

## Patent Pools\*

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### Abstract:

A patent pool is an agreement by multiple patentholders to share intellectual property among themselves or to license a portfolio of patents as a package to outsiders. Patent pools were common in the U.S. from the 1890s to the 1940s; since the mid-1990s, there has been a resurgence of patent pools tied to technological standards. I discuss the history and antitrust treatment of patent pools in the United States, and review the related academic literature (both theoretical and empirical).

**Suggested JEL Classifications: K21 (antitrust law); L24 (technology licensing); L4 (antitrust issues and policies); O34 (intellectual property rights)**

### patent pools

A patent pool is an agreement by multiple patentholders to share intellectual property among themselves or to license a portfolio of patents as a package to outsiders. Patent pools were common in the United States in the first half of the twentieth century, and reemerged as an important institution in the mid-1990s; an estimated \$100 billion worth of goods sold in 2001 were based at least partly on pooled patents.

### history

The first patent pool emerged from infringement lawsuits won by Elias Howe, credited with inventing the sewing machine, who returned from marketing his invention in England in the 1840s to find that others had copied it. Following the lawsuits, Howe, Isaac Singer, and two other manufacturers established a pool of sewing machine-related patents in 1856, with Howe receiving the bulk of the royalties.

Patent pools were commonplace in the U.S. from the 1890s to the 1940s. Lerner, Strojwas and Tirole (2007) identify 125 pools, most of them from this time; Lerner and Tirole (2007) claim that in the early twentieth century, “many (if not most) important manufacturing industries had a patent pooling arrangement.” (A partial list from Merges (2001) includes pools covering shoe machinery, automobiles, bathtubs, door parts, seeded raisins, coaster brakes, davenport beds, movie projectors, hydraulic pumps, and

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swimming pool cleaners; a longer list from Lerner, Strojwas and Tirole includes railroad couplers, TV equipment, and plastic artificial eyes.) In 1917, with airplanes needed for World War I, then Assistant Secretary of the Navy Franklin D. Roosevelt pushed eight aircraft manufacturers into a patent pool because patent litigation had shut down U.S. aircraft production. A 1915 pool containing automobile patents had 146 initial members, but most of the pools examined in Lerner, Strojwas and Tirole started with six members or fewer.

Following Congressional hearings on patent pools in the 1930s and '40s and several negative antitrust rulings, patent pools essentially vanished from the mid-1950s until the mid-1990s. In 1997, after extensive discussion with regulators, a pool formed containing patents essential to the MPEG-2 digital video standard. This was followed by pools tied to the DVD, Bluetooth, 1394 (Firewire), DVB-T, MPEG-4 (AVC), and 3G-Mobile standards. The MPEG-2 pool alone currently has 26 members, nearly a thousand patents, and over 1,300 licensees and affiliates. Pools have also recently been discussed for the biotech and pharmaceutical industries.

#### antitrust treatment

For two decades following the passage of the Sherman Antitrust Act in 1890, patent pools appeared to offer a way to circumvent its prohibitions. In 1902, the Supreme Court upheld the legality of the National Harrow pool, which dominated the market for float spring tooth harrows. Among other things, the licensing terms required licensees to only sell particular products, and fixed the prices for these products. The Court wrote:

The general rule is absolute freedom in the use or sale of rights under the patent laws of the United States. The very object of these laws is monopoly, and the rule is, with few exceptions, that any conditions which are not in their very nature illegal with regard to this kind of property... will be upheld by the courts.

*E. Bement & Sons v. National Harrow (186 U.S. 70)*

In 1912, however, the Court reversed itself, upholding a lower court's breakup of a pool with similarly restrictive licensing terms (*Standard Sanitary Manufacturing v. United States*). In the decades following, the court continued to focus on licensing terms, breaking up pools which fixed downstream prices or production, and allowing pools whose licensing agreements "contained no restrictions as the quantity of goods to be produced, or the price to be charged, or the territory in which they might be sold by the licensee" (*Baker-Cammack Hosiery Mills v. Davis, 181 F.2d 550 1950*). In 1945, the Supreme Court ruled against the Hartford-Empire pool, which used licensing terms to set production quotas in the glassware manufacturing industry, claiming, "The history of this country has perhaps never witnessed a more completely successful economic tyranny over any field of industry" (*Hartford Empire Co. v U.S., 323 U.S. 386*). Though the Baker-Cammack ruling followed that, several other pools were broken up in subsequent years (*United States v. Line Material, United States v. U.S. Gypsum, United States v. New Wrinkle*), and Hartford-Empire was generally seen as signaling the end of favorable treatment toward pools; by the mid-1950s, pool formation had essentially ceased.

This changed following release of the Antitrust Guidelines for the Licensing of Intellectual Property by the Department of Justice and Federal Trade Commission in April, 1995. Under the heading "cross-licensing and pooling arrangements," the Guidelines stated:

These arrangements may provide procompetitive benefits by integrating complementary technologies, reducing transaction costs, clearing blocking positions, and avoiding costly infringement litigation. By promoting the dissemination of technology, cross-licensing and pooling arrangements are often procompetitive.

Department of Justice analysis, enunciated in business review letters of several proposed pools, focused on three questions: whether a pool would integrate complementary patent rights (as opposed to patents which would otherwise be in competition); whether it would foreclose competition in related markets; and whether it would discourage further innovation. In the cases of the MPEG-2, DVD, and 3G pools, the DOJ stated after review that it was “not presently inclined to initiate antitrust enforcement action against the conduct you have described.” In 1998, the FTC did challenge a pool formed by Summit Technology and VISX, the only firms with FDA-approved technology for laser eye surgery, which was viewed to be functioning primarily as a price-fixing arrangement; the pool was dissolved as part of a settlement resolving the case. A 2007 DOJ/FTC report, which followed public hearings held in 2002, summarizes the current regulatory view.

#### characteristics of recent pools

To address the first regulatory concern – the integration of only complementary patent rights – recent pools have been limited to patents deemed *essential* for standard compliance. The business review letter on the proposed MPEG-2 pool reads:

The Portfolio combines patents that an independent expert has determined to be essential to compliance with the MPEG-2 standard; there is no technical alternative to any of the Portfolio patents within the standard. Moreover, each Portfolio patent is useful for MPEG-2 products only in conjunction with the others. The limitation of the Portfolio to technically essential patents, as opposed to merely advantageous ones, helps ensure that the Portfolio patents are not competitive with each other... The continuing role of an independent expert to assess essentiality is an especially effective guarantor that the Portfolio patents are complements, not substitutes.

*Joel Klein (Acting Assistant Attorney General), letter to Garrard Beeney, June 26, 1997*

Several of the recent pools include grantback provisions – pool participants and licensees agree to add to the pool, or at license to each other at reasonable terms, any future patents they receive which are judged to be essential. The pools also allow for separate licensing of individual patents – that is, licensing through the pool is not done exclusively. The majority of the recent pools allocate revenue in proportion to the number of essential patents that each firm has contributed to the portfolio, although some of the pools do attempt to account for patents which are more or less valuable.

One unusual case is that of the 3-G mobile standard. 3-G was designed to use five different radio interfaces, in order to be backward-compatible with five second-generation wireless networks. Antitrust concerns led to the establishment of five separate License Administrators to oversee licensing of patents essential for each interface, rather than a single platform or pool containing all of the relevant patents.

(The 3-G Platforms are different from traditional pools in that all licensing is done “a la carte,” at standardized terms set by each Administrator.)

#### theoretical literature

Shapiro (2001) employs a Nash-Bertrand model to show that pools result in lower prices and greater welfare when patents are perfect complements, by correcting the “complements problem” of excessive prices; and higher prices and lower welfare when patents are perfect substitutes, by eliminating competition. Kim (2004) finds that when patents are perfect complements, the case for pools is even stronger in the presence of vertically integrated firms (patentholders who are also downstream producers). Choi (2003), on the other hand, shows that patent pools change the incentive for another patentholder or a potential infringer to challenge questionable patents in court, making pools of complementary but weak patents possibly welfare-destroying.

Lerner and Tirole (2004) introduce a more flexible model than perfect complements and perfect substitutes, and show that when patents are more substitutable, pools are more prone to be welfare-positive. They show that forcing pool participants to also make their patents available individually has a destabilizing effect on welfare-negative pools, but no effect on welfare-positive pools, and therefore propose compulsory individual licensing as a screen for efficient pools. Brenner (forthcoming) examines the equilibrium effects of different pool formation rules in the Lerner and Tirole framework, showing that endogenously-occurring pools will be inefficiently small if patentholders can opt out individually without disrupting pool formation.

My own work (Quint, 2008) examines pools in a setting with both essential and nonessential patents; I find that pools of essential patents are always welfare-increasing, while pools containing nonessential patents have ambiguous welfare effects, even when they are limited to patents which are perfect complements. I also find that when a pool is welfare-increasing, agreements which “bind the pool’s hands” with respect to pricing will reduce, and may even reverse, the welfare gains.

#### empirical literature

Merges (2001) discusses the workings of many historical pools. Gilbert (2004) discusses a number of important court rulings and how they hold up under economic analysis. Lerner, Stojwas and Tirole (2007) analyze the licensing rules of 63 patent pools, most from before 1950 but a handful from the 1990s; they find that, consistent with theory, pools containing complementary patents were more likely to allow independent licensing and require grantbacks. Layne-Farrer and Lerner (2008) examine arrangements for dividing pool revenue and its effect on participation; they also find that vertically integrated firms are more likely to join pools. Lerner and Tirole (2007) review current public policy and suggest certain changes.

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