Good and Bad Licensing

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1 Motivation

It is not clear how markets for IP work, whether they should be reformed, and how

- cf. FTC hearings on the evolving IP marketplace

A key distinction between IP and tangible property:

- In the case of IP it is difficult to clear rights prior to investing

A rise of new IP business model(s) over the past decade.

- Non-practicing entities (NPEs)
  - Firms that buy, sell/license and enforce IP
  - Do not primarily manufacture nor do R&D

In the market for IP many think NPEs are bad ("trolls")

- NPEs merely search for *ex post* licensing opportunities
  - e.g., the cases of *NTP v. RIM*, *eBay v. MercExchange*

$\longrightarrow$ NPEs are tax on innovation

$\longrightarrow$ unnecessary enforcement costs

Like in other markets with frictions, many think "NPE-type" intermediaries are good

- via *ex ante* licensing NPEs provide technology sourcing

Our goal

Positive and normative analyses of licensing & technology markets abstracting from traditional R&D externalities

- Modeling costs and benefits of NPEs, ex ante and ex post licensing
- What leads to the entry of NPEs?
- How the recent U.S. supreme court decisions affect the licensing markets and welfare?
- How should the patent system reformed?

Literature

Weak patents: Shapiro (2006) and Farrel and Shapiro (2008)

Ex ante and ex post licensing: The works of Scotchmer etc

Economics of NPEs: Henkel and Reitzig (2007, 2008), Lerner (2008)

Patent system reform: Jaffe and Lerner (2004), Denicolò (2007), Bessen and Maurer (2008) etc

Search theoretic models: Acemoglu (2001)

Main results (in progress)

There is too little R&D in the market

- Both ex ante and ex post licensing reduce R&D incentives

There can be too little or too much NPE activity in the market

Tightening liability standards against practiced patents

- promotes R&D
- effect on the NPE activity ambiguous
  - stronger protection of practiced patents discourages NPE entry
  - increased R&D activity encourages NPE entry
- generally (but not necessarily always?) increases welfare

2 The model

Based on the Diamond-Mortenssen-Pissarides undirected search model

- Measure t of NPEs with a patent seeking to licensing deals
- Measure m of unlicensed (innovation projects by) established producers

$\longrightarrow \frac{t}{m} \equiv \theta \approx$tightness of the market for patents

$\rightarrow$matching function, $q(\theta)$, the rate with which a (unlicensed) producer meets a NPE (with an unlicensed patent)

2.1 Manufacturers

Each with an R&D project

Success rate: h

Flow cost of innovation: $\rho(h); \rho' > 0, \rho'' > 0$.

Yields a patented innovation, with a revenue stream: y

Innovations become obsolete with Poisson rate λ

Limited number of R&D projects

- "Ideas are scarce"

2.2 Non-practicing entities (NPEs)

Each with a patent, searching for exclussive licensing deals

Search cost: s (includes the costs of acquiring patents)

Free-entry of NPEs

Undirected search -> both *ex ante* and *ex post* matching

2.3 Court process

If a NPE meets a producer with an unlicensed innovation, the NPE sends a notice of infringement

If they go to the court, the court decision arrives with Poisson rate δ

Litigation is costly (at least for the NPEs)

Remedy: damages (injunctions to be considered)

- If a NPE wins, it will receive a (damage) payment of d

An infringement is found with probability $1 - \alpha$

$\longrightarrow \alpha =$the probability that the producer can escape infringement (e.g., NPE's patent is invalid)

$\alpha \approx$strength of a practiced patent, the probability that the practiced innovation is fully covered by the patent(s)

2.4 Licensing

In equilibrium the parties settle rather than go to the court

When a producer and a NPE meet, the producer can make a take-or-leave-it licensing offer to the NPE

- i.e. the NPE has no *formal* bargaining power

$\rightarrow$The NPE's *real* bargaining power arises from the litigation threat $(1 - \alpha)$.

Both *ex ante* and *ex post* licensing possible

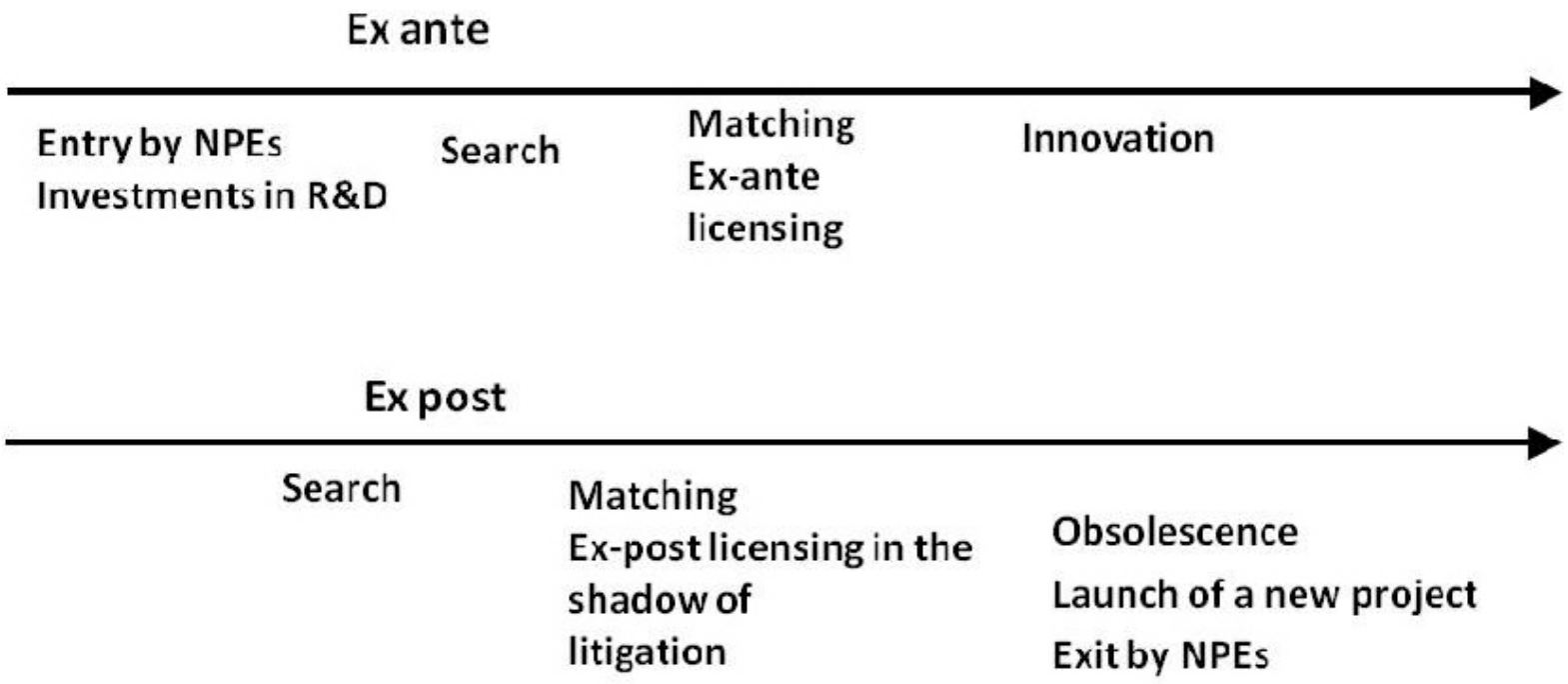
- Ex post licensing: A NPE and a producer meet after the producer has come up with an innovation

$\longrightarrow$ reduces the value of the manufacturer's innovation, like a tax -> "bad licensing"

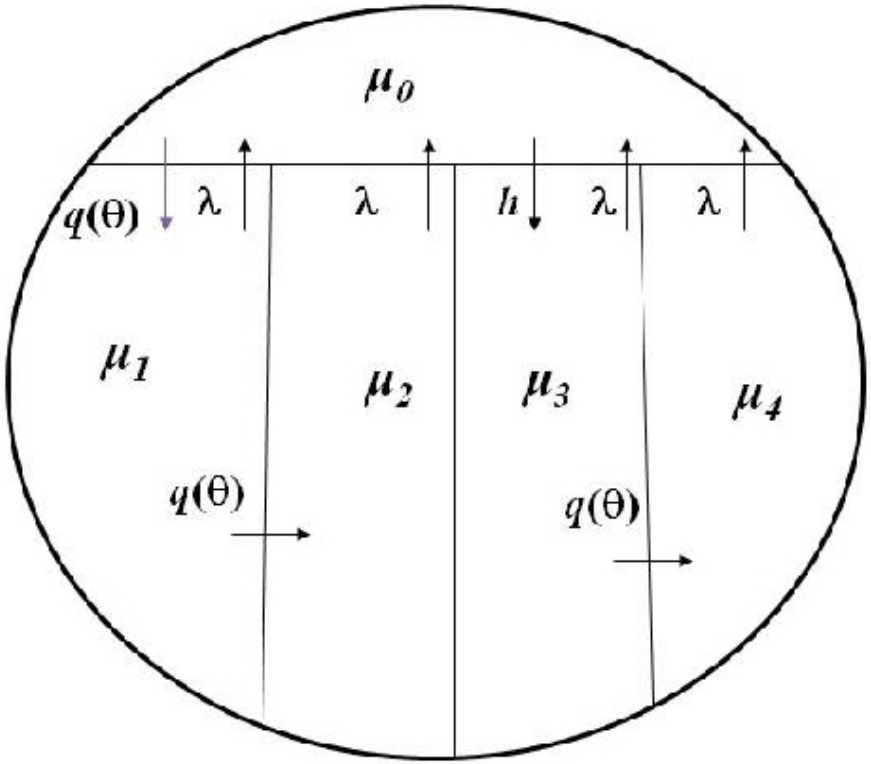
- Ex ante licensing: A NPE and a producer meet before the producer has made an innovation
  - Technology transfer: the producer gets production technology,

$\longrightarrow$ saves manufacturer's R&D costs -> "good licensing"

Timing


Ex ante
Entry by NPEs
Investments in R&D
Search
Matching
Ex-ante
licensing
Innovation
Ex post
Search
Matching
Ex-post licensing in the
shadow of
litigation
Obsolescence
Launch of a new project
Exit by NPEs

Manufacturer flows



μ_0 = conducting R&D

μ_1 = producing with an ex ante license

μ_2 = producing with ex ante and ex post licenses

μ_3 = producing without licenses

μ_4 = producing with an ex post license

$\mu_0 + \mu_1 + \mu_2 + \mu_3 + \mu_4 = 1$

3 Equilibrium

Value of an unlicensed patent (for a NPE):

$$rV_T = (1-z)\frac{q(\theta)}{\theta}\left(L_T^{exante} - V_T\right) + z\frac{q(\theta)}{\theta}\left(L_T^{\text{exp}\,ost} - V_T\right)$$

where

- $z =$ fraction of ex post licensing opportunities to all licensing opportunities

- $L_T^e, e \in \{\text{exante, expost}\} =$ value of a licensed patent

- we focus on the case with no iron-clad patents: $L_T^{\text{exp}\,ost} \geq V_T$

i.e., α cannot be too high

Value of an R&D project (for a manufacturer)

$$rV_M^{R\&D} = q(\theta)\left(L_M^{exante} - V_M^{R\&D}\right) + h\left(V_M - V_M^{R\&D}\right) - \rho(h)$$

where the value of the innovation

$$rV_M = y + \lambda\left(V_M^{R\&D} - V_M\right) + q(\theta)\left(L_M^{\text{exp}\,ost} - V_M\right)$$

3.1 Ex Post Licensing

The value of litigation for a NPE:

$$rC_T = -c_T + \lambda\left(V_T - C_T\right) + \delta\left[\left(1-\alpha\right)W_T + \alpha V_T - C_T\right]$$

where the value of a winning for a NPE

$$rW_T = d + \lambda\left(V_T - W_T\right).$$

Value of an expost license for a NPE

$$rL_T^{\exp ost} = f^{\exp ost} + \lambda\left(V_T - L_T^{\exp ost}\right)$$

Ex post licensing fee $f^{\exp ost}$ solves $L_T^{\exp ost} = C_T$

3.2 Equilibrium conditions

Free-entry of NPEs (TE) : $V_T = 0$

- Determines θ for a given h and implies that

$$L_T^{exante} = V_T = 0 \rightarrow f^{exante} = 0.$$

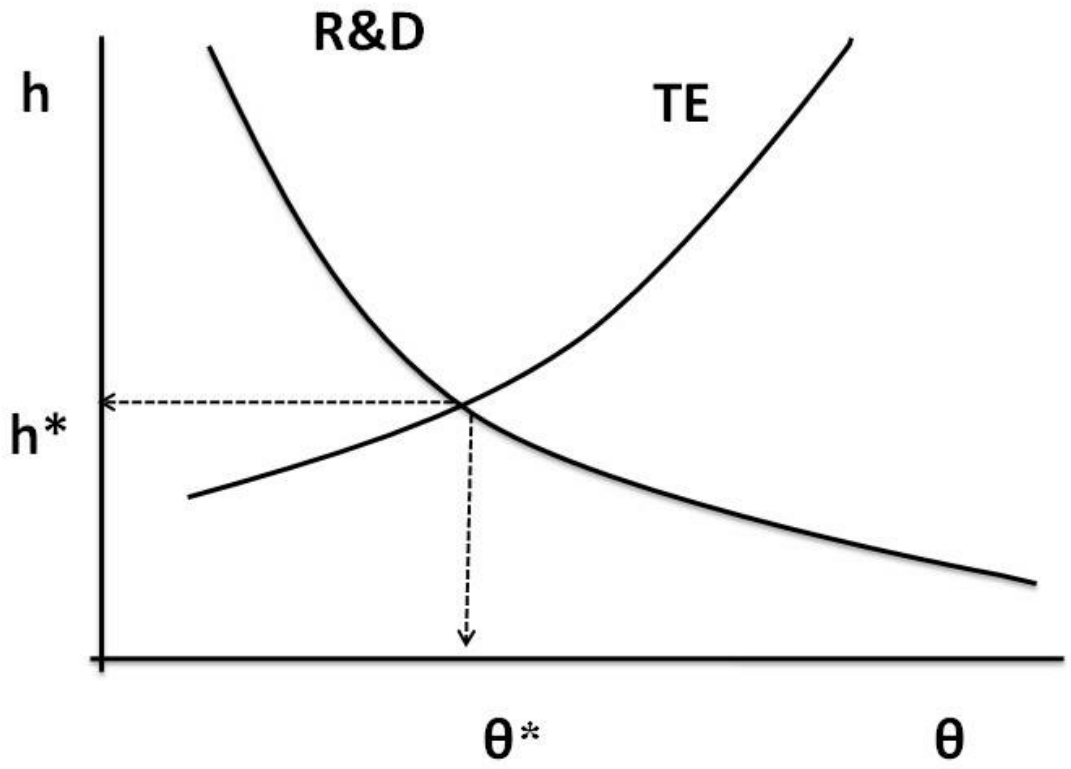
  Incentives to innovate (R&D):

$$\max_h r V_M^{R\&D} = (h + q(\theta)) \left(V_M - V_M^{R\&D} \right) - \rho(h)$$

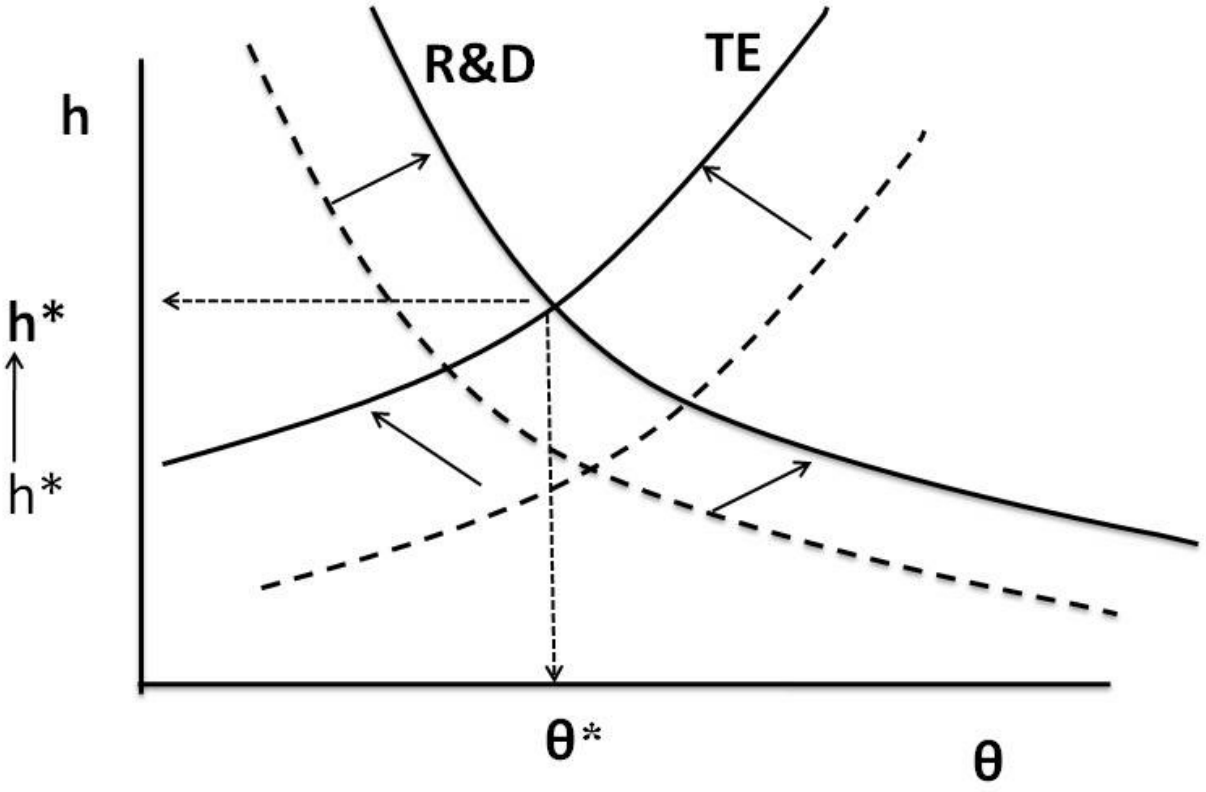
- Determines h for a given θ

4 Results

Result 1: Unique Equilibrium



Result 2: Tightening Liability Standards



5 Welfare

Recall: no traditional R&D externalities (consumer surplus, spillovers, business stealing), just search externalities and incentive effects

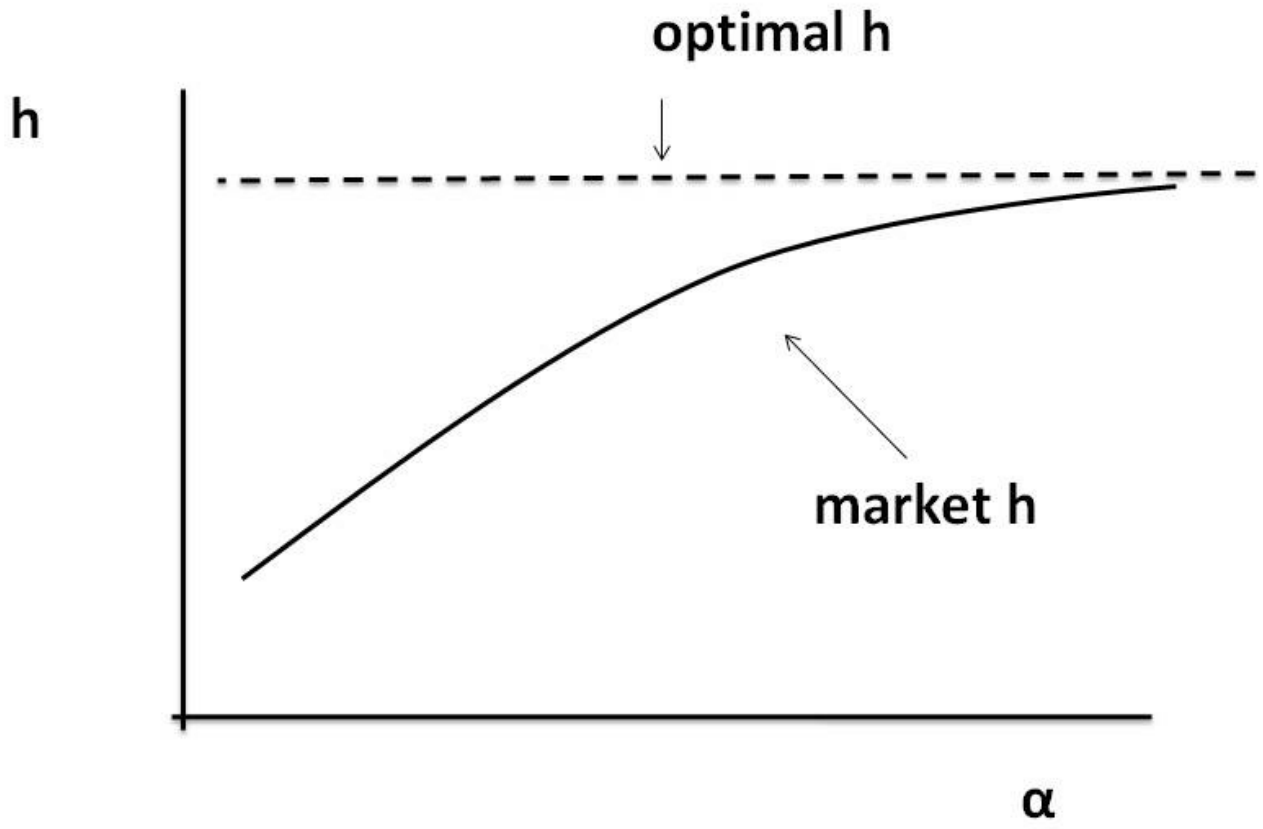
The planner chooses h and θ to maximize

$$S = y - \mu_0 \left(y + \rho \left(h \right) + s\theta \right)$$

Welfare Results

Too little R&D in the market thanks to "tax effect" of ex post licensing and "search externalities" in the ex ante licensing markets

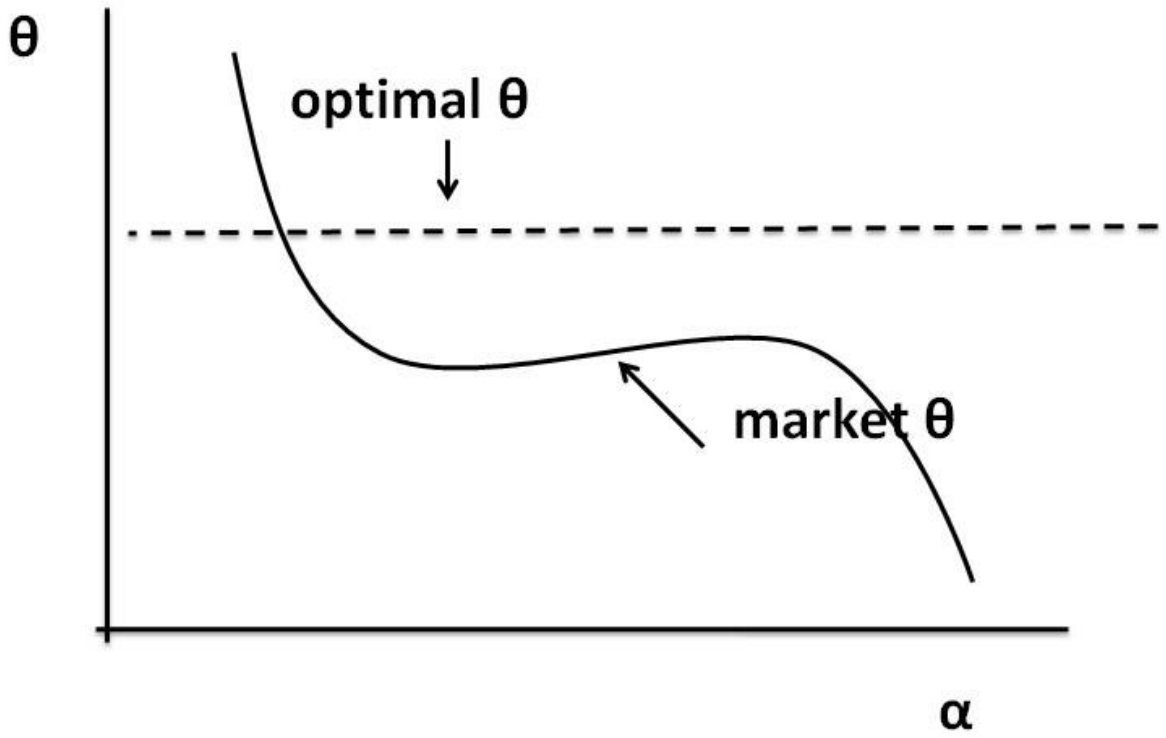
Result 3: Too Little R&D in the Market



There can be too little or too much NPE activity

- Ex post licensing is bad thanks to tax effect
- Ex ante licensing is good thanks to manufacturer R&D cost savings

Result 4: NPE Activity



6 (Tentative) Policy Implications

Tightening liability standards against practiced patents

- always increases R&D towards social optimum
- may or not may not make the volume of NPE activity "more efficient"
- nonetheless tends to improve welfare as the NPE effects tend to cancel out each others

7 Conclusions

- We build an equilibrium search model of licensing and technology markets
  - to study the effects of imprecise patent boundaries on
    - NPEs' entry incentives
    - Incentives to innovate
    - Welfare

Results:

1. There is too little R&D in the market equilibrium even without traditional R&D externalities

2. There may or may not be too much NPE activity in the market

3. Tightening liability standards against practiced patents
   - increases R&D investments.
   - its effects on the NPE activity generally ambiguous
   - nonetheless tends to improve welfare