Taste for exclusivity and intellectual property rights

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Motivation

- In certain industries, some agents value being the exclusive consumers of a good: high tech gadgets, fashion, status goods...
- An exclusivity (status-) premium is often derived from consuming the newest generation of a good
- Granting exclusivity might be easier under intellectual property (IP) protection as it usually requires some price setting power

This paper

- We study the impact of IP protection on innovation in a quality-ladder model where some consumers have a taste for exclusivity
- We find that such preferences can reverse the effect that IP protection has on innovation
- Differences between monopoly and entrant innovator case

Literature

- Raustiala and Sprigman (Virginia Law Review 2006)
- Pesendorfer (AER 1995)
- Corneo and Jeanne (JPE 1997)
- Horowitz and Lai (IER 1996)

Overview

- Setup:
  - Preferences
  - Simple micro-foundation: Matching model
  - Technology
- Monopoly innovator
- Innovation by entrants
- Durable good
- Conclusions

Preferences: taste for exclusivity

- Each time period agents may consume a (non-durable) good with discrete quality levels $k = 1, 2, \ldots$
- Two types of agents, each with unit demand
  - Low types (mass $1 - \beta$): instantaneous surplus from consuming

$$U_L(k) = k$$

  - High types (mass β): instantaneous surplus from consuming differs from low types only when they consume a higher quality

$$U_H(k) = k + \Delta \qquad \text{where } \Delta > 0$$

- Can be motivated by a simple matching model (welfare analysis!): more here

Technology

- Non-durable good
- Production costs normalized to zero
- An innovation improves the good from level k to level $k+1$
- R&D cost for obtaining an innovation with arrival rate ϕ is given by

$$C(\phi) = \begin{cases} c\phi & \text{for } \phi \leq \phi_m \\ \infty & \text{otherwise.} \end{cases}$$

- Innovations are protected by intellectual property rights ("patent")
- IPRs expire with hazard rate γ. Expiry allows for costless imitation of latest quality level by a competitive fringe.
- Time is continuous and the rate of interest is given by r

Monopoly innovator

- Suppose that IP protection has already expired up to good $h \leq k$.

Assumption

When $h < k$ a monopoly innovator always wants to quality differentiate between the two types of agents, i.e.

$$\beta(1 + \Delta) > 1\,.$$

- A monopolist always sells the newest good k exclusively to the high types at a price $p_H = k + \Delta - h$
- ...and good $k - 1$ to low types at $p_L = k - 1 - h$.
- Investment incentives for next quality level $k + 1$:

$$\text{Incremental profit } = \begin{cases} 1 & \text{when } h < k \\ \beta(1 + \Delta) & \text{when } h = k \end{cases}$$

- IP protection has two effects on innovation incentives:
  - Increasing γ (lowering IP protection) reduces value of an innovation
  - Composition effect: innovation incentives are larger when the latest good is not protected by IPRs, which is more likely the larger γ

Monopoly innovator - cont'd

Proposition

When $\frac{\beta(1+\Delta)}{r} > c > \frac{1}{r}$ *the average innovation rate is maximal for an intermediate level of IP protection.*

Proposition

Suppose that discounted gross welfare gains of an innovation are given by $\frac{\lambda}{r}$*, where* $\lambda \geq 1$*:*

Imperfect IP protection is optimal iff either

- λ *is large enough and if the average innovation rate is increased by reducing IP protection below the maximal level*
- *or if the instantaneous welfare loss from exclusivity is large enough.*

Innovation by entrants

- Suppose that R&D is carried out by entrants only
- For simplicity, assume that a successful innovator cannot only produce good k but also a damaged version of quality $k-1$:
  - Bertrand competition for good $k-1$: $p_L = 0$
  - Latest innovator charges $p_H = 1 + \Delta$ for good k
  - Incremental profit always given by $\beta(1+\Delta)$. No composition effect.

Proposition

- *Under entrant innovation the average innovation rate is maximal for full IP protection*
- *Limiting IP protection may be socially optimal only to reduce excessive innovation or to destroy exclusivity if it is socially inefficient*

- General case: Result depends on competition regime between innovator and incumbent. The proposition holds for all non-exotic competition regimes. General entrant innovation case

Durable good

- Leasing of durable goods: results from consumable good case apply
- Possibility to commit (prices, innovation) and the presence of secondary markets play a key role

Buyback program

- The monopolist commits to buy back previously sold goods at their purchase price when a consumer purchases a new good (as long as IP protection has not expired):
  - No incentive for consumers to wait with purchase until price drops
  - No incentive for monopolist to introduce new version in order to extract an exclusivity premium a second time
- Monopolist sells at prices $p_H = \frac{k-h+\Delta}{r+\gamma}$ and $p_L = \frac{k-1-h}{r+\gamma}$
- IP protection affects innovation in the same way as in the case of non-durable goods

Secondary market (simplest case: $\beta > \frac{1}{2}$)

- No buyback, but price commitment for already introduced goods
- High-types always buy latest version of the good, sell previous version on the secondary market to low-types at price zero
- Monopolist can extract (expected discounted) status premium for each new innovation (independent of the lead)
- Incremental profits independent on whether latest good still IP protected
- No composition effect. Thus, full IP protection maximizes the innovation rate. Note that the monopolist wants to reduce ϕ.
- $\beta \leq \frac{1}{2}$: Incremental profits increase in the lead over the competitive fringe. Composition effect reversed: $\gamma = 0$ maximizes innovation rate.

Network Effects

Let us now assume that $U_H(k) = \theta k + \Delta$ with $\theta > 1$ while still $U_L(k) = k$ (higher willingness to pay of the high types)

Monopoly Case: Given that $\beta\theta > max\{1; 1 - \beta\Delta\}$, the monopolist sells the newest good k to the high types while the low types consume the competitive fringe good h. Profit flows are given by $\beta\theta(k - h) + \beta\Delta$

Network effects, i.e. $\Delta < 0$

Reducing IP protection is particularly harmful for innovation as incremental profits are lower in the case where the IPR on the latest good has expired.

Conclusions

- The presence of a taste for exclusivity provides a new reason for why intermediate IP protection may be optimal
- The effect of IP protection on innovation depends on the competition regime (monopolist vs. entrant innovation) and on commitment possibilities in the durable goods case
- Paradox: IPRs needed for exclusivity. Too stringent IPRs bad for innovation in monopoly innovator case.

Matching model

- Agents of type L, H, who get matched in pairs (each period)
- H-type agents derive utility $\Delta + \delta$ (δ) from matches with H-type (L-type) agents
- L-type agents derive utility δ (0) from matches with H-type (L-type) agents
- Type private information. W/o signaling device: random matching.
- Suppose a good (think of good k) is available for signaling, *i.e.* monopolist can decide whether to sell to all agents or to H exclusively
- Monopolist sells exclusively iff $\beta(1+\Delta) > 1$
- Welfare gain from exclusivity: $\beta(1+\Delta) - 1 - \underbrace{\beta[(1-\beta)\delta + \beta\Delta]}_{>0}$.

Proposition

A monopolist prefers to introduce an exclusive good for the purpose of signaling in the matching game more often than would be socially efficient.

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General entrant innovation case

Now suppose that we are in a competition regime where some profits π_L are left to the previous innovator.

There are three states of nature:

1. All IPRs have expired: zero profits for all parties
2. Only the IPR on the newest good has not expired: profits π_{HC} for innovator
3. IPRs for the two newest goods have not expired: profits π_H for innovator and π_L for the incumbent

Proposition 3

- If $\pi_{HC} \leq \pi_H$, the average innovation rate is maximal for full IP protection.
- If $\pi_{HC} > \pi_H$, the average innovation rate may be maximal for an intermediate strength of IP protection.

Assume that in the case where IPRs are protected, each firm can only sell the good it has invented. Then, no pure strategy equilibrium exists if firms set prices simultaneously. Therefore, we consider different competition regimes:

- Price competition with punishment of price deviations that reduce the profits of the other party: $\pi_{HC} = \pi_H$
- Cournot competition: $\pi_{HC} < \pi_H$
- Perfect price discrimination: $\pi_{HC} = \pi_H$
- Sequential equilibrium:
  - Incumbent sets price first: $\pi_{HC} < \pi_H$
  - Innovator sets price first: $\pi_{HC} \lesseqgtr \pi_H$

Consequently, reducing IP protection below the maximal level might only increase the average innovation rate in the last case

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