Problem Set 1

Law and Economics - Fall 2022

Submit before: Sunday, Sept 25, 23:59.

Problem 1 Escaping Liability

Consider the Unilateral Care Model from class. In that model, the injurer chooses how much to invest in precautions. Imagine that the injurer can also invest in a technology to escape liability. Formally, let $z \in [0, \infty)$ be the amount invested in the escaping technology. In case that there is an accident, the injurer 'gets away' with probability $q(z)$ where $q(\cdot)$ is increasing in z and $q(0) = 0$. If the injurer gets away he doesn't pay any damages.

a. Assume that z is chosen before the accident is realized (at the same time as the level of care x) and that z is observable by the authorities ex-post (so liability ψ can be a function of z as well as x and D).

i. Write down the problem of the injurer for a generic liability function ψ, using functions p and q.

ii. Is there a liability rule for which efficiency is achieved? If so, explain carefully under what conditions. If not, prove the impossibility carefully.

b. Assume that z is chosen ex-ante and that z is not observable ex-post.

i. Write down the problem of the injurer for a generic liability function, using functions p and q.

ii. Is the negligence rule $\psi(x, D) = 1_{\{x<x^*\}}D$ efficient? If so, explain carefully under what conditions. If not, prove it carefully.

c. Assume that z is chosen ex-post (after the accident happened) and not observable by the authorities.

i. Write down the problem of the injurer for a generic liability function, using functions p and q.

ii. Is the negligence rule $\psi(x, D) = 1_{\{x<x^*\}}D$ efficient? If so, explain carefully under what conditions. If not, prove it carefully.

Problem 2 Consider the Unilateral Care Model, where the level of care $x \in [0, 1]$, the probability of accident is given by $p(x) = \frac{1}{2x}$, and the distribution of damage conditional on accident is uniform on $[0, 1]$ (notice that, in this problem, care does not affect the distribution of damage conditional on accident). The injurer has an upper bound on liability $\bar{\psi}$.

a. **Social Optimum**. What is the socially optimal level of care x^*? Does it depend on $\bar{\psi}$?

b. **Strict Liability**. Suppose that the designer chooses a (limited) strict liability rule $\psi(x, D) = \min\{D, \bar{\psi}\}$.

i. Write down the total cost of the injurer (as a function of x, a, D, and $\bar{\psi}$).

ii. Conditional on an accident happening, what is the expected amount that the injurer pays when $\bar{\psi}$ is not binding, i.e. when $\bar{\psi} > 1$?

iii. How much care would the injurer choose if $\bar{\psi}$ was not binding?

iv. Conditional on accident, what is the expected liability that the injurer has to pay when $\bar{\psi} = 1/2$?

v. How much care would the injurer choose for $\bar{\psi} = 1/2$?

c. **Reverse liability.** Suppose that, instead of the injurer compensating the victim, the victim had to pay an amount s to the injurer if there is no accident.

i. Write down the problem of the injurer in this case.

ii. What is the transfer s^* that achieves the socially optimum level of care? Does it depend on the bound $\bar{\psi}$?

d. **Negligence**. Suppose that the designer chooses a negligence rule in which the injurer is fully liable[1] if the level of care is below a threshold $\bar{x}$ and not liable otherwise.

i. How much would the injurer pay as a function of $x, \bar{x}, D$, and $\bar{\psi}$.

ii. Consider the case of $\bar{\psi} = \frac{1}{2}$. Can efficiency be implemented with a negligence rule? If so, for what $\bar{x}$? Prove your answer carefully.

[1]Notice that this is different that the way we presented negligence rules in class, in which the injurer was liable for the expected damages given the level of care taken.