Economics, Law, and History of Patent Pools and Cross-Licensing Agreements

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Benefits of Patent Pools and Cross-Licensing Agreements

- Clear blocking positions
- Reduce royalty stacking
- Reduce variable costs by exchanging IP for IP
- Promote sharing and dissemination of technology
- Coordinate launch of new technology/standards
- Promote R&D by reducing the potential for hold-ups

Competitive Risks of Patent Pools and Cross-Licensing Agreements

- Combining substitute patents can lead to higher royalties
- Reduce incentives to challenge weak patents
- Control downstream prices
- Create barriers to entry
- Discourage investments in R&D by facilitating free-riding

A Review of Patent Pooling Cases

- 24 Cases from 1902 to present
- Court approved the pool in 9 instances
- Court held the pool to be illegal in 15 instances
- Competitive hazards identified by the courts

Competitive Hazards Identified in Cases

- Competitive relationships of patents in the pool
  - 2-way blocking
  - 1-way blocking (improvements)
  - Substitutes
- Fix downstream products
- Weak patents
- Restrict use of non-patented products
- Prevent unilateral licensing
- Joint defense agreements

Competitive relationships of patents in the pool

2-way blocking:

Patents A and B are both necessary to practice a technology

- MPEG-LA and DVD patent pools

"The proposed agreement … requires the retention of an independent expert to review patents submitted to any of the Licensors for inclusion in the Portfolio and to review any Portfolio patent which an MPEG-2 Licensor has concluded is not essential or as to which anyone has claimed a good-faith belief of non-essentiality."

- What defines "essential"?

Competitive relationships of patents in the pool

2-way blocking:

Patents $i = 1, \ldots, N$

Royalties r_i

Total royalty $R = \Sigma\, r_i$

Demand $D(R) = A - bR$

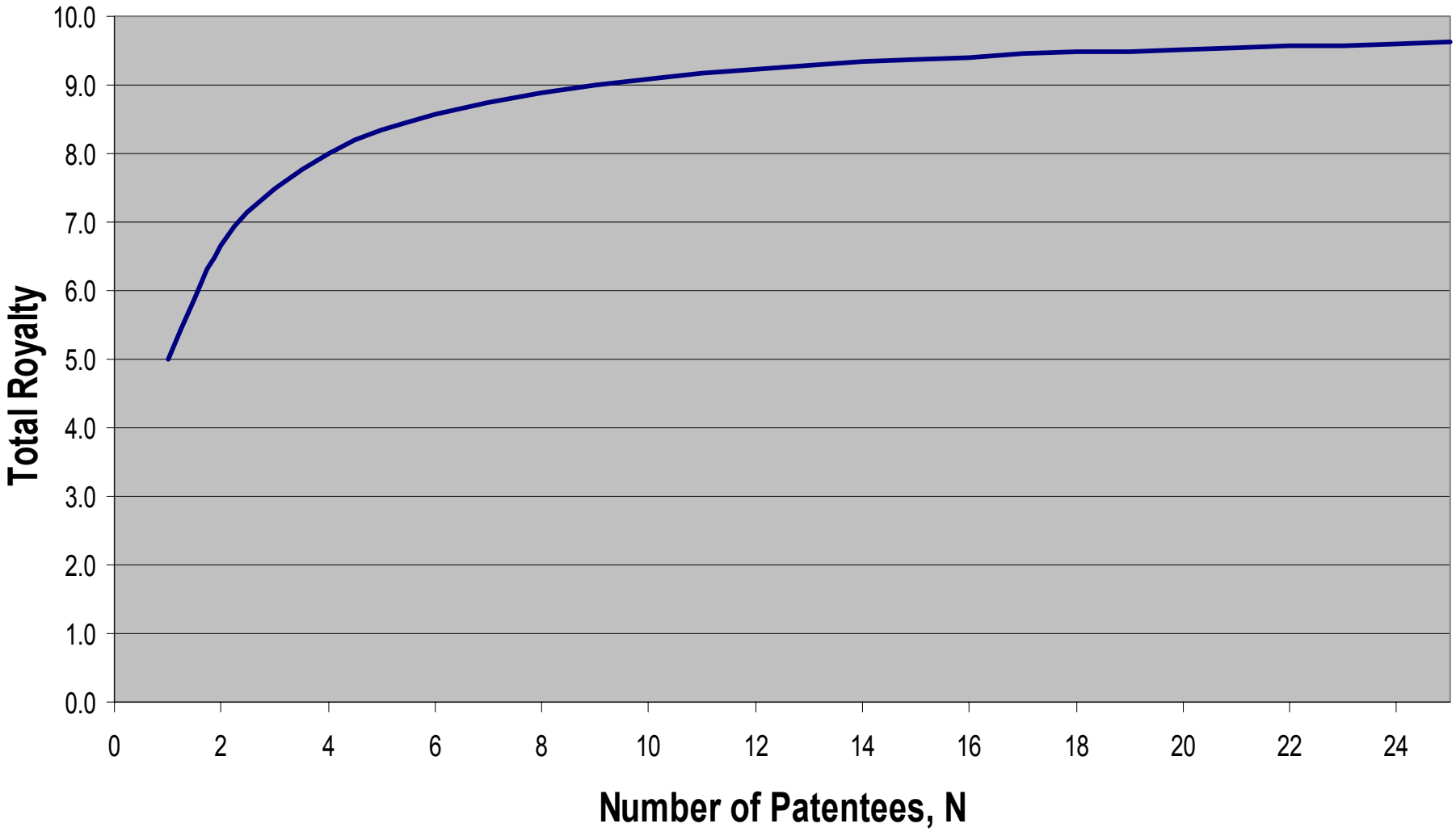
Pool maximizes $RD(R)$ $\qquad R^m = A/2b$

Independent IP owners maximize $r_i D(R)$

$r_i^* = (A - bR_{-i})/2b$

$R^* = NA/(N+1)b$

Total Royalty with N independent Patentees



Competitive relationships of patents in the pool

1-way blocking:

Patent A is necessary to practice B, but B is not necessary for A. E.g., B is an improvement technology.

- Standard Oil v. U.S. (1931)

"Where there are legitimately conflicting claims or threatened interferences, a settlement by agreement, rather than litigation, is not precluded by the [Sherman] Act. … This is often the case where patents covering improvements of a basic process, owned by one manufacturer, are granted to another."

Does pooling of complementary patents raise competitive issues?

Example:

Two patents: 1 and 2.

- Patent 1 essential for Good A.
- Patent 2 improves Good A.

N consumers

WTP for Good A with only patent 1 = v_1

WTP for improved Good A with patents 1 and 2

= $v_2 > v_1$

Perfect competition, zero marginal cost (other than royalties)

Does pooling of complementary patents raise competitive issues?

Pool Patents 1 and 2

License patents 1 and 2 as a portfolio at royalty $R^{pool} = v_2$

Consumer surplus = 0

Pool profits $= N v_2$

Does pooling of complementary patents raise competitive issues?

No Pooling

Royalty for patent 1 = r_1

Royalty for patent 2 = r_2

Consumers compare $\{v_1 - r_1;\ v_2 - (r_1 + r_2)\}$

If $r_1 < v_1$: $r_2 = v_2 - v_1$, $R^{no\ pool} = r_1 + v_2 - v_1$

Consumer surplus = $v_1 - r_1$

Total Profits = $N(r_1 + v_2 - v_1)$

If $r_1 \geq v_1$: $r_2 = v_2 - r_1$, $R^{no\ pool} = v_2$

Consumer surplus = 0

Total Profits = $N\, v_2$

Does pooling of complementary patents raise competitive issues?

Pooling of complementary (one-way blocking) patents can result in higher prices in some cases

Note that example required a restriction on the licensing of individual patents by the pool – otherwise, pool collapses to the no-pooling case

Competitive relationships of patents in the pool

Substitute patents:

Licensees can use either patent to satisfy demand. Obvious competitive problems. Pool can raise royalties by eliminating competition among patentees.

Examples?

- Hartford – Empire
  - –alternative ways to manufacture glass
- Summit-VISX
  - –Alternative surgical procedures

Summit-VISX Story

FTC challenges patent pooling agreement. FTC argues that a key patent was obtained by fraud. If patent invalid, the surgical procedures are substitutes.

Summit-VISX settles with FTC and dissolves the pool.

FTC loses its fraud case.

PTO re-examines the patent. Disallows the disputed claim, but allows 40 new claims.

Competitive Implications of Cooperative Patent Defense

r_i = royalty charged for use of i^{th} patent

Effective Royalty R = Royalty that must be paid to offer product.

Substitutes:

$R^m = \min (r_1, r_2)$

Complements:

$R^m = r_1 + r_2$

Competitive Implications of Cooperative Patent Defense

Assume patent *i* valid with probability α_i if no cooperation and with probability $(\alpha_1 + \alpha_2)/2$ with cooperation.

Let $\alpha_1 = \alpha - a$ $\alpha_2 = \alpha + a$

Substitutes: both patents must be valid to survive competition

$R = \alpha_1\alpha_2 R^m = (\alpha^2 - a^2)R^m$

Compare to $\alpha^2 R^m$ with joint defense.

Complements: only one patent must be valid to survive competition

$R = (1-(1-\alpha_1)(1-\alpha_2))R^m = (\alpha^2 + a^2) R^m$

Compare to $\alpha^2 R^m$ with joint defense.

Competitive Implications of Cooperative Patent Defense

Cooperative defense increases the effective royalty if patents are substitutes.

Cooperative defense decreases the effective royalty if patents are complements.

Why share defense if patents are complements?

- Economies of scope in litigation?

A Competitive Hazard Index

- Patent Substitution Index:

  Are the pooled patents 2-way blocking, 1-way blocking, or substitutes?

  – Substitutes +3
  – Unknown or unasked +2
  – 1-way blocking +1
  – 2-way blocking 0

A Competitive Hazard Index

- Did the pool fix downstream prices? +2
- Did the pool combine weak patents? +2
- Did the pool restrict the use of non-patented products or processes? +2
- Did the pool prevent unilateral licensing? +1
- Did the pool require joint defense? +1

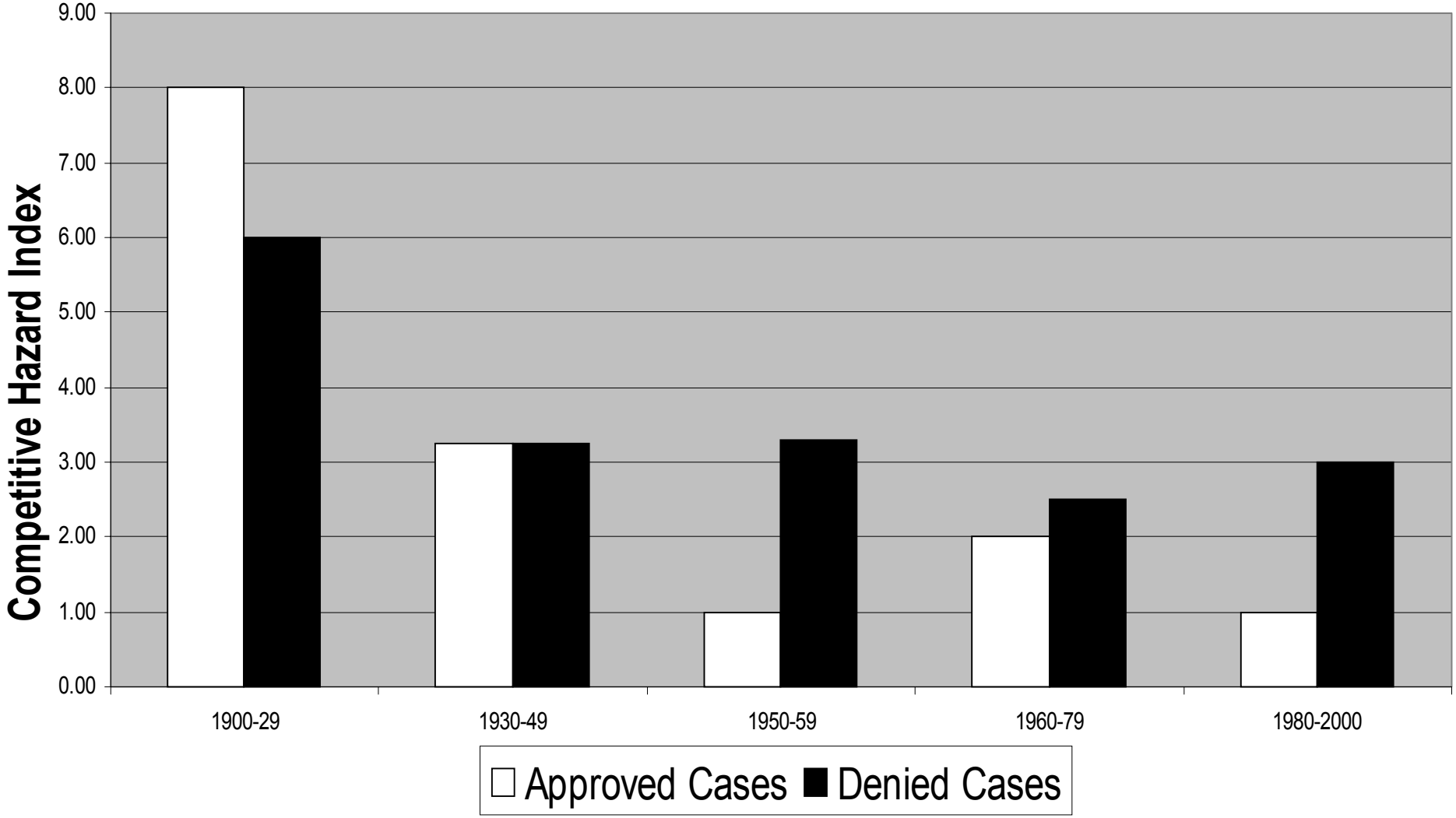
Did the pool fix product prices?

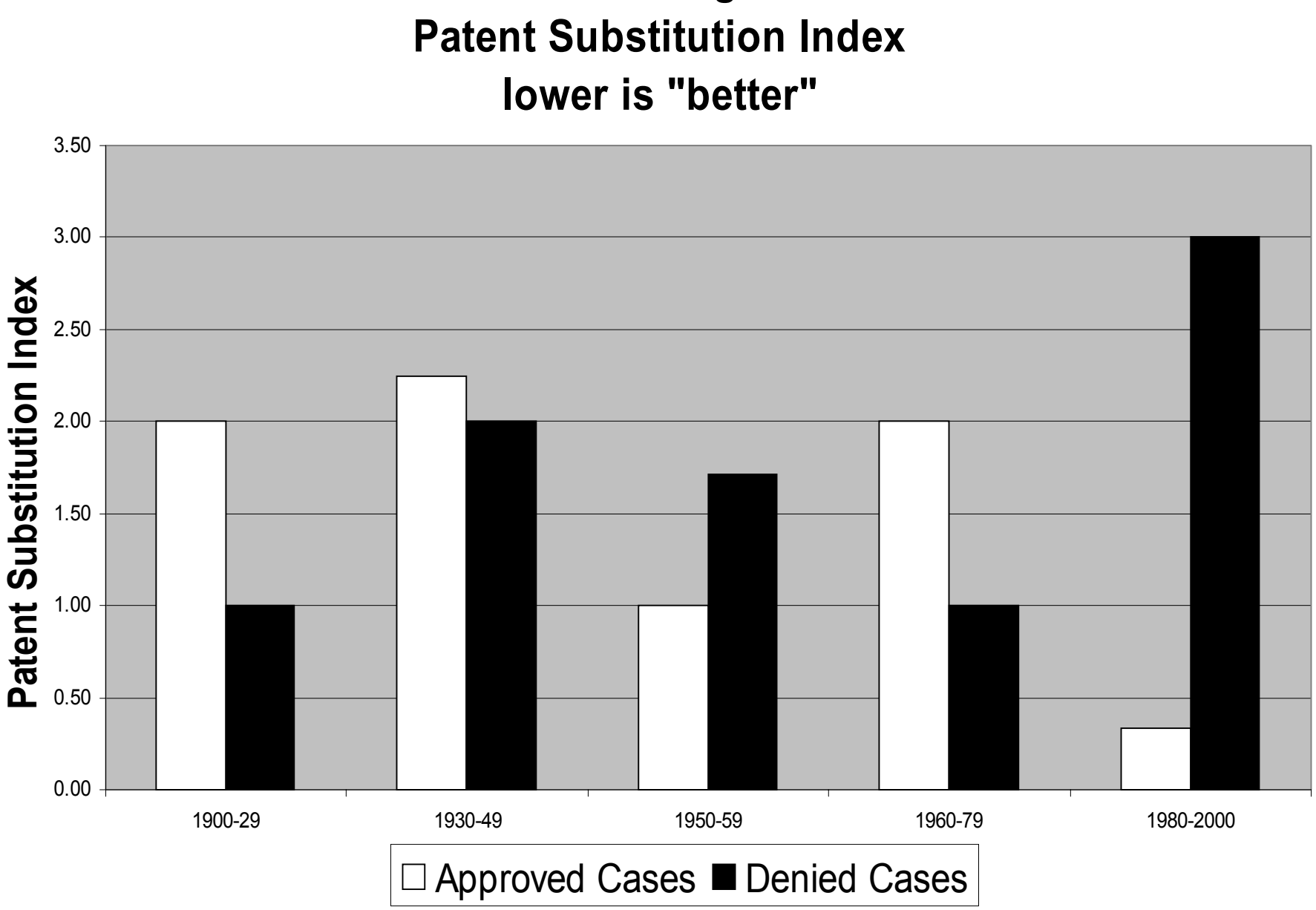
Confusion over fixing royalties v. fixing downstream products. E.g. royalties that are a percentage of sales from products that use the patented product.

Other Competition Issues

- Weak patents
- Restrictions on the sale of non-patented products
  - Similar to fixing prices of downstream products
- Package licensing
- Cooperative defense

Patent Pooling Cases
Total Competitive Hazard Index
lower is "better"




Patent Pooling Cases
Patent Substitution Index
lower is "better"
Patent Substitution Index
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
1900-29
1930-49
1950-59
1960-79
1980-2000
Approved Cases
Denied Cases

Some General Observations On Courts and Patent Pools

- Courts recognize the importance of substitutes v. complements, but rarely delve deeply into the issue. As a result, they often pay too little attention to the central competitive effects of pooling arrangements.

Some General Observations On Courts and Patent Pools

- Courts often fail to recognize that harms from vertical restrictions flow from the competitive nature of the patents, not from the restrictions themselves.
  - Hartford-Empire v. U.S. (1942) and U.S. v. National Lead (1945)

    Court held that patent pools were illegal. However, allowed the pools to continue after licenses were modified to eliminate field-of-use restrictions on downstream products. Court concluded that an aggressive remedy, such as royalty-free licenses, was not necessary where defendants are in vigorous competition with one another and with other producers, rivals are not losing ground, and licensees are prospering.

Some General Observations On Courts and Patent Pools

- Courts often defer to PTO and ignore weak patents
  - Boston Scientific Corp. v. Schneider (1997)

    "… the theory assumes a failure on the part of the Patent and Trademark Office to limit the patents to their proper scope … [A]nti-competitive effects cannot be adequately alleged when they require a presumption that the PTO is unable to do its job without the assistance of outside parties."

Some General Observations On Courts and Patent Pools

- Courts often object to cooperative efforts to enforce valid patent rights
  - United States v. Singer Mfg. (1963)

    Court disallowed a patent cross-licensing arrangement whose main purpose was to get patents in the hands of those who could most effectively enforce the patents against competition from Japanese entrants.
  - Courts distinguish cooperative patent enforcement in a cross-licensing arrangement from patent enforcement by a corporation that is a holding company for all patents.

Some General Observations On Courts and Patent Pools

- Courts sometimes confuse high royalties with control of downstream product prices

- Refusals to deal
  - Open pools are particularly problematic when patents are substitutes
    - Patent pool as cartelmeister
  - Closed pools have advantages when patents are complements
    - Reduce free-riding on new investments

Some General Observations On Courts and Patent Pools

- Courts have objected to pools that appear to extend patents to control downstream industry prices
  - Courts are more sensitive to these concerns when the patents in the pool are not clearly blocking. But even blocking patents raise these concerns when the pool grants licenses with extensive field of use and geographical restrictions.
- Courts have looked favorably on pools that appear to promote licensing and vigorous competition, even if the patents in the pool may be substitutes.

Some General Observations On Courts and Patent Pools

- Beware of bathroom patent pools
  - 6 of the 15 pooling arrangements held to be illegal involved objects or materials that are commonly found in bathrooms

Some Policy Recommendations for Review of Patent Pooling Arrangements

- DOJ MPEG-LA/DVD business review letters show the way
- Courts should retain independent patent expert to assess whether patents are substitutes or complements
- Technology market analysis – does the pool create significant market power?
- Rule of reason approach to vertical restraints if patents are not substitutes

	Competitive Effect of Combining Patents									
	Substitutes +3	Not Known +2	Complements +1	Pure Blocking +0	Fix Product Prices +2	Weak Patents +2	Restrict non-patented products +2	Prevent Unilateral Licensi +1	Joint Defense[1] +1	Total
National Harrow 1902		Y			Y	N	Y	Y	Y	8 approved
Standard Sanitary 1912			Y[2]		Y	N	Y[2]	Y	N	6 denied
Standard Oil 1931			Y		N	N	N	N	N	1 approved
Hartford-Empire[4] (pre-revision) 1942	Y				N	N	N	Y	N	4 denied
Hartford-Empire (post-revision) 1945	Y				N	N	N	Y	N	4 approved
National Lead (pre-revision) 1945		Y			N[3]	N	N	N	N	2 denied
National Lead (post revision) 1947		Y			N	N	N	N	N	2 approved
Line Material 1948			Y		N	N	N	N	N	1 denied
U.S. Gypsum 1948		Y[5a]			Y[5b]	N	Y	N	N	6 denied
Cutter Laboratories 1949	Y[6]				N	N	N	N	N	3 approved
Baker-Cammack 1950			Y		N	N	N	N	N	1 approved
Besser Mfg 1951		Y			N	N	N	Y	N	3 denied
New Wrinkle 1952		Y			N	N	N	N	N	2 denied

Does pooling of complementary patents raise competitive issues?

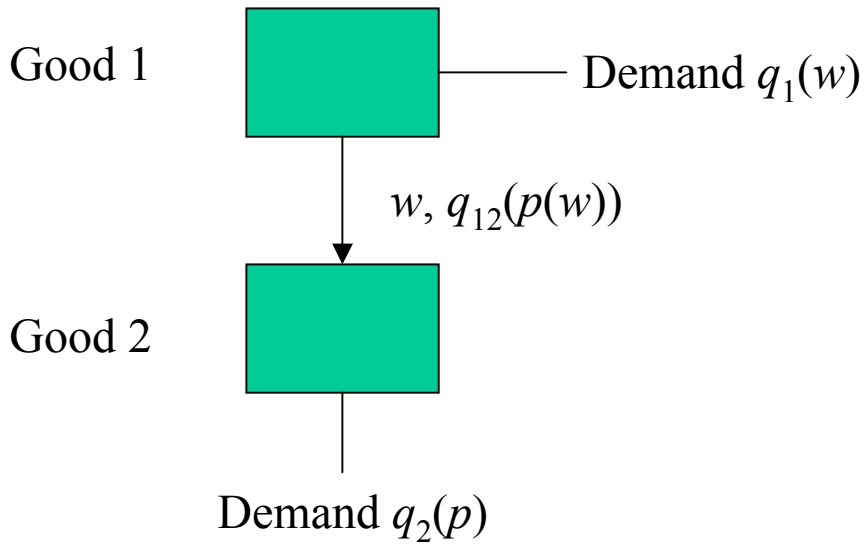
No pooling:

Firm 2 chooses p to max $(p\text{-}w)q_2(p)$

Firm 1 chooses w to max $w(q_1(w)+q_{12}(p(w))$

Pooling:

Pooled firm chooses w and p to max $wq_1(w) + pq_2(p)$



Does pooling of complementary patents raise competitive issues?

Suppose:

$q_1 = a_1 - b_1 w$

$q_2 = a_2 - b_2 p$

zero marginal production costs

Pooling:

Profit-maximizing price of good 2 is $p^p = \frac{a_2}{2b_2}$.

Profit-maximizing price of good 1 is $w^p = \frac{a_1}{2b_1}$.

Does pooling of complementary patents raise competitive issues?

No pooling:

Profit-maximizing price of good 2 is $p^n = \frac{(a_2 + b_2 w^n)}{2b_2}$.

Pooling lowers the price of good 2 if $w^n > 0$.

Firm 1's profit maximizing price is $w^n = \frac{2a_1 + a_2}{2(2b_1 + b_2)}$.

- Pooling lowers the price of good 2
  (if firm 1 would meet the stand-alone demand for good 1 with no pool).
- Pooling raises the price of good 1 if $\frac{a_1}{b_1} > \frac{a_2}{b_2}$.