Live Exercise 3: Optimal Patent Length – the Ideas Model

Gerhard Riener

Group exercise (≈20 minutes)

- Work in groups of 2–3.
- Show all intermediate steps.
- Parts (a)–(c) are computational; part (d) is a short discussion.

Problem: Patent length and the ideas model

A patent regulator is evaluating two candidate drugs under the Scotchmer ideas model. Each drug is characterised by a pair (ν, F), where ν is the per-period consumer surplus under competitive supply and F is the fixed development cost.

The regulatory parameters are:

$$\pi = \frac{1}{2}, \qquad \lambda = \frac{1}{4}, \qquad r = \frac{1}{4},$$

where π is the share of per-period consumer surplus appropriated by the patent holder as profit, λ is the per-period deadweight loss as a share of ν, and r is the discount rate. The current (discounted) patent length is $T = 20$.

Drug	ν	F
Alpha	10	60
Beta	5	10

(a) Private investment condition

For each drug, determine whether a firm will voluntarily invest given $T = 20$.

The investment condition is: $\pi\nu T \geq F$.

(b) Net social value

For each drug, compute the net discounted social value of development:

$$\text{Social value} = \frac{\nu}{r} - \lambda\nu T - F.$$

(Note: with $r = \frac{1}{4}$, the perpetual benefit per unit of ν is $\frac{1}{r} = 4$.)

Does either drug yield a positive net social surplus at $T = 20$?

(c) Socially optimal patent length for Drug Beta

Find the minimum patent length T^* that just induces private investment in Drug Beta. At $T = T^*$, compute the net social value and state your conclusion.

(d) Discussion (5 minutes)

At $T = 20$, both drugs are privately profitable yet socially wasteful. Drug Beta becomes socially efficient at a much shorter patent length.

1. What does this imply for the design of a uniform patent length (the same T for all drugs)?
2. Why is it difficult in practice to implement drug-specific patent lengths, even if they would be welfare-improving?

———————————————————

Bibliography