Competition policy and intellectual property rights

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Competition policy and IPRs

• Tension between competition policy and IP protection
  – IPRs reward inventors by granting them market power
  – Competition policy prevents undeserved market power, or limits its exploitation

• Areas in which tension emerges
  – Compulsory licensing of patents, copyrights and trade secrets (e.g. Microsoft)
  – FRAND licensing (e.g. Qualcomm)
  – ...

This talk

• Optimal level of IP protection
• Optimal form of IP protection
• Recent theories that may shed light on the intersection between competition policy and IPRs (Segal and Whinston 2007)
Optimal level of IP protection

• Nordhaus’ trade-off
  – IP protection serves to provide incentives for the creation of innovative knowledge
  – However, it does so by granting inventors market power, which is socially costly
Optimal level of IP protection

• What is the optimal resolution to this trade-off?
• In a simplified model (Denicolò 2007), one obtains:

\[
\text{profit ratio} = \text{elasticity of the supply of inventions}
\]
Optimal level of IP protection

• **Profit ratio**
  – ratio between the profits that IP holders actually get to the maximum hypothetical profits that they would get with complete protection

• **Elasticity of supply of inventions**
  – percentage increase in the number of inventions associated with a one percent increase in R&D expenditure
Elasticity of inventions

• Many empirical estimates based on the “innovation production function” approach
  Estimates range from 0.2 to 0.95
  – However, most cluster around 0.5/0.6
• Other approaches:
  – Acemoglu and Linn (2004): natural experiment in the pharmaceutical sector: elasticity between 0.8 to 0.85
  – Jones and Williams (2001): calibration of endogenous growth model: elasticity greater than 0.5
• No available estimate for copyrightable material
  – but arguably significantly smaller
## Profit ratio: length

<table>
<thead>
<tr>
<th>Patent life (in calendar time)</th>
<th>Real interest rate</th>
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<tbody>
<tr>
<td></td>
<td>2%</td>
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<tr>
<td>20</td>
<td>.33</td>
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<td>.30</td>
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<td>15</td>
<td>.26</td>
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<td>12</td>
<td>.21</td>
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Profit ratio: breadth

- Patent protection is limited not only in length, but also in “breadth”
  - Inventing around a patent
  - Follow-on innovations
  - Imperfect enforcement of IP rights
- Probably limited breadth contributes more than finite length to reducing the profit ratio
Optimal level of IP protection

- Any assessment is inevitably highly tentative
- For patentable innovation, what evidence is available does not seem to indicate that patent holders are systematically over-compensated
- For copyrightable material, the risk of systematic over-compensation seems more concrete
Cumulative innovation

• Many authors argue that patent protection can actually impede technological progress when innovation is sequential
• However, one must distinguish between two different issues
  – The optimal division of profit between first and second-generation innovators
  – The joint optimal profit level
Cumulative innovation

• Wrong division can indeed impede innovation
• However, the joint profit level should actually be greater than in the stand-alone case
  – There is a positive externality among innovations, so in the market equilibrium there is even more under-investment than in the stand-alone case
Cumulative innovation

• In addition to wrong division of profits, however, other effects might be at work
• Bessen and Maskin (2009) argue that patents may impede the sharing of intermediate technological knowledge
  – However, their model is based on a number of strong assumptions (e.g. intermediate knowledge not licenseable; no entry by imitators etc.)
Optimal form of IP protection

• Any level of IP protection may be provided in different ways
  – Optimal combination of length and breadth (Gilbert and Shapiro, 1990)
  – Breadth itself is a multi-dimensional variable
    • optimal combination of various aspects of breadth
Kaplow’s ratio test

• An intuitive, general criterion of optimality (Kaplow, 1984)

• Optimal policy should minimise the ratio between deadweight losses and profits: 
\[ \frac{D(x)}{\pi(x)} \]
Breadth and length

• As an example, consider the Gilbert and Shapiro problem
• Here, $x$ is patent breadth which is taken to be the price-cost margin that the IP holder can charge
• Typically, $D(x)$ is increasing and convex, while $\pi(x)$ is (over the relevant range) increasing and concave
Breadth and length

• Therefore, increasing breadth (i.e. $x$) increases the Kaplow ratio

• On the other hand, increasing length leaves the ratio unchanged
  – assuming stationarity, total discounted deadweight losses and total discounted profits increase at the same rate as length increases

• Hence, Kaplow’s ratio is minimised when length is highest and breadth is lowest (given the target level of profit)
Competition and innovation

• Can competition be good for innovation?
  – If yes, then no conflict between competition policy and IP protection

• Various theories
  – Incentives to innovate are higher when firms are neck and neck
  – Technological leaders have larger market shares when competition is more intense
  – ...

Segal and Whinston

- Model of sequential innovation
- Standard assumption: the latest inventor instantaneously becomes the new incumbent
  - See e.g. endogenous growth theory (Aghion and Howitt 1992, Grossman and Helpman 1991) or the optimal patent design literature Green and Scotchmer 1995)
- Hence, stronger competition policy (i.e. more restraints on the incumbent’s behaviour) means weaker IP protection
Segal and Whinston (2007)

• They assume that it takes some time (i.e. one period in their discrete time model) for the latest inventor to become the new incumbent
• In that period, the inventor is an entrant that competes with the previous incumbent (i.e. the penultimate innovator)
Segal and Whinston

• Competition policy affects
  – The joint profit of the incumbent and the new inventor
  – The division of profit between the two firms

• Harsh competition policy reduces joint profits but facilitates entry and hence increases the new inventor’s share
Segal and Whinston

• Abstract from any effect on joint profits
• Then, harsher competition policy
  – favours the new inventor in the current period
  – harms the new inventor in some future period, when he will be the incumbent facing entry by the next inventor
Segal and Whinston

- If a transversality condition holds, the former effect must prevail on the latter (front-loading effect)
- In this case, harsh competition policy is good for innovation
Conclusion

• Competition policy may serve to reduce excessive market power created by IP protection
• However, extreme caution must be exercised as inventors may actually be under-compensated
• Arguably, over-compensation (and hence the scope for harsh competition policy) is more likely for copyrightable material than for patentable innovations