ADVERSE SELECTION – CONCEPTS

Economic transaction between M and L
M has more info. than L about some relevant aspect
usually M's own skill, health, preferences etc.
M wants to reveal info. if "good" (its revelation
would increase M's benefit from transaction)
But words not enough – "bad" M can claim to be "good"
Actions speak louder than words

Signaling – M initiates action
Screening – L requires M to take action

To be credible, need action that bad M would not mimic
Must have differential cost of action
Costly action needed merely to prove your info
– cost of information asymmetry, falls on good types

Alternative – direct investigation of info.
But that is costly and not perfectly reliable
In practice need to compare costs

AKERLOF'S "LEMONS" EXAMPLE

Private used car market; each potential seller knows
more about quality of his own car than potential buyers
Suppose potential buyers know nothing; for them
any car on the market is indistinguishable from the average

Suppose quality Q in the full population of used cars,
as measured by value in hands of seller,
is uniformly distributed in $[0, 1]$
Quality Q car's value in hands of buyer $= \frac{3}{2}\,Q$

Since buyers can't find out Q of any specific car
Price P must be same for all cars on the market
Sellers who know their own Q is $< P$ will sell;
those with $Q > P$ won't
So cars *on the market* are not representative
sample of the full population of used cars
but an "adversely selected" sample of low-quality cars
uniformly distributed in $[0, P]$, not the full $[0, 1]$
Average is $\frac{1}{2}\,P$; so risk-neutral buyers willing to pay

$$\frac{3}{2}\,\frac{1}{2}\,P = \frac{3}{4}P < P$$

Sellers with $\frac{3}{4}\,P < Q < P$ drop out
This is true for any P, so no end to process
Complete collapse of market !

Reality not that bad; but in this market
it is especially difficult to find good credible signals

SIGNALING AND SCREENING
SPENCE'S JOB MARKET MODEL

Two types of workers A and C, productivities $A > C$
Each worker knows own type
Population proportions θ of C, $(1-\theta)$ of A

Firms compete for limited numbers of workers
So with full and symmetric information:
Wages $W_A = A$, $W_C = C$

If no way to convey productivity information:
Everyone gets wage $\overline{W} = (1-\theta)\,A + \theta\,C$

Education as signal of productivity:

Each unit of education (year, tough courses)
costs α to type A, γ to type C, with
crucial differential cost condition $\alpha < \gamma$

Separating equilibrium:

Competing firms believe that anyone with
x or more units of education is type A, else type C
Wage as function of education y

$$W(y) = \begin{cases} C & \text{if } y < x \\ A & \text{if } y \geq x \end{cases}$$

For equilibrium, beliefs must be correct, that is :

A-types choose to acquire $y = x$, C-types choose $y = 0$
"Incentive-Compatibility" or "Self-Selection" constraints

$$A - \alpha\, x > C, \qquad C > A - \gamma\, x$$

$$\frac{A - C}{\alpha} > x > \frac{A - C}{\gamma}$$

Range of x, so continuum of such equilibria,
each sustained by its own beliefs
If education has no other value, then
the one with the lowest x is best
Even this inflicts costs: A-types get

$$A - \alpha\, \frac{A - C}{\gamma} = \left[1 - \frac{\alpha}{\gamma}\right]\, A + \frac{\alpha}{\gamma}\, C < A$$

The cost is solely to prove they are not type-C
Type-C exert "negative externality" on type-A

Separation can be achieved by screening
where firms require enough education to pay A
Or by signaling, where worker takes initiative
gets enough education to be credible proof of type-A

If you are type-A, and don't use an available signal,
you will be taken for a type-C

General result – excessive investment in signals

Pooling can be Pareto superior: Type C get same C,
but type-A get more if

$$\overline{W} = (1-\theta)\,A + \theta\,C > \left[1 - \frac{\alpha}{\gamma}\right]\,A + \frac{\alpha}{\gamma}\,C$$

or $\theta < \alpha/\gamma$ (few C-types in population).

But pooling cannot be equilibrium:
If pooling going on, and everyone gets $\overline{W}$,
any one A-type can acquire education x_0 such that

$$A - \gamma\,x_0 < \overline{W} < A - \alpha\,x_0$$

or

$$\frac{\theta\,(A-C)}{\gamma} < x_0 < \frac{\theta\,(A-C)}{\alpha}$$

and so credibly separate himself

Again this could be initiated by firm or worker

So pooling may have to be enforced by policy
Similar to cream-skimming in insurance

SCREENING -- AIR FARES

First v. economy class, or Unrestricted v. restricted
Two types of travelers with different willingness to pay

		First (F)	Economy (E)
Airline's cost of carrying/seat		200	100
Willingness to pay	Business (B)	600	300
	Tourist (T)	250	200

Total 1000 passengers, of whom b are business flyers

A. If airline can identify the type of each individual passenger
Offer each B an F seat for (just under) 600,
each T an E seat for (just under) 200
Total profit = (600-200) b + (200-100) (1000-b)
= 400 b + 100 (1000-b)

B. If airline cannot identify the type of each individual passenger
(i) All F configuration – either
price 250, everyone buys, profit 50 (1000)
price 600, only B buy, profit 400 b
Latter better if b > 125
(ii) All tourist class
price 200, everyone buys, profit 100 (1000)
price 300, only B buy, profit 200 b
Latter better if b > 500

(iii) Both classes, price x for first, y for economy

Incentive-compatibility constraints (IC) :

Want T to self-select E : $250 - x < 200 - y$, OR $x - y > 50$

Want B to self-select F : $600 - x > 300 - y$, OR $x - y < 300$

Participation constraints (PC) : $x < 600$, $y < 200$

Total profit = $b (x-200) + (1000-b) (y-100)$

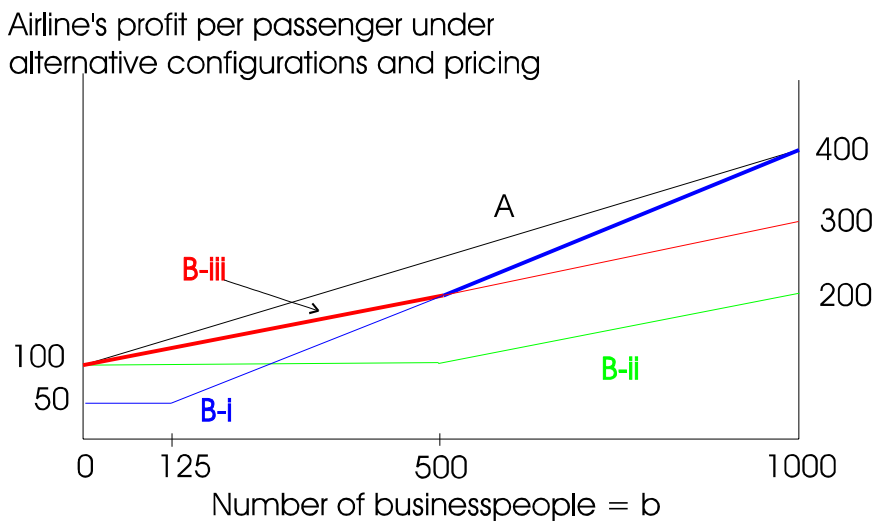
$= 1000 (y-100) + b (x-y-100)$

To max this, want to make y and (x-y) as large as possible, subject to the IC and PC constraints

So $y = 200$, $x - y = 300$ and then $x = 500$

Can't raise x to 600: that would require $y > 300$.

Total profit = $b (300) + (1000-b) 100$



Airline's optimal policy –

If $b < 500$, use B-iii, price discrimination with self-selection

If $b > 500$, use B-i, all first class (don't serve the tourists because that forces lower prices for business flyers)

For each b, height between A and B-i or B-iii (as relevant) is the airline's reduction in profit b/c of asymmetric information

ESSENTIALS OF SIGNALING AND SCREENING

1. Infer information (type) from action
   Mere words often lack credibility
   (Unless it is common knowledge that
   the players' payoffs are well aligned)

2. Rely on differences between types
   about costs (or benefits) of different actions

3. "Bad" types have incentives to mimic "good" types
   So separation requires excessive costly action
   This is a negative spillover from bad types to good

4. Signaling – action is initiated by informed player
   Screening – action is taken by informed player at the
   insistence of the less-informed player

5. "No news is bad news" principle of signaling
   If signal of good type is known to be available
   and you don't send that signal
   then others will assume you are bad type
   Example – exercising pass/fail option

6. No or multiple equilibria
   No equilibrium if pooling and separation
   can alternately beat each other
   Multiple equilibria if level of signal needed for
   credibility is arbitrary, depends on expectations