

Licensing Probabilistic Patents, Liability Rules and Injunctions

Economic Behavior &
Interaction Models

EBIM



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EBIM–Economic Behavior & Interaction Models.

1. Motivation

Patent law should encourage innovation and the dissemination of knowledge by providing exclusivity in exchange for knowledge disclosures. The value of exclusivity derives from two penalties imposed on infringing parties: injunctions that stop subsequent use and damages in compensation for previous use.

Two liability rules are commonly used by the courts for calculating the damage payments. The first is that the infringer must reimburse the property owner's **lost profits (LP)** and the second is that he must disgorge his **unjust enrichment (UE)**. Treating patents as well-defined rights to exclude rivals has permitted economists to focus on the important and complex relationships among patents, innovation, competition, and diffusion of technology.

This framework has informed research on a wide range of topics, including patent races, technology transfer through licensing, and research joint ventures.

Recently economists have changed their idea about patents as well-defined property rights giving their owners either a monopoly over some market or at least a significant competitive advantage in that market.

The models developed some years ago had tended to assume that the patent was valid, that it granted a right of definite scope, and that competitors respected that right or were forced by courts to do so through legal procedures.

However, as was noted by Lemley and Shapiro [2005] the patent holder just gets a right to sue infringers, under the charges of unauthorized use of a property right, once in the court the patent is proved invalid or upheld, whether the patent is declared valid legal mechanisms enter in scene for punishing and for deterring infringement, in another case the exclusivity rights of the patent holder disappear.

2. Licensing Probabilistic Patents, Liability Rules and Injunctions

In order to give private agents incentives to engage in costly research and development activities, intellectual property rights, such as patents, copyrights, and trademarks, are assigned to innovators. These property rights include the right to license innovations to other firms.

There is a huge literature that has analyzed issues related to licensing under well defined (ironclad) property rights, many of this work was related to comparing the impact of different licensing methods on the market structure and the revenue of the patent holder (see Kamien and Tauman [2002] and Sen and Tauman [2007] for a survey of the most important results).

However this early literature has considered patent as ironclad rights, meaning that once unauthorized use of a patented technology is found, the legal system takes actions in order to deter and to deter infringement of the patented technology.

Assuming vertical licensing relationships and ironclad patents, by comparing two doctrines of damages, LP and UE Schankerman and Scotchmer [2001] concluded that UE protects the patent holder better than LP in the case of proprietary research tools. Both can be superior to a property rule (injunctions), also depending on how much delay is permitted before infringement is enjoined,

and for cost-reducing innovations, these conclusions can be reversed.

In contrast Anton and Yao [2007] and Choi [2006] independently developed equilibrium oligopoly models of patent infringement for horizontal competition in which they analyze the impact of patent infringement damages on market competition by considering patents as probabilistic property rights, they concluded that is optimal for the imitator to infringe.

3. Objective

Further research is needed to understand how damage rules and injunctions effect the market shape competition and licensing. In particular when probabilistic property rights are considered. In this context, also royalty and fixed fee negotiations between a patent holder and a downstream firms should be studied.

My project aims to contribute to the literature of licensing games, and fill the gap existent between licensing games, liability rules and Injunctions. the questions that I expect to answer are the following:

1. Are royalty rates a better mechanism for licensing than fixed fees for the patent holder?
2. Why do we observe so much infringement and little licensing?
3. Is LP better than UE for the patent holder /consumers/ society?

4. Model Framework

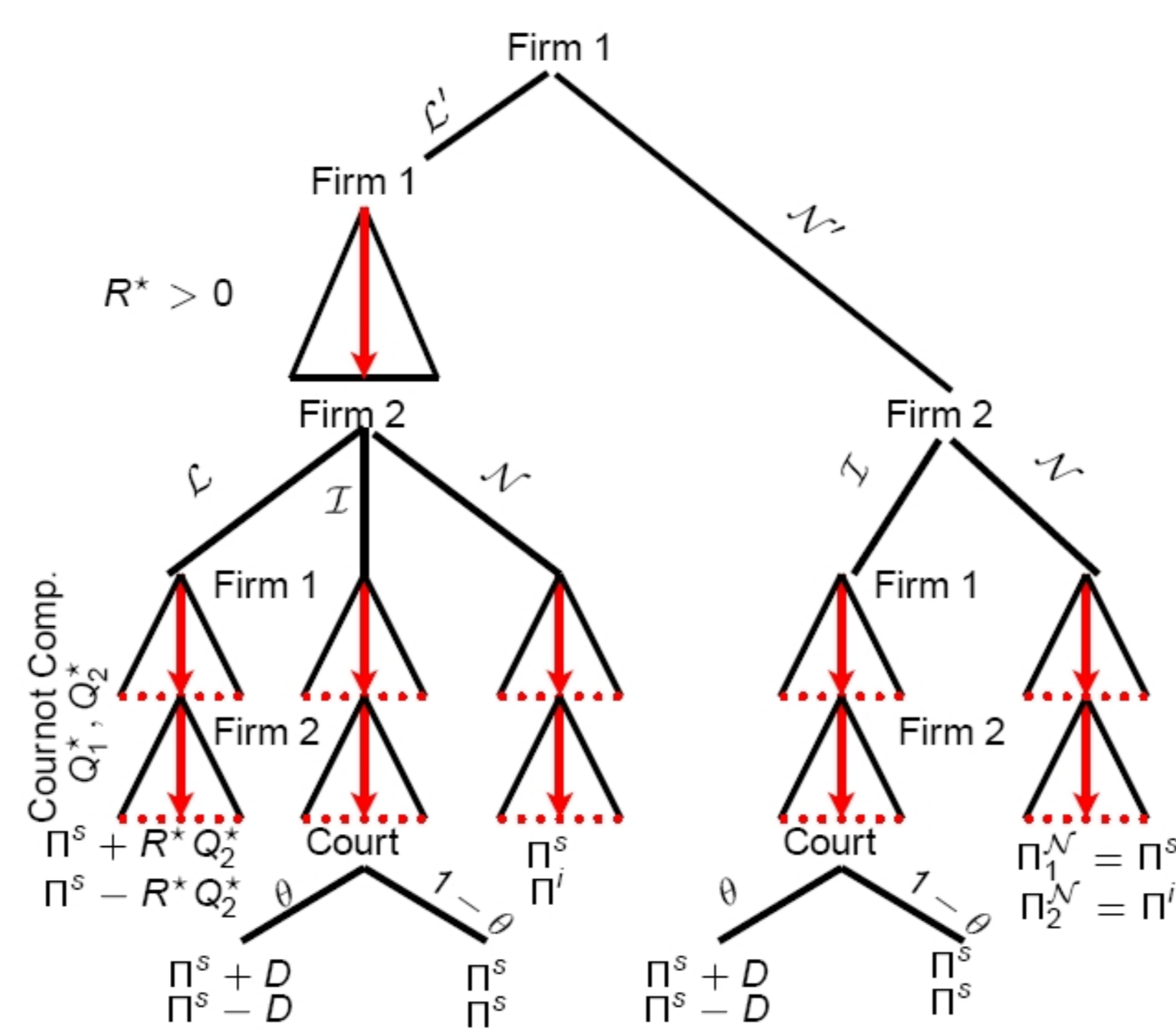


Figure 1: Licensing cost reduction innovations.

The approach that I use is the game theoretical, and is based in the following assumptions:

1. There are two suppliers of a product: Firm 1 and Firm 2 and both firms produce under a fixed marginal cost C .
2. The Firm 1 (Patent Holder) gets a patented cost reduction innovation that reduces the cost from C to $C - \epsilon$, where $0 < \epsilon < C$.
3. $\Pi_i^s(Q_i, Q_j) = (P - C - \epsilon)Q_i$
4. $\Pi_i^i(Q_i, Q_j) = (P - C)Q_i$
5. The Firm 1 could license its innovation to the Firm 2 (Incumbent) (L') or not (N'). A license is offered against a fixed fee (F) or a royalty rate (R).
6. Firm 2 decides to take a license (I) and pay F or R , to infringe the patent (I), or to use the old tech. (N).

7. Firms compete in quantities and face a inverse linear demand $P = A - Q$
8. There is a common knowledge value θ that reflects the strength of the patent and if infringement is proved in a court there are damage payments.
9. Damage payments are calculated using the LP or the UE rule, where $D^{LP}(Q_1, Q_2) = \max\{\Pi_1^N - \Pi_1^s(Q_1, Q_2), 0\}$ and $D^{UE}(Q_1, Q_2) = \Pi_2^s(Q_1, Q_2) - \Pi_2^N$.

5. Equilibrium results under LP and UE

Once the game is solved I arrive to the following results:

1. Licensing by a royalty rate is preferred to licensing by a fixed fee for the patent holder for any positive fixed fee.
2. The patent holder will never license under UE (drastic or not) a similar situation is obtained when the LP rule is used but, when the innovation is sufficiently big (Areas 6,7), licensing is more profitable for the patent holder just under the LP rule.
3. For medium and big innovations LP gives more incentives to the patent holder compared to the UE rule (Areas 2,3,5,6,7).
4. Consumers are better off under the UE rule for big innovations and drastic ones (Areas 6,7) and are at least as good as in the LP rule with medium size innovations (Area 5) and just better off under LP when the innovation is small (Areas 1,2,3,4).
5. The social welfare is bigger under UE for big and some small innovations (Areas 3,4,6,7), is at least as good as the LP rule for medium innovations (Area 5) and is lower for a small group of innovations (Areas 1,2).

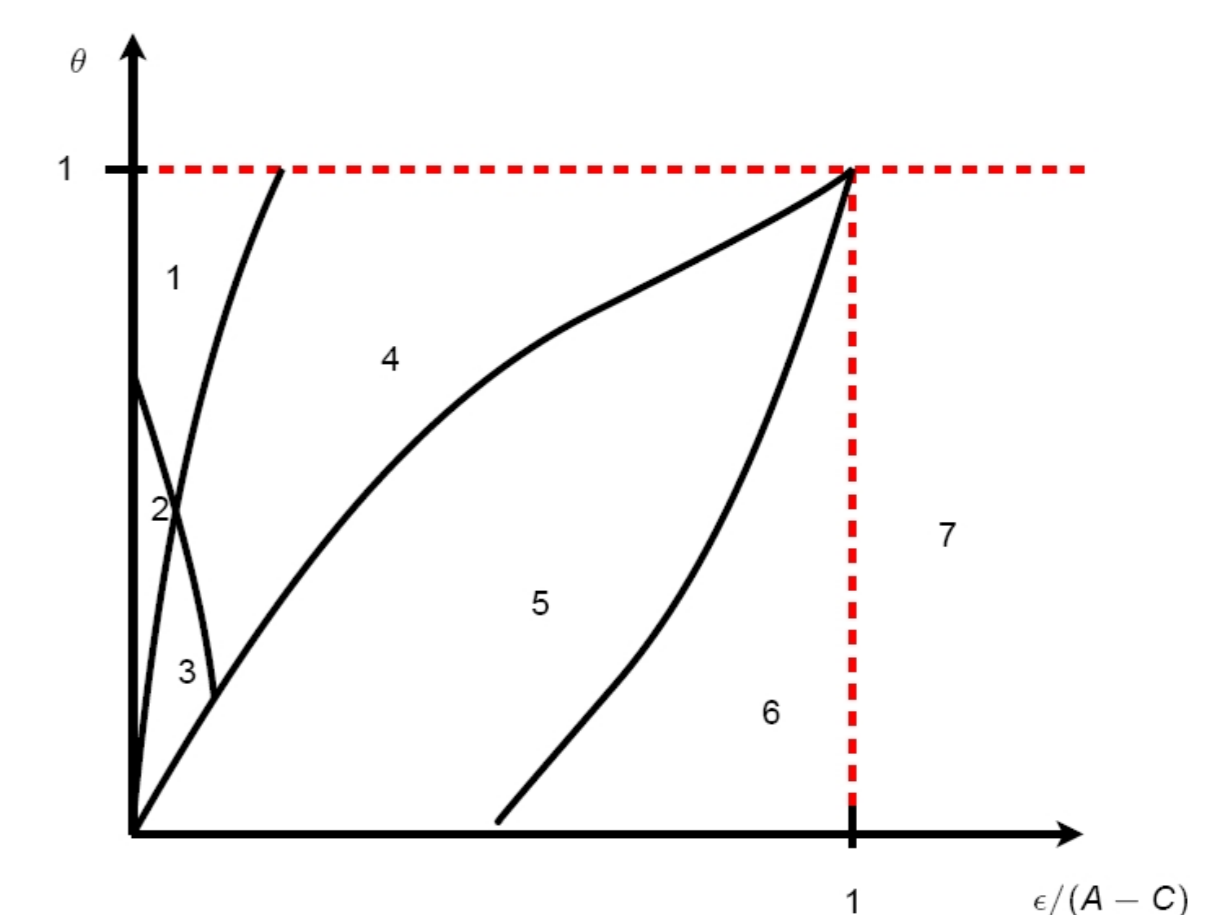


Figure 2: Equilibrium outcomes depending on the innovation size ($\epsilon/(A - C)$) and the patent strength (θ).

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