Stage-2 choice  
 differs from their ordinary Nash equilibrium mixture,  
 depending in any way on Robbers' Stage-1 announcement,  
 because Robbers will manipulate this to their own advantage  
 So Cops must disregard Robbers' announcement,  
 and then the Robbers' announcement can be arbitrary  
 Game has only the babbling equilibrium

More generally, extent of credible communication  
 depends on extent of alignment of players' interests  
 In reality, often this extent of alignment is itself a matter of  
 information asymmetry between the players  
 Then must use costly actions as credible signals  
 instead of costless cheap talk

## MAIN TYPES OF INFORMATION ASYMMETRY

### MORAL HAZARD

1. Firm's owner can't observe  
effort (quality) of manager or worker
2. Insurance company can't observe  
contributory negligence of policyholder
3. Policyholder exaggerates amount of loss

Each player knows own action, but has only  
imperfect or inferential knowledge of other's action

### ADVERSE SELECTION

1. Employee's innate skill, insuree's innate riskiness
2. A player's values or payoffs  
Common interests or conflict  
Patience, risk-aversion in bargaining  
Risk-tolerance in brinkmanship
3. Actions available to a player  
weaponry, war-readiness of country

Usually, each player knows (perfectly, or at least better)  
such information about himself than about the other

Call all such relevant personal info a player's TYPE

Call a player's information or type "good"

if he gets higher payoff when others know this info/type  
and "bad" if he gets lower payoff when the info leaks

Then each player wants others to think he is a "good" type  
And each wants to find out the others' true type

## STRATEGIES TO MANIPULATE INFORMATION

### FOR BETTER-INFORMED PLAYER –

#### 1. SIGNALING – Revealing "good" information truthfully

Examples: your skill or carefulness

your commitment, threat or promise

your lack of hostile intent

Credible signal - observable action that someone with "worse" type would not mimic. Relies on differential costs of signal

Example – signal or screen for skill by taking tough courses, signal for low-risk by accepting partial insurance

#### 2. SIGNAL-JAMMING – Concealing "bad" information, misleading (bluffing in poker), involves mixed strategy

Mimic actions of a "better" type

### FOR LESS-INFORMED PLAYER

#### 1. Coping with adverse selection (at a cost)

employer - employee's skill or effort

insurance company - applicant's risk class

Screening by examination - test or audit

Screening by self-selection -

induce action by the other, more informed, player

that is optimal for one type but not for another,

so "separates" and reveals other player's type

Example – air fares with restrictions, separate tourist & business

#### 2. Coping with moral hazard

incentive payments based on observable outcome

Example – stock or options for managers

Sometimes better to remain ignorant – achieve deniability, remain immune from others' threats