

IMPACT OF LITIGATION AND PATENT OFFICE
POLICY ON THE SEARCH FOR PRIOR ART

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January, 2010

MOTIVATION

- There is concern that 'bad' patents have been granted (Lemley, 2000 & Merges, 1999).
 - Duplication of innovation costs.
 - Unnecessary monopoly power.
- Innovators are often better at searching for prior art than a patent office, but they may lack incentives to search.
- Patent applicants are required to disclose all relevant known information with their application (Lemley, 2000 & Cotropia, 2007).
- Decision is influenced by:
 - Patent office checks patent applications (public enforcement).
 - Competitors decide whether to challenge patents through litigation (private enforcement).

MOTIVATION

RESEARCH QUESTION

- What impact does patent office and competitor behaviour have on the incentives to innovate and search for prior art?
- Does an increase in patent office search lead to an increase in innovator search and improve welfare?
- How do public and private enforcement interact?

MOTIVATION

LITERATURE

- Lemley (2000) – how much should the patent office search.
- Chiou (2008) – find that public and private enforcement can be complements.
- Caillaud and Dechêne (2009) – overloading at the patent office.
- Langinier and Marcoul (2009)
 - consider search and disclosure.
 - no innovation or litigation.
- Atal and Bar (unpublished)
 - consider search intensity.
 - no litigation.

MODEL

STAGE ONE: SEARCH FOR PRIOR ART

- Three players: innovator, competitor and patent office.
- Innovator
 - receives idea which is valid (novel) with probability α .
 - decides whether to search for prior art where cost of search is $s > 0$.
- Search is perfect: prior art will be found iff it exists.
- If search conducted and
 - prior art found: idea is invalid \Rightarrow innovator cannot patent.
 - no prior art found: idea is valid.
- Innovators cannot credibly reveal whether they searched.

MODEL

STAGE TWO: INNOVATION

- Innovator decides whether to invest in innovation.
- If search revealed prior art, they can invest at cost 0 but cannot apply for patent.
- Otherwise, they can invest at cost $i > 0$ and apply for patent.
- Innovator payoff =
$$\begin{cases} \pi_M, & \text{with patent protection} \\ \pi_D, & \text{without patent protection} \end{cases}$$
- Assumption: $\pi_M > i > \pi_D > 0 \Rightarrow$ worthwhile to invest in novel innovations iff they can earn monopoly profits.

MODEL

STAGE THREE: PATENT OFFICE DECISION

- If application received, patent office searches for prior art at cost s .
- Assume the patent office follows a predetermined strategy of always searching or never searching.
- If prior art exists, office finds it with probability $p \in (0, 1)$
 \Rightarrow patent office has less knowledge than the innovator.
- Patent granted iff prior art is not found.
- Allison and Lemley (1998) find that 54% of patents are found to be valid at final judgement at district/federal court.

MODEL

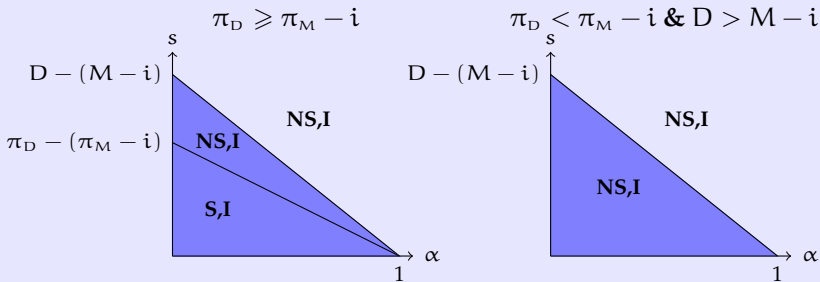
STAGE FOUR: LITIGATION

STAGE FIVE: ENTRY

- Stage Four: Litigation
 - Potential competitor decides whether to litigate.
 - Litigation is equally costly to both parties (cost L).
 - Potential competitor observes whether patent has been granted, but not whether the innovator searched.
 - Litigation perfectly determines the patent's validity.
- Stage Five: Entry
 - If innovator still holds a valid patent, the competitor cannot enter, and innovator earns π_M .
 - If innovator does not hold a valid patent, the potential competitor can imitate at no cost \Rightarrow both firms earn π_D .

NO ENFORCEMENT

PATENT OFFICE ALWAYS GRANTS + NO LITIGATION

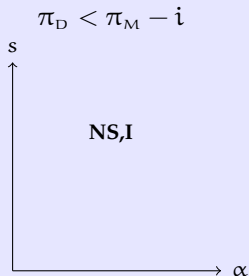
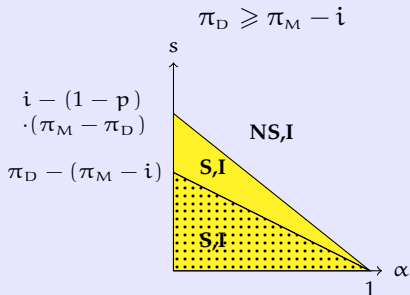


- $\pi_D \geq \pi_M - i$:
 - Innovator searches for low s .
 - Socially optimal to search for $s < (1 - \alpha)(D - (M - i))$ but innovator does not search enough.
- $\pi_D < \pi_M - i$:
 - Innovator never searches.
 - Socially optimal to search if $s < (1 - \alpha)(D - (M - i))$.

PUBLIC ENFORCEMENT

PATENT OFFICE SEARCHES + NO LITIGATION

CASE A: $p \leq p^{p^o}$

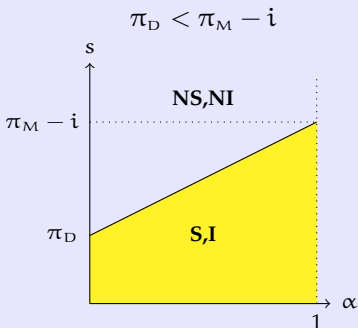
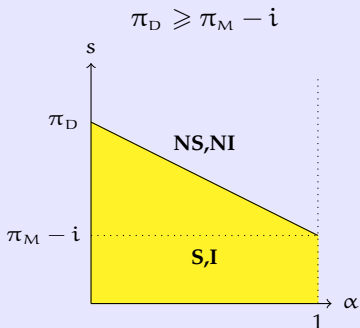


- $\pi_D \geq \pi_M - i$:
 - Innovator searches more.
 - Reduces welfare when s is sufficiently low or high.
- $\pi_D < \pi_M - i$:
 - No change in innovator strategy.
 - Reduces welfare when s is sufficiently high.

PUBLIC ENFORCEMENT

PATENT OFFICE SEARCHES + NO LITIGATION

CASE B: $p > p^{PO}$



- Optimal to search in both cases if $s \leq \alpha(\pi_M - i - \pi_D) + \pi_D$.
- As α increases, more likely to receive $\pi_M - i$ than π_D .
- (NS,NI): No enforcement is better than public enforcement.

PUBLIC AND PRIVATE ENFORCEMENT

PATENT OFFICE SEARCHES + COMPETITOR CAN LITIGATE

- If $p > p^{PO}$,
 - innovators never invest in innovation without first searching.
 - no litigation \Rightarrow public enforcement crowds out private enforcement.
- If $p \leq p^{PO}$
 - innovators search for a larger part of the parameter space compared to public enforcement alone.
 - innovators now search with a positive probability when $\pi_M - i > \pi_D$.
 - innovators choose not to innovate when α is low and s is high.
 - there is no private enforcement when α is high.
- If $p \leq p^{PO}$ and p increases
 - the innovator searches and invests in innovation more.
 - the competitor litigates less.

CONCLUSION

- Public enforcement encourages innovators to search for prior art but may also discourage innovation.
- When we allow for both public and private enforcement, compared to public enforcement,
 - private enforcement declines as public enforcement becomes more efficient. If p or α is high enough, the competitor may not litigate at all.
 - there is more innovator search if $p \leq p^{PO}$.
 - there is always some region of parameters where the innovator will not innovate.
- Enforcement not only reduces the number of 'bad' patents that are granted, but it also reduces the number of 'bad' patents that are applied for.