**TOPIC 5**

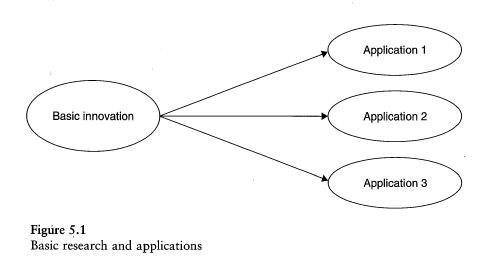
1. **INTRODUCTION**

* Innovators learn from their predecessors
  + Without prior insights innovation might not happen
* Difficult to compensate developers of basic technologies
  + Commercial value usually resides in products that are developed much later
* If ‘founders of ideas’ earn some profit, it is mostly due to licensing fees from later developers
  + This requires that later products infringe patents

1. **HOW SHOULD PROFIT BE DIVIDED BETWEEN SUCCESSIVE INVENTORS?**

* Innovators must not only collectively earn enough profit to cover joint cost
* Profits must be divided that it creates the right incentives at each stage of the innovation process
* Among other feature, each innovator must be able to cover the own costs
* Current IP system is a blunt instrument for this delicate problem

1. **CASE 1 : Basic vs. Applied research**



* Licensing : instrument for passing profits from applications to basic inventor
* If division of profit is insensitive to division of cost, the incentive system will nog work very well

1st innovator

* Social value = x ((1/r) – f\*T)
  + x = per-period value to end users
  + r = discount rate
  + f = fraction of value lost as deadweight loss during patent life
  + c1 = invention cost
* Patent owner’s profits = x\*π\*T
  + π = fraction
* => if 1ste innovation is purely basic science => x = 0

2nd innovator

* Social value = (x + y) ((1/r) – f\*T)
  + y = per-period increment to market value of new product = sum of all future discounted profits
  + c2 = development cost
* Total profit = (x + y) \* π \* T

Social value of 1st innovation should reflect option for the 2nd

x((1/r) – f T) – c1 + max[0, y((1/r) – fT) – c2]

Goals of patent system

* Ensure investment into 2nd innovation whenever y \* ((1/r) – f\*T) > c2
* Transfer enough surplus to 1st innovator
* Consider 1st innovation is pure science, i.e. x = 0.
  + There would be no value without 2nd innovation
  + 1st innovation would never exist if inventor could not benefit from 2nd

1. **Terms of licensing : 2 ingredients**

Threat points

* For each firm, the threat point is expected profit it can guarantee itself when it leaves the bargaining table

Bargaining surplus

* Amount by which the 2 firms will be richer in total if they actually make a licence deal

1. **Cases**

Ex-ante license : make deal before 2nd invests c2

* If 0.5y πT – c2 > 0

No ex-ante, no investment by firm 2

* 0.5y πT – c2 < 0

No ex-ante license, firm 2 invests, ex-post license

* They would bargain and threat point is profit if no license deal is made
* Profits are

x πT + 0.5y πT – c1   
and 0.5y πT – c2

No ex-ante license, firm 2 invests, no ex-post license

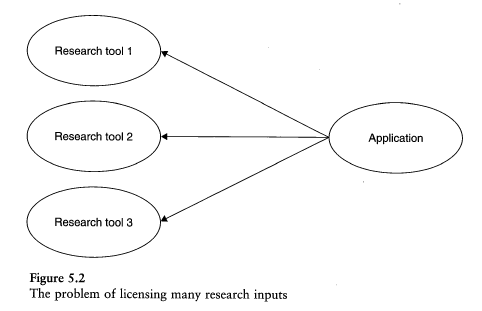
1. **Consclusions**

* Being constrained to resolve blocking patents might put 2nd generation of products in jeopardy
  + 2nd innovator knows that it may have to pay license fees
  + 2nd innovator will not invest unless the value of the innovation >> costs
  + Resolving blocking patents ex-ante can expand the circumstances in which 2nd product is developed
* To ensure that costs of both innovators are covered, patent life T might have to be longer than if same innovator had developed both innovations
* Society’s interest might be aligned with 1st innovators interest
  + 2nd innovation is never in jeopardy if ex-ante licenses can be made
  + From society’s perspectivy, one would need to insure that 1st innovator can cover costs
    - This could be achieved if the 1st could make a take-it-or-leave-it license offer to 2nd innovator and thus collect all net profit on 2nd
    - Beneficial for society, as 2nd innovation is not going to happen without 1st.
    - Unlikely

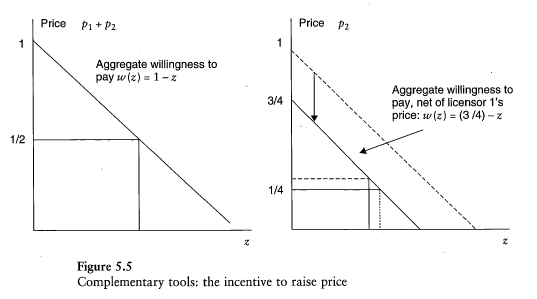
1. **Remarks**

* Research exemption on 1st innovation is beneficial for its owner
  + 2nd innovation can be developed without a license but cannot commercialize
  + Improves 1st bargaining position as bargaining occurs after investment of 2nd
* Division of cost is not sensitive to innovators’ relative cost. If c2 increases, the 1st innovator has to offer more generous license terms
  + Not vice versa
  + As 1st ‘s costs are already sunk when 2nd enters the game
  + Increasing T will help
* Current patent legislation does not address these issues
  + T is same for all patents
  + Research exemptions exist for universities but not for firms

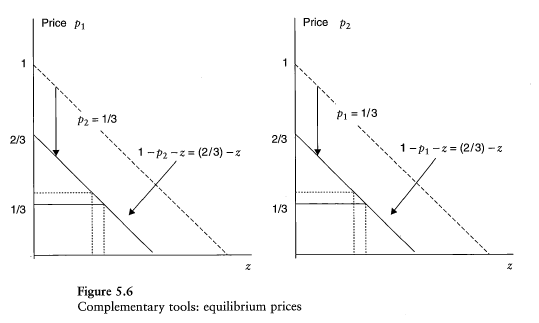
1. **CASE 2 : Research tools**



* Suppose : 2nd innovation requires input from several 1st generation innovations
* Combined price of multiple research tools can be so high => 2nd generation user is excluded
* Can be explained by Cournot model-type: assume products (here research tools) are complements
* Combined price means the owners of research tools form a cartel. Then each provider has an incentive to deviate from collusive price.
* Possible solution: Patent Pools
  + Owners of patents put there patents into a pool, and registered users pay a fixed license fee to everybody = Cartel with contract



* Aggregate willingness-to-pay curve
  + = demand curve for both research tools together
* z users : sorted by willingness to pay
* Licensors form monopoly and charge monopoly price
  + (MC = 0 here) 🡺 p = ½ 🡺 each provider gets p1=p2=¼.
* Right panel shows:
  + Licensor 2 has incentive to deviate from that price 🡺 it would increase profits
* 🡺 take licensors 1 choice as given, and subtract price of ¼ from licensor 2’s demand curve.
  + If licensor 2 would serve less users, profits would increase
  + Max is at MRR = MCC = 0



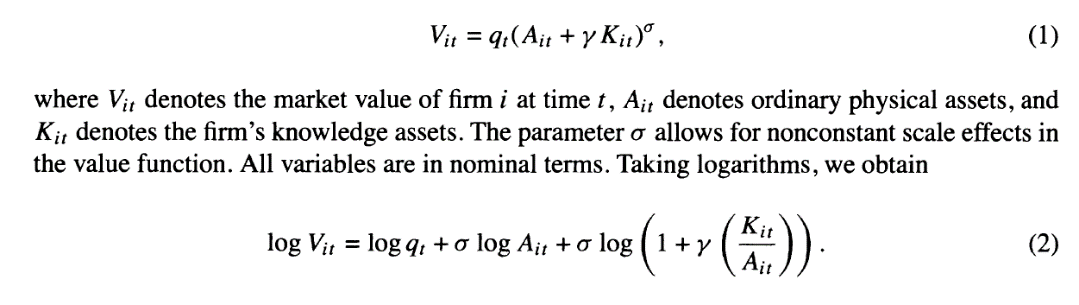
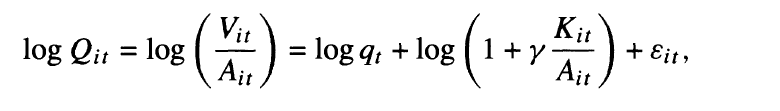
* Licensor 1 would react to the p-change of licensor 2 and also choose profit-optimal price
  + When they price separately, equilibrium p1=p2=1/3
  + Thus total price for user p1+p2 = 2/3 > ½
  + Both could actually increase profits by charging jointly ½ each.

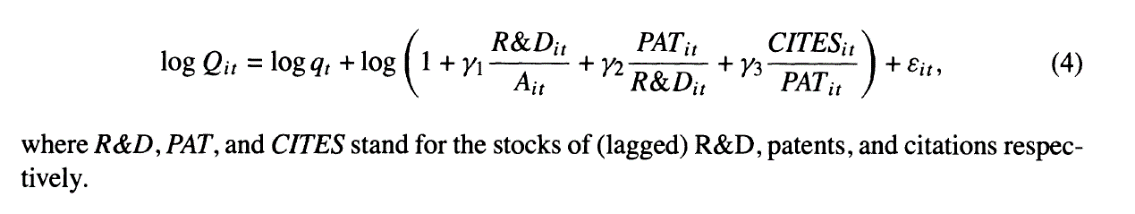
Extra

* Cursus : 5.4 and 5.5 and 5.7

1. **CASE 3 : Quality ladders**

* The more frequently a patent is cited in subsequent patent applications, the more social (and thus also private) value it might have





* Hall, Jaffe and Trajtenberg
  + Used patent citations
  + Showed that those patents that are referred to more often in subsequent inventions are more valuable
* Czarnitzki/Hussinger/Leten (2011, working paper) go one step further:
  + The European Patent Office classifies patent references
  + Some are cited because they describe the state-of-the-art
  + Others are cited because the insights made there do actually challenge the inventive-step of the new patent applications

