

PATENT POOL OUTSIDERS

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ABSTRACT

Individuals who decline to join cooperative groups—outsiders—raise concerns in many areas of law and policy. From trade policy to climate agreements to class action procedures, the fundamental concern is the same: a single member of the group who drops out could weaken the remaining union. This Article analyzes the outsider problem as it affects patents.

The outsider phenomenon has important bearing on patent and antitrust policy. By centralizing and simplifying complex patent licensing deals, patent pools conserve tremendous transaction costs. This allows for the widespread production and competitive sale of many useful technologies, particularly in the consumer electronics industry. Because these transaction-cost savings appear to outweigh the most common competition-related concerns raised by patent pools, antitrust authorities generally view these private groups favorably.

Others are less sanguine. Most patent pools are incomplete: for the technologies they cover, not all relevant patents are included. The reason for this is understandable. Patent holders sometimes believe they can negotiate for higher royalties by declining to join an existing pool. Antitrust regulators are aware of this behavior but do not worry much about it. A growing number of economists and legal scholars believe, however, that this outsider behavior may impose higher costs on pool licensees, detracting from the central benefit that patent pools offer—transaction cost savings. These commentators urge antitrust regulators to regard patent pools with greater caution and skepticism.

These calls for caution, however, are based mostly on theories about how patent pools should work, rather than on empirical studies. Remarkably, little research has been done to shed light on the actual impact of patent pool outsiders. Through an original ethnographic study, this Article seeks to remedy this gap. A set of the most notable and public episodes of outsider behavior were collected from industry press reports, case reports, and historical archives. Crucial new information was then gathered through interviews with lawyers and executives directly involved with the episodes studied.

The study reveals a characteristic of patent pools that has gone unappreciated until now: they subtly but powerfully influence bargains that take place “poolside”—i.e., deals between patent holders and licensees that take place “in the shadow” of the pool. This spillover effect can beneficially limit the power that theorists have assumed outsiders have. This is an unappreciated benefit of cooperation. The theorists, as it turns out, have not used the wrong approach, but rather, have been missing some important parameters.

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To further aid regulators, this Article builds upon its qualitative findings by introducing a new quantitative technique for estimating the cost that a licensee either incurs or saves due to an outsider. Applying this technique to original financial and industry data gathered from research subjects, this Article shows that, counterintuitively, patent licensees are sometimes better off where cooperation among licensors is partial, rather than complete. The inflection point lies where the royalty rate hike that a unified pool would need to charge to draw in an outsider is equal to the transaction costs that licensees would conserve by dealing with a single pool.

This study's revelations have provocative implications that reach beyond patent law. Contrary to conventional wisdom, slightly fragmented property markets may sometimes be preferable to "grand coalitions." There may exist in any given market for complementary patent rights (or other complementary property rights), an optimal level of diffusion of ownership that resides between total diffusion and total concentration. Some cooperation may not only be better than none, but also better than more.

Drawing upon this study, antitrust regulators who must evaluate patent pools can assemble a clearer and more complete understanding of their overall costs and benefits. This Article is also helpful beyond patent law. The ethnographic methodology followed here reveals dynamics between outsiders and groups that theory alone has not captured. Scholars concerned with outsiders in other areas of law and policy can refine and build upon theory by applying a similar ethnographic approach.

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I. INTRODUCTION

A sense of unraveling is in the air. Scholars and experts in far-flung corners of law and policy are growing concerned that outsiders—individuals who decline to join economic, legal, and social collaborations—will upend important policy goals. Ask an international trade expert about outsiders, and you may learn why Britain’s 2016 decision to withdraw from the European Union could undermine and weaken the remaining federation;¹ ask an expert on climate governance, and you may learn that the United States’ decisions to

1. See Guido Calabresi & Eric S. Fish, *Federalism and Moral Disagreement*, 101 MINN. L. REV. 1, 17 (2016) (discussing the potential impact of weak versus strong central governments on Britain’s decision to leave); Paul Craig, *Brexit: A Drama in Six Acts*, 41 EUR. L. REV. 447, 460 (2016) (discussing some issues plaguing the EU resulting in a “social legitimacy deficit”); Horst Eidenmüller, *Negotiating and Mediating Brexit*, 44 PEPP. L. REV. 39, 49 (2016) (warning of “detrimental long-term consequences for the Union as a whole” were other Member States to follow the pathway that the U.K. has forged).

abstain from key treaties could cause cooperation among other nations to dissolve;² ask commentators in corporate law, meanwhile, and you may hear concerns that a sole creditor can disrupt a cooperative plan to divide an insolvent company's or nation's debts.³ In the grand cathedral of law, the outsider concern has become a resounding echo: a rogue litigant undermines the efficiencies of a class action by objecting to settlement terms;⁴ a solitary property owner causes a nuisance by refusing to cooperate with a neighborhood plan;⁵ a venture capitalist threatens the future of a young company by opportunistically pulling out of a cooperative round of funding;⁶ a reluctant juror stands in the way of a just ruling by rejecting the conclusions

2. See generally Daniel H. Cole, *The Problem of Shared Irresponsibility in International Climate Law*, in DISTRIBUTION OF RESPONSIBILITIES IN INTERNATIONAL LAW 290 (André Nollkaemper & Dov Jacobs eds., 2013) (examining how outsider nations that refused to join the Kyoto Protocol affected the underlying goals of the federation of countries that did join).

3. Mark J. Roe, *The Voting Prohibition in Bond Workouts*, 97 YALE L.J. 232, 238 (1987) (“Even when a single creditor and the firm overcome these impediments, they cannot readily strike their own deal and ignore the other creditors, because value will flow from the consenting creditor to the holdout creditors.”); G. Mitu Gulati & Kenneth N. Klee, *Sovereign Piracy*, 56 BUS. LAW. 635, 636 (2001) (discussing the “holdout creditor” issue in connection with competing interpretations of a discussion of a “pari passu” clause, “a standard clause found in almost all sovereign bond indentures”); Lee C. Buchheit & G. Mitu Gulati, *Sovereign Bonds and the Collective Will*, 51 EMORY L.J. 1317, 1324 (2002) (“Holdout creditors could use this threat of liquidation to extract preferential settlements at the expense of the debtor and the other creditors.”).

4. See Elizabeth Chamblee Burch, *Litigating Together: Social, Moral, and Legal Obligations*, 91 B.U. L. REV. 87, 100 (2011) (discussing class action outsiders); Brian T. Fitzpatrick, *The End of Objector Blackmail?*, 62 VAND. L. REV. 1623, 1624 (2009) (explaining that “[t]he holdout problem in class action litigation” stems from an objector to a settlement); Georgene Vairo, *Is the Class Action Really Dead? Is That Good or Bad for Class Members?*, 64 EMORY L.J. 477, 519 (2014) (discussing situations in which defendants have the right to walk away from a settlement if a threshold percentage of plaintiffs do not participate). See, e.g., *In re Microsoft Corp. Antitrust Litig.*, 185 F. Supp. 2d 519, 521 (D. Md. 2002) (“[Plaintiffs] would have a right to opt out, and, if there were a certain number of opt-outs . . . Microsoft would have the right to withdraw from the settlement.”).

5. See, e.g., Abraham Bell & Gideon Parchomovsky, *Reconfiguring Property in Three Dimensions*, 75 U. CHI. L. REV. 1015, 1040–42 (2008) (discussing nuisance doctrine with respect to holdouts and outsiders).

6. See, e.g., Joseph L. Lemon, Jr., *Don't Let Me Down (Round): Avoiding Illusory Terms in Venture Capital Financing in the Post-Internet Bubble Era*, 39 TEX. J. BUS. L. 1 (2003); Usha Rodrigues & Mike Stegemoller, *Exit, Voice, and Reputation: The Evolution of SPACS*, 37 DEL. J. CORP. L. 849, 856 (2013) (discussing a study of voting procedures in the context of special acquisition corporations that “created what turned out to be a costly holdout right”).

of her fellow jurors.⁷ It seems that outsiders are everywhere, threatening the good that can come from cooperation.⁸

Today, one of the most important debates over outsiders concerns patents. A growing number of economists and legal scholars believe that patent holders who refuse to join patent pools—cooperative licensing clearinghouses—will undermine and sometimes entirely undo the benefits that pools deliver.⁹ Such outsider behavior has been on the rise in recent years.¹⁰ Commentators who subscribe to this theory urge antitrust regulators, who must evaluate patent pools, to regard pools more skeptically than they currently do.¹¹

This “Patent Outsider Theory,” as we might call it, is more provocative than it sounds. Patent pools are important to the consumer technology industry, and by extension, to the entire U.S. economy.¹² That is because they address a big problem: transaction costs. Technology standards that the developed world relies upon, such as LTE data and MPEG streaming video, cannot be commercialized without the permission of many different patent holders.¹³ Because dozens of patent holders often hold essential pieces of the

7. See, e.g., *Influences on the Jury*, 45 GEO. L.J. ANN. REV. CRIM. PROC. 643, 656 (2016) (“A judge who concludes that the jury cannot overcome a deadlock may . . . declare a mistrial.”). See generally Jeffrey Abramson, *Anger at Angry Jurors*, 82 CHI.-KENT L. REV. 591 (2007) (describing a holdout juror’s role in hung juries); Shari Seidman Diamond et al., *Revisiting the Unanimity Requirement: The Behavior of the Non-Unanimous Civil Jury*, 100 NW. U. L. REV. 201 (2006) (providing empirical data on holdout behavior on juries); Alison Markovitz, *Jury Secrecy During Deliberations*, 110 YALE L.J. 1493 (2001) (discussing the relationship between the holdout juror and jury deliberations).

8. Richard Epstein noted insightfully that holdouts and externalities can disrupt an efficient allocation of resources. See generally Richard A. Epstein, *Holdouts, Externalities, and the Single Owner: One More Salute to Ronald Coase*, 36 J.L. & ECON. 553 (1993).

9. See *infra* Section II.B.1.

10. *Id.* (enumerating recent episodes).

11. See, e.g., Reiko Aoki & Sadao Nagaoka, *Coalition Formation for a Consortium Standard through a Standard Body and a Patent Pool: Theory and Evidence from MPEG2, DVD, and 3G* at 2–3 (Inst. of Innovation Research Hitotsubashi Univ., Working Paper No. 05-01, 2005), <http://hermes-ir.lib.hit-u.ac.jp/rs/bitstream/10086/15986/1/070iirWP05-01.pdf> [<https://perma.cc/547A-HXBJ>].

12. See generally Robert P. Merges, *Contracting into Liability Rules: Intellectual Property Rights and Collective Rights Organizations*, 84 CALIF. L. REV. 1293 (1996) [hereinafter Merges, *Contracting into Liability Rules*]. For a body of work examining different aspects of patent pools, see, for example, FLOYD L. VAUGHAN, *THE UNITED STATES PATENT SYSTEM* (1956); Michael Mattioli, *Power and Governance in Patent Pools*, 27 HARV. J.L. & TECH. 421 (2014); Robert P. Merges, *Institutions for Intellectual Property Transactions: The Case of Patent Pools*, in *EXPANDING THE BOUNDARIES OF INTELLECTUAL PROPERTY: INNOVATION POLICY FOR THE KNOWLEDGE SOCIETY* 123, 129–30, 132, 144 (Rochelle Dreyfuss et al. eds., 2000) [hereinafter Merges, *The Case of Patent Pools*].

13. In the consumer electronics industry, many of these technologies are standards, such as formats for digital video, wireless data communications, and the like. As of this writing

puzzle, the transaction costs of negotiating a deal with each individually would be phenomenally high.¹⁴ A patent pool addresses this problem by granting manufacturers and service providers permission to use the necessary patents through a single agreement. Licensees agree, in return, to pay standard royalty rates, which the pools divide among the patent holders—i.e., their members. By minimizing the number of licensing transactions that must take place, patent pools reduce transaction costs that would otherwise persist.¹⁵ The benefits are far-reaching. Anyone who has owned a smartphone, video game console, personal health device, or modern television has benefited directly from the work that patent pools do.¹⁶

How could a sole outsider upset this happy state of affairs? Theorists imagine the following: if an important patent holder refused to join a patent pool and demanded greater royalties than it would otherwise receive as a member of that pool—i.e., supracompetitive prices—licensees would have to pay higher royalties than they otherwise would.¹⁷ Those higher royalties would offset at least some of the transaction cost savings the pool provides to those licensees.¹⁸ This might motivate other companies to pull away from the pool. It is easy enough to spin out hypothetical problems that might follow: faced with prohibitively high licensing costs, some would-be licensees might decide to focus on other (less preferred) products and services. With fewer competing manufacturers to purchase goods from, consumers could encounter higher prices. Meanwhile, the reduced patent licensing activity could weaken the

(March 2018), one of the largest patent pool administrators in the country is MPEG LA, a company that oversees thirteen patent pools for various standards and is overseeing the development of a future pool. Many of these pools have formed in just the past five to ten years. For more information, see the MPEG LA website. *Revolutionizing Intellectual Property Rights Management*, MPEG LA, www.mpegla.com/main/Pages/About.aspx [https://perma.cc/LTB8-K2Q9] (last visited Mar. 11, 2018); see also Justin R. Orr, *Patent Aggregation: Models, Harms, and the Limited Role of Antitrust*, 28 BERKELEY TECH. L.J. 525, 553 n.159 (2013) (describing the role of patent pools in producing MPEG technology).

14. See Michael A. Heller & Rebecca S. Eisenberg, *Can Patents Deter Innovation? The Anticommons in Biomedical Research*, 280 SCIENCE 698, 698–700 (1998); Michael Mattioli, *Communities of Innovation*, 106 NW. U. L. REV. 103, 110–13 (2012) (presenting historical and current case studies of this issue); Carl Shapiro, *Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard Setting*, in 1 INNOVATION POLICY AND THE ECONOMY 119, 124–26 (Adam B. Jaffe et al. eds., 2001).

15. See Robert P. Merges & Michael Mattioli, *Measuring the Costs and Benefits of Patent Pools*, 78 OHIO ST. L.J. 281, 297, 319 (2017) (providing estimates of the transaction costs pools conserve and associated methods of deriving these methods).

16. As explained in Part II, patent pools have facilitated the use of digital video standards that the devices listed in this sentence use. These standards include, for instance, MPEG-2 video, Bluetooth, and LTE.

17. See *infra* Section II.B.1.

18. *Id.*

incentive that patents represent, thus dampening research investments. It brings to mind the old proverb, “for want of a nail, the shoe was lost; for want of a shoe, the horse was lost,” and so on, until a battle, a war, and an entire kingdom are lost, “all for want of a horseshoe nail.”¹⁹ That’s how the theorists see it, at least.

This Article suggests that the theorists have it wrong. This conclusion is drawn from an original set of case studies that reveal new information about real-world constraints that limit the power of patent pool outsiders. Most significantly, by publicizing their royalty rates, patent pools signal information to licensees about the value of patents in the pool, as well as the related *patents outside of the pool*. In addition, the outsider strategy presents considerable risks to patent holders. These factors have not been identified or reported on in the literature on patent pools. The research draws upon news articles, press releases, and court papers that describe important outsider episodes. This Article also uniquely provides deeper insight through information that was captured in semi-structured interviews with lawyers and executives who were directly involved with important episodes where patent holders preferred to license patents outside of pools. In addition to illustrating the constraints that pool outsiders are under, these case studies reveal some unappreciated aspects of patent pools that may be relevant in other cooperative settings. This evidence does not suggest that the theorists have it wrong because they have approached the outsider problem incorrectly, but rather, that they have been missing some important dynamics.

This conclusion has important implications for antitrust policy. As mentioned earlier, antitrust regulators evaluate patent pools because, for all of their benefits, pools can raise competition concerns. The chief concern, as explained in greater depth in Part II of this Article, is that a pool may suppress competition between two substitutive technologies by placing them both within the pool.²⁰ Aware of this risk, antitrust regulators have long sought to weigh the benefits and the costs that individual patent pools offer.²¹ In a 2017 article, Robert Merges and I argued that on average, the benefits of patent pools appear to far exceed their costs.²² Interestingly, antitrust authorities have

19. A notable example of this ancient proverb appears in Benjamin Franklin’s 1758 book, *The Way to Wealth*. BENJAMIN FRANKLIN, *THE WAY TO WEALTH* (1758).

20. *See infra* Section II.A.

21. *See, e.g.*, U.S. DEP’T OF JUST. & FED. TRADE COMM’N, *ANTITRUST ENFORCEMENT OF INTELLECTUAL PROPERTY RIGHTS: PROMOTING INNOVATION AND COMPETITION* (2007), <https://www.justice.gov/sites/default/files/atr/legacy/2007/07/11/222655.pdf> [<https://perma.cc/Z6C4-2HTM>] [hereinafter DOJ GUIDELINES].

22. Merges & Mattioli, *supra* note 15 (concluding that on average, patent pools do far more good than harm).

long assumed that outsiders are not detrimental to patent pools.²³ In general, the Department of Justice (DOJ) views patent pools favorably. In public advisory notices, the DOJ has expressed its view that, absent any unrelated concerns, antitrust authorities will view some cooperation among patent holders as better than none.²⁴

To sum up: the concern about outsiders voiced by academic theorists is at odds with the long-held (but unsupported) assumptions of antitrust regulators. This Article offers the first empirical view of this topic, and it suggests that the regulators have it right: outsiders do not appear to significantly reduce the transaction costs that patent pools conserve. This information has short-term and long-term value to regulators: in the short-term, it provides empirical support for a long-held assumption that has recently been called into question; in the longer term, it urges against a change in how regulators regard patent pool outsiders in the future. Since the nineteenth century, regulators' attitudes toward patent pools have vacillated pendulum-like, between periods of distrust and periods of favor.²⁵ Although regulators are currently friendly toward pools, the pendulum seems likely to swing backward in the future. To further aid regulators, this Article introduces a new quantitative technique for estimating the real-world cost that a licensee either incurs or saves due to an outsider.

This leads to a second surprising discovery. Drawing upon pricing and pooling information collected from interview subjects involved in major pools, this Article argues that, under some circumstances, slightly fragmented property markets are preferable to “grand coalitions”—i.e., a pool containing all relevant patent holders. This argument assumes that a unified patent pool would need to entice outsiders to join by offering royalties either equal to or

23. *See, e.g.*, Letter from Thomas O. Barnett, Assistant Att’y Gen., Antitrust Div., U.S. Dep’t of Justice, to William F. Dolan & Geoffrey Oliver, Jones Day 7 (Oct. 21, 2008), <https://www.justice.gov/archive/atr/public/busreview/238429.pdf> [<https://perma.cc/6PWN-EEYP>] [hereinafter RFID Business Review Letter] (“Not all owners of potentially blocking patents are currently members of the Consortium—and these owners may never join it—potentially limiting efficiency gains. Failure to realize all potential efficiencies does not mean, however, that the efficiencies created are noncognizable.”). In their communications licensees, patent pools have acknowledged the possibility of outsiders as well. *See, e.g.*, Lucent Techs., Inc. v. Gateway, Inc., No. CIV. 02-2060-B(CAB), 2007 WL 2900484, at *11 (S.D. Cal. Oct. 1, 2007) (“Moreover, the MPEG LA sublicensee agreement explicitly warns that the MPEG LA pool does not necessarily include all the patents necessary to practice the technology and that sublicensee signs the agreement aware of such risks.”).

24. RFID Business Review Letter, *supra* note 23.

25. *See* Michael Mattioli, *Empirical Studies of Patent Pools*, in 2 RESEARCH HANDBOOK ON THE ECONOMICS OF INTELLECTUAL PROPERTY LAW (Peter S. Menell et al. eds., forthcoming 2018).

greater than the royalties outsiders already collect independently.²⁶ Because patent pools typically compensate their members according to simple royalty-division formulas, this implies that a pool would need to deliver proportionally higher royalties to all members. A pool that unifies in this way would charge licensees higher royalty rates than the sum of the individual rates that licensees must pay to a partially complete pool and to an outsider. Stated more simply, complete unification may often be undesirable because it entails the cost of luring in outsiders. Outsiders may not be powerful, but multiplication is. These results should be helpful in advancing the scholarly debate, and more practically, to antitrust policy.

This Article's lessons extend beyond patent law. Considering the widespread concern over outsiders in so many areas of law and policy, this Article shows that an ethnographic approach based upon interviews and novel documentary evidence can add critical information that theoretical models are missing. The argument is not that an economic analysis of outsiders is inappropriate, but rather, that such an analysis can yield more accurate and complete results when the dynamics of the situation are well understood. Experts in other domains far removed from patent and antitrust law may find the approach taken here helpful.

The Article unfolds in three parts: Part II explains the relationship between patent pools and federal policies that promote competition and innovation. Part II builds on and summarizes prior research showing that the benefits of patent pools tend to outweigh their costs. The discussion then turns to the recent concerns over patent pool outsiders through a review of recent economic and legal scholarship. Part III presents a set of case studies of outsider behavior in action. These episodes do not support the theory that outsiders meaningfully detract from the benefits patent pools offer. Importantly, these case studies lay out new findings that help explain why, as regulators have long guessed, patent pools can still be very helpful even when they do not contain all of the essential patents involved. Part IV presents a new method that antitrust regulators can use to assess the impact of outsiders on patent pools. Applying real-world data gathered in this study, the Article yields broad new insights that are helpful to policymakers.

26. Based on the interviews conducted for this Article, the decision to join a patent pool is almost entirely an economic one. Although pool membership may theoretically carry spillover benefits—i.e., constructive working relationships with other companies, signaling to inventors—such benefits do not appear to factor prominently into the decision to join a pool.

II. BACKGROUND

Patent pools can be helpful or harmful: on one hand, they conserve vast transaction costs; on the other hand, they can dampen competition. Most scholarship on patent pools has focused on these potential costs and benefits. Recently, however, some scholars have voiced a new concern: they argue that the primary benefit patent pools offer—transaction cost savings—may not be as robust as most experts believe. As a patent pool becomes more economically important, the incentive will grow for some patent holders to “go it alone.” They predict that this behavior can impose high royalty licensing fees on licensees, thus offsetting the transaction costs that pools conserve.

Outsider behavior appears to be on the rise in patent pools. As one subject interviewed for the study in Part III of this Article stated, “this is happening more and more, as patent pools have higher difficulties attracting patent owners.”²⁷ Whether outsiders are truly a problem for pools and for licensees remains an open question. If antitrust authorities are convinced that outsiders are a concern, however, they may regard patent pools less favorably than they presently do. This Part lays the groundwork for the empirical study presented in Part III by discussing these concerns in greater detail.

A. PATENT POOLS, INNOVATION, AND COMPETITION

John Donne’s oft-quoted line, “no [one] is an island,” aptly captures the role patents play in technology markets.²⁸ Many of the products and services that fuel the U.S. economy today incorporate *thousands* of related patented inventions. A widely-cited 2012 study estimated that the average smartphone, for example, incorporates approximately 250,000 patented technologies.²⁹ A lion’s share of the patents that make up these vast mosaics are owned by technology companies.³⁰

In this environment, patent licensing is important and potentially problematic. In theory, any patent holder that blocks the use of a patent essential to a product or service could impede commercialization of that technology.³¹ Manufacturers and service providers thus must achieve a

27. Email from Subject #3 to author (July 18, 2017) (on file with author).

28. JOHN DONNE, DEVOTIONS UPON EMERGENT OCCASIONS (1624).

29. See RPX Corp., Securities Registration Statement, Amendment No. 3 (Form S-1), at 59 (Apr. 18, 2011), <https://www.sec.gov/Archives/edgar/data/1509432/000119312511101007/ds1a.htm> [<https://perma.cc/8HSA-D2ST>].

30. In this Article, the term “technology companies” refers to companies that specialize in computer hardware and software, as well as related digital devices and services. Readers should note that many patents are owned by universities and nonpracticing entities (“NPEs”) as well.

31. See *infra* Section II.B.1 (explaining this in greater detail).

daunting goal: they must obtain *many* licenses from *many* patent holders. Even for firms with ample capital and resources, the transaction costs required could be steep—so steep, in fact, that the licensing might often not take place.³² Scholars in law and economics sometimes call this unhappy outcome, “The Tragedy of the Anticommons”—a term Rebecca Eisenberg and Michael Heller coined to describe the underuse of patented inventions due to high ex ante costs of aggregating rights.³³

Patent pools address this licensing muddle by serving as clearinghouses.³⁴ Groups of patent holders typically form pools to grant licensees (usually manufacturers) permission to use their sets of related patent rights through unified licenses. Today, most patent pools are administered by independent companies with specialized legal and business expertise. These companies help establish pools and handle the ongoing work of furnishing manufacturers and service providers with licenses, collecting royalty payments from them, and then dividing those funds among patent holders. Two of the most prominent patent pool administrators in the United States are MPEG LA, LLC, based in Denver, and Via Licensing Corporation, located in San Francisco.³⁵

Patent pools deliver considerable benefits to their licensees, patent holders, and consumers. By offering collections of patents under standard licensing terms, they remove the need for manufacturers and service providers to negotiate a *series* of individual licenses.³⁶ Patent holders, meanwhile, can draw a stream of royalties from a potentially large set of licensees. Since the 1850s, this elegant cooperative model has enabled the growth of entire industries, from sewing machines, to steel, to airplanes and cars, to critical drugs and medical procedures, to wireless data, to digital film, to television distribution.³⁷ Today, patent pools are particularly important in the field of consumer technology standards. Anyone who has ever listened to a compact disc, used a

32. This is commonly referred to as “The Complements Problem.” See, e.g., Shapiro, *supra* note 14, at 122–24 (explaining the complements problem as it applies to patents).

33. Heller & Eisenberg, *supra* note 14, at 699–700.

34. See Merges, *Contracting into Liability Rules*, *supra* note 12, at 1319 (discussing the clearinghouse function of pools).

35. See *Current Programs*, MPEG LA, <http://www.mpegla.com/> [<https://perma.cc/ZN6V-WAC3>] (click on “Current Programs”) (last visited Mar. 11, 2018); *Licensing Programs*, VIA LICENSING, <http://www.via-corp.com/us/en/licensing.html> [<https://perma.cc/NFZ6-F5P6>] (last visited Oct. 31, 2017).

36. See Richard J. Gilbert, *Ties That Bind: Policies to Promote (Good) Patent Pools*, 77 ANTITRUST L.J. 1, 8 (2010).

37. See Mattioli, *supra* note 12, at 431–39, 444, 449 (discussing and analyzing the royalty division rules in historical patent pools relating to these technologies); Vaughan, *supra* note 12, at 39–68 (discussing historical pools covering these technologies).

smart phone, owned a video game console, or watched a DVD has directly benefited from the work of patent pools.³⁸

Even in the realm of patent licensing, however, there is no such thing as a free lunch. Alongside the transaction costs that they conserve, patent pools can generate social costs if they are not carefully designed. One such cost can result from reduced competition. Suppose a patent pool includes two patented technologies that do the same thing but in slightly different ways. In antitrust parlance, such technologies are called “substitutes.”³⁹ By bundling two substitute technologies in a single license, a patent pool could charge consumers more for both patents than the sum of what each patent would command in a competitive licensing market.⁴⁰ Considering this possibility, it is unsurprising that patent pools have long been scrutinized by antitrust regulators.⁴¹

Some commentators argue that patent pools can also dampen innovation. A patent pool that requires its members to offer a royalty-free license back to the pool covering any future patents the licensee acquires could, in theory, suppress the incentive of exclusivity that patents ordinarily represent. Some scholars believe that companies subject to such “grant-back” clauses may choose to reduce their innovation investments.⁴² The result could be a net drop in innovation, higher prices for consumers, or both. Because of these possibilities, antitrust regulators and courts have long attempted to determine whether individual pools do more harm than good.⁴³ This has generally been an imprecise, highly qualitative exercise.

38. As explained in Part III of this Article, these products all rely upon MPEG-2 video.

39. See DOJ GUIDELINES, *supra* note 21, at 74–78.

40. See *id.* at 77 (“[A] pool containing substitutable patents, i.e., patents covering technologies that compete with each other and that licensee producers would choose between, may have the anticompetitive effect of increasing the total royalty rate to licensees.”).

41. See Merges & Mattioli, *supra* note 15, at 328, 335–36 (explaining that such scrutiny has lately been ad hoc and qualitative).

42. See *id.* at 59–62 (discussing the potential social welfare costs of grant-backs); U.S. DEPT OF JUST. & FED. TRADE COMM’N, ANTITRUST GUIDELINES FOR THE LICENSING OF INTELLECTUAL PROPERTY 31 (2017), https://www.ftc.gov/system/files/documents/public_statements/1049793/ip_guidelines_2017.pdf [<https://perma.cc/2ZBC-DGAR>] (“Another possible anticompetitive effect of pooling arrangements may occur if the arrangement deters or discourages participants from engaging in research and development, thus retarding innovation.”).

43. See, e.g., DOJ GUIDELINES, *supra* note 21, at 2 (“The Antitrust Division of the U.S. Department of Justice and the U.S. Federal Trade Commission (the ‘Agencies’) frequently address complex antitrust questions related to conduct involving the exercise of intellectual property rights in enforcement actions, reports, testimony, reviews of proposed business conduct, and *amicus curiae* or ‘friend of the court’ briefs filed in the federal courts of appeals and the Supreme Court.”). For a discussion of the DOJ’s view of patent pools, see *id.* at 8–9.

In a 2017 article, Robert Merges and I sought to aid regulators in this regard by providing the first empirically grounded estimates of the costs and benefits of patent pools.⁴⁴ We first presented original methods of calculating the transaction cost savings that pools provide and the potential social costs they impose. We then applied those methods to financial data we obtained directly from leading patent pool administrators. Ultimately, we concluded that the transaction costs that modern patent pools conserve appear to greatly exceed the potential social costs they might impose. We estimated that a patent pool organized around popular video and audio standards saves the consumer electronics industry conservatively between \$400 million and \$600 million dollars.⁴⁵ On the other side of the equation, potential costs associated with lost competition or innovation appear to be far lower.⁴⁶ Patent pools might not deliver a “free lunch,” but they look like a remarkably good bargain.

B. THE OUTSIDER QUESTION

Recent scholarship has shown that most modern patent pools do not include *all* of the patents that relate to the technologies they support.⁴⁷ Anne Layne-Farrar and Josh Lerner estimated in a recent study, for instance, that the most “complete” modern pools contain eighty-nine percent of the patents that a licensee might need.⁴⁸ The least complete pools, they estimated, contained as few as ten percent of the necessary patent rights. They also estimated that “most pools contain roughly one-third of the eligible firms.”⁴⁹ In 2015, Justus Baron and Tim Pohlmann built upon this work by examining even more pools

44. See generally Merges & Mattioli, *supra* note 15. Our study was prompted in part by recent calls for greater antitrust regulation of pools. See, e.g., Steven C. Carlson, *Patent Pools and the Antitrust Dilemma*, 16 YALE J. ON REG. 359, 383 (1999) (“[T]he DOJ and the FTC should not adopt a per se rule of legality for the pooling of blocking patents, and that they must carefully stipulate the permissible bounds of those pools deemed procompetitive”); Scott Sher, Jonathan Lutinski & Bradley Tennis, *The Role of Antitrust in Evaluating the Competitive Impact of Patent Pooling Arrangements*, 13 SEDONA CONF. J. 111, 112 (2012) (“[A]ntitrust enforcement can and should take a more central role in the evaluation of the competitive effects of mass marketed patent pools containing thousands of separate and likely competing patents”).

45. See Merges & Mattioli, *supra* note 15, at 319–24.

46. *Id.* at 327–38.

47. See Anne Layne-Farrar & Josh Lerner, *To Join or Not to Join: Examining Patent Pool Participation and Rent Sharing Rules*, 29 INT’L J. INDUS. ORG. 294, 299 (2011).

48. See *id.*

49. *Id.* at 298.

and reported consistent findings.⁵⁰ Most patent pools, it would seem, are not grand coalitions.⁵¹

One reason why patent pools are incomplete in this sense is that they often form through a gradual process. Groups of technology companies usually collaborate to design technology standards.⁵² This work is often mediated by standard-setting organizations (SSOs).⁵³ SSOs often require collaborators to promise that they will declare any standard-essential patents (SEPs) that they hold and to license any such patents under “fair, reasonable and non-discriminatory” (FRAND) terms.⁵⁴ This standard-setting process usually comes before any patent pool forms. Only later, once a draft of the standard has been finalized, might some of the collaborators work toward forming a pool.⁵⁵ Typically, the organizers of such a pool issue a public call for patents and hire an independent expert to evaluate whether any declared patents are essential to the standard. This two-step process—standard-setting followed by pool formation—is a hallmark of pools designed around modern technology standards.⁵⁶

Layne-Farrar and Lerner cleverly estimated the participation rates in modern standards-based patent pools by comparing the numbers of patents included in those pools with the total numbers of patents declared (by their owners) to be essential to those pools.⁵⁷ They explained that the difference between these numbers could be the result of deliberate, calculated outsider behavior, or simply by disagreements concerning essentiality: “for those firms that *do* join [pools],” they wrote, “their patents are subject to an independent

50. See Justus Baron & Tim Pohlmann, *The Effect of Patent Pools on Patenting and Innovation – Evidence from Contemporary Technology Standards* 13–16 (Feb. 2, 2015) (unpublished manuscript), http://www.law.northwestern.edu/research-faculty/searcenter/innovationeconomics/documents/Baron_Pohlmann_effect_of_patents.pdf [<https://perma.cc/RJ9-V8YJ>].

51. See Gilbert, *supra* note 36, at 17 (“The grand coalition is the set of all the relevant players.”).

52. See generally Jorge L. Contreras, *Patents, Technical Standards and Standards-Setting Organizations: A Survey of the Empirical, Legal and Economics Literature*, in 2 RESEARCH HANDBOOK ON THE ECONOMICS OF INTELLECTUAL PROPERTY LAW: ANALYTICAL METHODS (Peter S. Menell et al. eds., forthcoming 2018) (providing an overview of interoperability standards and standards setting organizations).

53. *Id.* at 3 (working version).

54. *Id.* at 17 (working version).

55. See Jorge L. Contreras, *When a Stranger Calls: Standards Outsiders and Unencumbered Patents*, 12 J. COMPETITION L. & ECON. 507, 510–12 (2016).

56. Since the 1850s, patent pools have formed differently in many industries. Some have been collective solutions to litigation among patent holders, while others have been in response to pressure exerted by the federal government. See Mattioli, *supra* note 14, at 119–47.

57. Layne-Farrar & Lerner, *supra* note 47, at 297–301.

review for essentiality and not all patents declared as essential to a standard are actually found to be so.”⁵⁸ On its own, this evidence does not reveal whether the apparent lack of coverage in modern pools is the result of strategic outsider behavior or simply disagreements between patent holders and evaluators about essentiality.

But then Layne-Farrar and Lerner investigated patent pool participation more deeply. They examined whether patent holders were more likely to seek membership in patent pools that stood to compensate them relatively well.⁵⁹ Patent pools compensate their members by divvying-up royalties paid to the pool by licensees according to simple formulas.⁶⁰ Most commonly, these formulas are based upon *pro-rata* or *per-capita* divisions.⁶¹ This “rough and ready” approach to royalty sharing is attractive to many patent holders because it makes licensing simple, certain, and enables a volume of licensing that would otherwise be difficult and costly.⁶² Layne-Farrar and Lerner found that firms that possibly owned essential patents were less likely to seek participation in pools with royalty-division rules that stood to undercompensate them.⁶³ This finding, they explained, is suggestive of a deliberate outsider behavior rather than a disagreement over essentiality.⁶⁴ The authors did not conclude, however, that this kind of imperfect cooperation is a practical problem for pools.

1. *The Concerned View of Outsiders*

To understand why outsider behavior concerns some scholars, it is helpful to introduce two intertwined concepts: *holdouts* and *the complements problem*.⁶⁵ Hold-out situations often arise when a prospective property buyer or licensee

58. *Id.* at 298.

59. *Id.*

60. See Mattioli, *supra* note 12, at 439–55, 463 (cataloging royalty division and apportionment in historical and present-day pools).

61. *Id.*

62. *Id.* at 446 (referring to this as a “rough and ready” approach).

63. See Layne-Farrar & Lerner, *supra* note 47, at 296; see also Peter Bright, *New Patent Group Threatens to Derail 4K HEVC Video Streaming*, ARS TECHNICA (July 23, 2015, 9:55 PM), <http://arstechnica.com/tech-policy/2015/07/new-patent-group-threatens-to-derail-4-hevc-video-streaming/> [<https://perma.cc/EU4Q-Y76A>] (“If those companies are unhappy with MPEG LA’s terms, they don’t have to participate. It appears so far that at least five companies have decided to do just that: HEVC Advance claims General Electric, Technicolor, Dolby, Philips, and Mitsubishi Electric as members.”).

64. *Id.*

65. The first discussion of this problem is typically credited to the French mathematician AUGUSTIN COURNOT. See AUGUSTIN COURNOT, RESEARCHES INTO THE MATHEMATICAL PRINCIPLES OF THE THEORY OF WEALTH 103–04 (Nathaniel T. Bacon trans., 2d ed. 1971) (1838) (explaining the problem).

needs to strike deals with many individual property owners. A canonical example is the development of a shopping mall that will sit where a set of individually-owned lots exist.⁶⁶ Upon learning that his or her rights are essential to the developer's plan, each property owner has an incentive to drive a hard bargain.⁶⁷ Trouble arises, however, if the owners of these complementary property rights individually demand prices that lead to an unworkable aggregate for the prospective buyer.⁶⁸ If one or more property owners demand royalties that are high enough, no deals will be made, rendering all parties worse off.⁶⁹ This is the complements problem.

In a 1999 article in the journal *Science*, Michael Heller and Rebecca Eisenberg argued that a similar dynamic may play out in patent licensing markets—i.e., that a single patent holder aware that it can block access to a necessary technology could hold out for high royalties.⁷⁰ If multiple patent holders behave in this way, with no regard for their impact on the overall cost for would-be licensees, the technology may become too costly to license. They famously termed this outcome “The Tragedy of the Anticommons.”⁷¹ The authors acknowledged, however, that patent pools could overcome this problem.⁷² Robert Merges later developed this point into a landmark publication that offered some optimism: patent pools themselves are the evidence, Merges argued, of the power of private actors to wisely overcome holdout situations and the related complements problem.⁷³

Outsiders (as the term is used in this Article) are like traditional holdouts, but they imply some unique dynamics. Like the holdout, the outsider pressures a buyer or licensor for supracompetitive rates. Unlike the holdout, however, the outsider can also lean upon a set of insiders—i.e., a group of complementary rights holders. The outsider seeks to bargain in the shadow of

66. See, e.g., Richard McGregor & Yu Sun, *China's 'Nail House' Floors Developers*, FIN. TIMES, Mar. 27, 2007, at 6 (offering a real-life example of this holdout behavior).

67. See Thomas F. Cotter, *Patent Holdup, Patent Remedies, and Antitrust Responses*, 34 J. CORP. L. 1151, 1160 (2009) (discussing the holdout or holdup dilemma); Shapiro, *supra* note 14, at 124–29 (same).

68. Shapiro, *supra* note 14, at 125

69. *Cf. id.*

70. Heller & Eisenberg, *supra* note 14, at 698. Arti Rai has also written important foundational commentary on modern patent pools in the biopharmaceutical industry and in the consumer technology industry—including the pools studied in this Article. See Arti K. Rai, *Fostering Cumulative Innovation in the Biopharmaceutical Industry: The Role of Patents and Antitrust*, 16 BERKELEY TECH. L.J. 813, 848 (2001) (“To be sure, the MPEG-2 and DVD patent pools represent something of a high-water mark of procompetitiveness in a patent pool.”).

71. Heller & Eisenberg, *supra* note 14, at 698.

72. See *id.* at 701.

73. See Merges, *Contracting into Liability Rules*, *supra* note 12, at 1319.

this cooperative group, trading off its efficiencies.⁷⁴ In doing so, the outsider can theoretically not only demand high rates from licensees, but also exert pressure on the insiders by demanding a larger share of the pie in exchange for its cooperation.⁷⁵

Scholarly concerns about patent pool outsiders first surfaced in a paper written by Reiko Aoki and Sadao Nagaoka, published in 2005. The paper examined the factors that might lead patent holders in different industries to become pool outsiders.⁷⁶ The authors presented an economic model that explained how outsiders who negotiate in the shadow of established patent pools could, under some circumstances, demand higher royalties than the pool would deliver. The outsider can free-ride, they posited, off the efficiencies and certainty of licensing enabled by the pool.⁷⁷ Their model suggested, however, that this will usually tend to happen when the number of essential patent holders is large.⁷⁸ In settings where few patent holders operate, they predicted that a “grand coalition” is possible.⁷⁹ Considering the large numbers of

74. François Lévêque & Yann Ménière, *Technology Standards, Patents and Antitrust*, 9 COMPETITION & REG. NETWORK INDUSTRIES 29, 34 (2008) (“Still, some patent owners may prefer not to participate in the patent pool so as to take advantage of the collective self-discipline accepted by those who did join the pool. This hold out problem arises basically because an essential patent owner can always charge a higher price if it manages to set its price after the others.”). For the foundational discussion of the “bargaining of the shadow” concept, see generally, Robert Cooter et al., *Bargaining in the Shadow of the Law: A Testable Model of Strategic Behavior*, 11 J. LEGAL STUD. 225 (1982).

75. In other words, this expanding body of scholarship suggests that cooperative failures not only lead to suboptimal licensing, but also that at least some patent holders waste capital in ill-fated efforts to prevent that very result. See also Steffen Brenner, *Optimal Formation Rules for Patent Pools*, 40 ECON. THEORY 373, 374 (2009) (discussing the outsider problem as it affects the welfare-enhancing aspects of patent pools); Gilbert, *supra* note 36, at 17–18 (discussing the factors that might make joining a pool more or less compelling to an individual patentee); Daniel Quint, *Pooling with Essential and Nonessential Patents*, 6 AM. ECON. J. MICROECONOMICS 23, 34 (2013) (noting that the outsider problem “creates a free rider problem which may prevent pools from reaching their optimal size”); Gastón Llanes & Joaquín Poblete, *Ex Ante Agreements in Standard Setting and Patent Pool Formation*, 23 J. ECON. & MGMT. STRATEGY 50, 50 (2014) (studying the effects of “pool-formation rules on technology choice, prices, and welfare”).

76. See Aoki & Nagaoka, *supra* note 11, at 3. The authors explained that “[t]he breakdown of an integrated patent pool,” caused either by an outsider, or by the splintering of the pool into multiple licensing groups, “not only raises the total price to be paid by the licensees but also reduces the joint profit of the patentees.” *Id.*

77. See *id.* at 8; see also Mattioli, *supra* note 12, at 439–51 (indicating that patent pools allocate royalties to their members through formulas agreed upon when the pool is created).

78. See Aoki & Nagaoka, *supra* note 11, at 21 (“[T]he emergence of an outsider is inevitable [because] . . . a firm can gain by becoming an outsider and [this] gain increases as the coalition of the other firms expands.”).

79. *Id.* at 21 (“[A] grand coalition can be implemented only if the number of essential patent holders (n) is small.”).

essential patents in modern standards pools, the authors concluded, “there is indeed a risk of the tragedy of anti-commons.”⁸⁰

In a 2003 California Law Review article, Michael R. Franzinger expressed similar concerns relating to a patent pool designed to cover 3G wireless technologies.⁸¹ The wireless giant, Qualcomm, Franzinger explained, was vocal in its reluctance to join the pool. Franzinger posited that this may have been because Qualcomm drew its revenues primarily from licensing rather than manufacturing.⁸² “Especially for a nonmanufacturing patent holder who only wishes to license out its technology and not to obtain reciprocal licenses from others,” he wrote, “there would seem to be no good reason to join the Platform.”⁸³ Franzinger added, “[t]he lack of full industry-wide participation may dilute the competitive benefits of [a patent pool] more than it dilutes its dangers,” and concluded that the risk of “capture” presented by patent pool outsiders is significant and deserving of policy intervention.⁸⁴

In a 2010 article, the esteemed economist Richard Gilbert observed that “patentees are not compelled to negotiate with other patentees” to address a collective negative externality.⁸⁵ Gilbert explained that the more a pool thrives, the greater is there a rational impulse for members to defect.⁸⁶ In the context of patent pools, Gilbert wrote:

The more the pool succeeds in lowering royalties and avoiding transaction costs, the greater is the benefit from independent licensing of an essential patent. The incentive to leave the pool (or not join in the first place) is analogous to the incentive to defect from a cartel. By restricting output and raising prices, harmful cartels make it profitable for a firm to act as an independent competitor.⁸⁷

Gilbert analyzed the outsider problem through the economic theory of the core—a framework that examines the ability of players in a given economic setting to form beneficial coalitions.⁸⁸ “In the patent example,” he explained, “the core exists if every patentee prefers its payoff when part of a pool that consists of all patentees to the payoff it could get in any different coalition of

80. *Id.* at 22.

81. Michael R. Franzinger, *Latent Dangers in a Patent Pool: The European Commission’s Approval of the 3G Wireless Technology Licensing Agreements*, 91 CALIF. L. REV. 1693, 1706 (2003).

82. *See id.*

83. *Id.*

84. *Id.*; *see id.* at 1727.

85. Gilbert, *supra* note 36, at 17 (“The grand coalition is the set of all the relevant players.”).

86. *Id.* at 16–8.

87. *Id.*

88. *Id.* at 18.

patentees.”⁸⁹ Gilbert further added that “[p]atent owners that choose to remain outside a pool can unravel the benefits from pooling by interfering with one-stop shopping and by demanding high royalties.”⁹⁰

It is helpful to synthesize these concerns into a coherent picture. One concern appears to be that licensees will pay more in settings where a sole licensor operates outside of a pool than they would pay if the same patent holder had joined the pool.⁹¹ If this cost difference is great, it might shut some would-be licensees out of the market. A related concern has to do with the effect that outsiders have on the overall cohesion of the pool. If every member of a pool acts on a rational impulse to “go it alone,” the group will splinter apart, setting the stage for an anticommons.

Although there have been no empirical studies of the impact of patent pool outsiders, Jorge Contreras’ recent study of patent infringement lawsuits brought by “standards outsiders” helps illuminate this discussion.⁹² Contreras was interested in patent holders unencumbered by FRAND obligations. He identified lawsuits where such “standards outsiders” brought suits against technology producers.⁹³ Contreras’ research goal was to see whether “[the standards outsiders] could potentially seek rents in excess of the rates received by [insiders].”⁹⁴ Contreras found that suits brought by outsiders make up an appreciable proportion of all assertions of standard-essential patents.⁹⁵ He also found that the companies that bring these suits most often are so-called nonpracticing entities.⁹⁶ These conclusions are concerning, but they leave open the question of what impact, if any, patent pool outsiders have on the efficiencies pools offer.

89. *Id.*

90. *Id.* at 28.

91. It is helpful to distinguish this concern from the concern that royalty-free cross-licenses between pool members can give them an unfair advantage over licensees. Kenneth Flamm argued that this advantage became unfair in the DVD landscape as the price of manufacturing the technology dropped: “Within a few short years, however, the royalties charged by the DVD patent pools evolved into truly significant sums relative to the total cost of manufacturing optical disk drives (ODDs)—indeed they now account for the majority of manufacturing cost for a potential entrant.” Kenneth Flamm, *A Tale of Two Standards: Patent Pools and Innovation in the Optical Disk Drive Industry* 20 (Nat’l Bureau of Econ. Research, Working Paper No. 18931, 2013), <http://www.nber.org/papers/w18931.pdf> [<https://perma.cc/Z42Q-2RX3>]. This criticism is not really about the outsider problem, however.

92. See Contreras, *supra* note 55.

93. *Id.* at 507.

94. *Id.* at 520.

95. *Id.* at 535.

96. *Id.* at 518–19.

Industry stakeholders and market analysts are often concerned by outsiders as well. In 2015, for instance, industry commentators warned that the existence of two 4K video patent pools “threatened to derail” the future of streaming videos by increasing the cost of licensing of the underlying technology.⁹⁷ In 2012, when Nokia, Apple, and Google withdrew from patent pooling efforts related to the LTE wireless data standard used by smartphones, similar predictions were reported in the Wall Street Journal.⁹⁸ A few years earlier, industry analysts made similar comments about the 3G wireless data and MPEG-2 video patent pools, each of which did not include important patent holders.⁹⁹

2. *The Sanguine View of Outsiders*

Antitrust authorities have assumed that patent pool outsiders are not a problem. Their assumption is simply that some pooling is more helpful than none at all.¹⁰⁰ This optimistic view is supported by ample anecdotal evidence:

97. Stephen Shankland, *Next-gen High-res Video Faces New Fees and Uncertainty*, CNET (Mar. 26, 2015, 6:40 PM), <http://www.cnet.com/news/patent-group-raises-new-fees-uncertainty-for-4k-video/> [<https://perma.cc/T3RK-ZZ7N>]. (“‘[The introduction of HEVC Advance] creates confusion in the market,’ especially given MPEG LA’s pool of patents from 27 different patent holders, said Frost & Sullivan analyst Dan Rayburn. ‘They put out a press release that scares a lot of content owners, and then won’t give any details . . . I’ve got content owners saying this is bad for my business.’”).

98. See Don Clark, *Plan to Pool LTE Patents Takes Shape*, WALL ST. J. (Oct. 3, 2012, 8:01 AM), <https://blogs.wsj.com/digits/2012/10/03/plan-to-pool-lte-patents-takes-shape/> [<https://perma.cc/L2GW-G79E>] (acknowledging that some companies tend to act independently when it comes to patent matters).

99. See Franzinger, *supra* note 81, at 1706. (“The lack of full industry-wide participation may dilute the competitive benefits of the Platform more than it dilutes its dangers.”); Vikrant Narayan Vasudeva, *Patent Valuation and License Fee Determination in Context of Patent Pools*, CTR. FOR INTERNET & SOC’Y (July 9, 2014), <https://cis-india.org/a2k/blogs/patent-valuation-and-license-fee-determination-in-context-of-patent-pools> [<https://perma.cc/4895-W3U6>] (“Correspondingly, if the patent pool does not contain all the patents it cannot curtail royalty stacking issues for the users. For example, Alcatel-Lucent pursued infringement claims for patents that it alleged covered the MPEG-2 standard and were not in the pool.”).

100. See, e.g., Letter from Joel Klein, Assistant Att’y Gen., U.S. Dep’t of Justice, to Garrard R. Beeney, Esq., Sullivan & Cromwell 13 n.58 (Dec. 16, 1998), <https://www.justice.gov/sites/default/files/atr/legacy/2006/04/27/2121.pdf> [<https://perma.cc/EJ3W-5JH7>] [hereinafter DVD Business Review Letter] (“Transaction costs to licensees would almost certainly be somewhat lower if these later patents were included in the pool, instead of being subject to separate negotiations. However, the fact that this pool might not enable the realization of all potential efficiencies of pooling patents in this area does not mean that the efficiencies that it does create are insubstantial or that the arrangement is anticompetitive or unlawful.”); RFID Business Review Letter, *supra* note 23, at 8 (proposing that a pool will yield cognizable efficiencies, although those efficiencies may not be as great as they would be if the pool contained all essential patents); Gilbert, *supra* note 36, at 26 (“Nonetheless, even partial pools that do not include all patents that are necessary to make or use a product offer

as mentioned earlier, many important industries appear to have flourished due to patent pools. If outsider behavior was truly a problem, one would expect to see far fewer successful pools, as well as lower commercialization and higher prices of the technologies around which they are organized.

In a 2006 paper, Douglas Lichtman suggested why this might be. He made the important point that outsiders could be companies that are known *before* a technology is in widespread use or *after* the fact.¹⁰¹ In the former case, an outsider theoretically would possess only the power to demand royalties that reflect the marginal value of its patents. This would be because, if an outsider's demands are viewed as excessive by prospective licensees (which may include pool members), given enough time, the industry can simply adopt a different technology in place of the one hold-out. Lichtman theorized that patent holders that assert themselves after a technology is in widespread use, meanwhile, may ironically be in a poor position if there are very many of them. Just as a creditor can only receive a smaller share of the pie if it is one of many, Lichtman posited, in a market that can only pay a limited maximum rate, each of many outside licensors can only have a weak leverage.¹⁰² Lichtman believed that licensees have more power and that patent holders are more farsighted than the pessimists have guessed. These predictions cast doubt on the outsider concern. As Lichtman explained, the risk of being one of many holdouts fosters "less of an incentive for a firm to strategically delay in the hopes of being a patent holdout, and less of an incentive for an accidental patent holdout to actually bring suit."¹⁰³

Another possibility is that pools set a practical baseline for independent licensors. A recent dispute between Microsoft and Motorola suggests this is so. In *Microsoft Corp. v. Motorola, Inc.*, the Ninth Circuit instructed that a patent pool may serve as a useful data point in determining a "reasonable" rate under a FRAND obligation.¹⁰⁴ Jonathan Barnett posited that multiple complementary patent licensors may "signal" royalty rates to one another,

considerable savings in transaction costs and can mitigate royalty stacking compared to separate licensing with independent patentees."); Mark A. Lemley & Carl Shapiro, *Patent Holdup and Royalty Stacking*, 85 TEX. L. REV. 1991, 2014–15 (2007) ("Such a patent holder might well maximize its revenues by staying out of a proposed patent pool and asserting its patent rights independently, unless it believes that its failure to join the pool will undermine the formation of the pool and thus seriously hinder sales of the product in question.").

101. See Douglas G. Lichtman, *Patent Holdouts and the Standard Setting Process* 1–3 (Univ. of Chi. John M. Olin Law & Econ. Working Paper, Paper No. 292, 2006).

102. See *id.* at 6–7.

103. *Id.* at 6.

104. See *Microsoft Corp. v. Motorola, Inc.*, 795 F.3d 1024, 1043 (9th Cir. 2015) ("Motorola provided no evidence that its patents were more valuable than the other patents in the pool.").

leading to an aggregate cost that is workable.¹⁰⁵ As the study presented in Part III of this Article shows, Barnett is correct.

In addition, patent owners do not always sue unlicensed users. Herbert Hovenkamp and Eric Hovenkamp suggest that a licensee will not be “meaningfully blocked as a matter of fact” if, “for example, . . . there is a widespread belief that a blocking patent is invalid, such that competitors are willing to practice the blocked technology without a license notwithstanding the risk of an infringement suit.”¹⁰⁶ This accords with Rebecca Eisenberg’s observation—which has been echoed by other scholars—that many patented technologies are used without permission with no legal consequences for the infringer.¹⁰⁷ Because of this, Eisenberg notes, the effective reach of a patent may fall short of its nominal reach.¹⁰⁸ This reasoning suggests that the same may be true for patent pools: a pool that does not contain all patents that relate to a technology may nonetheless be *effectively* complete if the outsiders permit the unlicensed use of their patents.

On one side of this debate, economic theory urges greater concern over patent pool outsiders; on the other side, the long-held intuition of regulators is that these independent patent holders do not meaningfully detract from the transaction costs that pools mitigate. If the theorists have it right, then regulators may wish to rethink their long-held assumptions; if, on the other hand, regulators are correct that outsiders dampen the benefits of patent pools, then academic debate on this subject could be meaningfully advanced. The next Part presents the results of an original study that adds new empirical insights to this debate.

105. See Jonathan Barnett, *From Patent Thickets to Patent Networks: The Legal Infrastructure of the Digital Economy*, 55 JURIMETRICS 1, 41–42 (2014).

106. HERBERT HOVENKAMP, MARK JANIS, MARK LEMLEY & CHRISTOPHER R. LESLIE, IP AND ANTITRUST: AN ANALYSIS OF ANTITRUST PRINCIPLES APPLIED TO INTELLECTUAL PROPERTY LAW § 34.04[C] at 34-8 (3d ed. 2016).

107. See Jonathan M. Barnett, *Has the Academy Led Patent Law Astray?*, 32 BERKELEY TECH L.J. (forthcoming 2017) (arguing that unlicensed infringing uses are extremely common); David J. Teece, *The “Tragedy of the Anticommons” Fallacy: A Law and Economics Analysis of Patent Thickets and FRAND Licensing*, 32 BERKELEY TECH. L.J. (forthcoming 2017) (arguing that uncompensated, infringing uses are net more harmful to innovation than patent thickets); Rebecca Eisenberg, *Patent Costs and Unlicensed Use of Patented Inventions*, 78 U. CHI. L. REV. 53, 53–54 (2011) (“Empirical work suggests that unlicensed use of patented inventions is common in research Unlicensed use is likely pervasive in other settings as well, including commercial production.”).

108. See Eisenberg, *supra* note 107, at 55–56.

III. AN ETHNOGRAPHIC STUDY OF PATENT POOL OUTSIDERS

This Part presents a study of patent pool outsiders—i.e., episodes where essential patent holders have declined to join pools and instead licensed independently.

A. METHODOLOGY

The methodology followed here was deeply influenced by the work of Nobelist Elinor Ostrom, who famously developed the Institutional Analysis and Design (IAD) framework. Using this approach, which entails defining broad categories of inquiry, Ostrom and the many scholars she inspired have shed light on how groups manage shared resources (including property rights) in a variety of settings.¹⁰⁹ Katherine Strandburg, Brett Frischmann, and Michael Madison have recently adapted the IAD framework to the study of “knowledge commons,” such as patent pools.¹¹⁰ Inspired and informed by this body of work, this Article adopts a similar ethnographic approach.¹¹¹

This study analyzes the following research question: “Do outsiders (independent licensors) impose significant costs on licensees or otherwise undermine the transaction costs conserved by patent pools?” I focused my research on the following research topics¹¹²: (1) the technological, industrial, and social contexts in which outsider episodes occurred; (2) the patents involved, including their numbers and their relationships to the patents in pools; (3) the firms and institutions involved; (4) the motivations and goals of the licensors and pool administrators involved; (5) the internal governance

109. See generally ELINOR OSTROM, GOVERNING THE COMMONS: THE EVOLUTION OF INSTITUTIONS FOR COLLECTIVE ACTION 182–85 (1990). For an example of an ethnographic approach applied to study outsiders outside of patent settings, see generally Cole, *supra* note 2 (examining how outsider nations that refused to join the Kyoto Protocol affected the underlying goals of the federation of countries that did join). Surprisingly, outsiders in that setting not only failed to weaken, but in fact strengthened, coalitions of rights-holders.

110. See generally Peter B. Meyer, *An Inventive Commons: Shared Sources of the Airplane and Its Industry*, in GOVERNING KNOWLEDGE COMMONS 341 (Brett M. Frischmann, Michael J. Madison & Katherine J. Strandburg eds., 2014).

111. The methodology carried out borrowed heavily from the IAD framework but did not formally adhere to that framework in every respect. See Michael Mattioli, *The Data-Pooling Problem*, 32 BERKELEY TECH. L.J. 179, 224 (2017) (describing an analogous targeted application of the IAD framework). More specifically, aspects of the IAD framework that were not relevant to the central question under examination were not employed.

112. Brett M. Frischmann et al., *Governing Knowledge Commons*, in GOVERNING KNOWLEDGE COMMONS 1, 20 (Brett M. Frischmann, Michael J. Madison & Katherine J. Strandburg eds., 2014).

rules of the pools and outside licensors involved; (6) outcomes, with a focus on costs and benefits.

This work began with a broad literature review. To learn about the topic and to identify potential case studies and research study subjects, I searched through newspaper and industry press archives for well-documented episodes of patent pool outsiders. Because this work revealed several episodes that involved litigation, I carefully studied lawsuits by reviewing court decisions, docket filings, and corporate press releases, such as announcements of settlements. Because the DOJ reviewed the pools examined, this study gathered helpful details from publicly available letters exchanged between pool organizers and the Antitrust Division of the DOJ.¹¹³ I also gathered critical information about pool composition (patents, membership, and licensees) from the websites of patent pool administrators. Archived copies of these same webpages revealed pool membership data from earlier points in time.¹¹⁴ In some cases, publicly available annual reports to shareholders were reviewed as well.

With a preliminary record assembled, I sought to construct a deeper and richer understanding by interviewing individuals directly involved with selected outsider episodes. I contacted and interviewed executives and lawyers who work for the largest patent pool administrators in the United States. I then interviewed executives and counsel at large technology companies, some of which were members of pools, and some of which were outsiders of prominent pools.

All interviews were conducted by telephone and email in a semi-structured fashion and focused on a set of interview questions that I shared with the individuals beforehand. The questions were divided into two lines of inquiry: the impact of outsider behavior on patent pools generally, and questions pertaining to specific case studies. Most conversations led to follow-up emails and phone conversations. In the interest of clarity, the findings are reported here in three sub-parts: a set of general observations followed by two deep case studies.

A note on the selection of case studies: there are many episodes of outsider behavior that can be analyzed. This study proceeded on the premise that depth would be more helpful than breadth. Rather than cataloging as many outsider episodes as possible, the goal was instead to provide deep and nuanced

113. See *Business Review Letters and Request Letters*, U.S. DEP'T OF JUSTICE, <https://www.justice.gov/atr/business-review-letters-and-request-letters> [https://perma.cc/RL84-WSWG] (last updated Dec. 27, 2017).

114. Historical copies of these pages were gathered from the Internet Archive. See *About the Internet Archive*, INTERNET ARCHIVE, <https://archive.org/about/> [https://perma.cc/TU5V-7PEB] (last visited Mar. 11, 2018).

portraits of this behavior. The first two modern-day patent pools, covering MPEG-2 video and DVD, were selected because they revealed a rich variety of dynamics and because they are related to one another, as explained in the discussion that follows. Research subjects opined that these two episodes offer lessons that are broadly applicable. Research subjects also offered high-level insights on outsider behavior, generally. This information is presented first.

Relatedly, although great efforts were made to avoid bias, it is possible that selection bias is present. Selection bias is a fundamental challenge in nearly all ethnographic work, and the challenge is heightened where the sample size—i.e., the number of cases observed—is small, as it is here.¹¹⁵ To minimize this risk, I analyzed as many relevant episodes as I could find and based my “general” category of questions on what those episodes appeared to reveal. Research subjects explained that the two selected case studies illustrate important dynamics between outsiders and patent pools. It is possible that the individuals who agreed to be interviewed for this study may, by coincidence, happen to share similar subjective opinions. To minimize the odds of this, the interviews include a range of experts on different sides of the outsider issue—i.e., outsiders, insiders, and pool administrators—however.

An additional challenge is the fact that the only episodes that could be explored deeply were those in which patent pools had successfully taken form. At least one licensor speculated that a “critical mass” of licensors must agree to join a patent pool for any cooperation to take place at all. Because there is little to no available information on point, it is very difficult to examine pools that might have formed but did not. Fortunately, however, this study can comfortably leave such episodes out of the analysis: the purpose of this Article is to offer insights to antitrust regulators who are tasked with examining patent pools that have necessarily gathered sufficient critical mass.

B. THE UNAPPRECIATED INFLUENCE OF POOLS

This section describes general observations that interview subjects shared about patent pools and outsiders who decide, for various reasons, not to join a pool. The two case studies that follow this discussion illustrate the insights summarized here.

As a threshold matter, interview subjects explained that it is difficult to say with certainty if any patent pool contains “all” of the necessary patents involved. “There’s no way to know whether you have all of the patents in a

115. See AMY R. POTEETE, MARCO A. JANSSEN & ELINOR OSTROM, WORKING TOGETHER 36 (2010) (“Small samples present two serious limitations: selection bias and indeterminacy. A sample is biased if the cases observed do not represent variation on the dependent or independent variable accurately.”).

pool,” one subject commented.¹¹⁶ He added, “there might be unknown patent holders at the time of a pool’s formation.”¹¹⁷ Another subject stated that it is almost “inevitable” that there are one or more independent or outside patent holders.¹¹⁸ Some are, this subject explained, nonpracticing entities that own patents that “just happen, by coincidence, to read on the standard to which the pool relates.”¹¹⁹

These observations capture a fundamental insight: patent pooling is not neatly analogous to real property assembly, such as the canonical land development example discussed in Part I. Unlike the land developer who can know with certainty the underlying property rights that she must gather before breaking ground, a technology manufacturer can never be entirely sure of every possible patent that might read on its product. This is because the boundaries of patent rights are inherently less certain than those of real property.¹²⁰ Relatedly, the validity (and hence, the enforceability) of the patents identified is generally less certain than the rights of a property owner.¹²¹ The operative question for manufacturers, then, might not be whether a pool contains “all” of the relevant patents in existence, but rather, whether the pool helps licensees obtain permission from the companies most likely to sue them for infringement. Stated differently, the technical or *nominal coverage* of a pool may be less important than its *effective coverage*.

Moving beyond this threshold observation, the most important insight shared by research subjects is that patent pools significantly influence the royalty rates that outsiders can ask for and receive. By publishing their rates, patent pools signal the value of the portfolios of patents they offer. This gives licensees a basis to negotiate rates for other essential patents outside of the pool. As one subject stated, “there is no doubt that the royalties asked by a major pool influence the royalties asked by other patent holders.”¹²² Another

116. Telephone Interview with Larry Horn, President & CEO, and Bill Geary, Vice President of Bus. Dev., MPEG LA, LLC (Feb. 23, 2017) [hereinafter Telephone Interview with Horn & Geary] (on file with author).

117. *Id.*

118. Telephone Interview with Ruud Peters, Exec. Vice President & Advisor, Koninklijke Philips N.V. (July 15, 2017) (on file with author).

119. *Id.*

120. Real property is defined by geographic coordinates. By contrast, the metes and bounds of patents are defined by claim language, which is inherently more subject to interpretation and validity challenges. See Clark D. Asay, *The Informational Value of Patents*, 31 BERKELEY TECH. L.J. 259, 270 (2016) (discussing this common analogy).

121. David J. Teece, *The “Tragedy of the Anticommons” Fallacy: A Law and Economics Analysis of Patent Thickets and FRAND Licensing*, 32 BERKELEY TECH. L.J. 1489, 1504 (2016) (discussing the impact of uncertainty with respect to validity on damages calculations).

122. Email from Subject #5 to author (July 11, 2017) (on file with author).

explained that the royalty rate offered by the pool not only limits the power of the outsider, but also “lowers negotiation costs by orders of magnitude for all licensing done in the shadow of the pool.”¹²³ Yet another subject added, “the patent pool sets a *de facto* market reference.”¹²⁴

A pool’s rate signals a ballpark sense of value. It would be a mistake to assume that a patent pool’s influence can be boiled down to a simple “per-patent” measure of value. One reason for this is that the composition of patent pools is dynamic. Old patents expire, new patents join, and all the while, the royalty rate charged by the pool does not rise or fall in response.¹²⁵ As a result, a simple per-patent calculation would problematically yield a frequently shifting baseline for outside negotiations. Alongside this problem is the fact that a single invention can spawn many patents. This is because inventions are often patented in different countries, and claims are sometimes split into divisionals.¹²⁶ Complicating licensing matters further, the same invention may not always be represented by the same number of patents in different countries. (A product that requires ten U.S. patent licenses to manufacture might require only seven German patent licenses, for instance.) This explains why the influence of patent pools on outside negotiations is not so simple as a per-patent pool rate.¹²⁷ Although some research subjects referred to the “per-patent” value of pools, further discussions clarified that this term was used imprecisely. A more helpful (but still imperfect) way to gauge a pool’s influence on outside negotiations at any point in time might be “per-

123. Email from Subject #4 to author (July 15, 2015) (on file with author).

124. Telephone Interview with Subject #3 (July 19, 2017) (on file with author).

125. Many pools, such as those administered by MPEG LA, drop their royalty rates over time, but this is not caused by the removal of patents. These decisions are made at the time of pool formation and discussions surrounding these decisions are typically confidential.

126. John R. Allison & Emerson H. Tiller, *The Business Method Patent Myth*, 18 BERKELEY TECH. L.J. 987, 1064 (2003) (describing “divisional” patent applications).

127. As one subject explained, “[p]atent pools are for the convenience of licensees in acquiring patent rights from multiple patent holders at a single rate in a single transaction as an alternative to negotiating separate license agreements, and the royalties [in our pools] are the same whether one or more patents is infringed/used . . . Similarly, neither do royalties increase or decrease based on the number of patents as licensors and patents are added to the pool or patent expire, and licensors would be unlikely to volunteer their patents for the benefit of licensees if they did. Instead, there is a royalty rate for a pool license based on striking a balance between what it takes to retain licensors and offer reasonable terms to licensees over the course of a license, and this concept is important for understanding a pool’s operation and success.” Email from Larry Horn, President & CEO, and Bill Geary, Vice President of Bus. Dev., MPEG LA, LLC to author (July 21, 2017) [hereinafter Email from Horn & Geary] (on file with author).

invention” or “per-patent-family” royalties—a higher number than a “per-patent” calculation would produce.¹²⁸

There are several reasons why patent pools can exert such an influence on negotiations. One explanation appears to be a widespread understanding that, if an outsider sued a pool licensee for patent infringement and won, under several common scenarios, a court would likely look to the patent pool as a reflection of the value of the outsider’s patent. The court would assume that, had the outsider been a participant in the standard-setting process, it would have likely made a FRAND commitment. *Microsoft v. Motorola*, discussed earlier, indicates that a court may look to a pool’s rates for an indication of whether an outsider’s demands are “reasonable,” such that they satisfy a FRAND obligation.¹²⁹ (Recall this decision also instructs that a FRAND commitment is a contract, removing the patent holder’s power to demand an injunction.)¹³⁰

A patent pool’s royalty rate could similarly affect an independent patent holder who is not subject to a FRAND commitment, however. As one subject explained:

The pool rate defines a ballpark figure for the per-patent royalty that you can ask. If you come in as an independent licensor and you demand a multiple of the per-patent royalty the pool is asking for [relative to the technology being licensed], then you will meet incredible resistance in the negotiations with the potential licensees. They will simply refuse to take a license. Then the licensor could only get companies licensed if it is prepared to sue. In that case, it needs to defend its case before court and it will need to show that its royalty is reasonable compared to what the pool is asking. That is costly, and takes a long time with an uncertain outcome. Most licensors don’t want to litigate each and every company and wait for years and years to get their money. So, they are forced to lower their royalties to a level that the market finds acceptable.¹³¹

128. A subject interviewed explained that such negotiations should “begin with the recognition that patent pools are for the convenience of licensees in acquiring patent rights from multiple patent holders at a single rate in a single transaction as an alternative to negotiating separate license agreements and the royalties are the same whether one or more patents is infringed/used.” Email from Horn & Geary, *supra* note 127.

129. See Susan Decker, *Ericsson Tries to Avoid Patent War by Publishing Rates for 5G*, BLOOMBERG (Mar. 17, 2017, 11:00 AM), www.bloomberg.com/news/articles/2017-03-17/ericsson-tries-to-avoid-patent-war-by-publishing-rates-for-5g [<https://perma.cc/TR8W-7JC8>].

130. *Microsoft Corp. v. Motorola, Inc.*, 696 F.3d 872, 877 (9th Cir. 2012) (“[B]ecause of the RAND licensing commitment, injunctive relief is an inappropriate remedy for infringement of standard-essential patents.”).

131. Telephone Interview with Ruud Peters, *supra* note 118.

Another subject made consistent comments, stating that, faced with a high royalty demand from an outsider, pool licensees may sometimes decide to “efficiently infringe” the patent, even if it is essential to a standard.¹³² The outsider can sue for infringement, that subject explained, but injunctions are difficult to obtain in these settings, and monetary awards are more common.¹³³ At this stage, explained the subject, it will be up to a court to determine the value of the infringed patents. Where might the court look? Common wisdom is that the pool is a likely source.¹³⁴

The situation is even more constrained for an outside patent holder that is also a technology manufacturer, a common situation. To operate, these patent holders should obtain licenses to the necessary patents. They may do so through the pool or by contacting the individual patent holders. As discussed earlier in this Article, some pools have historically required grant-back promises from licensees, obligating them to license any essential patent rights back to the pool. As one subject explained, “a patent holder who also manufactures products using the pool technology may be constrained by a grant-back provision if he must sign a license with the pool and will necessarily grant licenses based on the pool royalty level.”¹³⁵ Another subject commented, “an outsider could ask for very high royalties only if it does not have business exposure and so doesn’t need to become a licensee.”¹³⁶

Subjects explained that, even in pools without grant-back provisions, outside licensors who are also manufacturers may experience similar pressures. The reason lies in the simple fact that the independent must come to an agreement with the patent holders in the pool. “They will still need licenses from the pool licensors,” explained one subject:

These pool licensors will say to the independent, “I am a member of the pool. You are asking on a per-patent basis a multiple of what we are asking for our patents. So, either we go with my per-patent royalty or we take yours. If we go with yours, then you need to pay me your per-patent royalty for the use of my patents.”¹³⁷

An outside licensor in this position who asks for an unreasonably high rate, the subject explained, “is shooting itself in the foot.”¹³⁸

132. Telephone Interview with Subject #7 (Feb. 23, 2017) (on file with author).

133. *Id.*; see also *eBay Inc. v. MercExchange, L.L.C.*, 547 U.S. 388, 392–93 (2006) (instructing that, contrary to prior judicial practice, judges should not automatically issue injunctions upon finding patent infringement).

134. *Id.*

135. Email from Subject #5 to author, *supra* note 122.

136. Telephone Interview with Subject #3, *supra* note 124.

137. Telephone Interview with Ruud Peters, *supra* note 118.

138. Telephone Interview with Subject #3, *supra* note 124.

Remarkably, even outsiders who somehow succeed in getting licensees to agree to very high royalties do not always benefit in the end. The reason, according to some subjects, is the underreporting of sales. One research subject explained this through a hypothetical:

Let's say you have an independent that is commercially not active and assume that it asks for a relatively high royalty rate and that licensees agree in the end—because they want to avoid the cost of litigation—to take licenses. Normally, these licensees will be required to submit quarterly reports with the number of products they have sold in that quarter and thus the total royalty amount they have to pay. If licensees feel that the royalties they have to pay are too high, they may adjust their reported quantities, so that effectively their royalty rate comes within the range that they believe is more fair and reasonable.¹³⁹

Research subjects explained such underreporting “happens on a large scale,” even though it violates the contractual obligations of licensees under their license agreements.¹⁴⁰ In part, this is because underreporting is difficult and costly to detect. The subject quoted above explained that some licensees are very creative in masking underreporting. “Of course,” he stated, “the licensor can take measures, such as hiring an independent auditing firm to check the books of licensees, but that costs a lot of money and takes quite some time. In countries with different business practices, it's not always an easy job.”¹⁴¹

The foregoing explains why, as one subject opined, “an outsider might be able to negotiate a higher rate, but not that much higher.”¹⁴² The head of licensing at a large technology company that has historically operated inside and outside of some large pools commented, “if the per-patent rate is too different from the per-patent pool rate, potential licensees would rather fight in court than take the license.”¹⁴³ The subject added, “you may deviate in practice from the baseline by 30 or 40% but not by 300% for example.”¹⁴⁴

This leads to another observation: the existence of a patent pool not only sets a baseline for negotiations, but also eliminates the need for an outsider to

139. Telephone Interview with Ruud Peters, *supra* note 118.

140. *Id.*

141. *Id.*

142. *Id.*

143. Telephone Interview with Subject #3, *supra* note 124. Here, the term “per-patent” was used casually and imprecisely. The speaker was referring to per-patent-family or per-invention rates. *See supra* notes 124, 125, and accompanying text (discussing the problem with looking to per-patent rates).

144. Telephone Interview with Subject #3, *supra* note 124.

search for licensees and vice-versa—tasks that would contribute significantly to search costs in a world of one-to-one licenses. “We did a lot of their homework for them,” one pool administrator explained.¹⁴⁵ In summary, the very existence of the patent pool, in a sense, cuts down on both search costs and negotiation costs.¹⁴⁶ This can help licensees to get a clear picture of which patents are essential to license.

Interestingly, some research subjects explained that not all outsiders are holdouts seeking an economic advantage. Some are simply companies that have large, internal licensing staff who they wish to look out for by reserving work for them rather than going along with the pool.¹⁴⁷ The company might view both options as equal in terms of the bottom line and yet the option to go it alone can keep their people employed.

Finally, evidence gathered for this study shows that the decision to remain outside of a patent pool can raise the odds that a patent holder will need to litigate. As one research subject commented:

You may also have to litigate more, even though patent pools are litigating sometimes. If you are alone, you will have to do more litigation, so you may have more, you know, bad press articles about you because these companies may also play with the media. Certain companies would hate to have to litigate by themselves.¹⁴⁸

The MPEG-2 case study that follows provides a vivid example of this risk.

In summary, research subjects offered a surprising window into how patent pools limit the royalties that outside licensors can succeed in collecting. If the independent is a technology manufacturer, it typically must limit its demands if it wishes to use the patents in the pool (especially if it owes a contractual duty to grant-back). If the independent is not a licensee, the pool’s rate still is thought to be the basis in determining a reasonable royalty, either under a FRAND obligation or simply as a legal remedy. As one subject stated, “if the patent holder is not a pool licensee, his asking for high royalties will still be rejected by the licensees and his only solution for trying to get these will be litigation . . . with the associated risks.”¹⁴⁹ Finally, even an outsider that gets licensees to agree to a high rate faces the problem of underreporting and an increased risk of litigation. One subject summed the situation up well: “if they want to get some money, then they need to be moderate.”¹⁵⁰

145. Telephone Interview with Horn & Geary, *supra* note 116.

146. *Id.*

147. Telephone Interview with Subjects #12 and #13 (Feb. 23, 2017).

148. Telephone Interview with Subject #3, *supra* note 124.

149. Email from Subject #5 to author, *supra* note 122.

150. Telephone Interview with Ruud Peters, *supra* note 118.

C. OUTSIDE THE MPEG-2 PATENT POOL (CASE STUDY)

In the earliest days of filmmaking, about fifteen patents covered the technology needed to record and deliver movies to the public.¹⁵¹ These inventions covered flexible film, winding and spooling mechanisms, camera lenses, and related methods. In 1908, efforts to settle legal disputes between the two chief owners of these patents led to the formation of “The Motion Picture Patents Company”—the first of several patent pools that operated in the film industry of the early 20th century.¹⁵²

In the 1990s, the rise of digital video boosted not only the quality and transportability of movies but also the number of patent rights needed to play them. Many advances made it possible for celluloid and magnetic reels to be replaced by weightless computer instructions. One achievement, however, could be credited for the widespread adoption of digital video: the MPEG-2 video standard. Developed by (and named after) the Moving Picture Expert Group (MPEG) and a team of engineers and scientists from leading technology firms, MPEG-2 is a standardized way to describe motion, light, and sound through sequences of 1's and 0's. It is the language understood by DVD players, cable boxes, smart phones, digital cameras, online video providers, and video game consoles.

MPEG took form at a January 1988 meeting of the International Organization for Standardization (ISO) and held its first meeting in May of that year.¹⁵³ The group, which was open to any interested parties, held frequent meetings which were widely attended by delegates of leading technology companies. MPEG required its participants to pledge to license any patents they might own related to the standard under development at FRAND terms—a fact that would later have important bearing on one of its outsiders.¹⁵⁴ Over the course of a few years, at meetings held in Berlin, Australia, New York, Brussels, and Seoul, the MPEG-2 standard took form.

151. The chief patents were U.S. Patent Nos. 12,192; 12,037; 629,063; 578,185; 580,749; 586,953; 588,916; 673,992; 707,934; 722,382; 673,329; 744,251; 770,937; 771,280; 785,205; and 785,237. See INDUSTRIAL COMBINATIONS AND TRUSTS 259–65 (William S. Stevens ed., 1914) (listing the aforementioned patents).

152. See Ralph Cassady, Jr., *Monopoly in Motion Picture Production and Distribution: 1908–1915*, 32 S. CAL. L. REV. 325, 329 (1959); see also Jeanne Thomas, *The Decay of the Motion Picture Patents Company*, 10 CINEMA J. 34, 34 (1971) (indicating that The Motion Picture Patents Company formed in 1908 by the emergence of two factions of the film industry).

153. See Josh Lerner & Jean Tirole, *Public Policy Towards Patent Pools*, in 8 INNOVATION POLICY & THE ECONOMY 157, 174 (Adam B. Jaffe et al. eds., 2008) (“The standard was developed by the International Organization for Standardization (ISO) under the leadership of Leonardo Chiariglione, along with scientists and engineers from many universities and corporations.”).

154. See *id.* at 174–75.

The group produced a final draft in late 1994, and necessary stakeholders approved it in early 1995.¹⁵⁵

Although it took an ensemble of talented engineers to develop MPEG-2, the way the technology works is easy to grasp¹⁵⁶: movies, television, and other video are, of course, made up of sequences of still images. Thanks to a trick of human psychology, when viewed in rapid succession—twenty-four frames per second for film, and thirty frames per second for television video—the images appear to move.¹⁵⁷ Traditional analog movies create this illusion by storing thousands of images on film or magnetic tape and flashing them before the viewers' eyes.¹⁵⁸ As a practical matter, however, often only small areas of any frame in a sequence differ from the frame that immediately preceded it. Large swaths of a picture—the blue of a sky, or the green grass on a field, for instance—do not change. The information that matters most is what has changed between two successive frames. MPEG-2 cleverly takes advantage of this by formalizing a way to describe the portions of each image in a series that change from one frame to the next. The result is a phenomenally efficient method of compressing video, making for faster transfers over networks and more economical use of storage space on physical media.

Shortly following MPEG-2's completion in early 1995, one of the technology firms that helped develop the standard organized an internal working group, the purpose of which was to identify any relevant patents. With the help of lawyers and engineering consultants from over forty technology firms, the group identified and reviewed about 8,000 U.S. patent abstracts and about 800 patents, which had been assigned to over 100 patent owners.¹⁵⁹ This

155. Lerner & Tirole, *supra* 153, at 174 (“The standard setting effort began in July 1990, and the final MPEG-2 standard was approved in November 1994.”).

156. For more, see generally JAN VAN DER MEER, *FUNDAMENTALS AND EVOLUTION OF MPEG-2 SYSTEMS: PAVING THE MPEG ROAD* (2014) (discussing the development of MPEG-2).

157. Paul Backaus, *The Illusion of Motion*, PAULBAKAUS.COM (May 21, 2014), <https://paulbakaus.com/tutorials/performance/the-illusion-of-motion/> [https://perma.cc/A8RN-WACT].

158. This effect is commonly referred to as “the persistence of vision.” See generally Bill Nichols & Susan J. Ledermann, *Flicker and Motion in Film*, in *THE CINEMATIC APPARATUS* 96 (Teresa de Lauretis & Stephen Heath eds., 1980).

159. See HOVENKAMP, *supra* note 106, § 34.04[C] at 34–50 (“To determine which patents would be contributed to the pool, a number of firms participating in a ‘MPEG-2 Intellectual Property Working Group’ hired an expert and invited submissions of patents that might be relevant to MPEG-2 compliance. The expert reviewed some 800 patents assigned to approximately 100 parties, and ultimately concluded that several of the patents were ‘essential’ to compliance with the MPEG-2 standard—meaning that there were no technological alternatives to the claimed technologies. Of the patents identified as essential, most (27) were contributed to the pool.”).

work led to a consensus among the companies involved that they had found all (or nearly all) patents essential to MPEG-2.¹⁶⁰ At its launch, the MPEG-2 License included 25 patent families consisting of 102 essential patents. These covered many aspects of the standard, including spatial and temporal compression techniques, and methods of transmission.

After identifying these patents, the group developed a set of agreements that defined a new patent pool. A new limited liability company, “MPEG LA,” was formed to administer licensing.¹⁶¹ The group invited holders of all essential patents to join and made the pool open to any future members that wished to include standards-essential patents that they owned.¹⁶²

In April 1997, MPEG LA and the individual patent holders that had joined the MPEG-2 pool—Columbia, Fujitsu, General Instrument, Lucent, Matsushita, Mitsubishi, Philips, Scientific-Atlanta and Sony¹⁶³—submitted a letter to the Antitrust Division of the DOJ, requesting assurance that their planned pool did not violate the law or otherwise raise competition concerns. Two months later, on June 26, 1997, the DOJ responded favorably. Following a careful and lengthy analysis of the proposed pool, the letter concluded, “[i]t appears, however, that the proposed arrangement will not raise any significant competitive concerns.”¹⁶⁴ The MPEG-2 pool officially launched a short time later, on July 17, 1997.

Around this time, an outsider emerged. Although Lucent collaborated on the pool and joined in signing the letter sent to the DOJ, it elected to license independently.¹⁶⁵ Details of this decision are not well documented, but an interview subject directly involved in the pool offered a helpful account of when the news was relayed: “on the day of the announcement of the patent pool’s launch,” he explained, “Lucent told the other members of the group and MPEG LA that it planned not to join.”¹⁶⁶ According to this subject, one reason for Lucent’s reluctance to join was their successful internal licensing

160. See Letter from Garrard R. Beeney, Sullivan & Cromwell, to Joel I. Klein, Assistant Att’y Gen., U.S. Dep’t of Justice 11 (Apr. 28, 1997), <https://www.justice.gov/archive/atr/public/busreview/request-letters/302637.pdf> [<https://perma.cc/4J5V-AW5Y>] (“[T]he proposed licensing arrangement includes most, but not all, MPEG-2 essential patents.”); Letter from Joel I. Klein, Assistant Att’y Gen., U.S. Dep’t of Justice, to Garrard R. Beeney, Sullivan & Cromwell (June 26, 1997), www.justice.gov/archive/atr/public/busreview/215742.pdf [<https://perma.cc/3753-L3P5>] [hereinafter MPEG-2 Resonance Letter].

161. See *A History of Success—A Future in Innovation*, MPEG LA, <http://www.mpegla.com/main/Pages/AboutHistory.aspx> [<https://perma.cc/EA3M-XZ33>] (last visited Mar. 11, 2018).

162. *Id.*

163. See MPEG-2 Response Letter, *supra* note 160, at 2.

164. See MPEG-2 Response Letter, *supra* note 160, at 10.

165. See HOVENKAMP ET AL., *supra* note 106, at 34–49.

166. Telephone Interview with Horn & Geary, *supra* note 116.

capabilities. “Lucent was very well known for running a very strong and successful licensing program with their own portfolio which may have accounted for their decision,” this subject stated.¹⁶⁷ According to Josh Lerner and Jean Tirole, Lucent’s decision came down to compensation:

Lucent had a large internal licensing department with sufficient resources to conduct its own MPEG-2 licensing activities. Moreover, Lucent believed that two of its patents were most critical to the MPEG standard. Lucent felt that the licensing rate established by MPEG LA was lower than it could have been and decided not to join the pool. Lucent estimated that the higher royalty rates it would be able to charge by not joining the pool would more than offset the decreased fraction of the MPEG-2 market that would license its technology if it pursued its own licensing activities.¹⁶⁸

Like Lucent, Thomson also initially refused to join to the pool, preferring to independently license its patents.¹⁶⁹ As explained later in this case study and in the DVD case study that follows, however, it ultimately joined relatively early in the pool’s history, in July 2002.¹⁷⁰

The MPEG-2 pool’s royalty division formula treated all essential patents as equal in value—a view that may have not been shared by Lucent at the time.¹⁷¹ As an interview subject at MPEG LA explained, because any essential patent could block commercialization, all the patents arguably carried an equal value.¹⁷² “The patents included in this pool are all essential,” stated another subject, referring to debates about the issue among licensors.¹⁷³ “I don’t think anyone can say that one patent is *more* essential than another, because you need them all. They are all blocking.”¹⁷⁴ The subject went on to note, however, that “this was the first modern-day patent pool, and there were many who had reasons to be skeptical about its success.”¹⁷⁵

Lucent’s absence from the pool may have fostered some initial doubts in the market. As a subject at MPEG LA explained, “Lucent’s withdrawal added yet another element for them to be skeptical about.”¹⁷⁶ According to this

167. *Id.*

168. Lerner & Tirole, *supra* note 153, at 176.

169. Telephone Interview with Subject #3, *supra* note 124.

170. *Id.*

171. Telephone Interview with Subjects #12 and #13, *supra* note 147.

172. *Id.*

173. Telephone Interview with Horn & Geary, *supra* note 116.

174. *Id.*

175. *Id.*

176. *Id.*

subject, MPEG LA allayed these concerns with a straightforward explanation of the value they were offering:

We told [prospective licensees] that our program was voluntary and that Lucent had decided not to join. Despite this fact, we explained that the patents of the eight firms in the pool were essential, valuable, and worth paying for. We also explained that we were doing a lot of their homework for them because we were basically showing them the patent landscape they would otherwise have to research for themselves.¹⁷⁷

“People accepted the license we offered with the eight [patent holders],” explained a research subject at MPEG LA, adding, “the eight, by the way, grew rapidly to about ten in about six months.”¹⁷⁸ MPEG LA respected Lucent’s decision to go it alone but kept the door open for them to join anytime, “in the interest of including as much essential intellectual property as possible for the benefit of licensees,” a subject at MPEG LA explained, adding, “the extent to which the pool may have affected Lucent’s licensing efforts was not clear.”¹⁷⁹

Lucent was nevertheless steadfast in remaining an outsider. In March 2003, Alcatel, a French telecommunications company joined the MPEG-2 patent pool as a licensor.¹⁸⁰ In April 2006, Lucent and Alcatel agreed on a plan to merge their companies.¹⁸¹ Just two months later, with the merger underway, executives at Lucent realized that unless they acted fast, the company’s MPEG-2 patents would likely be included in the patent pool by virtue of Alcatel’s membership.¹⁸² (MPEG LA’s membership agreement required all members and their present or future “affiliates” to license essential patents to the pool.)¹⁸³ To prevent this, Lucent established a trust in Delaware, which it named the Multimedia Patent Trust (MPT).¹⁸⁴ Lucent was named as a beneficiary.¹⁸⁵ In November 2006, Lucent transferred its MPEG-2 essential patents to the trust.¹⁸⁶

177. *Id.*

178. *Id.*

179. Email from Horn & Geary, *supra* note 127.

180. Lucent Techs., Inc. v. Gateway, Inc., No. CIV. 02-2060-B(CAB), 2007 WL 2900484, at *1 (S.D. Cal. Oct. 1, 2007).

181. *See id.* at *1.

182. *See id.* at *2.

183. *See id.* at *4.

184. *See id.* at *2.

185. *See id.* at *6.

186. *Id.* The patents were U.S. Patent Nos. 4,958,226 and 4,383,272.

Alcatel-Lucent then sued several computer hardware manufacturers for infringing the patents held in the trust. The defendant in one suit was Microsoft.¹⁸⁷ There, Alcatel-Lucent filed a motion for summary judgment, holding that Microsoft's implementation of the MPEG-2 video standard in its Xbox video game console was infringing.¹⁸⁸ In response, Microsoft challenged the validity of the patents in the trust and argued for equitable estoppel based on Lucent's commitment to license the patents to MPEG LA.¹⁸⁹ Microsoft also argued in the alternative that even if the patents were valid, they were not essential to the MPEG-2 standard.¹⁹⁰ Microsoft argued, in other words, that the mere fact that its products abided by the MPEG-2 standard was not *prima facie* proof that it had infringed Lucent's patents.¹⁹¹ Finally, Microsoft asserted a series of counterclaims of patent infringement against Lucent.¹⁹² Ultimately, Alcatel-Lucent was unsuccessful on both fronts: the court held that the facts did not support a conclusion that Microsoft's products infringed Lucent's and did support Microsoft's patent infringement claims.¹⁹³

Matters grew worse for Alcatel-Lucent and MPT in 2007, when MPEG LA sued them for breach of contract in Delaware.¹⁹⁴ The complaint alleged that Alcatel-Lucent had promised to license *all* MPEG-2 patents that it could—an obligation that MPEG LA argued Lucent had failed to fulfill when it transferred the patents to MPT. The complaint stated, “the only purpose of the transfer was to avoid Alcatel's contractual commitment” in order “to extract additional royalties from MPEG-2 licensees.”¹⁹⁵

In late March, 2010, the suit settled—“literally in the middle of trial,” as one subject involved recounted.¹⁹⁶ As described in a court filing, the settlement

187. Lucent Techs., Inc. v. Microsoft Corp., 544 F. Supp. 2d 1080 (S.D. Cal. 2008).

188. *See id.* at 1087.

189. *See id.* at 1094, 1098.

190. *See id.* at 1102.

191. *See id.* at 1090–91.

192. *See id.* at 1096–1103.

193. Lucent Techs., Inc. v. Microsoft Corp., No. 06-CV-0684-H (CAB), 2008 WL 2872738, at *2 (S.D. Cal. July 23, 2008).

194. Press Release, MPEG LA, MPEG LA Sues Alcatel Lucent for Breach of MPEG-2 Patent Pool Contractual Obligations (Nov. 5, 2007), <http://www.mpegla.com/main/Pages/LegalAction.aspx> [<https://perma.cc/XD8N-P6P3>].

195. Amended Verified Complaint ¶¶ 6–7, MPEG LA, L.L.C., v. Lucent, No. 3317-VCL, (Del. Ch. Feb. 12, 2010), 2010 WL 519600; *see also* Scott M. Fulton III, *MPEG-2 Patent Holder, Licensing Agent in High-Def Codec Dispute*, BETANEWS (Nov. 6, 2007), <https://betanews.com/2007/11/06/mpeg-2-patent-holder-licensing-agent-in-high-def-codec-dispute/> [<https://perma.cc/JKD8-W9JV>].

196. Telephone Interview with Horn & Geary, *supra* note 116; *see also* Susan Beck, *We Surrender! After Two Days, Alcatel-Lucent Waves the White Flag in Patent Showdown*, AM. LAW. (Mar.

agreement required the MPT to subject the patents at issue in the Action pursuant to MPEG LA's usual procedures for determination of whether any of them were "MPEG-2 Essential Patents" or "MPEG-2 Systems Essential Patents."¹⁹⁷ MPT agreed that if the patents were determined to be essential, it would join the pool.¹⁹⁸

Thomson, as mentioned earlier, had initially elected to keep its patents outside of the MPEG-2 pool. They joined long before the episode involving Alcatel-Lucent's trust, however, in July 2002.¹⁹⁹ One research subject explained, "Technicolor [Thomson] was originally participating in discussions of the MPEG-2 Video patent pool, they stayed out and went as an independent. But later on, they experienced that they were not as successful as MPEG LA at sales, and they joined MPEG LA. So, they came back."²⁰⁰ Another subject directly involved with the decision explained that Thomson joined because it was impressed by MPEG LA's success in its early years.²⁰¹ Interestingly, Thomson's need to become a pool *licensee* may have also factored into their decision to join. "Thomson needed to become in its own right a licensee," added another subject.²⁰² "They made a lot of set-top boxes in that era, and they used MPEG-2. The good news is that Thomson became a licensee."²⁰³

As for Lucent, staying outside of the MPEG-2 pool appears to have been a costly strategy. According to multiple subjects interviewed, Lucent was unable to collect royalties that were appreciably higher than what they would have received as a member of the pool.²⁰⁴ This was because the pool provided a signal to licensees of what the value of the patents relating to the technology

26, 2010, 12:00 AM), [https://www.law.com/americanlawyer/almID/1202446807481/\[https://perma.cc/Z2WF-PVB3\]](https://www.law.com/americanlawyer/almID/1202446807481/[https://perma.cc/Z2WF-PVB3]).

197. Press Release, MPEG LA, MPEG LA Lawsuit Against Alcatel Lucent Settled (Mar. 29, 2010), <http://www.mpegla.com/main/Pages/LegalAction.aspx> [https://perma.cc/9C7Y-B3FF].

198. *Id.*; see also Exhibit A, Lucent Technologies, Multimedia Patent Trust v. Gateway, Inc., Trade Reg. Rep. P 75977 (C.C.H.) (S.D. Cal, October 1, 2007), 2007 WL 9431594.

199. Telephone Interview with Subject #3, *supra* note 124.

200. Telephone Interview with Subject #2 (July 15, 2017) (on file with author).

201. Telephone Interview with Subject #3, *supra* note 124.

202. Telephone Interview with Horn & Geary, *supra* note 116.

203. *Id.*

204. Telephone Interview with Subjects #12 and #13, *supra* note 147. Consistently, the court found no evidence that Alcatel-Lucent had demanded "supracompetitive" prices, arguing that this was just attorney speculation. Lucent Techs., Inc. v. Gateway, Inc., No. CIV. 02-2060-B(CAB), 2007 WL 2900484, at *17 (S.D. Cal. Oct. 1, 2007). This is consistent with the accounts laid out earlier, that Lucent was unable to use its outsider status to demand supracompetitive prices. *See id.*

was.²⁰⁵ Licensees apparently reasoned that, because any essential patent could block commercialization, all patents were approximately equal in value.²⁰⁶ Meanwhile, by suing licensees of the pool, Alcatel-Lucent exposed itself to counterclaims that led to findings of patent infringement on its part.²⁰⁷ The same court's finding that Lucent had not been infringed upon, meanwhile, raised fresh questions about the essentiality of some of Lucent's patents.²⁰⁸ Added to all of this was Lucent's opportunity cost. "In the period between 1997 when they decided to join and 2010 when this lawsuit forced them to join," explained an interview subject, "they left huge amounts of money on the table. Because you can't go back to get royalties that you missed when you should have been in the pool. Because that money goes out the door to licensors."²⁰⁹ In the end, all of Lucent's patents ended up in the pool.²¹⁰

D. OUTSIDE THE DVD PATENT POOLS (CASE STUDY)²¹¹

In the late 1980s, the ascendance of digital music CDs over cassette tapes set the stage commercially and technologically for Digital Versatile Disc (DVD) technology.²¹² Although analog systems that stored and played back movies from optical discs had existed since the late 1970s, none were widely adopted in the United States.²¹³ As a result, through the early 1990s, most Americans owned a VHS player—a device that played movies stored in analog

205. Telephone Interview with Horn & Geary, *supra* note 116.

206. This conclusion was drawn generally from discussions with interviewees.

207. Lucent Techs., Inc. v. Microsoft Corp., 544 F. Supp. 2d 1080, 1120 (S.D. Cal. 2008).

208. Steven Reynolds, *Setting the Record Straight on Upcoming Patent Rights Trial*, LUCENT-ALCATEL CEO BLOGS (Mar. 2010) ("That court decided that the MPT patents were not infringed by Microsoft's MPEG2 products. Obviously, and as is clarified by Bloomberg through its correction, Alcatel-Lucent can't be risking something that a court already determined that the MPT is not entitled to receive. The amount quoted is completely unrelated to the current trial.").

209. Telephone Interview with Horn & Geary, *supra* note 116.

210. *Id.*

211. This discussion pertains specifically to DVD Video and not recordable DVD media. For more information about recordable DVD standards, see Stephan Gauch, + vs -: *Dynamics and Effects of Competing Standards of Recordable DVD-Media*, in *THE DYNAMICS OF STANDARDS* 47 (Tineke M. Egyedi & Knut Blind eds., 2008).

212. See JIM TAYLOR, *DVD DEMYSTIFIED* 38 (2d ed. 2001) ("It was not until the development of compact disc digital audio in the 1980s that optical media again proved its worth in the world of bits and bytes, setting the stage for DVD.").

213. Julie Flaherty, *Bittersweet Times for Collectors of Laser Disc Movies*, N.Y. TIMES (Apr. 29, 1999), <https://nyti.ms/2v7Gk1e> [<https://perma.cc/K7YR-NU92>] (commenting on the success of DVD). One subject for this Article stated, "[l]aser discs with movies . . . did not have success on the market. Many companies thought before the launch of DVD that DVD would not take off. It has been a good surprise for everyone." See email from Alfred Chaouat, Senior Vice President of Licensing, Technicolor, to author (July 24, 2017).

form on cumbersome cartridges of magnetically charged tape.²¹⁴ When it was introduced in the late 1990s, DVD marked a leap ahead in quality and convenience, offering full-length movies in the then-new MPEG-2 format on elegant plastic discs the same size as CDs.²¹⁵ Although it was eventually usurped by high-definition Blu-Ray discs and streaming video, DVD was a commercial giant during its reign: by 2006, about eighty-one percent of American homes had a DVD player, a figure that surpassed that of VCR player ownership in that year.²¹⁶ The Microsoft Xbox and Sony PlayStation—two dominant videogame consoles of the 1990s and 2000s—also relied upon the DVD format for game data.²¹⁷ This success resulted from the work of two patent pools, one lone licensor, and many manufacturers who licensed from all three.

Warren Lieberfarb, former President of Warner Home Video, is widely credited for his instrumental role in encouraging the development of the DVD standard.²¹⁸ During his distinguished career working at leading film production companies—first as a financial analyst and later as a senior executive—Mr. Lieberfarb was, according to former colleagues, deeply intrigued by the idea of a digital video disc for decades.²¹⁹ He encouraged Toshiba to develop a prototype of the technology, which was demonstrated to electronics companies and industry stakeholders in 1994.²²⁰ Despite initial skepticism, the

214. See generally TAYLOR, *supra* note 212, at 19, 24–37 (discussing the history of VHS and other video technology and reporting that 87% of all U.S. households owning at least one VCR as of the book’s publication date, which was 1998).

215. See *id.* at 60–70 (discussing the introduction of DVD players in the United States).

216. See, e.g., *DVD Players Overtake VCRs*, CNN MONEY (Dec. 26, 2006, 9:34 AM), http://money.cnn.com/2006/12/26/technology/dvd_vcr [<https://perma.cc/VT9L-EJEP>].

217. See, e.g., Steve Traiman, *It’s All in the Games*, BILLBOARD MAG., Mar. 31, 2001, at 62, 69 (noting that Nintendo’s Gamecube console relied on a variant of DVD that used discs with smaller diameters).

218. See, e.g., Martin Dale, *Warren Lieberfarb: The History of DVD and Cable Networks Highlights the Tremendous Value of Classic Films*, VARIETY (Oct. 12, 2014, 11:08 AM) (“Warren Lieberfarb is universally recognised as the ‘architect of the DVD’ . . .”), <http://variety.com/2014/film/global/warren-lieberfarb-the-history-of-dvd-and-cable-networks-highlights-the-tremendous-value-of-classic-films-1201328060/> [<https://perma.cc/6RN8-Z7MH>]; James Greenberg, *Private Sector; The Would-Be King of DVD*, N.Y. TIMES (Nov. 24, 2002), <http://www.nytimes.com/2002/11/24/business/private-sector-the-would-be-king-of-the-dvd.html> [<https://perma.cc/9KWV-F7AW>] (reporting that many in the film industry credit Lieberfarb “with dreaming, cajoling and bullying the DVD into existence”). Similarly, a research subject for this study emphasized Lieberfarb’s importance in bringing about the DVD. See email from Alfred Chaouat to author, *supra* note 213.

219. See Greenberg, *supra* note 218 (quoting the former executive of AOL Time Warner as saying that Mr. Lieberfarb’s focus on the DVD was “the most consuming manifestation I’ve ever seen in an individual”).

220. *Id.*

film and technology industries came to support the development of a new standard, thanks in large part to Mr. Lieberfarb's lobbying.²²¹ After further research and experimentation, two teams composed of leading technology firms emerged with the most promising solutions: Philips and Sony co-developed a format it called "Multimedia CD" or "MMCD";²²² Toshiba, meanwhile, asked Hitachi, Matsushita (Panasonic), Mitsubishi, Victor (JVC), Pioneer, and Thomson to help it further develop its 1994 prototype.²²³ This work led to a format the group called the "Super Disc" or "SD."²²⁴ Anxious about the possibility of a wasteful format war like the one that slowed the adoption of VHS over a decade earlier, Apple, Microsoft, Sun Microsystems, Dell, and other manufacturers, urged these two teams to combine.²²⁵

Cooperation came in 1995, but it would be short-lived. Sony and Philips agreed to join the "SD" group to work on a single format that would incorporate elements of both the MMCD and the SD formats.²²⁶ The collaborators agreed to call the new format the DVD.²²⁷ Notably, this development work was not mediated by a standard-setting organization, but instead, was largely a private venture that operated under the auspices of "The DVD Consortium" (later renamed "The DVD Forum").²²⁸ As a result, details of the DVD standard were kept confidential and available only to licensees who signed a nondisclosure agreement.²²⁹ Two subjects directly involved

221. See TAYLOR, *supra* note 212, at 37–39 (noting that optical discs rely on a method of storing information through the use of divots to represent bits, a principle understood since Charles Babbage's seminal work in developing digital programmable computers).

222. See *id.* at 40–60; Letter from Garrard R. Beeney, Sullivan & Cromwell, to Joel I. Klein, Assistant Att'y Gen., U.S. Dep't of Justice (July 29, 1998), <https://www.justice.gov/atr/page/file/1020341/download> [<https://perma.cc/8SGD-ZDVW>] [hereinafter DVD3C Request Letter].

223. Email from Alfred Chaouat to author, *supra* note 213.

224. Letter from Carey R. Ramos et al., Paul, Weiss, Rifkind, Wharton & Garrison to Joel I. Klein, Assistant Att'y Gen., Antitrust Div. of the U.S. Dep't of Justice 6 (Oct. 9, 1998), <https://www.justice.gov/sites/default/files/atr/legacy/2014/01/08/302365.pdf> [<https://perma.cc/269A-WBFT>] [hereinafter DVD6C Request Letter]; see also *Electronic Giants Battle On*, NEXT GENERATION, Nov. 1995, at 19 (discussing the battle between MMCD and the SD formats).

225. See TAYLOR, *supra* note 212, at 48–49 (discussing reconciliation between the two camps).

226. See *id.*

227. See *id.* at 50.

228. *Id.*; Telephone Interview with Alfred Chaouat, Senior Vice President of Licensing, Technicolor (July 19, 2017) (explaining the change in name).

229. Discussing the DVD standard, one research subject emphasized the difference between "technical essentiality" and "commercial essentiality." The former, the subject explained, relates to patents that are necessarily infringed by any device that follows a standard; the latter, by contrast, describes patents that are infringed by devices that follow the standard

independently confirmed that participants in the DVD Forum were subject to a FRAND obligation, however.²³⁰ The group finalized the first DVD specification in late 1995.²³¹

The collaborators wished to pool their patents under a single license, but they were unable to come to an agreement. At a June 1996 DVD conference, speakers announced that the ten companies had agreed to form a patent pool in order to streamline licensing.²³² “The goal was to form one pool,” stated one subject directly involved.²³³ On August 2, 1996, Sony and Philips announced that they would begin licensing their patents jointly and invited the other eight companies to join in.²³⁴ Pioneer later joined Sony and Philips, and the three companies formed a pool called the “DVD3C Licensing Group.”²³⁵ Six of the remaining companies formed a pool they called the “DVD6C Licensing Group.”²³⁶ Thomson, meanwhile, decided to license independently.²³⁷

A research subject directly involved with the attempt to form a single pool commented, “ultimately, the goal of a single pool failed because various groups had different views as to how to share the royalties.”²³⁸ This subject went on to explain that “the fundamental difference was whether the royalties should be divided on a per-patent basis only or should also take into account the total contribution of a party to the optical technology concerned.”²³⁹ Another subject with knowledge of the episode commented, “frankly, they couldn’t agree on royalties. That was the problem. They were never able to get there.”²⁴⁰ Yet another individual involved explained:

The discussions for formation of a potential pool including all DVD Forum companies took many months, did not reach a consensus and finally led to the formation of two separate pools . . . in great part

in a manner that makes the device commercially desirable or cost effective. Telephone Interview with Horn & Geary, *supra* note 116 (“There’s a lot of mechanical stuff in a DVD player. So, let’s say the standard recites that you have to be able to jump across ten tracks within a certain number of milliseconds but it doesn’t specify how you could do that. There may be many ways you could actuate the system to make that jump, some of which are preferable to the manufacturer. Those practices may be commercially essential.”).

230. Telephone Interview with Subject #2, *supra* note 200; email from Alfred Chaouat to author, *supra* note 213.

231. *See* TAYLOR, *supra* note 212, at 51.

232. *See id.* at 54.

233. Telephone Interview with Subject #2, *supra* note 200.

234. *See* TAYLOR, *supra* note 212, at 56.

235. *See generally* DVD3C Request Letter, *supra* note 222 (describing the pool).

236. DVD6C Request Letter, *supra* note 224 (describing the pool).

237. Telephone Interview with Subject #3, *supra* note 124.

238. Telephone Interview with Subject #2, *supra* note 200.

239. *Id.*

240. Telephone Interview with Horn & Geary, *supra* note 116.

because Philips would not accept to decrease its share in the intended pool. Thomson decided that it was better off financially, and as a respected licensor, to continue to license its patents separately, in a single license incorporating all technologies used in the DVD player.²⁴¹

For its part, Thomson appears to have had a few reasons for remaining independent. A research subject explained that in part, the company viewed certain patents it held as having special value:

All essential patents in a patent pool have, in general, the same value. At that time, Thomson still owned some fundamental patents addressing the way the pits are read by an optical laser beam, which, from our perspective, was much more valuable than the DVD essential patents dealing with the multi-angle view, for example. So, we decided not to join any of the DVD patent pools.²⁴²

In addition to this, however, Thomson felt the most comfortable working with its own licensing staff purely because very few other companies involved in the pools had a long track record for this kind of work. The research subject continued:

Another reason why Thomson did not join the 6C patent pool is the uncertainty about who would be the agent. We knew that Philips had great experience and talent through their joint CD licensing program with Sony. We were not so sure if the other 6C pool members had the ability to manage a patent pool well, however. Also, we were already managing our own successful CD player licensing program. The decision to join a pool has to do with the rate and your share of it, but also how you assess the capabilities of the licensing agents. Licensing agents are not all equal.²⁴³

As a result, manufacturers of DVD players would need to obtain essential patent licenses from both pools and Thomson.

Despite the fragmentation, the three licensors requested royalties that resulted in roughly comparable royalty rates relative to the number of patent-families or inventions licensed. In a letter requesting review and approval from the DOJ, for instance, the 3C licensing group (Philips, Sony, and Pioneer)

241. Email from Subject #5 to author, *supra* note 122.

242. Email from Alfred Chaouat to author, *supra* note 213. This subject went on to note that Thomson spearheaded an important Blu-Ray patent licensing pool, however, and emphasized that the decision to join or pool or remain independent is done “one a case-by-case basis.”

243. Telephone Interview with Alfred Chaouat, *supra* note 228.

stated that their pool would contain 115 DVD player patents.²⁴⁴ Based on discussions with a subject involved and a review of essentiality lists, this figure refers to patent families, each of which may have included individual patents granted in different countries and some divisionals as well.²⁴⁵ The 3C pool stated that it would charge DVD player manufacturers 3.5% of net sales with a minimum of \$7 per unit sold, which would drop to \$5 per unit sold beginning in the year 2000.²⁴⁶ Because most DVD players sold for under \$200, the minimum dollar rates were the most important after several years.²⁴⁷ Before the year 2000, the 3C pool collected a per-patent-family rate of about \$0.06.²⁴⁸ From the year 2000 onward, the pool yielded a per-patent-family rate of about \$0.043 for each player.²⁴⁹ The DOJ replied favorably on December 16, 1998, stating that the 3C pool raised no antitrust concerns.²⁵⁰ With these assurances, the DVD3C pool began offering licenses soon after.

The 6C group (Hitachi, Matsushita, Time Warner, Toshiba, and others) submitted a request for business review to the DOJ at around the same time, on October 9, 1998.²⁵¹ They would license forty-four DVD player patents at a rate of 4% of net sales per player, with a minimum of \$4 per player.²⁵² This figure refers to patent families, each of which may have included individual patents granted in different countries and divisionals as well.²⁵³ Again, because DVD player prices were generally low enough, it is safe to assume that the

244. See DVD Business Review Letter, *supra* note 100, at 4 (“[T]here are 115 patents in all for the manufacture of DVD players, and 95 for the manufacture of the discs themselves.”).

245. Email from Alfred Chaouat to author, *supra* note 213; see also *Licensing: DVD-Video/ROM Disc (Joint)*, PHILLIPS, <http://www.ip.philips.com/licensing/program/29/dvd-video-rom-disc-joint> [<https://perma.cc/6TXR-8UQ4>] (last visited Mar. 11, 2018) (offering a list of patents granted in different countries).

246. See DVD3C Request Letter, *supra* note 222.

247. Telephone Interview with Ruud Peters, *supra* note 118. For a more detailed view of these numbers, see the tables and accompanying discussion *infra* Section IV.B.

248. *Id.*

249. *Id.*

250. Interestingly, the DOJ addressed the outsider concern in its response, although not with respect to the two DVD pools or Thomson. Instead, it discussed the possibility that a member of the DVD3C pool might refuse, at some future time, to license essential patents it might acquire—outsiderism by an insider, as it were. The DOJ did not believe this would seriously dampen the efficiencies of the pool. See DVD Business Review Letter, *supra* note 100, at 14 n.58 (“Transaction costs to licensees would almost certainly be somewhat lower if these later patents were included in the pool, instead of being subject to separate negotiations. However, the fact that this pool might not enable the realization of all potential efficiencies of pooling patents in this area does not mean that the efficiencies that it does create are insubstantial or that the arrangement is anticompetitive or unlawful.”).

251. See DVD6C Request Letter, *supra* note 224.

252. *Id.* at Exhibit 2 (on file with the author) (listing the forty-four patents).

253. *Id.* at 13.

minimum price per player was the most relevant. Based on this, the DVD6C group collected per-patent-family rates of approximately \$0.09 for players. The DOJ responded favorably on June 10, 1999.²⁵⁴ “By reducing what would otherwise be six licensing transactions to one,” the DOJ wrote, “the pool would reduce transactions costs for Licensors and licensees alike. By ensuring that each Licensor’s patents will not be blocked by those of the other five, the pool would enhance the value of all six Licensors’ patents.”²⁵⁵ In the DOJ’s view, it seemed that some cooperation was better than none.

This leads to Thomson. According to a subject directly involved, prior to July 2002, Thomson licensed both its MPEG-2 and DVD patents independently.²⁵⁶ At that time, the rate it charged DVD player manufacturers for both sets of patents was \$1.7 for each DVD player sold.²⁵⁷ In July 2002, Thomson decided to join the MPEG-2 patent pool, as discussed earlier,²⁵⁸ and it lowered the rate of its DVD patents to 1.3% of the net selling price of each player, with a minimum of \$1.3 per unit.²⁵⁹ Thomson’s portfolio included 10 essential patent families.²⁶⁰ As with the two pools, each patent family included numerous patents filed in different countries as well as divisionals.²⁶¹ At a rate of \$1.3 per sale, this equated to a per-patent-family rate of \$0.13.

Although this effective per-patent-family rate is higher than that of the 3C and 6C pools, a research subject explained that some licensees who held patents Thomson wished to license paid Thomson lower rates. “We concluded some bilateral licenses (i.e., including a license back for Thomson) at a lower rate than the standard rate when the licensee owned relevant DVD patents that we were using in our products. Otherwise, we succeeded to license our patents at the standard rate.”²⁶² This comment connected with an opinion shared by another research subject, who stated,

254. See Letter from Joel I. Klein, Assistant Att’y Gen., U.S. Dep’t of Justice, to Carey R. Ramos, Paul, Weiss, Rifkind, Wharton & Garrison (June 10, 1999), <https://www.justice.gov/sites/default/files/atr/legacy/2012/08/01/2485.pdf>. [<https://perma.cc/23X3-S793>] [hereinafter DVD6C Response Letter] (responding favorably to the proposed pool).

255. *Id.*

256. Telephone Interview with Research Subject #3, *supra* note 228.

257. *Id.*

258. Press Release, Thomson Multimedia, Thomson Joins MPEG LA Patent Pool (July 11, 2002), www.sec.gov/Archives/edgar/vpr/0204/02048954.pdf [<https://perma.cc/WNS2-EMC3>].

259. Telephone Interview with Alfred Chaouat, *supra* note 228.

260. *Id.*

261. *Id.*

262. Email from Alfred Chaouat to author, *supra* note 213.

You need to understand that this is the asking price. In bilateral negotiations there's always a difference between the asking price and the price you finally settle on—a negotiation margin. When you have a pool, by contrast, you always have a fixed rate.²⁶³

The per-patent-family rates for players collected by all three licensors were not vastly different in part because there was a mutual awareness that the aggregate cost for licensees could not be too high. Simply put, the licensors set their royalties in light of one another. The DVD6C pool signaled this when it wrote to the DOJ, “[t]he royalty rates proposed by the DVD pool are reasonable, especially when compared to the rates proposed by the MPEG-2 pool for patents used in DVD products or when compared to the rates proposed by the Sony/Philips/Pioneer 3-party DVD pool.”²⁶⁴ When asked if this showed that the 6C group looked to the 3C group for a baseline, a research subject directly involved commented, “I think that is a reasonable conclusion.”²⁶⁵ A licensing expert directly involved with licensing at Thomson also explained, “Thomson’s rate was set based on the rates set up by the two DVD patent pools.”²⁶⁶ In short, there was signaling among the two pools and Thomson.

A 2004 dispute in the District of Delaware involving the 6C pool illustrates the willingness of licensees to push back against independent rates they perceive as unreasonable in light of pool rates. *Matsushita Electrical Industrial Co. v. Cinram International, Inc.* involved a company that sought to license certain DVD disc patents directly from the individual members of the 6C pool.²⁶⁷ The pooling agreement allowed the companies to do this. The licensee was upset, however, because the per-patent-family rate requested by each licensor outsider of the pool was higher than the per-patent-family rate that the pool offered.

Cinram maintains that the structure of the 6C Pool discourages individual licenses because such licenses would undercut the pool price. . . . Cinram explains that the cost for individual licenses from four of the six 6C Pool members totaled \$0.11. Cinram points out that this total substantially exceeds the \$0.05 per disc royalty that it

263. Telephone Interview with Subject #2, *supra* note 200.

264. DVD6C Request Letter, *supra* note 224, at 20.

265. Telephone Interview with Subject #2, *supra* note 200.

266. Email from Alfred Chaouat to author, *supra* note 213.

267. *See Matsushita Elec. Indus. Co. v. Cinram Int'l, Inc.*, 299 F. Supp. 2d 370 (D. Del. 2004).

currently pays for a 6C Pool License, thereby making individual licenses entirely impractical.²⁶⁸

Interestingly, the District of Delaware rejected this argument based on its finding that the rates charged by the pool fell well below the “objective value” of the patents.²⁶⁹

The DVD licensing story fails to support the theory that outsiders will ask for royalties so excessive that licensees will be unable to bear the aggregate cost. Rather, in line with the MPEG-2 story, this episode seems to show that the pricing information published by patent pools (i.e., royalty rate announcements) sets a baseline for negotiations that take place outside of the pool and even rates charged by complementary pools. As explored in Part IV, this spillover benefit may be viewed as an unappreciated benefit of patent pools.

IV. ASSESSING THE IMPACT OF OUTSIDERS

The foregoing study shows that the royalty rates set by patent pools tend to limit the royalty rates that outsiders ask for and receive. This finding directly conflicts with the theory that outsiders will tend to undermine the benefits of patent pools. This is not to say, however, that the rate charged by outsiders and secondary pools is not relatively higher than the rate collected by individual members in a pool. In the DVD episode, for instance, some licensors collected relatively more than others. Should the higher relative rates in such settings be viewed as an “outsider premium?” To aid regulators, this Part introduces a technique for estimating the cost that a licensee either incurs or saves in the presence of an outsider. This technique is then applied to real-world financial and industry data collected in the foregoing study. The results indicate that, surprisingly, licensees may pay less in settings where cooperation among

268. *Id.* at 378.

269. *Id.* at 379 (“The Second Circuit has stated that the only valid test to prove that an alternative is too costly to be a realistic alternative is whether the price for such a license, in an objective sense, is higher than the value of the intellectual property rights being conveyed. In accord with this reasoning, the court concludes that the per disc royalty differential only causes the individual licensing option to be an unrealistic alternative if it is higher than the value of the DVD rights conveyed. The court finds that the facts at bar do not show this to be the case.”) (internal citations omitted); *Buffalo Broad. Co. v. Am. Soc. of Composers, Authors & Publishers*, 744 F.2d 917, 927 (2d Cir. 1984) (“Even if the blanket license is objectively the ‘better buy’ for most users, the program license would be a realistic alternative so long as it was fairly priced for those who might find it preferable for reasons other than price. But if the program license were available only at a price beyond any objectively reasonable range, the ‘bargain’ nature of the blanket license would not immunize it from characterization as a restraint.”).

licensors is slightly fragmented than they would pay in a setting where outsiders were induced to join a single pool.

A. A METHOD FOR ESTIMATING OUTSIDER COSTS AND BENEFITS

Do licensees pay more when outsiders are present than they would pay to a unified pool? This question asks one to compare reality as it is to a hypothetical world where no outsiders or secondary pools exist—i.e., a grand coalition where all relevant patent holders are joined. Evidence presented in the foregoing case studies indicates this is an unrealistic ideal, of course. Some outsiders simply prefer to go it alone, sometimes for idiosyncratic reasons. Unrealistic as it may be, however, a grand coalition hypothetical allows for a head-on quantitative assessment of the outsider concern. The following discussion presents a method of comparing the costs that a licensee incurs in settings with and without outsiders.

The greatest challenge in developing a picture of a grand coalition is determining what total royalty rate such a patent pool would charge licensees. Research subjects confirmed that the royalty rate set by a patent pool strikes a balance between what it takes to retain licensors and to offer reasonable terms to licensees over the course of a license.²⁷⁰ Recall from Part II of this Article that the amount licensors receive in most modern pools is determined by a formula, rather than through individual deals with each licensor who joins.²⁷¹ Earlier scholarship has shown that nearly all patent pools, historical and contemporary, have adopted this “rough and ready” approach to royalty divisions.²⁷² The two most common methods pools use to apportion royalties are “per-capita” and “per-patent.”²⁷³ Many patent pools use combinations of these two approaches as well.²⁷⁴ As a research subject for this Article explained, some pools will divide, say, twenty percent of their incoming royalties equally among the patent owners and the remaining eighty percent may be divided based upon the number of patents each member has licensed.²⁷⁵ A subject explained that a problem with a simple “per-patent” approach is that it encourages members of the pool to file many “divisional” patent applications relating to just one invention because doing so increases the raw number of patents upon which members’ royalties are based.²⁷⁶ To remedy this issue,

270. Email from Subject #11 (July 27, 2017) (on file with author).

271. Mattioli, *supra* note 12, at 439–55.

272. *See id.* at 462.

273. *See id.* at 446–47.

274. *Id.*

275. Telephone Interview with Subject #8 (July 15, 2017) (on file with author); email from Alfred Chaouat to author, *supra* note 213.

276. *Id.*

subjects explained, some recent pools have limited the number of patents that may be included in per-patent calculations, either by limiting the number of divisionals to be counted, or basing the division not on the raw number of patents but instead on the number of patent families contributed by a licensor.²⁷⁷ In light of these observations, a foundational assumption in this exercise is that a patent pool that includes all relevant patents will include a royalty-division formula of some kind.

This leads to a second assumption: in order to entice all outsiders to join as members, a grand coalition would need to deliver to all outsiders royalties that are at least as great as those they can already collect outside of the pool. One could argue quite fairly that perhaps a slightly lower rate than this would be enough to entice some outsiders to join, in light of the transaction cost savings that patent holders enjoy by belonging to pools. On the other hand, this study has revealed that most outsiders enjoy the efficiencies of robust internal licensing departments. For this reason, it is difficult to guess whether an outsider would be willing to give up some of its royalty returns in exchange for the efficiencies of belonging to a pool, and if so, how much. For these reasons, this exercise proceeds on the assumption that, to induce all licensors to join, a single pool must deliver to the highest-paid outsider royalties at least as great as those that outsider could draw on its own.

As a threshold matter, then, it is necessary to determine who the highest-paid licensor is and how much that licensor collects for each product that its licensees sell. In the course of conducting the studies in this Article, I received directly from research subjects and documentary sources a wealth of industry pricing data as well as the royalty rates charged by patent pools and individual licensors. In the practical example that follows, data from the DVD licensing industry are presented.

To aid in this analysis, it is helpful to represent the foregoing assumptions as equations. Equation 1, below, shows the total per-licensee royalty rate that a patent pool using a per-capita royalty division formula would need to charge in order to bring in an outsider that collects a per-licensee rate of “*RateOutsider*.” Here, n represents the total number of patent holders in the pool.

Equation 1: Royalty Rate Charged by Unified Pool Using Per-Capita Formula

$$RatePC = RateOutsider \times (n + 1)$$

277. *Id.*

This equation assumes that a patent pool is driven strictly by a royalty division formula and that it has not made a special agreement that has resulted in compensating the outsider more, comparatively, than the other members. This assumption might be challenged, but it seems reasonable, as existing members of a pool would likely disfavor disproportionately benefiting a reluctant member. For comparison, Equation 2, below, shows the total per-licensee royalty rate (“*RatePP*”) under a per-patent approach. Here, “*NumInside*” is the number of patents in the pool before the outsider joins, “*RateOutsider*” is the royalty rate the highest-paid outsider draws, and “*NumOutside*” is the number of relevant patents owned by that outsider.

Equation 2: Royalty Rate Charged by Unified Pool Using Per-Patent Formula

$$RatePP = (RateOutsider/PatentsOutsider) \times (NumInside + NumOutside)$$

To calculate the royalty rate that would be charged by a unified pool that uses a combination of the per-capita and per-patent approach, one can multiply the “*RatePP*” and “*RatePC*” values by their relative weights (e.g., 20% and 80%) and take the sum. The sum is referred to below as “*RateHypo*.”

Next, one can compare these hypothetical rates to the royalty rate that licensees pay all licensors in reality. This latter amount, represented by “*RateActual*” below, can be derived by adding the individual rates charged by each pool and each licensor. The difference between these values is a licensee’s total royalty cost or savings by working with a single pool as opposed to working with a pool and one or more outsiders.

Equation 3: Calculation of Rate Increase Due to Outsider Inclusion in Pool

$$RatePremium = RateHypo - RateActual$$

It is also necessary to consider transaction costs. For a licensee, working with a single pool involves just one transaction, compared to the multiple transactions necessary to work with, say, two pools and an outsider. The transaction costs conserved (“*TCostsSaved*”) by working with a unified pool, or grand coalition (“*TCostsGC*”), instead of a partial coalition involving multiple pools and outsiders (“*TCostsPC*”) can be represented as follows:

Equation 4: Transaction costs conserved under unified pool (per-licensee)

$$TCostsSaved = TCostsPC - TCostsGC$$

Bringing this all together, one can determine the total increase or decrease in cost to each licensee (“*OutsiderPremium*” below) by subtracting the transaction costs conserved by the rate increase incurred:

Equation 5: Calculation of Outsider Premium

$$\textit{OutsiderPremium} = \textit{RatePremium} - \textit{TCostsSaved}$$

If “*OutsiderPremium*” is positive, then licensees are better off under current conditions (licensing from the pool and outsider) than they would be if the outsider were induced to join the pool; if “*OutsiderPremium*” is negative, then licensees should wish for the pool to raise its rates to induce the outsider or outsiders to join.

Ultimately, the analysis boils down to comparing two numbers: the costs licensees incur in reality against those they would incur in a setting with a single pool that has raised its rates to pull in outsiders.

B. ESTIMATING THE IMPACT OF OUTSIDERS ON DVD LICENSEES

This discussion applies real-world financial and patent data gathered from the study in Part III to the method described in the preceding discussion. The result is a rough estimate of the impact, in cost, of outsiders on DVD licensees. The results are surprising: arguably, licensees fare *better* in the slightly fragmented licensing landscape that exists than they would in a setting with a single pool. The implications of this conclusion are explored further toward the end of this Article.

Drawing upon the study in Part III, the table below lists the number of patent families and royalty rates charged by DVD patent holders. Although research subjects indicated that outsiders such as Thomson sometimes agreed to accept rates lower than the rates they asked for, this study will rely on the “asking price” because this was reportedly the typical amount Thomson collected.

Table 1: DVD Video Licensing Rates (Per Unit Sold)

LICENSOR	PATENT FAMILIES	ROYALTY RATES	ROYALTY RATES (DOLLARS PER-PATENT-FAMILY)
DVD3C (3 LICENSORS)	115	\$7 before yr. 2000 \$5 after yr. 2000 (alt: 3.5% NSP ²⁷⁸)	\$0.06 (later \$0.043)
DVD6C (6 LICENSOR)	44	minimum: \$4 (alt: 4% NSP)	\$0.09
THOMSON / TECHNICOLOR (1 LICENSOR)	10	\$1.3 (alt: 1.3% NSP)	\$0.13

In addition to the minimum per-patent-family royalty rates that appear in Table 1, it is helpful to determine the actual per-patent-family royalty rates for years in which the minimum did not apply. As Table 1 shows, all licensors based their royalty rates on a percentage of the net selling price (NSP) of a DVD player until that percentage fell below a certain number—\$100 in the cases of DVD6C and Thomson. Drawing upon sales data published by the Consumer Electronics Association, Table 2 reflects the patent royalties a licensor would have collected from each licensor for an average-priced DVD player in the years 1997–2004.²⁷⁹ This range of years was selected because it coincided with the introduction and growth of DVD.

278. NSP signifies “Net Selling Price.” This is shown as an alternate measure of royalties owed. If the percentage shown in the table multiplied by a product’s NSP exceeds the minimum, the higher number was owed. Looking to the first row for example, if a DVD player was sold in the year 2001 for \$250, then 3.5% of this would have equaled \$8.75. Licensees would have owed this sum because it is higher than the minimum of \$5 listed for that time.

279. See *Cost of DVD Players*, DATA360, http://www.data360.org/dsg.aspx?Data_Set_Group_Id=497 [<https://perma.cc/65T8-87PX>] (last updated Sept. 7, 2006).

Table 2: DVD Video Licensing Costs (1997–2004)
(asterisks indicate that the minimum licensing rate has been reached)

YEAR	AVG. PRICE OF DVD PLAYER	DVD6C ROYALTIES PER UNIT SOLD	DVD3C ROYALTIES PER UNIT SOLD	THOMSON ROYALTIES PER UNIT SOLD	TOTAL LICENSING COSTS PER UNIT SOLD
1997	\$489.97	\$19.60	\$17.15	\$6.37	\$43.12
1998	\$390.18	\$15.61	\$13.66	\$5.07	\$34.34
1999	\$270.00	\$10.80	\$9.45	\$3.51	\$23.76
2000	\$201.55	\$8.06	\$7.05	\$2.62	\$17.74
2001	\$165.00	\$6.60	\$5.78	\$2.15	\$14.52
2002	\$142.00	\$5.68	\$5.00*	\$1.85	\$12.53
2003	\$123.00	\$4.92	\$5.00*	\$1.60	\$11.52
2004	\$108.60	\$4.34	\$5.00*	\$1.41	\$10.76

These amounts may now be compared to the hypothetical royalties that a single pool would charge licensees.

How much would a single pool need to charge to entice the highest-paid outsider to join? First, one must determine which entity is the highest-paid licensor. Thomson's profits for each product sold appear in Table 2. It is possible that a member of the DVD3C or DVD6C pool earned more than Thomson for each product sold. It is difficult to know this, however, because the formulas that apportion royalties among the three members of the DVD3C pool and the six members of the DVD6C pool are confidential.²⁸⁰ If the pools relied upon simple per-capita divisions, however, then Thomson always collected more than any member of the 3C or 6C pool for each net sale. If the formulas were more complex (which the business review letters indicate), then it is possible that one member of the 3C group could have collected more than Thomson at any time.²⁸¹ In the interest of keeping the final estimates conservative, however, one may select Thomson's royalties as a

280. See DVD Business Review Letter, *supra* note 100, at 6 ("The allocation of royalties among the Licensors is not a function of the number of patents contributed to the pool.").

281. See *id.*

measure of the highest amount any member would need to collect in a unified pool.²⁸²

Now it is useful to consider what total rate a patent pool using the various royalty-division rules outlined in the prior discussion would need to charge to ensure that Thomson received at least the level of royalties that it was able to collect independently. First, we can consider a formula based upon the number of patents infringed by a product, defined earlier in Equation 2. As explained earlier in this Article, the *per-patent-family* rate charged by a pool is a more accurate indicator of the value each member brings to the table than a *per-patent* rate and is reflective of the formulas that pools use in practice. For that reason, this example considers a formula that apportions royalties based on the number of patent families contributed. Thomson, as reported in Table 1, would have ten patent families to contribute to the pool. Therefore, the *per-patent-family* rate charged by the pool can be calculated simply by dividing Thomson's return (in Table 2) by ten. A flaw in this approach, of course, is the fact that patent composition may have changed during the period (1997–2004). As explained earlier, patents may have been added to or removed from pools. As a result, the calculation in Table 3 is approximate.

282. This assumption does not hold in all cases, as the 3C or 6C pools reach their royalty minima. However, the limitation of this assumption does not undermine the conclusion that pools consolidate at the highest royalty rate.

Table 3: Hypothetical Royalties Per Product Sold (Pro-Rata Formula)

YEAR	PER-PATENT-FAMILY RATE	DVD6C ROYALTIES (PER UNIT SOLD)	DVD3C ROYALTIES (PER UNIT SOLD)	THOMSON ROYALTIES (PER UNIT SOLD)	TOTAL LICENSING COSTS (PER UNIT SOLD) ("RATEPP")
1997	\$0.64	\$28.03	\$73.26	\$6.37	\$107.65
1998	\$0.51	\$22.31	\$58.31	\$5.07	\$85.68
1999	\$0.35	\$15.44	\$40.37	\$3.51	\$59.32
2000	\$0.26	\$11.53	\$30.13	\$2.62	\$44.28
2001	\$0.22	\$9.46	\$24.73	\$2.15	\$36.34
2002	\$0.19	\$8.14	\$21.28	\$1.85	\$31.27
2003	\$0.16	\$7.04	\$18.40	\$1.60	\$27.04
2004	\$0.14	\$6.20	\$16.22	\$1.41	\$23.83

What would the unified pool need to charge if it relied upon a per-capita formula? Referring to Equation 1, the information in Table 1, and the assumption that Thomson is the highest-paid licensor, the amounts under this hypothetical can be calculated, as shown in Table 4. To clarify, the DVD3C column receives three-times Thomson's rate, and the DVD6C pool receives six-times. Total licensing costs to a licensee appear in the right-most column.

Table 4: Hypothetical Royalties Per Product Sold (Per-Capita Formula)

YEAR	DVD6C ROYALTIES (PER UNIT SOLD)	DVD3C ROYALTIES (PER UNIT SOLD)	THOMSON ROYALTIES (PER UNIT SOLD)	TOTAL LICENSING COSTS (PER UNIT SOLD) ("RATEPC")
1997	\$38.22	\$19.11	\$6.37	\$63.70
1998	\$30.42	\$15.21	\$5.07	\$50.70
1999	\$21.06	\$10.53	\$3.51	\$35.10
2000	\$15.72	\$7.86	\$2.62	\$26.20
2001	\$12.90	\$6.45	\$2.15	\$21.50
2002	\$11.10	\$5.55	\$1.85	\$18.50
2003	\$9.60	\$4.80	\$1.60	\$16.00
2004	\$8.46	\$4.23	\$1.41	\$14.10

A comparison of the rates appears below:

Table 5: Actual Versus Hypothetical Royalty Cost to Licensees Per Unit Sold

YEAR	RATEACTUAL: ACTUAL COST TO LICENSEES	RATEPC: HYPOTHETICAL RATE TO LICENSEES UNDER PER-CAPITA ALLOCATION	RATEPP: HYPOTHETICAL RATE TO LICENSEES UNDER PRO-RATA ALLOCATION
1997	\$43.12	\$63.70	\$107.65
1998	\$34.34	\$50.70	\$85.68
1999	\$23.76	\$35.10	\$59.32
2000	\$17.74	\$26.20	\$44.28
2001	\$14.52	\$21.50	\$36.34
2002	\$12.53	\$18.50	\$31.27
2003	\$11.52	\$16.00	\$27.04
2004	\$10.76	\$14.10	\$23.83

The increase in licensing costs under a unified pool can be derived by subtracting *RateActual* in the first column from either *RatePC* or *RatePP*, depending on which royalty-division formula one wishes to consider in the hypothetical. The result is *RatePremium*, defined earlier in Equation 4.

Turning to transaction costs, in 2017 Robert Merges and I gathered financial data from the largest patent pool administrators in the United States that can be directly applied to this estimate. Based on our findings, the average licensee incurs about \$35,000 in costs per year dealing with a patent pool.²⁸³ These amounts stem from administrative fees tied to reporting sales data, making royalty payments, and the like.²⁸⁴ (The patent pool eliminates negotiation and search costs.) This example assumes that licensees incur similar ongoing transaction costs when working with individual outsider licensors. Added to this, in the case of an individual outsider, is the initial cost of negotiating an agreement. A widely-cited estimate suggests the average cost of an average patent licensing would be about “\$50,000 per licensee per patent.”²⁸⁵ The evidence revealed in this Article suggests the amount might be lower, however, as a pool effectively places a ceiling on the negotiations, which could simplify the process. An annual cost can be estimated by dividing this upfront negotiation cost over some period of time during which the patent has commercial value. If one assumes that period of time to be ten years, for instance, the average annual cost is \$5,000. To keep the estimate conservative, however, we may assume a higher value of, say, \$15,000. In summary, this example assumes that a licensee spends an average of \$35,000 in transaction costs for each pool it licenses from and approximately \$50,000 in transaction costs working with one outside licensor.²⁸⁶

Applying these numbers to the DVD example, one may assume, conservatively, that each licensee incurred about \$120,000 in annual administrative costs to work with two patent pools and one outsider (i.e., \$35,000 in costs for one pool, plus \$35,000 for a second pool, plus \$35,000 in administrative costs of dealing with the outsider, plus an initial cost of \$15,000 in negotiation costs with the outsiders). Under a unified pool, the annual cost would drop to \$35,000. Referring to Equation 4, the total annual transaction costs saved (*TCostsSaved*) would be approximately \$85,000.

283. See Merges & Mattioli, *supra* note 15, at 322–23.

284. See *id.*

285. Mark A. Lemley, *Rational Ignorance at the Patent Office*, 95 NW. U. L. REV. 1495, 1507 (2001) (“[A] reasonable estimate of the cost of negotiating a license might be \$50,000 per licensee per patent.”).

286. It is important to emphasize that, industry-wide, patent pools *profoundly* reduce transaction costs by reducing the number of necessary transactions and negotiations. See Merges & Mattioli, *supra* note 15, at 320.

To compare the annual transaction costs conserved to the higher rate discussed earlier and defined in Equation 4, it is necessary to estimate the total annual costs that a licensee might incur under the higher rate. (Until now, this discussion has discussed the rate in terms of per-unit sales). One can develop a ballpark figure by multiplying the *RatePremium* number by the total number of units that a licensee might expect to sell each year. Publicly available sales data reported in Form 10-K filings and annual reports makes it possible to draw such an estimate for an average licensee. In the year 2001, for instance, Sony reported selling thirty-nine million DVD players.²⁸⁷ In the interest of keeping the estimate conservative, however, one can consider *far* lower average sales numbers. Table 6, below, assumes an annual average sales figure of just one million units during the relevant years.

Table 6: Calculation of Annual Outsider Premium (based on average annual sales of 1,000,000 units)

YEAR	OUTSIDER PREMIUM (ADDITIONAL TOTAL COST TO LICENSEE UNDER UNIFIED POOL)	TCOSTSSAVED (ANNUAL)	RATE PREMIUM (PER-SALE)	RATE PREMIUM (BASED ON ANNUAL AVERAGE SALES OF 1M UNITS)
1997	\$20.48M	\$90,000	\$20.58	\$20.58M
1998	\$16.26M	\$90,000	\$16.36	\$16.36M
1999	\$11.24M	\$90,000	\$11.34	\$11.34M
2000	\$8.36M	\$90,000	\$8.46	\$8.46M
2001	\$6.88M	\$90,000	\$6.98	\$6.98M
2002	\$5.87M	\$90,000	\$5.97	\$5.97M
2003	\$4.38M	\$90,000	\$4.48	\$4.48M
2004	\$3.24M	\$90,000	\$3.34	\$3.34M

These calculations indicate that licensees should far prefer the current environment, in which they must license from two pools and one licensor, to the hypothetical setting where one pool has lured in all outsiders with higher royalties. This conclusion is directly at odds with warnings that some industry

287. See SONY CORP., SONY CORPORATION ANNUAL REPORT 2001 at 39 (2001), www.sony-latin.com/corporate/SOLA/acerca/infocorporativa/pdf/info_financiera/ar2001e.pdf [https://perma.cc/M5HF-2YV9].

analysts gave at the time fragmentation in the DVD licensing landscape occurred.²⁸⁸

In summary, the small outsider margin, multiplied across a pool in the manner pools commonly distribute royalties, leads to a significant price difference for licensees. If one assumes that a single pool would need to merely offer outsiders an amount *equal to* what they can collect outside of the pool and if one also assumes that such a pool would rely upon a commonly used basis for the division of royalties (as opposed to disproportionately compensating the outsider), the result could mean much higher rates than licensees currently pay. Outsiders may not be powerful, but multiplication is.

C. THE VIRTUES OF IMPERFECT COOPERATION

The foregoing suggests a provocative idea with implications that reach beyond patent markets: partial cooperation may, in some settings, be preferable to complete cooperation. In the context of patent pools, this condition is met when the marginal premium charged by an outsider multiplied according to the royalty-sharing rules in a pool (to lure in the outsider) exceeds the transaction costs that licensees would save by dealing with a single licensor. The case of DVD patent licensing appears to meet these conditions. This does not reflect the power of outsiders but rather that of modest arithmetic: multiplied across a pool according to the most commonly used royalty-division formulas, the small outsider margin can yield a significant total price increase.

It would be a mistake to conclude that robust patent pools that contain many essential patents are not extremely helpful. To the contrary, as discussed earlier, Robert Merges and I have estimated that the average transaction cost savings of a modern patent pool is on the order of \$400 to \$600 million.²⁸⁹ The foregoing discussion presumes a partially integrated pool taking steps to draw in a reluctant outsider. The takeaway is that the benefits pools offer are not lost or even undermined simply because an outside licensor also exists. Assuming no independent competitive concerns exist, regulators should assume that the patents that are within pools belong there, and the patents held by outsiders are not a cause for concern. By setting a baseline for outside negotiations, pools prevent these outsiders from upsetting the careful balance the pools set for their members and licensees. The fact that some patent holders prefer not to join a central pool is not necessarily a bad thing—not for licensees, not for other patent holders, and not for the pool. Antitrust

288. See *Sony, Philips Break Ranks, Prepare DVD Licensing Fees*, OPTICAL MEMORY NEWS, Aug. 13, 1996 (“The price of digital videodisk (DVD) technology may balloon if other patent holders follow the lead of Sony Electronics and Philips Electronics NV and set licensing fees for their DVD patents, warn industry analysts.”).

289. See Merges & Mattioli, *supra* note 15, at 322.

regulators concerned by recent scholarship on patent pool outsiders should consider this in their evaluation of patent pools.

Scholars in other areas of law and policy might take something away from this too. Contrary to conventional wisdom, there may exist in any given market for complementary rights an optimal level of diffusion of ownership. Jonathan Barnett has explored this concept at a high theoretical level in a compelling and thought-provoking 2009 article.²⁹⁰ Somewhere between the ideal of a grand coalition and the proverbial anticommons, there may exist middle positions where partial coalitions work alongside outsiders, subtly influencing one another in ways that are helpful or even optimal for all involved. These settings may superficially look messy and plagued by disagreements. As this study has shown, however, looks can be deceiving.

V. CONCLUSION

This Article has examined a question fundamental to law and policy: how do individuals who decline to join cooperative groups affect the good those groups can do? In the context of patents, this is a deeply important question because it challenges the belief that regulators have shaped their policies around—i.e., that patent holders can privately remedy the high transaction costs that pervade technology licensing.

Antitrust regulators have long assumed that outsider patent holders that decline to join pools do not disrupt the benefits that patent pools offer. Against this backdrop, a rising chorus of critics has theorized compellingly that outsiders are more harmful than regulators assume. By demanding royalty rates that far exceed those requested by the pool, these theorists argue, outsiders quietly undermine the transaction cost savings the pool delivers to licensees. As the theorists see it, outsiders work both sides of the deal, demanding high royalties from licensees while at the same time pressuring pools for a healthier cut of the profits. This theory suggests that the mere presence of an outsider of multiple pools should cast doubt on the efficiencies and benefits that a pool under examination can offer.

By applying an ethnographic approach, this Article has revealed an intimate and surprising look at the reality of this situation. The most important finding is that outsiders are not as powerful as the theorists have guessed. This is because the royalty rate charged by a patent pool is a powerful signal to those outside of the pool (including courts) of the reasonable value of all patents concerned.

290. See generally Jonathan M. Barnett, *Property as Process: How Innovation Markets Select Innovation Regimes*, 119 YALE L.J. 384, 387–91, 432–37 (2009).

Meanwhile, it seems that licensees are willing to resist and defy outside licensors that ask for rates far out of step with a prominent pool. As research subjects explained, some licensors work independently because they are highly motivated to “get their money fast.”²⁹¹ These licensors are understandably eager to avoid the delays and costs of pursuing a patent infringement suit against a licensee. Moreover, suing for infringement in this context can be risky: as the Lucent episode shows, an aggressive outsider strategy can backfire, leading to validity challenges and counterclaims for infringement. As one subject explained, being an outsider can also lead to negative press that a company might prefer to avoid.²⁹² Added to this is the relative difficulty of obtaining an injunction, even when infringement is found. The general view shared by subjects is that courts will tend to look to a patent pool for a ballpark sense of the value of the patents infringed. It is no wonder that the licensing rates charged by outsiders in the DVD and MPEG-2 episodes were roughly in line with those of the pools they operated alongside.

The impetus to keep royalties reigned-in is even stronger for outside patent holders who are also licensees of a pool. As the DVD study shows, Thomson (a manufacturer) was highly successful in conducting outside licenses overall, but it lowered its asking price when making deals with patent holders whose patents it wished to license. A patent pool that includes a grant-back clause for licensees would make this a contractual obligation.

Finally, an outside licensor who, despite these many countervailing forces, succeeds in getting licensees to agree to pay a high rate still must contend with underreporting of sales. As research subjects explained, underreporting is common (it is costly to monitor and detect), and it tends to nudge payments from licensees to outsiders to be in line with pool rates.

The examination of royalty rates and prices in Part III brings these findings into stark relief. The data analyzed support the qualitative insights shared by research subjects: the per-patent-family rates charged by two pools and one independent licensor were all within a similar range. Moreover, to bring all patent holders in, a single pool may have had to raise its royalty rates in a manner that would have resulted in an overall price increase for licensees. This is not because the outsider advantage is large, but rather, because of how pools divide royalties: the small margin needed to draw in an outsider, multiplied across a pool in the manner pools usually distribute royalties, leads to a significant difference in price. The existing licensing landscape, imperfect as it might seem, may be more desirable than more aesthetically pleasing alternatives.

291. Telephone Interview with Subject #8 (July 15, 2017).

292. *Id.*

Putting this all together, cooperation among patent holders is not an *all-or-nothing* game. Contrary to theory, outsiders and secondary pools do not appear to undermine the benefits that patent pools offer. This is because patent pools have a quiet but powerful influence on negotiations that take place “poolside,” so to speak. This is why the gentle fragmentation among licensors that pervades technology licensing is mostly harmless, probably inevitable, and sometimes actually preferable to the alternative. Antitrust regulators who must evaluate patent pools should find this knowledge helpful. This finding can also be helpful to scholars concerned by outsider problems in many other areas of law and policy. An ethnographic approach like the one followed here can reveal aspects of an outsider situation that theory alone does not capture. Sometimes, the collective will of a group overpowers individual self-interest; sometimes, an outsider is also a good neighbor; sometimes, a little cooperation is not only better than none, but also better than more.