

Standard-Setting, Competition, and Innovation

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Introduction

- Voluntary standard-setting has long worked well, but recently debates, litigation – Why?
 - Increasingly important, esp. in IT/communications
 - Patent thicket problems, esp. in US
 - Emergence of NPEs or Innovation Specialists (ISs)
- Apparent widespread hostility to ISs
 - Justice Kennedy: “For these firms, an injunction ... can be employed as a bargaining tool to charge exorbitant fees ...”
 - Integrated firms can’t? “Mutual forbearance”?

Introduction II

- Recent complaints about ISs in std-setting:
 - Patent trolls: hide IP until standard set
 - Patent hold-up: hide licensing terms until standard
 - Royalty-stacking: Cournot complements pricing
- Will take the patent system as given, though its flaws clearly contribute to all these problems
- Question: How, if at all, should antitrust policy toward standard-setting be changed, esp. as it affects innovation specialists?

Specific Questions Addressed

- Threshold: Are compatibility standards set by competitors in consumers' interest? [Typically]
- Do different strategic royalty-setting incentives of innovation specialists and integrated firms justify policies hostile to specialists? [No?]
- Is encouraging ex ante auctions the solution to royalty-stacking & hold-up? [No]
- Is allowing collective negotiation of royalties? [No]
- What should antitrust do instead?

A Basic Model

$$U = X_0 + \alpha \sum_{i=1}^N X_i - \frac{1}{2} \sum_{i=1}^N X_i \left(X_i + \gamma \sum_{j \neq i} X_j \right) \quad \begin{array}{l} \gamma = 0, \text{ independent;} \\ \gamma = 1, \text{ perfect substitutes} \end{array}$$

$$P_i = \alpha - X_i - \gamma \sum_{j \neq i} X_j$$

$$U = I + \frac{1}{2} \sum_{i=1}^N X_i \left(X_i + \gamma \sum_{j \neq i} X_j \right), \quad I = \text{income}; X_0 \text{ is numeraire}$$

$$\Pi_i = X_i \left[P_i - C - \sum_{k=1}^K S_k - \sum_{j \neq i} R_j \right] + R_i \sum_{j \neq i} X_j, \quad \Pi_k = S_k \sum_{i=1}^N X_i$$

1: Innovation Specialists set S_k ; Integrated Firms set R_i

2: Integrated Firms, Manufacturing Specialists set X_i

The Decision to Standardize

- In the basic model standardization can be modeled as increasing γ , which intensifies price competition and lowers profit
- This will only raise profits, and thus be agreed to by sellers, if it also increases α enough
- With all royalties set to zero,

$$U = I + \frac{1 + \gamma(N-1)}{2} \sum_{i=1}^N \Pi_i$$

- Thus if raising α & γ raises profit, consumers win

Strategic Royalty-Setting

- Both ISs & IFs have royalty-stacking incentives:
 - Only ISs:
$$\sum_k S_k = (\alpha - C) \frac{K}{K+1}$$
 - Only IFs, $\gamma=1$:
$$\sum_{j \neq i} R_j = (\alpha - C) \frac{N^2 + 2N - 3}{N^2 + 4N - 1}$$
 - In the limit, output is driven to zero
- IFs have incentives to raise rivals' costs
 - $N=K$, $\gamma=1$; IFs set higher royalties than ISs would [Schmidt (2006)] but pay lower total royalties
 - Single IF excludes MSs when $\gamma=1$ [Kim (2004)], though (just) passes Swanson-Baumol ECPR test

Strategic Royalty-Setting II

- IFs can use cooperatively-set royalties (or mutual forbearance) to get monopoly output:

$$R_i = (\alpha - C) \frac{\gamma}{2[1 + \gamma(N - 1)]}$$

- Innovation specialists and integrated firms have incentives for strategic behavior
 - Both have incentives for royalty-stacking
 - ISs face vertical double marginalization
 - IFs face this on others' outputs; gain by raising rivals' costs (perhaps excluding) or cartelizing
- No support for strong IF v. IS preference

Formal Ex Ante Competition: A Model

- Suppose M components, unique best and second-best technologies for each
- (Strong) Assumptions:
 - Potential standards differ only in cost, not quality
 - Value independent of IP owners (implies no IFs)
 - Unit costs known: $C(d_1, \dots, d_M)$, d 's = a (best), b (2nd)
 - Market size fixed for $C \leq C_T$
- a 's & b 's = bids; $M=1$; best wins & is used if
$$a_1 \leq b_1 + [C(b) - C(a)], a_1 \leq C_T - C(a) \rightarrow$$
$$a_1 = \min [C_T - C(a), C(b) - C(a)], b_1 = 0$$

A Model of Formal Ex Ante Competition II

- $M=2$, b 's = 0, best selected and used iff
$$a_1 \leq C(b,a) - C(a,a), \quad a_2 \leq C(a,b) - C(a,a)$$
$$a_1 + a_2 \leq C(b,b) - C(a,a), \quad a_1 + a_2 \leq C_T - C(a,a)$$
- Game: rounds of sealed bids until satisfied
 - Equilibrium: a 's ≥ 0 , none can be increased
 - Exists because rhs's are non-neg; may be many
- Observations:
 - If best for 1 has perfect substitute, $a_1=0$
 - If best for 2 has no subs, only ita1 constrains
 - Hold-up: only ita1 constrains

Formal Ex Ante Competition: Problems

- Model easily generalizes to M components
 - No strategic behavior; bids easy to evaluate
 - Best standard, no hold-up or royalty-stacking
 - Rewards reflect incremental contributions
- But necessary assumptions are implausible
 - If market size not fixed, royalty-stacking appears
 - If qualities differ among standards, hard to compare bids, firms may disagree
 - $M=10 \rightarrow$ need costs of 1024 possible stds; not practical (When in process evaluate bids?)

Formal Ex Ante Competition: Problems II

- With both IFs and ISs, identity of bidder matters; comparisons tough, IFs sit where?
- $M=1$, IF & IS bid cost C , royalty r ; MS profit:
 - If IS wins: $\Pi = \left\{ \frac{(2-\gamma)(\alpha - C - r)}{(2-\gamma)(2 + \gamma(N-1))} \right\}^2$
 - If IF wins: $\Pi = \left\{ \frac{(2-\gamma)(\alpha - C) - 2r}{(2-\gamma)(2 + \gamma(N-1))} \right\}^2$
 - If $\gamma > 0$, MSs prefer IS: no cost disadvantage
- Formal ex ante competition with desirable properties is not workable; thus also of limited value for FRAND evaluation

Collective Negotiation

- Moving this (Galbraithian) way in US & EU:
 - EU Tech Transfer Guidelines: “Undertakings setting up a technology pool ... and any industry standard it may support are normally free to negotiate and fix royalties for the technology package...”
 - US FTC/DOJ IP Report: “In most cases, it is likely that the Agencies would find that joint ex ante activity undertaken by an SSO or its members to establish licensing terms as part of the standard-setting process is likely to confer substantial procompetitive benefits
 - Rule of reason without guidelines...

Collective Negotiation: Problems

- Expect exercise of monopsony power to reduce royalties, thus reduce incentives to innovate, thus slow technical progress
- Antitrust can't prevent: “competitive levels” “unreasonably suppressing” not operational
- Important to get new technology efficiently to market via standard-setting, but even more important to produce new technology

Collective Negotiation: Problems II

- Messy: “inducements,” royalty stacking (or 2 cartels?), cost/quality, when to negotiate?
- Differing positions/incentives of IFs and ISs.
 - Where do integrated firms sit?
 - Suppose $M=1$, equally attractive offers to MSs from an IF and an IS [$S = 2R/(2 - \gamma)$]. Who would pay more to win?
 - Small γ , IS: hungry because no income if lose
 - Large γ & R , IF: value of cost advantage dominates
- **Collective negotiation is messy, has no attractive properties, and risks slowing technical progress**

What Should (Not) Be Done?

- Antitrust is a blunt instrument; should avoid trying to fine-tune market processes that work, even if imperfectly – like standard-setting
- Incentives for strategic behavior don't justify tilting the policy field against ISs or IFs
- Formal ex ante competition is not workable in any form with desirable properties
- Collective negotiating may be tempting but has no desirable properties & risks technical progress

What Should be Done?

- Agree with moves away from per se treatment of considering royalty rates in standard-setting
- Agree with enforcement against troll-like behavior that causes monopoly power
- Give up on royalty-stacking: not an antitrust issue
- Push *bilateral ex ante* negotiation + FRAND
- Watch new VITA [required disclosure, no discussion], IEEE-SA [voluntary disclosure, some discussion] processes – do buyer cartels emerge?
- Gerald F. Masoudi (DOJ): “... act with caution...”