Extensive Grantback Agreements: The Effects of Partial Termination in Patent Pools on Innovation Incentives and Participation Rates

Henri de Belsunce

International Max Planck Research School for Competition and Innovation, Munich

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Outline

Facts and Puzzles

Legal and Economic Context

Model and Results

Small Extension
Facts and Puzzles from the Literature

- MPEG-2 Patent Pool decreased innovation rates of outsiders in technological proximity of the pool patents (Vakili, 2012)
- VI firms are overrepresented in MPEG-2 Pool (Layne-Farrar & Lerner, 2011)
- Average innovation outside of the pool is of higher quality\(^1\) (Layne-Farrar & Lerner, 2011)
- PT clause has procompetitive effects (DOJ, 1997)

\(^1\)Proxied for by number of citations. Slightly noisy data for my purpose.
Patent Pool literature

- erodes n-marginalisation, thus ↓ bundle price, ↑ demand for the standard and ↑ total industry profit
- composed only of essential patents (for standard functionality)
- subject to FRAND licensing
- obligation to license

→ but PT relaxes last bullet

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Partial Termination (PT) extends grantback obligation to related patents

Robert P. Merges, 1999:

"As a mechanism for integrating Related Patents into the pool, the MPEG-2 pool has some novel features. The charter allows individual MPEG-2 members to opt out of the pool with respect to a single licensee. The purpose of this provision (..) is to provide bargaining leverage to any MPEG-2 (pool-)member that is negotiating for a license to a complementary patent held by an MPEG-2 (pool-)licensee."

Conditions: PT grips when the licensee has

1. brought a lawsuit or other proceeding against the MPEG-2 Licensor for infringement of a licensee patent and
2. refused to grant the MPEG-2 Licensor a license under that patent on fair and reasonable terms and conditions.
"FRAND conditions" is a soft concept

- A FRAND commitment has serious legal implications, a commitment to offer IP on fair, reasonable, and non-discriminatory terms
- no universally agreed upon operational definition of that commitment
- no generally agreed tests for FRAND commitments

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Research Hypothesis

In the absence of absolute legal certainty, recourse to the PT clause by pool members to force licensing for an outsider innovation:

- reduces investment incentives of pool outsiders
- exacerbates the pool selection effect

→ Can PT clause help to explain the stylized facts?

Topical?
- Not yet triggered in real life, but some demand...
Set-up

- 2 vertically integrated players (Pool and outsider)
- Outsider always innovates
- Identical competitors ex-ante innovation: outsider licenses pool bundle at royalty $l_p$ (fully FRAND), which is normalized to cost advantage of outsider ($c = c_{ri} = c_{ph} + l_p$)
- Ex-post innovation, outside innovator charges a linear royalty $r$ to pool for its cost-reducing innovation of quality $\epsilon > 0$. 

**Status Quo**
Impact of PT

Forces PH to license new innovation at \( r = \text{FRAND} \) to pool members (instead of profit maximising \( r^* \)).

- where FRAND is:
  1. fair (same price for all licensees)
  2. non-discriminatory (accessible to anyone)
  3. reasonable (satisfied when the royalty on the innovation does not exceed a court set FRAND royalty rate \( \bar{r} \)).

- PT modelled as exogenous, probabilistic instrument of success rate \( y \) to capture innovation
Solving for

- Equilibrium royalty set by the innovator (and thus consequent downstream market structure)
- Innovation incentives for the outsider

Other technical assumptions

- Downstream market à la Cournot with linear demand:
  \[ P = \max(0, a - Q) \]
- In case of litigation, loser of the case incurs court costs \( K > 0 \)
- Quality \( \epsilon \) of innovation is common knowledge
Timing

1. Outsider innovates and makes a "take-it-or-leave-it" offer on the royalty $r$ for its innovation

2. Pool accepts or rejects the proposed royalty (triggers PT if it can)
   - If PT triggered, firms go to court, incur litigation costs $K$ and with probability $y$, PT is successful and the realised royalty is $\bar{r}$.

3. Non-cooperative Cournot competition in downstream market

→ Extension goes back a step and looks at incentives to join pool ex-ante.
Cases for non-drastic innovation (in paper C & D)

No PT:
- Optimal $r^* = \epsilon$ (monopoly pricing)
- results in a duopoly downstream
- Innovation threshold: $I \leq \frac{\epsilon}{9}[7(a - c) + \epsilon]$

With PT:
- Now optimal $r = r_{deal} < r^*$ (Indifference pricing\(^4\) w.r.t. to PT)
- still results in a duopoly downstream
- Innovation threshold:
  \[ I \leq \frac{1}{9}[7\epsilon(a - c) + \epsilon^2 + y(5(a - c - \bar{r})(\bar{r} - \epsilon) - 9K)] \]
  negative wedge on innovation

\(^4\)Without "BFOC": $\Pi_{RI}^D(r_{deal}) = [1 - y]\{\Pi_{RI}^D(r^* = \epsilon) - K\} + [y]\{\Pi_{RI}^D(\bar{r})\}$. 
Cases for a drastic innovation (in paper E & F)

No PT:
- Optimal $r^* = \frac{a-c+\epsilon}{2}$ (monopoly pricing)
- results in monopoly downstream
- Innovation threshold: $I \leq \frac{1}{36} [5a - 5c + 3\epsilon](a - c + 3\epsilon)$

With PT:
- Now optimal $r = r_{deal} < r^*$ (same indifference relation as before but with new optimal $r^*$ for drastic innovations)
- back to duopoly downstream
- Innovation threshold: $I \leq \frac{1}{36} [(5a - 5c + 3\epsilon)(a - c + 3\epsilon) - y(5(a - c + e)^2 - 20\bar{r}(a - c + e - \bar{r}) + 36K)]$
- negative wedge on innovation
- payoff slope of Innovation falls by $-\frac{5y}{18}(a - c + \epsilon - 2\bar{r})$
PT reduces marginal profitability of investments
→ disincentive to invest for VI outsiders in technological proximity of the pool (*confirms* Vakili, 2012)
Model predictions 2/2

- Upheaval of lower investment threshold
  → predicts post-pool formation patents of higher quality (confirms Layne-Farrar & Lerner, 2011)

Procompetitive effects

- PT moves downstream market from a monopoly to a duopoly for a drastic innovation
- Downstream prices decline
- Consumer surplus increases
- Producer surplus falls
  → structural change that is clearly pro-competitive (confirms DOJ, 1997)
PT draws VI firms into Pool, not so pure R&D firms

VI pool members

- Upstream profits = $\theta_{vi} l_p Q(\epsilon, r)^*$, which increases given 
  $\frac{\partial Q(\epsilon, r)^*}{\partial y} > 0$.

- Downstream profits = $\Delta (p - c + \epsilon)q_{ri} > 0$ since 
  $\left. \frac{\partial [q_{ri}(p-c+\epsilon)]}{\partial r_{deal}} \right|_{r_{deal}} = r = -\left[ \frac{(a-c+\epsilon+4r)}{8n} \right] < 0$.

VI outsiders

- miss out on benefits from PT clause, thus incentive to join pool

Pure R&D firms

- PT does not grip, thus no drawing-in effect
Extension predictions

- VI firms have an incentive to join the pool, whereas R firms do not.

589% VI in MPEG-2, 25% VI outside of MPEG-2, respective averages (incl MPEG-2): 83% and 32%.
Robustness and further work

Model robust against:

- Endogenising investment (except increased quality statement)
- Multi-firm setting
- Modified litigation costs

Further work:

- Baseline model argues litigation risk is a possible explanation for the ex-post decline in innovation rates of outsiders (*contradicts* Vakili, 2012)

  → Further work should test the effect of PT empirically
Thank you