IO micro 2019 - R&D and Intellectual Property Rights

The basic tradeoff

Static welfare: market power is detrimental (usually)

Dynamic view: to retrieve the costs of an irreversible investment, the firm has to have market power

In order to secure the incentives of the inventor, someone (society) must assure him **beforehand** that he can capture the sunk costs from the surplus in the market. (Arrow, Schumpeter)

Intellectual property rights

The growth of the economy is based on the creation of **new knowledge** (New growth theory, see eg Jones (1995) ch. 4.)

What is a patent?

- Exclusive right to a new AND USEFUL product, process, design and method May be incremental: a substantial improvement qualifies
- Originates from medieval Italy and England
- Must be applied and is granted at a fee

Copyright

- Exclusive distribution rights of a UNIQUE piece of (artistic) work
- Granted implicitly, but must be defended

Trademarks

- Symbols, names attached to a product or method.
- Costly protection through registration
- See http://www.prh.fi/fi/tavaramerkit.html

Economic Research on IPRs

- Optimal length and breadth of patent (Nordhaus)
- Optimal level of copyright (Landes and Posner)
- Strategic use of patent

Topical issues

Software

- A strange object: a poem (source code), then a machine (run time)
- Copyright used mainly for historical reasons
- In US also patenting, a debate within EU
- Note: open source (copyleft) is protected by copyright

Music etc.

- Napster and other methods technically do (or do not?) violate copyright (‘fair use’)

Pharmaceuticals

- Abolishment of patents of for example AIDS- drugs is demanded
- **Static vs dynamic view**

To be or not to be? What happens if patents of drugs are lifted?

An example: ‘Napsterizing pharmaceuticals’

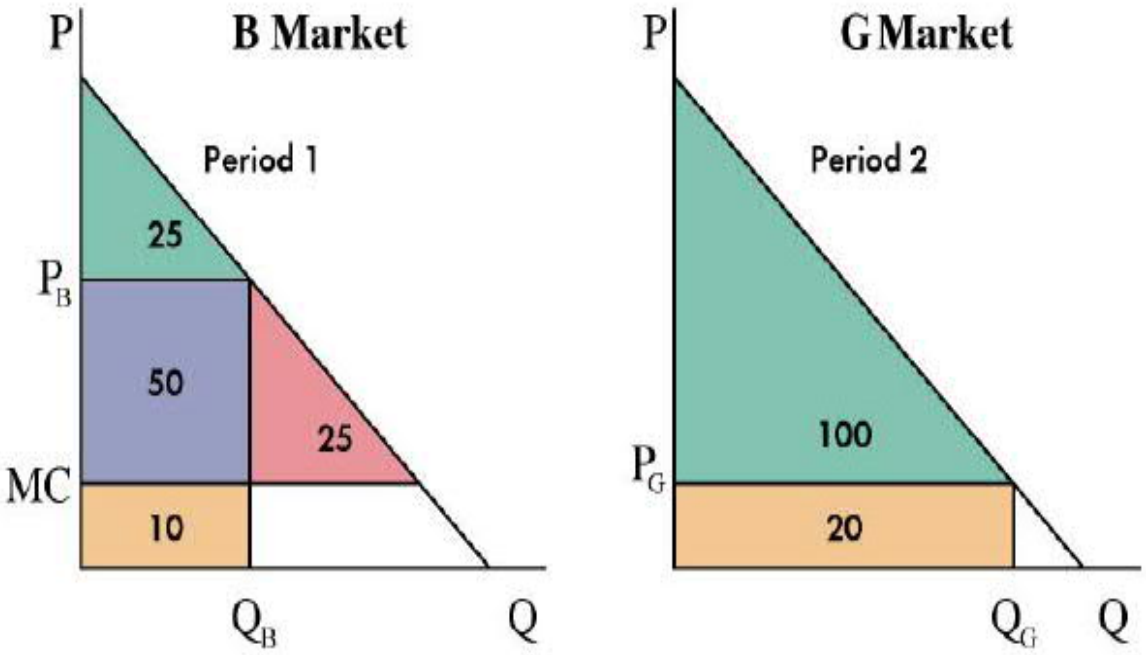
Hughes et al (2002, newer version 2011 in SSRN) estimate the potential consequences of abandoning patents in the pharmaceutical industry.

We first establish **status quo – patents are enforced**

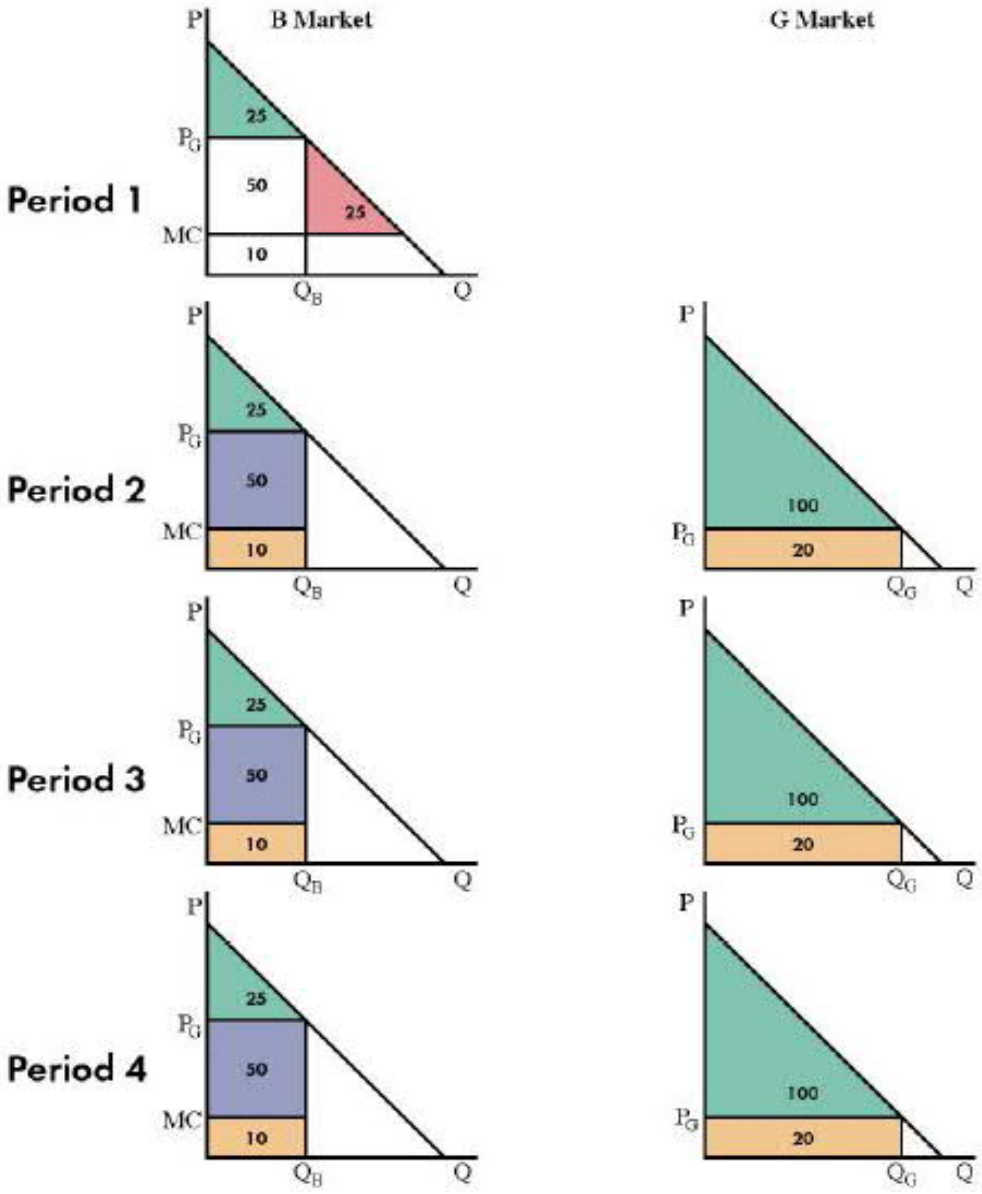
Then assess the **static gains** and the **dynamic losses** in the **absence of patents**

– What happens to **TOTAL consumer welfare (surplus)?**

Pharmaceutical market: constant R&D, new (Brand) drugs are patented and produced by a monopoly. After expiry of patent, the same (Generic) drugs are freely produced

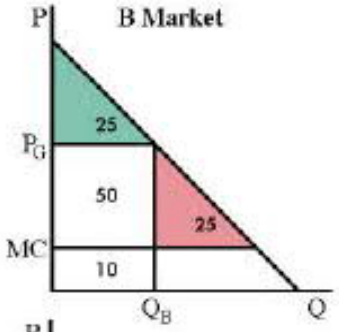


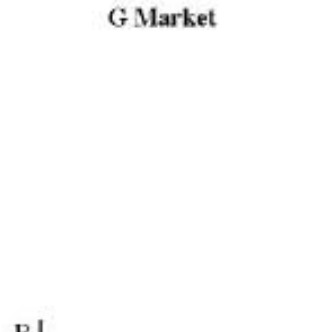
A drug is first a monopoly Brand then a competitive Generic



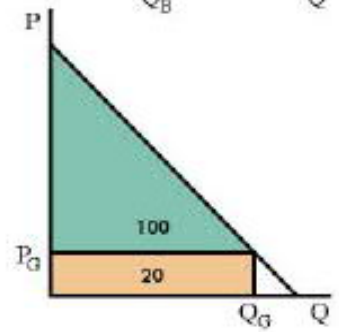
Patents are enforced

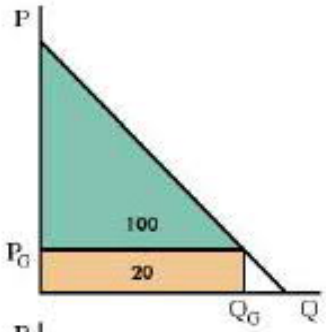
Period 1





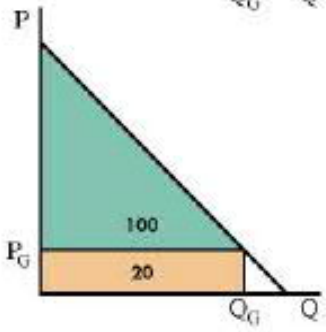
Period 2





Period 3

No New Invention

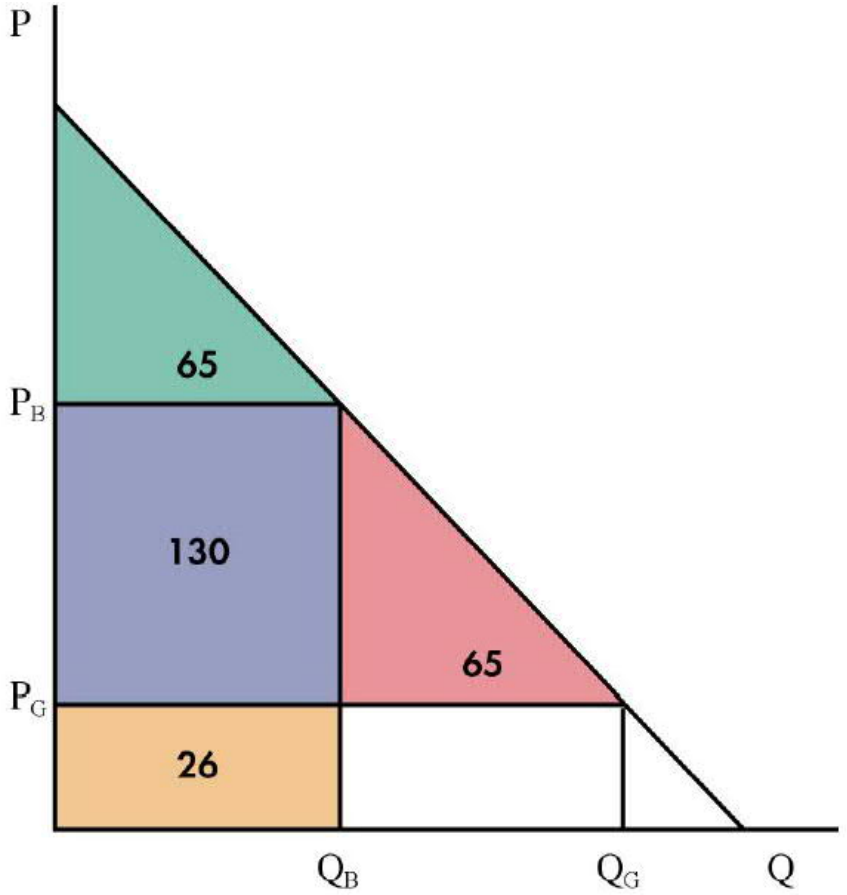


Period 4

No New Invention

No Previous Invention

Patents are NOT enforced after period 1



The drug market

The drug market year 2000

Yearly sales $208 billion, 75% Branded

Patent average duration 9 years

Drug lifetime 25 years

Under patent, price to cost –ratio 6:1

After the patent Generic gets 80%, Branded 20% of the market

Discount rate 2%

15% of profit goes to R&D

R&D has a yearly return of 15%

Calculating consumer surpluses by applying the data to the model

CS under status quo

CS from **branded** drugs (figure 4) = $**65** billion/year

CS from **generic** drugs.

-The 20/80 split of market implies a 60/40 split in revenues (31 vs 21 billion)

-from the **brand loyal** consumers, revenue is (1-1/6)x 31=25 billion => Consumer surplus **12,5** billion

-revenue from **true generic** market is 21 billion. Under perfect competition revenue=cost.

-were the market a monopoly, costs would be 10.5 billion, revenue 6x10.5=63 and contribution 63-10,5=52,5

-now CS=26,25, Welfare loss=26,25

BUT since it is NOT a monopoly, CS=52,5+26,25+26,25=**105** billion

TOTAL CS under status quo= 65+12,5+105=**182** billion

PRESENT VALUE (2% discount) = **9.1 trillion**

CS if patent protection lifted

1.Static efficiency **gain** from removing the patents of branded drugs

-from figure four and noting that CS under status quo is 65 billion, CS=130+65+65-65=195 billion
BUT
20% buy still branded drugs. In that monopoly, contribution=52 billion, welfare loss=26 billion

net CS improvement= 195-52-26=**117 billion**

Present value of CS improvements **850 billion**

REASON: accelerated generic entry in the market for existing patent protected drugs

2.Dynamic **loss** if protection lifted

Under patent:

R&D expenditure is a constant fraction (15%) of contribution

Yearly return on R&D is 15%

Contribution 130, R&D investment/year 20 and annual profit from development 3 billion

CS from branded drugs developed **in a single year** is 0.5x3=1.5 billion/year. Present value of the protection period of 9 years is **13** billion.

CS from the generic period (years 10-25) is 3.5 billion/year, with present value **37** billion

Drugs developed in **each year** generate during their lifetime a CS of 37+13 billion=**50** billion

Present value of all the CS of **those future drugs** (at 2% discount factor) is **2500 billion**

This is lost if there is no patent protection

REASON of loss: no new branded drugs **AND** eventually no new generic drugs

The result

A (very) conservative assessment: (no profits)

Abandoning the patent institution (‘napsterization’) increases the lifetime consumer surplus by a **static gain of $850 billion**

BUT

The **decrease through lost invention** has a present value of **$2500** billion

3:1 relationship

- Should the patent system be more restrictive than today?
- Today’s identified consumers against anonymous future generations

Recap

For dynamic gain (inventions), must have static losses (through market power)

New information goods (software) present challenges to applying IPRs

Consumers seem to benefit from IPRs

IPRs are just one of the methods to secure profits from innovation

References

Hughes J., M. Moore and E. Snyder (2002) “Napsterizing“ pharmaceuticals: Access, innovation and consumer welfare, NBER WP 9229.

Besen S, and L. Raskind (1991), An introduction to the law and economics of intellectual property, Journal of Economic Perspectives, 5, 3-28.

Jones C., (1997), Introduction to economic growth, W&W Norton, London.