Final Exam

Law and Economics - Fall 2021

Solutions

Problem 1 Consider the Bilateral Care Model with activity levels.

a. Would a Strict Liability Rule achieve the efficient level of activity by the victim? Explain.

***Solution*:** *No. The victim faces no costs, so will choose a higher activity level than efficient. Formally, victim solves:*

$$\max_{r,y} u(r) - r[y + qp(x,y)(D - \psi(x,y))]$$

With $\psi(x,y) = D$*, this becomes:*

$$\max_{r,y} u(r) - ry$$

What means that she chooses $y = 0$ *and* r *that maximizes* $u(r)$*.* □

b. Would a Strict Liability Rule achieve the efficient level of activity by the injurer? Explain.

***Solution*:** *The injurer internalizes all costs, so chooses the optimal level of activity and care GIVEN the choice of the victim. Since the victim is not taking optimal precautions and activity levels, the choice of the injurer will not necessarily be the socially optimal one.* □

Problem 2 Consider a model of patent race, similar to the one we considered in class.

In this model:

- There are two potential innovations: A and B.
- Two symmetric firms. Each firm can work on A or on B.
- A is relatively easy to invent: If one of the firms works on A and the other one on B, the firm working on A succeeds first with probability $3/4$.
- The value of innovation A is 24. The value of B is 32. This are perfect substitutes: once one of the innovations is invented, the marginal value of the other one is zero.
- The firm that innovates first captures the full value of the innovation, the second one gets nothing.

a. What would be the efficient way to work on the innovations (Both firms in A, both firms in B, or one firm on A and one on B)? Explain.

***Solution*:** *Working on B is what maximizes the value of innovation (32 vs 24 or 26), so this is what is efficient.* □

b. What is the best response for a firm that assumes that the other will work on A? Show carefully.

***Solution*:** *If the other firm works on A, working on A gives an expected payoff* $24/2 = 12$. *Working on B gives a payoff* $32/4 = 8$. *Thus, the best response is to work on A.* □

Problem 3 Consider Becker's setup with no imprisonment (only fines).

In this model:

- g was the criminal's gain from commiting the crime (stochastic)
- h was the harm to the victim (deterministic)
- p was the probability of apprehension.
- f was the fine in case of apprehension.

The criminal commits the crime when the gain g is larger than the expected penality $p \cdot f$. For the rest of this exercise we fix p, so that the only design variable is the size of the fine f.

a. A possible *harm-based solution* is to set the fine f equal to the total harm normalized by the probability of apprehension, i.e. $f = h/p$. Would this achieve efficient level of crime? Prove your answer.

***Solution*:** *Crime is efficient if $g > h$. The criminal commits the crime if $g > pf$. replacing with $f = h/p$ we get that crime is committed when $g > h$, so it is efficient.* □

b. A gain-based solution was to set the fine f equal to the gain normalized by the probability of apprehension, i.e. $f = g/p$. Would this achieve the efficient level of crime? Prove your answer.

***Solution*:** *Here crime is never committed (assuming the criminal does not commit crime when indifferent). This is inefficient whenever $Pr(g > h) > 0$.* □

c. Under what circumstances is each of these two alternatives more attractive than the other one?

***Solution*:** *A gain-based solution is more attractive when gains are easy to observe and when $Pr(g > h)$ is negligible. For example in the case of insider trading.* □

Problem 4 Consider the model of Plea Bargaining that we covered in class.

- A defendant is *guilty* (G) or *innocent* (I).
- P_G and P_I are the respective probabilities of conviction given the type with $P_G > P_I$.
- S is the sentence when convicted. S_0 is the plea that the prosecutor offers to the defendant.
- If the defendant accepts the plea, she pays S_0 but avoids trial.
- C_D is the cost of the defendant of going to trial (irrespectively of the sentence).

a. Explain why going to trial with both types of defendants (i.e. choosing a plea S_0 that is rejected by both guilty and innocent defendants) is never socially optimal.

***Solution*:** *By offering a plea $S_0 = P_G S + C_D$ that is accepted by the guilty defendant one saves on costs of trial while not affecting incentives to commit crimes (the cost of guilty defendants is the same).* □

b. What pleas are *separating* (only accepted by one type of defendant)?

***Solution*:** *A separating plea has to satisfy $S_0 \leq P_G S + C_D$ and $S_0 \geq P_I S + C_D$.* □

c. What are the concerns of using a separating plea that we discussed in class?

***Solution*:** *With a separating plea only guilty agents will go to trial. This might affect the way a jury or a judge interpret the evidence and could affect the probability of conviction, what would render the mechanism ineffective.* □