



Who gains from innovation? Appropriability and the appropriation dilemma

chap.8

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MGT 403 - Spring 2019

Intermediary wrap up

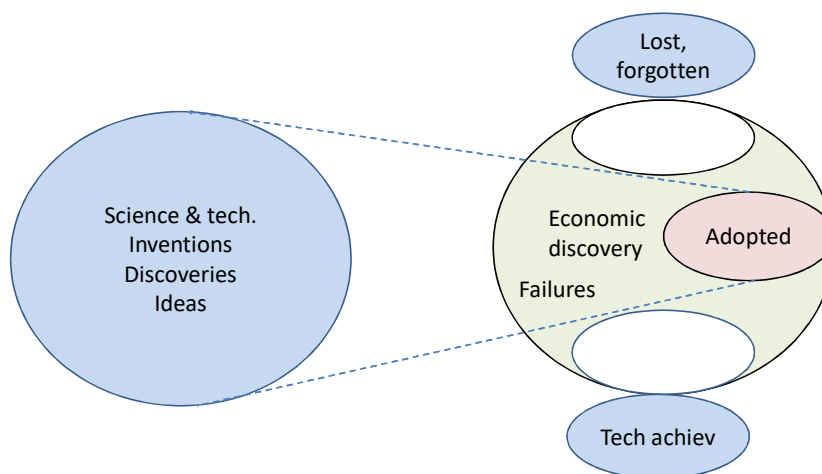


Innovation economics
represents an immense territory
but we have a map!

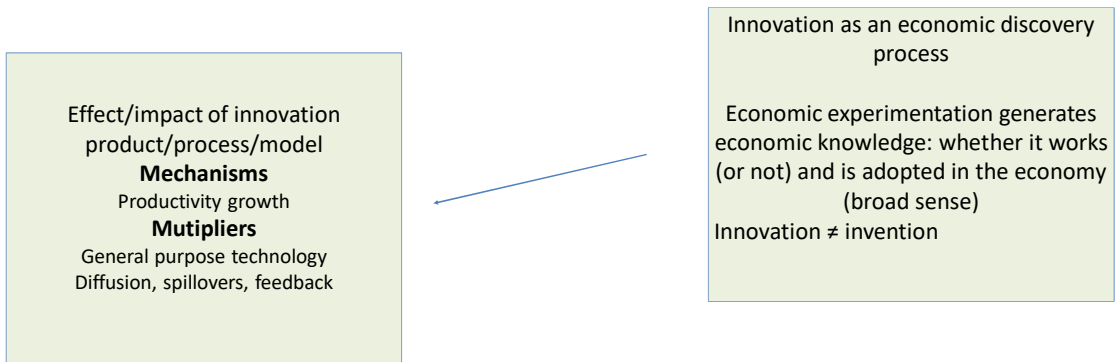
Innovation as an economic discovery process

Economic experimentation generates economic knowledge: whether it works (or not) and is adopted in the economy (broad sense)
 Innovation \neq invention

Stratégies de Spécialisation Intelligente

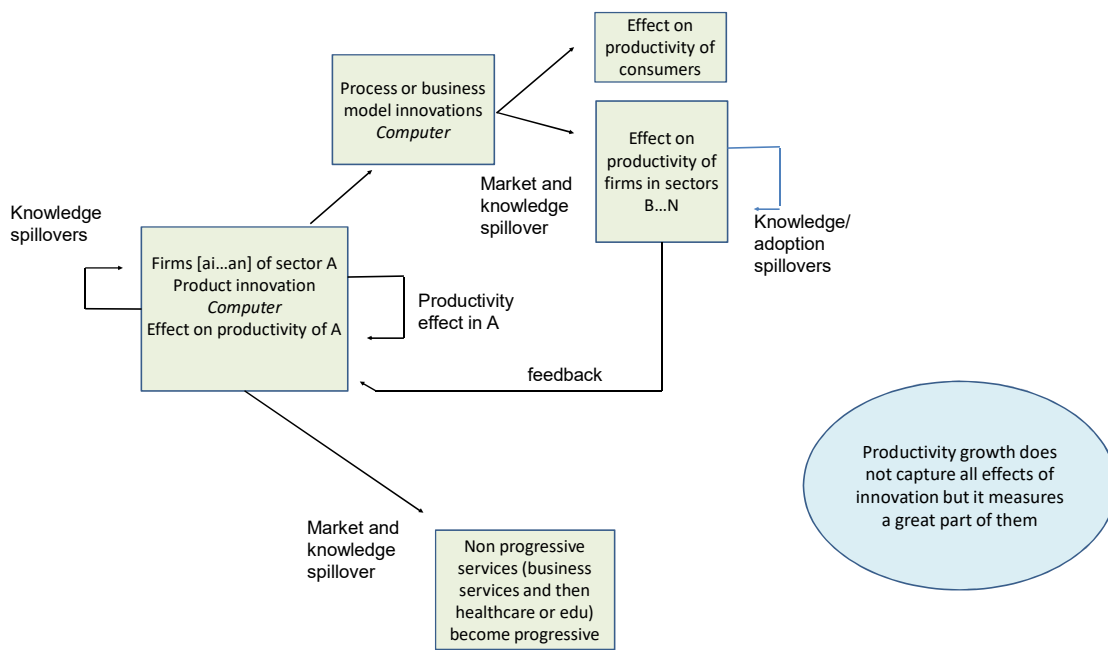


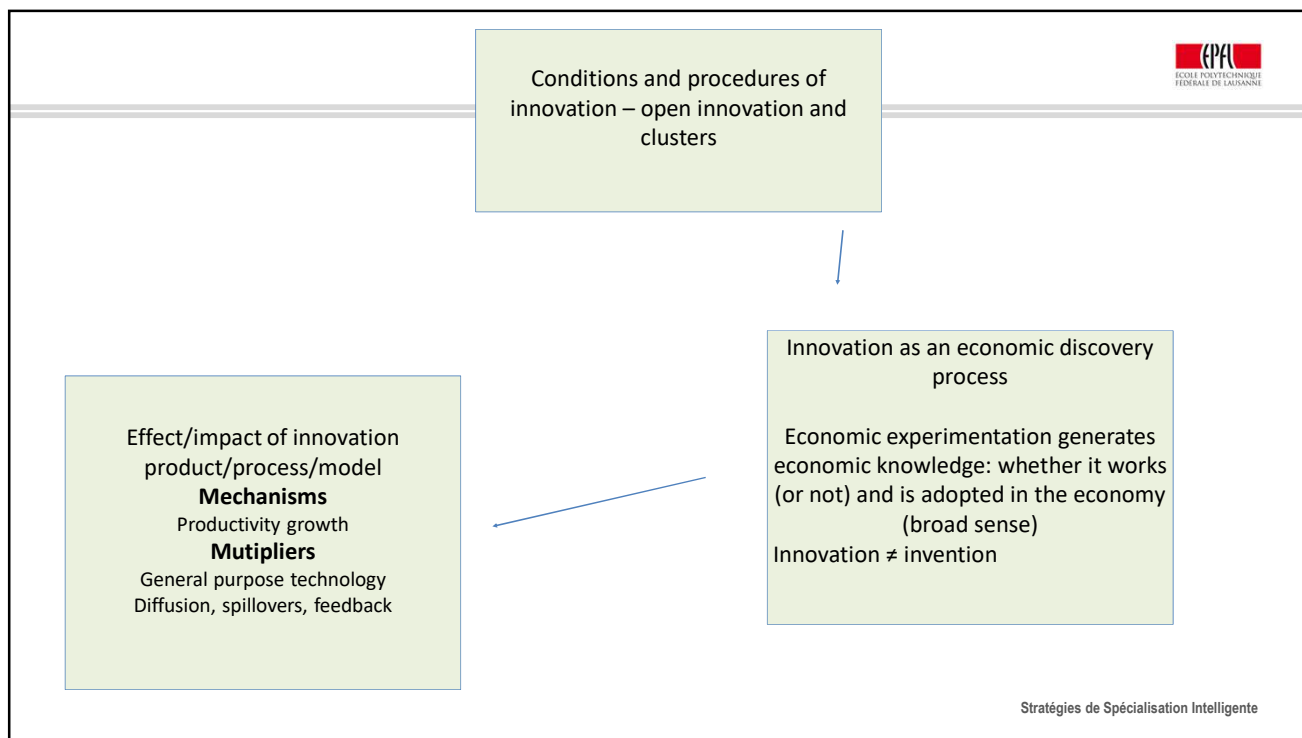
Chapter 2 – Innovation as an economic discovery process



Stratégies de Spécialisation Intelligente

Chapter 1 – Observing and measuring value and impact

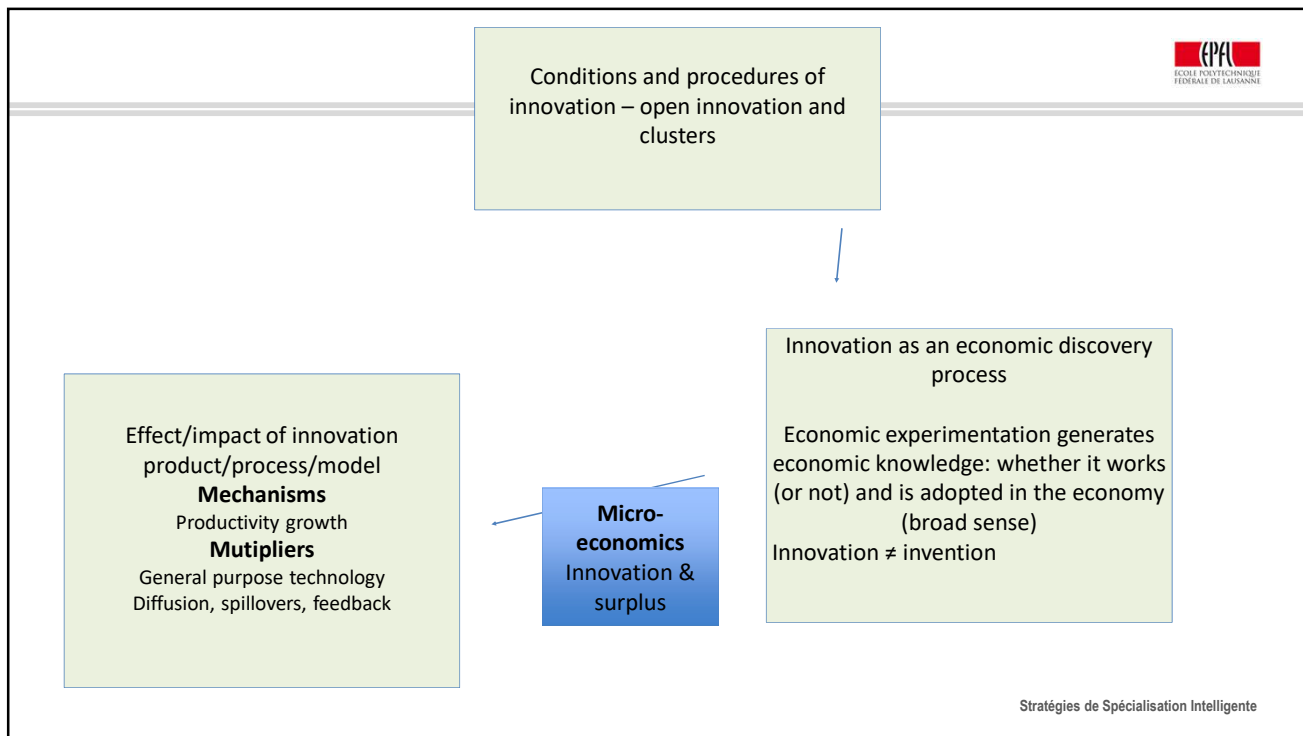




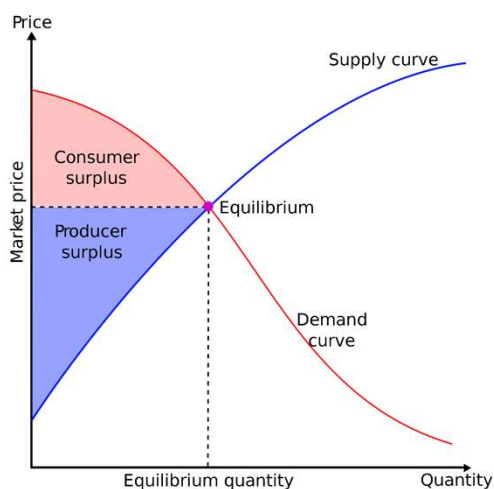
Chapter 7 – Open innovation and clusters



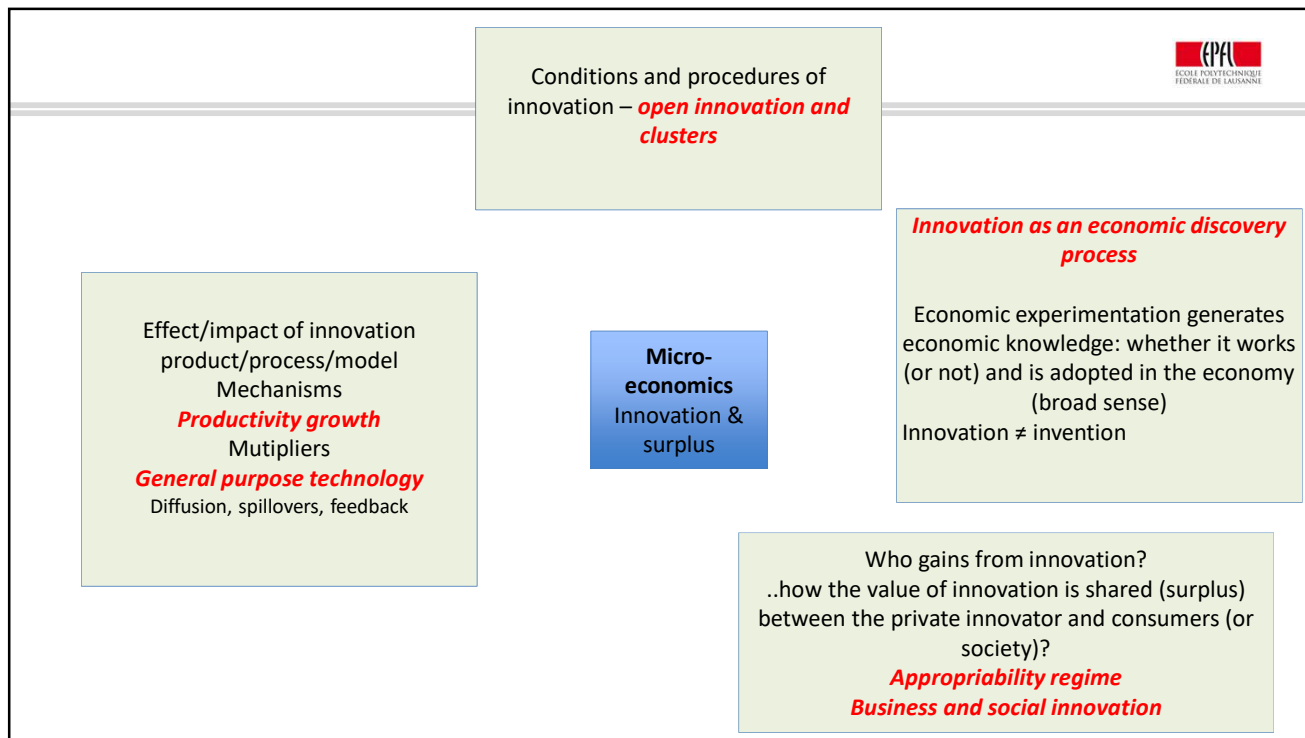
- Open innovation emerged in the electronics and computer industry; has spread to life sciences, supported by a favorable US environment
- To enable such an approach to develop successfully – many factors are needed and must be brought together – concept of cluster
- To be followed in Chapters 10 and 11



Chapters 3 to 6 – Principles of microeconomics



- Demand curve
- Supply curve
- Marginal cost – extracost of producing an additional unit of the good
- Perfect competition
- Surplus
- Pareto optimality
- Why price does converge towards equilibrium?



- *Who gains from innovation?*
- Price regimes in pharma
- Appropriability dilemma

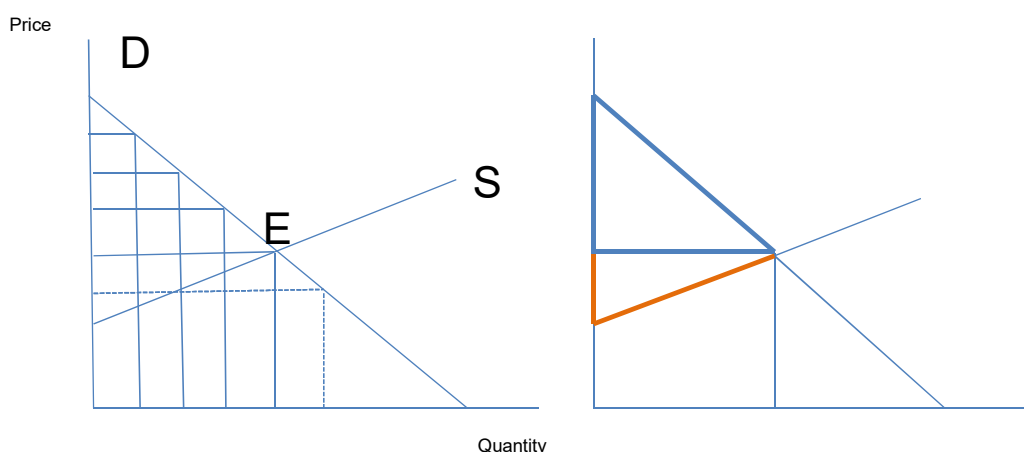
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Stratégies de Spécialisation Intelligente

How is the value captured and distributed?

- Most of the innovations produce social value and private value
 - Social value = value to society
 - Private value = value to the private innovator
 - Social value > private value → the private innovator can't (or does not want) internalise the total value –hence external benefits (to competitors, consumers) or spillovers
- Even if innovators do not generally capture the entire social value, they can capture a substantial fraction
- This is measured by the *appropriability* – the ability/capacity of the innovator to maximize the fraction of the value he/she can capture
- The usual way for innovative firms to capture a large fraction of the value is keeping exclusivity (monopoly) and pricing above marginal cost - which is possible if the exclusivity is solid: not challenged by rivals; last enough time (a patent is valid for 20 years)
- Other ways to capture value?

On 'perfect markets' there is only one equilibrium price

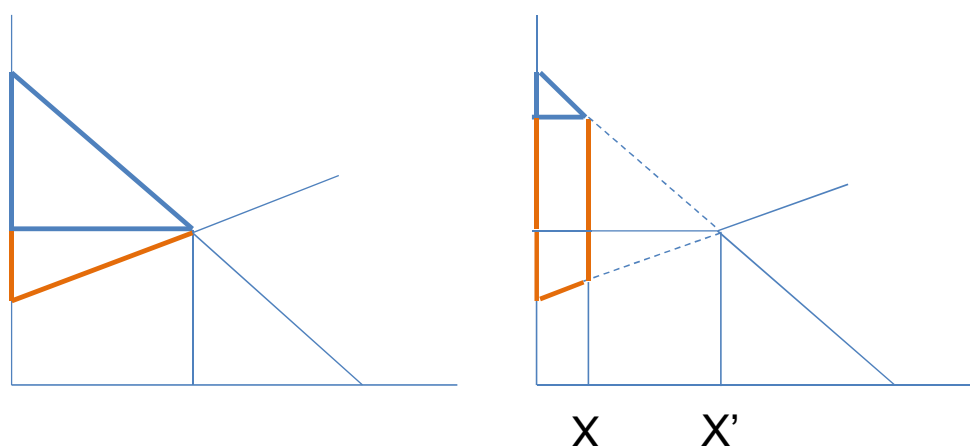


Stratégies de Spécialisation Intelligente

- Starting from the MEP situation, an innovation introduces 2 novelties!
- There is a fixed cost (e.g. R&D) which is not included in the marginal cost curve (this means that pricing at mc will not allow the innovator to cover the R&D cost)
- The possibility of a new market structure because as offering a unique solution the innovator can enjoy a monopoly situation (and can protect this situation for a certain period of time – e.g. patent)
- Conditions **of** pure & perfect competition are not desired by the innovator and **for** pure & perfect competition are not fulfilled
- Monopoly price – the firm can maximize profits by manipulating price and quantities without being constrained by potential entry of competitors at lower price

Stratégies de Spécialisation Intelligente

Distribution of surplus based on market price and monopoly price



Stratégies de Spécialisation Intelligente

How does private innovator capture (appropriate) the value?

- Making a price so as to generate a rent - i.e. an **excessive** revenue obtained from the new product in relation to the costs involved in its production – note that in case of innovation the revenue may be not excessive (because of fixed cost)
 - This is possible when the new offer (product, process) is unique, this unique position is protected (no entry) and some consumers are willing to buy it at the price made by the innovator
 - Try to make the exclusivity period as long as possible (patent = 20 years) - pharma
 - Try to maximize gains during a relatively short period (lead time) and innovate again – fashion, sport
 - There are various mechanisms to capture value – based on exclusivity
 - Patent, secrecy
 - Lead time (copying is difficult and take time)
 - Complementary assets
 - Exclusivity is 'relocated' and focus on complementary products not on the innovation (which is freely diffused) – standard, « razor-blade »

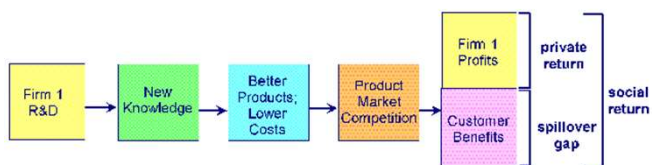
How the ability to capture value can be weakened?



- **Spillovers** – innovating firms cannot capture for themselves all the benefits of the innovation
- **Knowledge spillovers**
 - 'Idea' is a good which is hard to control (non excludable and non rival)
 - IPR efficacy, social relationships, complexity of ideas, tacit knowledge, complementary assets, control on complementary products or inputs
 - Knowledge spillovers make rival entering the market quickly with a similar (or better product) -
- **Market spillovers**
 - The process of competition will typically drive a firm to sell a new device at a price that captures only a portion of its full value – so that consumers also reap some of the benefits from innovation
 - Competition, regulation, public campaign (see slide 21)
 - Market spillovers make that – even with little knowledge spillovers – innovators may encounter difficulties to appropriate the value of innovation

Private and Social Returns to R&D

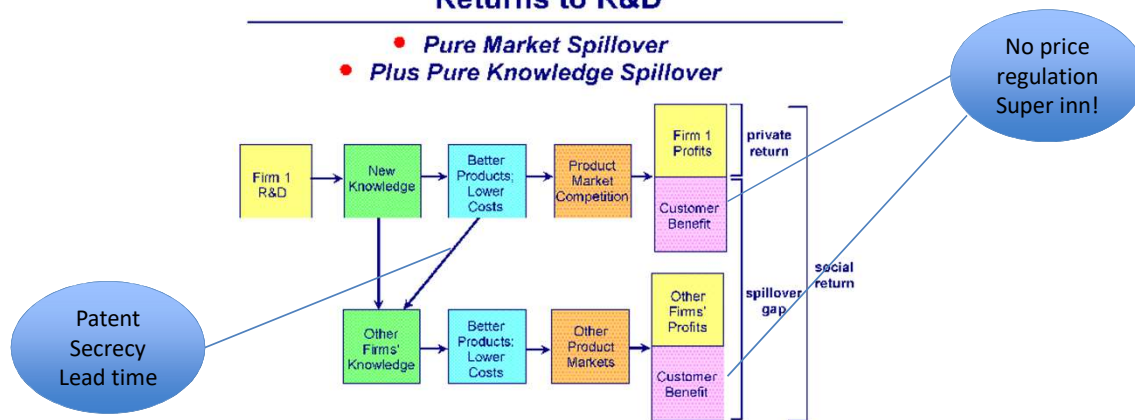
- *Pure Market Spillover*



The quality of the product is increasing but price remains constant : consumer surplus is increasing
 Sources: willingness to pay more is low, price control/regulation, high competitive environment, asymmetric relationships

Private and Social Returns to R&D

- *Pure Market Spillover*
- *Plus Pure Knowledge Spillover*



The appropriability conditions in various biomedical activities

- Drug discovery – large firm - US – strong!
 - Large firm capacity to appropriate value – patent and more – no price regulation (in the US!)
 - See next part (on price formation in the pharma)
- Med tech – start up – Switzerland – moderate!
 - Assymetric bargaining power (relative to large companies)
- Healthcare provider – US – low!
 - Difficult to raise prices (even for an innovative service), no patent
- Vaccine developers – developing countries – low!
 - Many pressures to keep prices low

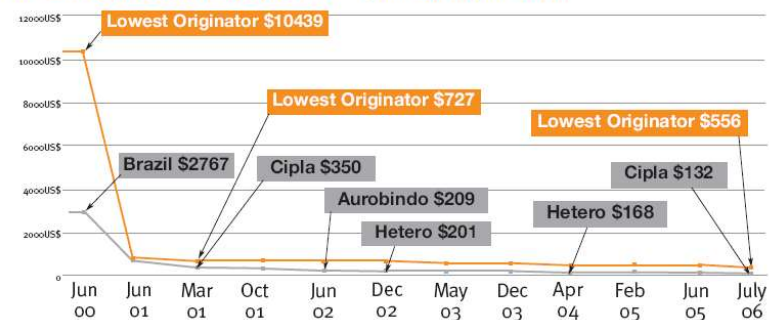


- Who gains from innovation?
- Price regimes in pharma
- Appropriability dilemma

From monopoly to competition : effect on innovation price

Graph 1: Sample of ARV triple-combination: stavudine (d4T) + lamivudine (3TC) + nevirapine (NVP). Lowest world prices per patient per year.

The Effects of Generic Competition June 2000-June 2006

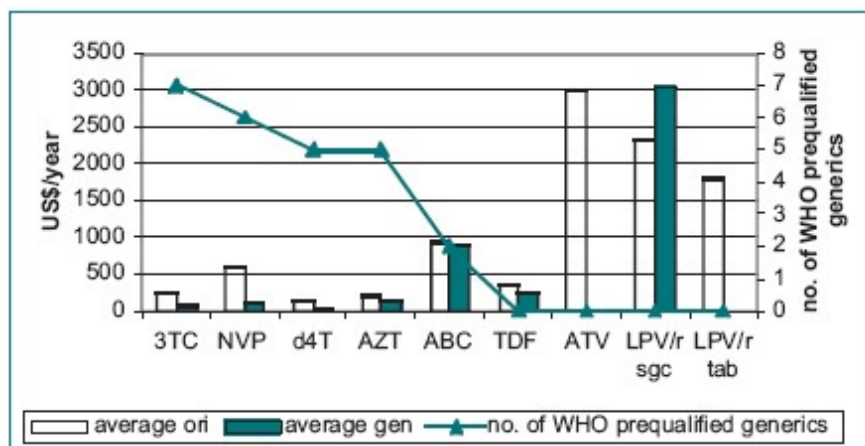


Generic competition has shown to be the most effective means of lowering drug prices. During the last five years, originator companies have often responded to generic competition.

Source: MSF (2006) « Untangling the web of price reductions: a pricing guide for the purchase of ARVs for developing countries »

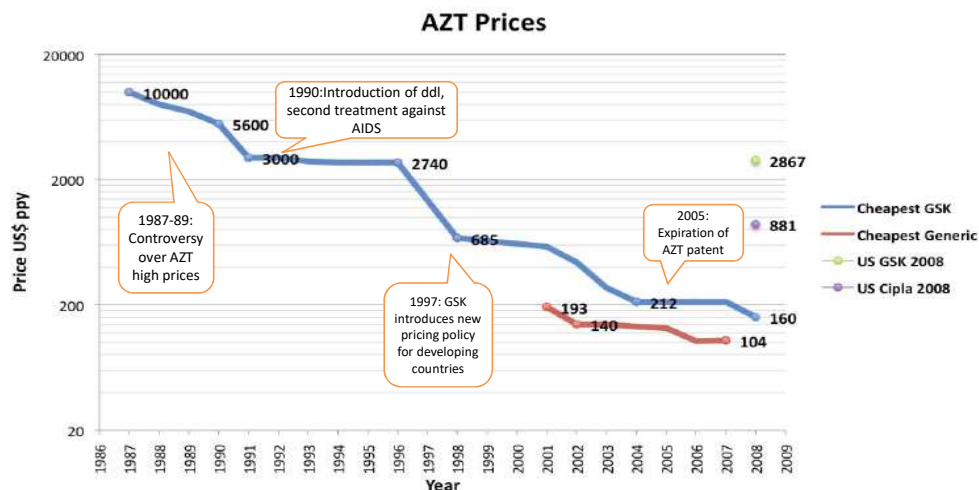
Collège du Management de la Technologie - CDM
Chaire en Economie et Management de l'Innovation - CEMI

Some evidence: cross-section



Source: MSF (2007) « Untangling the web of price reductions »

Some evidence: the effect of market spillovers



Source: based upon Petermann, Turk, Sottas & Abbuel (2008)

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One manufacturer	More than one manufacturer sell (imperfect) substitutes	More than one manufacturer sell the exact same substance
Monopoly	Therapeutic competition	Generic competition
AZT before 1990	Selective serotonin reuptake inhibitors (SSRIs): Prozac, Zoloft,...	Aspirin

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- International reference pricing: price is set at a weighted average of price prevailing in other countries
- Rate of return regulation: profits cannot exceed e.g. 20% of the capital stock (UK)
- Therapeutic benefit: price set by a panel of doctors according to therapeutic benefit of the drug

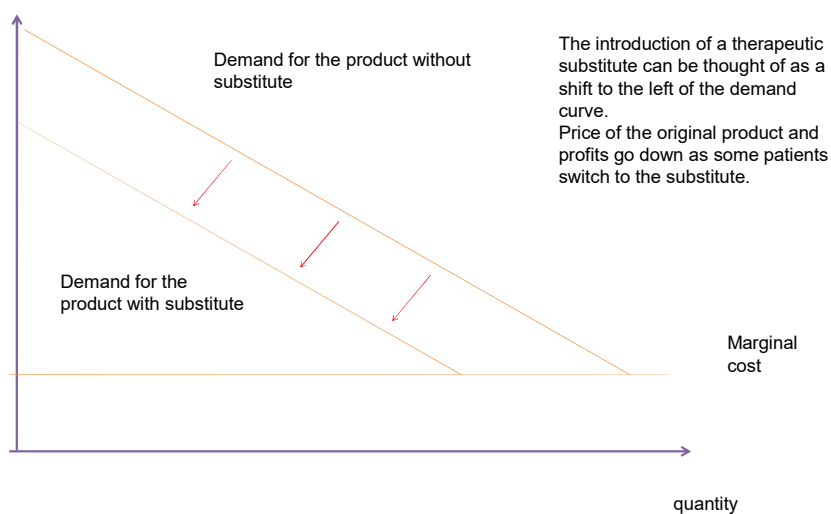
Pricing Regimes in Other OECD Countries, 1996

Main pricing regime ^a	Country
International reference pricing (with UK included in reference basket)	Austria, ^b Canada, Greece, ^c Ireland, Italy, Luxemburg, ^d Netherlands, Portugal ^e
Therapeutic benefit	Belgium, France, Sweden
Therapeutic reference pricing	Germany
Free pricing	US
Cost mark-ups	Spain

Source: Bloom & Van Reenen (1998)

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Effect of the introduction of a therapeutic substitute



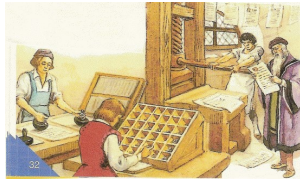
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- Who gains from innovation?
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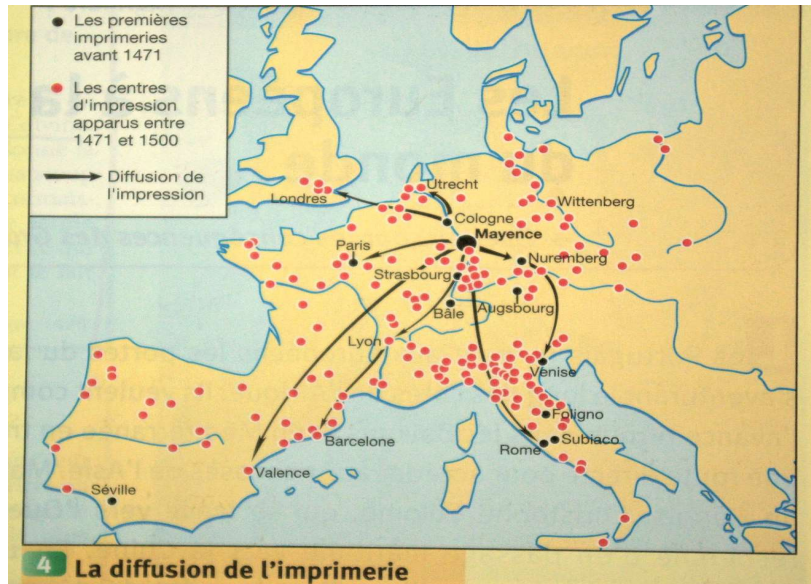
The appropriation dilemma

- There is a dilemma because two 'good things' cannot be obtained simultaneously
- High financial reward (price > marginal cost) – good for innovation, bad for consumers
- Price = cost – good for consumers, bad for innovators
- Dilemma:
 - Pricing innovation at marginal cost (i.e. weak or no property right) leads to under-provision (of R&D).
 - Pricing innovation at monopoly level (i.e. strong property rights) create monopoly distortions (deadweight loss)
- « *In the real world, distributive benefits can be obtained only by some sacrifice in innovation investment resulting from the reduced payoffs to the innovators. Thus, **there is a trade-off** between an increased flow of innovation and the distribution of benefits to others – the resulting rise in overall living standards – because of which **0 externalities cannot be optimal*** » Baumol
- Historical walk towards solutions

The appropriation dilemma – history

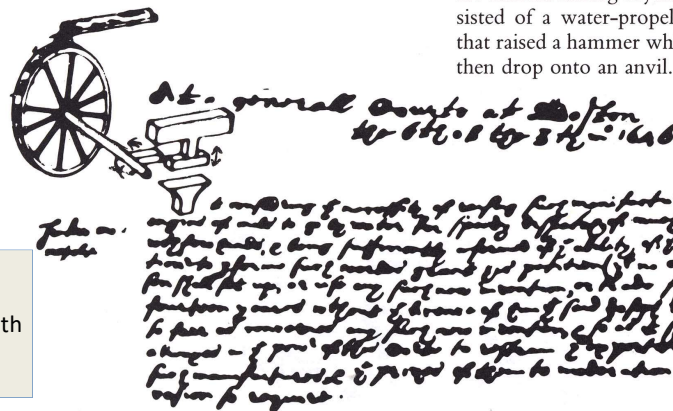


Patent did not exist at Gutenberg time!



First Patent in America—1646

The first patent on machinery in America was granted by the state of Massachusetts in 1646 for a mill for manufacturing scythes. It consisted of a water-propelled wheel that raised a hammer which would then drop onto an anvil.



An institutional revolution – to deal with the dilemma

The appropriation dilemma - history

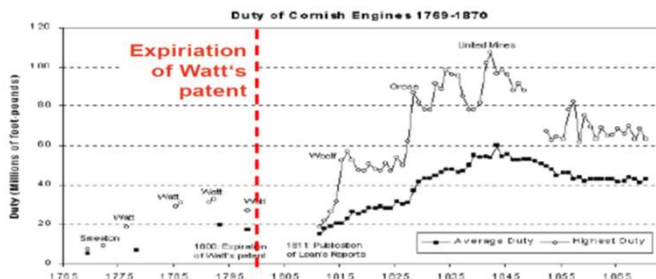


The first patent laws provided exorbitant privileges to the inventor

Patents' costs: Watt's blocking of innovations



- After Watt's patent had expired, a strong performance increase was realized with inventions that were made public, not patented
- Before this time, Watt blocked all attempts to improve his technology



ources: Nuvolari, "Collective Invention..."; Nuvolari, "Collective Invention..."; (2001), citing Lean (1839), Pole (1844), Dickinson and Jenkins (1927), Barton (1969)

Effects of patent on...	Positive	Negative
Innovation	Creates an incentive for R&D and innovation investments	Impedes the combination of new ideas & inventions Raises transaction costs Inhibits cumulative innovation
Competition	Facilitates entry of new or small firms with limited assets Enables vertical disintegration	Creates short-term monopolies, which may become long term in network industries

How to find the right balance between private reward and social benefits?

- Patent quality
- Disclosure function
- Patent fees and tax
- Non patentability of knowledge in certain fields (living organisms, educational methods, scientific results)

«If we did not have a patent system, it would be irresponsible to recommend instituting one. But since we have had a patent system, it would be irresponsible to recommend abolishing it»
Machlup

The appropriation dilemma – history



The State can correct *ex post* exorbitant privileges granted to inventors: patent buy out



Daguerre advertised his process and sought sponsorship, but few seemed interested. He then turned to [Francois Arago](#), a politician, who immediately saw the implications of this process, took his case up, and the French government commissioned a report on the process, to be chaired by [Paul Delaroche](#).

On 7 January 1839 an announcement was made of the discovery, but details were not divulged until 19 August when the process was announced publicly, the French government having bought the rights to the process from him, and given it free to the world.

From the day the announcement was made of this new discovery, the process came to be used widely. The claim was made that the daguerreotype "requires no knowledge of drawing...." and that "anyone may succeed... and perform as well as the author of the invention."

The appropriation dilemma – the best of the two worlds?



- Can we observe innovations priced immediately at market equilibrium level?
- **Strategic (business) choice**
 - To create standard and compete for (not on) the market – but the private capture will be « relocated » to
 - Complementary products (razor-blade business model)
 - Critical inputs (Hirshleifer effect)
- **Default choice**
 - Unability to make a price (market spillovers) – lack of control (knowledge spillovers) – not healthy situation for future innovation
- **State intervention** (patent buy out)
- **Social choices**: entrepreneurs and social innovations

Take home



- Who gains from the innovation? Who does capture the value of innovation?
These questions have profound implications:
 - On financial rewards to today innovators and incentives to future innovators
 - On the distribution of benefits (widely or tiny) – consumer surplus
- There is a dilemma
- Solutions to the dilemma involve **political economy analysis** – depending upon socio-economic conditions (rich versus poor markets), the nature of innovation (vital or not), public finance issues, etc..