

**Institutions for Intellectual Property Transactions:
The Case of Patent Pools**

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I. Introduction

In this Chapter I hope to accomplish three things: briefly summarize trends in the economic theory of intellectual property rights (IPRs); describe some ideas of my own on the emergence of IPR exchange institutions, and describe how an emphasis on institutions fits into existing theory; and ground these issues in a discussion of collective IPR licensing, in particular, patent pools. I begin with a discussion of how transactions have crept into IP theory, and then turn to an examination of actual institutions that have evolved out of the need for various industries to conduct a large volume of IPR transactions.

A. The Theoretical Literature

Economists have been arguing the merits of IPRs since at least the eighteenth century, though serious theorizing began only in the nineteenth.¹ From the beginning the literature was concerned primarily with the ultimate question of whether IPRs could be justified. As a simplifying assumption, and no doubt in part as a reflection of real-world conditions, individual property rights were assumed to be roughly coextensive with economic markets. A patent, for example, was conceived as a property right over a single, coherent product occupying a distinct economic market. Eli Whitney's patent on the cotton gin is a canonical example. Likewise a copyright was discussed as a property right over a particular book or map. In this way, debate over the consequences of IPRs could be conducted in the language of economics: IPRs were legally-granted "monopolies," whose distortionary effects on competitive markets could be defended or attacked in familiar

cost-benefit terms. This view of IPRs can be described as a simple “tradeoff model”: it sought to determine whether the costs of monopoly outweighed the benefits of legal inducements to create new works.

1. IPRs and Transaction Costs

In this early theory, the transactional role of IPRs is limited to facilitating product markets. The promise of a patent leads to the creation of the cotton gin, for example, and thence to a market for it.² Likewise with copyright: in the prototypical example, legal protection enables an author to sell his or her book to readers.³ This “one property right per marketable work” image of things simplified discussion, to be sure. Under it, the only relevant question is one of net effects: is the increased effort that the prospect of an exclusive right calls forth worth what Jefferson called “the embarrassment” of a state-backed monopoly?⁴ Commentators assumed that the reward took the form of exclusivity in a discrete end-product market.

This image lay undisturbed in the minds of economists until the important paper by Kenneth Arrow in 1962. In this paper, Arrow shifted the focus from product markets to markets for *information*, in keeping with his research agenda at the time.⁵ Patents became, in Arrow’s hands, a mechanism for encouraging information disclosure. Without such protection, the buyer of information, who presumably needs access to it to determine its worth, would never pay anything; or else, she would have to be content to buy it without seeing it – an arrangement not conducive to a robust market.

Arrow thus recognized that IPRs occupy a related, but separate, set of markets from the assets that embody them. Indeed, IPRs play a crucial role in creating the *possibility* of exchange in these markets. Implicit in Arrow's theory is that one firm may need to purchase informational inputs from another firm – and that patents facilitate this process. Arrow set the stage for a new type of theory, one that recognized the need to assemble information and property rights from disparate sources in the process of bringing a product to market. In this new theory, IPRs do not simply *reside* in marketable products; they are the subject of markets in their own right. They serve a *transactional* function, encouraging and perhaps even enabling the integration of pieces of information produced by disparate, independent firms. By focussing on markets for information, Arrow eliminated the assumption that property rights were coextensive with economic markets for final (tangible) products.

It took some time for this insight to sink in. One indication that things had begun to change was a series of papers on patent scope. Merges and Nelson, Scotchmer, and others became interested in how property rights were allocated among sequential innovators in various industries.⁶ This literature had as its chief concern the role of property rights in dividing the spoils – and setting the stage for private bargaining – between early (pioneer) inventors and follow-on improvers. Typically, papers in this genre explore how the details of IPR rules and doctrines affect the bargaining environment facing the sequential innovators. Property rights are important because they necessitate and structure transactions. The pioneer-improver paradigm reinvigorated thinking about

how economic agents integrate disparate IPRs, so that viable products can reach the market.

The recently developed “anticommons” theory associated with Michael Heller and (as applied to IPR problems) Heller and Rebecca Eisenberg , advances this theme by more explicitly analyzing interactions between property rights and transactions.⁷ The basic idea is that granting too many property rights of too small a scale can preclude effective exploitation of economic resources. Heller defines an “anticommons” as an economic resource that is covered by a large number of individual exclusionary rights. Businesspeople must bundle numerous rights to make good use of the resource.⁸ If various impediments to bargaining are present, this may prove difficult; as a result, the resource may be underutilized.⁹ Heller applies this notion to a number of situations, with special attention to retail stores in post-communist Russia. In a separate article, Heller and Eisenberg¹⁰ deploy anticommons theory in a critique of patents on short fragments of human genes:

The problem we identify is distinct from the routine underuse inherent in any well-functioning patent system. By conferring monopolies on discoveries, patents necessarily increase prices and restrict use – a cost society pays to motivate invention and disclosure. The tragedy of the anticommons refers to the more complex obstacles that arise when a user needs access to multiple patented inputs to create a single useful product. Each upstream patent allows its owner to set up another tollbooth on the road to product development, adding to the cost and slowing the pace of downstream biomedical innovation.¹¹

The authors present two “current examples in biomedical research”: the creation of “too many concurrent fragments of [IPRs] in potential future products,” and rules permitting

“too many upstream patent owners to stack licenses on top of the future discoveries of downstream users.”¹²

More recently, Heller has turned to solutions.¹³ He argues that various property doctrines forestall anticommons by preventing excessive fragmentation of rights. As examples, Heller identifies doctrines as diverse as minimum lot size zoning in real estate law, and the utility requirement in patent law. Describing the latter example, and elaborating on his article with Eisenberg, Heller explains¹⁴:

To give an intellectual property example, patent law only weakly prevents excessive fragmentation in biomedical research. Old-fashioned boundary doctrines, such as the “utility” requirement in patent law, have not kept pace with technological change. Rebecca Eisenberg and I have argued that creating property rights in isolated gene fragments seems unlikely to track socially useful bundles of property rights – a form of excessive “physical” fragmentation.

The emphasis on obstacles to bundling, and solutions rooted in close attention to “boundary problems,” highlights the transactional orientation of anticommons theory. This is a break with past IPR theory, as we have seen. But it also represents a break with received wisdom in the general economic theory of property rights. Indeed, the explicit emphasis on transactions is an attempt not only to move IPR theory more into alignment with observed features of the commercial world; but also to do the same for the more general economic theory of property rights. In the process, almost without noticing it (and certainly without commenting on it), the newer transactional theory of IPRs holds the potential to partially bridge the gap between the general literature on property rights and the more specialized work on IPRs.

Property rights theory in economics has not traditionally been especially concerned with bargaining among multiple rightholders. Ronald Coase, Harold Demsetz, and other earlier theorists worried primarily about the initial grant of rights to *individual owners*. For them, property rights are the solution of choice when one person's actions affect the well-being of others. Thus Coase argued the benefits of establishing clear entitlements where landholdings adjoined spark-emitting railroads, and where farms were set amidst roaming livestock.¹⁵ Demsetz studied rights over fur-bearing animals in colonial North America. He applauded the switch from common use to private ownership when the economic value of furs increased. In other early papers, Demsetz argued that economic actors refine property rights to keep pace with developments in enforcement and monitoring costs.¹⁶ While Coase and Demsetz showed some concern for the costs of moving rights around, this was not their primary focus. They emphasized the scope and content of property rights: the state's definition of the rights of property holders.

The newer transactional theories depart from this tradition. They worry a great deal about what owners do with their property rights *after* the state grants them. Heller has for the most part emphasized "tragedies," or transactional *failures*¹⁷; so too Heller and Eisenberg with respect to patents.¹⁸ Multiple, discrete rights give many owners the right to exclude, which creates the conditions for failure in their example because of the high costs of bundling together the necessary rights. Heller identifies bargaining failures, holdup problems in particular, as a key reason for anticommons tragedies. As he points out, in many settings rights are held by parties who will not undergo repeat interactions. A one-shot bargaining game results, where some party must assemble disparate rights to move

forward with a valuable economic project. This is a setting ripe for holdups and bargaining breakdown, as the economic literature has long recognized.¹⁹ This is true even in cases where only a few parties must bargain to strike a deal,²⁰ and notwithstanding that private contracting sometimes achieves bundling.

These successful bargained-for solutions were the subject of my article on “Bargaining into Liability Rules.”²¹ I found that multiple private rightholders bargained with each other in forming collective rights organizations in a number of industries. In many cases the resulting arrangements started as simple bilateral contracts between parties that had (or expected to have) repeated interactions with each other. Some such contracts matured into full-blown, freestanding administrative entities responsible for widescale licensing of large bundles of members’ intellectual property rights. This “repeat-play” feature is somewhat similar to the “close knit” societies examined so skillfully by property theorist Robert Ellickson, although in the cases Ellickson studied formal entitlements play a relatively minor role in structuring most negotiations.²²

Economist Gary Libecap has explored dysfunctional bargaining in the setting of oil field “unitization.”²³ Libecap’s studies center on oil fields governed by separate claims, held by independent owners. Potential efficiencies await owners who agree to treat the entire oilfield as a single “unit.” For example, such an agreement can prevent wasteful “pumping races” which are expensive and result in lower oil yields. But Libecap’s research shows that despite the presence of gains from cooperation, owners of oil field claims often fail to reach agreement.

Anticommons theory tells a series of similar cautionary tales about the doleful effects of too many overlapping property rights. Other recent theory is more optimistic: it examines voluntary exchange among disparate rightholders, recounting examples of what might be called transactional *success* stories.²⁴ In one respect the optimists and anticommons “pessimists” agree: the key issue is the cost of integrating disparate rights. But the optimists describe situations where rightholders establish formal and informal mechanisms – loosely, “institutions” – to bring these costs down. One example is the emergence of collective copyright licensing organizations, such as ASCAP.²⁵ This organization, and others like it, serves two functions. It gathers together a large number of musical composition copyrights, which permits it to issue a “blanket license” for all songs in its repertoire. This reduces transaction costs for large-volume users of music, such as radio and television stations. In addition, ASCAP distributes a share of the blanket licensing fees as payments to individual copyright holders. It does so using a complicated formula based on the estimated number of uses of each composition, determined through a combination of internal rate-setting procedures and sophisticated sampling techniques. ASCAP is governed by weighted voting rules, under which each member has a vote in proportion to the number of copyrights it has contributed and the value of each, as determined by past royalty distributions.²⁶

Patent pools are a second example of an IPR-based collective rights organization. A patent pool is an arrangement among multiple patent holders to aggregate their patents. A typical pool makes all pooled patents available to each member of the pool. Pools also usually offer standard licensing terms to licensees who are not members of the pool. In

addition, the typical patent pool allocates a portion of the licensing fees to each member according to a pre-set formula or procedure.

In both copyright collectives and patent pools, rightholders combine farflung property rights into useable bundles, overcoming the tragedy of the anticommons while preserving the incentives that come with these rights. In basic terms, the optimists assume nothing more than that conventional economic principles apply. With “gains from trade” to be had, the parties figure out a deal that makes everyone better off. (Even pessimists concede this will often be true.)²⁷ The only twist is a nod in the direction of transaction cost economics: for optimists, an institution creates a mechanism that lowers the average cost of transactions enough to make ongoing exchange worthwhile. In terms of traditional entitlements theory, this amounts to no more than a large helping of Coase, with a serving of Ellickson on the side.

The preceding, and in particular the optimist-pessimist terminology, implies that rival theorists differ only in the attitudes they bring to their studies. This is not really so. The theories do interpret things differently. But more importantly, at least to date, they *interpret different things*. Anticommons theory as applied to IPRs has concentrated on patents for short gene sequences. These are held by numerous entities that are both farflung and (for the most part) small. Their value, furthermore, is as yet highly uncertain. In many cases researchers do not yet know if a particular gene corresponds to (or “codes for”) anything useful, let alone a highly valuable protein product. But anticommons theorists believe that *when* a gene is found to be valuable, it may be devilishly difficult for

scattered, self-interested rightholders to agree on an effective multilateral licensing scheme. In the worst case, patients may be deprived of therapies that might help.

The optimists have not for the most part studied the gene fragment “business,” which in any case is still forming. They have instead concentrated on two types of industries: (1) established, technology-intensive industries, where the lineup of players is fairly stable, technological complementarities are common, and patent pools are a familiar sight on the industrial landscape; and (2) industries where IPR-producers are widely scattered but buyers need to buy in bulk, which creates demand for large *packages* of IPRs – music collectives (such as ASCAP) being the classic example. In the first case, firms organize patent pools to regularize frequent interactions. In the second, IPR holders create collectives such as ASCAP to bundle individual rights into more marketable packages.

Only recently has property rights scholarship honed in on the importance of transactions. And with so few data points, it is too early to decide on a general rule of pessimism or optimism. (We do know that each seems right in at least some cases so far.) We must begin to collect a list of factors that typically accompany anticommons tragedies, on the one hand, and institution-forming successes on the other. (This Chapter’s Conclusion takes a tentative step in this direction.)

2. IPRs and Property-Liability Rule Theory

For a transaction cost optimist, collective organizations such as ASCAP and patent pools are fascinating and instructive. They reveal what brings individual rightholders together to resolve transactional bottlenecks. Soon after coming together, one of the first

things they do is to settle two issues of valuation: the rates licensees will pay for access to the entire pool; and rules for dividing the spoils among the pool's members. In the case of licensing rates, the price(s) are the same for all takers, or at least for all licensees of similar size.²⁸ Through their collectively-determined prices, these institutions operate in much the same way as a compulsory license.²⁹ Essentially all comers are welcome to use the right(s), so long as they pay the pre-established price.

Of course, there is one major difference between private collectives and conventional, statutory compulsory licenses: in these organizations, the members, and not Congress or a court, set the price. This almost always involves extensive negotiations; sometimes, ongoing adjustments are carried out via a permanent administrative structure. The point is, however, that the collective organizations present a simple, coherent menu of prices and other terms to licensees – and that they do so after extensive internal consultation.

Group action like this is interesting not only for its internal dynamics, however. It also sheds light on a discussion central to entitlement theory, which is known as the Calabresi-Melamed Framework. The essence of this Framework is this: Calabresi and Melamed assign all legal entitlements to one of two rules, “property rules” and “liability rules.” The former are best described as “absolute permission rules”: one cannot take these entitlements without prior permission of the owner. The rightholder, acting individually, thus sets the price. Most real estate fits this description.

By contrast, liability rules are best described as “take now, pay later.” They allow for non-owners to take the entitlement without permission of the owner, so long as they

adequately compensate the owner later. In the Calabresi-Melamed Framework, ex post adequate compensation is deemed “collective valuation.” And in their examples, it is always a court that performs the valuation. The government’s power of eminent domain – where a state agency takes property, and a court determines the fair price for it – is the classic example of a liability rule. As another example, parties to a contract are usually said to possess this sort of right; they can breach the contract if they like, so long as they pay damages after the fact (ex post) sufficient, in the eyes of a court, to compensate the other party for the breach.

The organizations studied in this Chapter present what might seem a paradox in light of the literature on entitlements: they produce what look like liability rules to users, but they are based on IPRs – quintessential property rule entitlements.³⁰

It is not a paradox, however; and it is certainly not coincidence. The gist of my argument is that the high costs of repeat contracting – both among members, and between members and users – drive the rightholders to pool their property rights in a collective organization. The relatively uniform terms offered by this organization then lower the costs of exchange with users. At the same time, the organization’s internal rules for dividing up royalties save on member-to-member transaction costs. Rightholders establish these organizations in response to high transaction costs. In other words, property rule entitlements engender a liability rule-like regime based on private, though collective, determinations of economic value.

The organizations I study here therefore contribute the following important insight: they show that valuation of an entitlement can occur not just at the levels of the

individual, on the one hand, or the government, on the other, but also on the level of a private collective organization. These institutions are intermediate forums for the valuation of entitlements. Because these organizations offer a fixed menu of terms to all comers, and because the menu is determined by the members and not the government, I call them “private liability rule” organizations. Similarly, I call the process of creating them “contracting into liability rules,” because the contracting parties start with property rule entitlements, and wind up subject to a collectively-determined liability rule.

3. The Effects of Lower Enforcement Costs

The decision to found or join collective IPR institutions turns on exchange and enforcement costs. If the institution lowers the cost of exchange and enforcement, it makes sense to join. If not, it is better for each rightholder to stick to private enforcement.

Although economic theorizing about the choice of enforcement methods is still in its infancy, one model of this choice deserves mention here. Thrainn Eggertson, summarizing a field study and associated model by B.C. Field,³¹ makes the insightful observation that institutions can substitute for private property rights.³² Where a collective institution lowers the cost of excluding trespassers (or infringers), it can be used to augment private enforcement of property rights. Field’s model relates to decisions regarding the optimal parcel size for real property holdings by members of a community. He is concerned with showing that, where community members must police against damage from trespassers, efficiency is not necessarily served by small parcel sizes. (This is so even though, for well-understood reasons, small parcel size is associated with

significant advantages.) It makes sense, under certain circumstances, for individuals to in a sense cede some property rights to the community, in the form of sharing in larger parcels rather than owning smaller ones outright. In some cases this creates efficiencies in the enforcement against trespassers. Hence overall efficiency – taking into account one transaction cost, the cost of enforcement – is improved.

Models such as this help explain some features of IPR institutions. Firms in an industry are faced with the decision whether to rely on individual rights to exclude infringers or pool rights in a collective organization. They trade off enforcement costs associated with individual rights against the costs of founding and participating in the institution. Although joining such an institution involves ceding some individual control, it may lower costs overall. If so, firms will decide to join.

II. Emergence of Exchange Institutions in the Presence of Property Rights - Patent Pools

As an illustration of unadorned private liability rules, few institutions compare to the patent pool. Multiple patent holders assign or license their individual rights to a central entity, which in turn exploits the collective rights by licensing, manufacturing, or both. In addition, and most importantly, the pool regularizes the *valuation* of individual patents – making, as the Supreme Court put it, “a division of royalties according to the value attributed by the parties to their respective patent claims”³³

Patent pools, like collective rights organizations in copyright, thus serve to regularize technology transactions. Indeed, at least one court has noted the similarity

between ASCAP and patent pools.³⁴ Like ASCAP, their basic economic rationale is that they significantly reduce the transaction costs of exchanging rights when compared to a series of one-shot licensing deals. When they are not being used as a cover for a cartel,³⁵ they add significantly to the efficient operation of the patent system,³⁶ as many industries have discovered over time.³⁷

In many cases, pools are creatures of necessity. For example, where different firms hold patents on the basic building blocks of the industry's products, they will have to cross-license to produce at all.³⁸ This was the case, for example, with the aircraft industry in the early days of the twentieth century, and with sewing machines.³⁹ And it applies with equal force to the standards-driven industries of today, for example, in the manufacture of various types of digital media products (see below). Even where no single patent or set of patents is essential, however, firms in an industry often find that they engage in such frequent negotiations that a regularized institution with formal rules, or even general guidelines, is helpful in reducing transaction costs. An example of a pool such as this is the one formed by the early shoe machinery industry.⁴⁰ The economic literature on institutions explains this quite well; repeat-play makes it easier to reach agreement on any particular issue, because disparities tend to balance out over many transactions.

Patent pools function according to liability rules. Typically firms are required to license into the pool all patents covering technology of use in the industry.⁴¹ In exchange, pool members are permitted to use any other member's technology. Sometimes the cross-licensing is royalty-free, as with the great bulk of automobile patents in the auto industry pool. In other cases, members must pay licensing fees. Often these fees are calibrated to

reflect the significance of the technology being licensed; for administrative convenience, the technology in the pool is usually divided into several broad classes.⁴² The first licensing pool, among members of the sewing machine industry beginning in 1856, operated under these sorts of rules, as have many others including the aircraft and automobile pools.⁴³

All patent pools share one fundamental characteristic: they provide a regularized transactional mechanism in place of the statutory property rule baseline which requires an individual bargain for each transaction. In most other respects, however, they vary all over the lot. They range from huge industry-wide institutions with dozens of members, and encompassing hundreds of patents, to relatively simple arrangements that look like nothing more than multilateral relational contracts. Although at the latter extreme they border on terrain outside the scope of this paper – being not so much liability *rules* as elaborate installment contracts – the larger pools are plainly the sort of large-scale private institutions at the heart of our enterprise. So we begin with them.

A. Mega Pools

The most well-documented industry-wide pools arose in the automobile and aircraft industries around the turn of the twentieth century. In these cases representatives of the various members participate in the valuation of the patented technology. Each licensee of pooled technology is charged a royalty that is agreed upon by the pool committee.⁴⁴ This basic structure appears in pools covering not only autos and aircraft, but also sewing machines, bathtubs, door parts, seeded raisins, coaster brakes, and a variety of other technologies.⁴⁵

The rationale for pools with these more sophisticated administrative structures is well described in this passage from the 1935 Congressional patent pooling hearings:

These various institutions have differed materially in the type of organization created by the agreements. Perhaps the loosest of all is the automobile manufacturers agreement, and obvious [sic] the most severe restrictions are imposed where the patents pass into the hands of a single owner, yet all these agreements have in common the principle that *within the industry, the individual monopoly created by patents is abolished in the form it is provided by statute and a different system is substituted more in harmony with the needs of that industry.*

[I]n the airplane cross-licensing agreement, after completely abolishing the monopoly of the individual inventor and opening every patent to every member of the association, it provides that a board of arbitrators may decide in any case what reward should be paid to individual patent owners and this is based not upon the official determination of patentability by the Patent Office, but upon *the unofficial determination of the importance of the invention by a board of arbitrators.*⁴⁶

Actually, not all patent licensing requests were “arbitrated” under the aircraft pool. In its earliest incarnation, the pool’s chief functions were to eliminate ruinous litigation and divide royalties on patents existing at the time of the pool’s formation according to a set formula.⁴⁷ Apart from the “foundational” patents of Glenn Curtiss and the Wright Brothers, which earned millions of dollars in royalties for their holders under the pooling agreement,⁴⁸ most licensing was conducted on a royalty-free basis, with mutual forbearance from infringement suits as the real payment for the exchange.⁴⁹

Patents added to the pool after its formation were divided into two classes. Normal patents were licensed into the pool for all to use, with no special royalty payout going to the inventor or firm.⁵⁰ Exceptional patents did earn ongoing royalties, in an amount determined by a formal arbitration procedure; under the original contract creating the pool, known as the Manufacturers Aircraft Association (MAA), members agreed:

To submit claims for compensation in respect to airplane patents or patent rights hereafter acquired to a board of arbitrators consisting of one member appointed by the board of directors of the Association (Inc.), another by the subscriber making the claim, and a third by the other two, who shall determine the total amount of compensation, if any, to be paid for the same, and the rate of royalty to be paid toward such compensation by any subscriber desiring to take a license under such patent. (Art. V, pp. 4-5.)

To waive all claims as against each other for infringements prior to July 1, 1917 (Art. XIV, p. 13); to make various reports and to keep various accounts, etc.⁵¹

Since compensation requests were in practice limited to exceptional patents,⁵² arbitrated valuations were by definition rare.⁵³ This two-tiered approach to valuation is of course quite rough; but the repeat-play nature of exchange under the terms of the pool tended to smooth out any discrepancies in the parties' valuation in an individual transaction.⁵⁴ The general sense seemed to be that although one member might make out well on one technology – e.g., by getting free access to a very valuable invention – the member on the short end of the deal would make up the difference in future transactions. Some measure of the transaction cost savings engendered by the pool may be reflected in the fact that the major patent holders, Wright and Curtiss, lowered the royalty they were receiving before formation of the pool.⁵⁵

From the point of view of internal dynamics and administration, the MAA looked surprisingly like ASCAP; voting was weighted by the economic value of the patents contributed by the founding members. According to the Attorney General's report clearing the MAA of antitrust problems,

If all the manufacturers had been given equal voice in the Association (Inc.) the smaller manufacturers together would have been enabled to control the Association (Inc.), to wit, the agent of the parties in whose responsibility and vigilance the Wright-Martin and Curtiss corporations are so vitally interested. This

conflict of interest accounts for the adoption of the voting trust agreement under which the Wright-Martin and Curtiss corporations named one trustee, the smaller manufacturers another trustee, and a party not favorable to either interest, namely, a member of the Advisory Committee, was selected for the third trustee.⁵⁶

A corresponding governance structure, weighted to reflect the respective patent holdings of the founding members, was built into the auto industry patent pool when it was formed in the early twentieth century.⁵⁷ But the similarities do not stop there: the two institutions also shared a massive scale (the auto pool had 79 members and 350 patents when formed, and over 200 members and 1,000 patents in 1932);⁵⁸ a two-tiered patent classification scheme;⁵⁹ an arbitration procedure for exceptional patents;⁶⁰ and an institutionalized end to ubiquitous litigation.⁶¹

As with the MAA, most members seemed content to rely on the blanket, royalty-free cross-licensing that was also available under the pool.⁶² What arbitration there was took place in a committee of knowledgeable industry participants.⁶³ The arrangement was lauded far and wide as a success, even by no less an opponent of the patent system as Walton Hamilton.⁶⁴

In fact, Hamilton spoke of the success of the automobile pool as proof of the creaky substructure of the patent system. “A heterodox chapter,” he concluded, “challenges the whole theology of the patent system.”⁶⁵ It was as if the need to reconstitute the property rights by contract – the need to create an administrative apparatus to deal with the rights – proved the irrelevance or inadequacy of those rights.

But the thrust of this section of the paper is to read the institution of patent pools as a sign of success, not failure. Without the property rights – backed by the threat of

production-choking injunctions – the advantages conveyed by the pool would never have been realized. And note: those advantages extended far beyond a cessation of patent hostilities. They included the institutionalized exchange of all manner of *unpatented* technical information,⁶⁶ and the creation of a framework for the crucial task of standardizing sizes and configurations for car parts.⁶⁷ All this followed from the industry’s establishment of the contractual liability rule, or institution. A recognition of these advantages lies behind the language of a Congressional report on patent pools from 1935:

Each of these [patent pooling] agreements therefore represents the perhaps unformulated, but nonetheless definite and considered judgment of the leaders in that industry that it cannot exist under the patent law in the form in which that law was designed, and that progress demands a substitution for the law as created by statute and *the substitution of a new system of law by contract*.⁶⁸

It is hard to improve on this formulation: patent pools as a form of contractual governance that “*substitutes*” for life under property rule entitlements, i.e., for “patent law in the form in which that law was designed.”

B. Small, Contract-based Pools

Once we begin looking at patent pools as contractual substitutes for statutory entitlements, we can expand our field of vision beyond the auto and aircraft “mega-pools.” At that point a host of smaller, more modest pools, targeted at specific industry sectors or technologies, come into view. Besides the great diversity in organizational forms, what is striking about these prosaic pools is that each one, regardless of the particular industry or the scale of the institution, embraces the twofold principle of their larger cousins: (1) consolidate property rights in a central entity (i.e., the contract); and (2) establish a

valuation mechanism – often a simple formula – to divide up the royalty stream. Most small-scale pools are often nothing more than multilateral contracts incorporating these two basic elements.⁶⁹

Before examining small-scale pools in depth, we must return to a distinction first raised in the Introduction to this paper. Smaller, technology-specific pools might seem to lack the kind of complex administrative structure present in the larger pools we have discussed. One might even question how a simple contract can create a true liability *rule*, since this term seems to imply a legal regime that applies uniformly to anyone who might take or use a legal entitlement.

Typically, we would associate a liability rule with a more formalized administrative structure formed as an association of many rightholders. This separate entity typically offers a bundle of its members' property rights to all comers – just as in the simple licensing agreement just described. In addition, members grant the entity the power to add new property rights to the bundle licensed to customers, and in some cases to remove others found no longer necessary to making the relevant product; to restructure royalty payments accordingly; and in some cases to settle disputes among members about which property rights to include, and the value of respective members' rights (and hence royalty payments). The formal administrative entity created to deal with these problems is at the heart of a “private liability rule” system. Members cede to this entity some of the decisional rights they obtain when the state grants them property rights. They in turn are bound to at least some degree by the organization's administrative decisions. Each property owner grants to the central entity the power to allow other members of the

organization to use those property rights. The entity grants to sublicensees and customers – to all comers, typically – similarly open-ended rights. And each member gives the central entity power to modify the terms on which the members deal with each other, as well as the power to determine (or adjust) royalty rates charged to sublicensees and customers. Such an entity brings about a true liability *rule* as that term is used in the foundational entitlement literature: acting as a group, rather than an individual, it sets a pre-determined price for an entitlement.⁷⁰

With this in mind, we might sensibly distinguish between small-scale, bilateral contracts and large-scale institutions. The problem with this approach is that the two are not all that different to start with in some respects, and what differences there are often blur over time. This occurs because large patent pools -- those that spawn freestanding administrative entities -- often begin life as humble contracts. This happens by a sort of natural growth process: recall ASCAP with its nine founding members, and the auto pool, formed around a single, pioneering patent. Because the large oaks of formal institutions often grow from the small acorns of bilateral contract, we must often look for the roots of true liability rule institutions in simple contracts.

To take one example, noteworthy simply because of its simplicity, consider a pooling agreement drawn from the davenport bed industry of the 1930s:⁷¹

On November 3, 1916, a written agreement was entered into between the owners of . . . various patents [pertaining to folding davenport beds and similar devices], which provided for the granting of an exclusive license to the Seng Company . . . to manufacture and sell under all of said pooled patents, the specified royalties to be divided in stated proportions among the parties to said agreement. Of the total amount of said royalties, 33 per cent was allotted to the Pullman Couch Company . . . The license contract of November 3, 1916, was signed by the Davoplane Bed

Company and also by the Pullman Couch Company, as well as by [two inventors], individually. The Pullman Couch Company “submitted” 13 patents to be controlled by the pool agreement, including two of the Bostrom patents, and the Davoplane Bed Company “submitted” 7 patents, including one of the Bostrom patents. [An individual inventor] likewise “submitted” one patent.⁷²

This simple contract integrated at least three transactions that would otherwise have been negotiated separately. More importantly, it translated the contribution of each of the three patent holders into a precise percentage of the royalty stream.⁷³ The pool’s exclusive licensee, the Seng Company, paid a fixed percentage to one entity (the pool) in assembling the “patent inputs” required to manufacture a state of the art davenport bed.⁷⁴ Pool members then split the royalty according to the formula in the pooling agreement.⁷⁵ Thus did the patentees substitute a collective contractual framework for individually-bargained transactions.⁷⁶

This is by no means an unusual arrangement; a host of cases reveals similar contract-based pools in industries ranging from movie projectors (Edison’s famous “Motion Picture Patents Corporation”)⁷⁷ and hydraulic pumps⁷⁸ to swimming pool cleaners⁷⁹ and synthetic polypropylene fiber production.⁸⁰ In the davenport bed pool, and all the pools described in these sources, the simple administrative – i.e., contractual – structure ought not to divert attention from the significant conservation of transaction costs.

Despite differences in complexity and scale, these simple patent pools share several important features with the “mega-pools” for autos and aircraft studied earlier: expert valuation (in the form of negotiated royalty splits); a centralized transactional mechanism; and one-stop licensing for the non-member licensees. Surely the negotiated valuation of

intellectual property rights that is the essence of these contractual pools differs substantially from a true “collective valuation” mechanism as suggested by the term “liability rule.” Hence small-scale pools cannot realistically be deemed private “liability rules.” Yet even though they do not represent a fundamental reconfiguration or transformation of entitlements, they are worth studying because of the features they share with true, full-blooded private liability rule systems.

As we have seen, the chief characteristic of small-scale, contractual patent pools is that they regularize a set of transactions and thereby reduce transaction costs. To be sure, regularizing transactions does not eliminate entirely all sources of high transaction costs in exchanging patents. The historical record shows pool members negotiating at length, usually over the valuation of particularly important patents. The extensive cross-licensing agreement between DuPont and Imperial Chemical Industries (ICI) of Great Britain, which resembled a pool in complexity due to the magnitude of each firm’s chemical research efforts, provides several examples.⁸¹ Although the agreement lasted for more than ten years, there were disputes over an implicit contractual arrangement whereby certain “exceptional” inventions were placed outside the licensing framework created by the agreement.⁸² For these inventions – which included nylon and neoprene for DuPont, and polyethylene for ICI – the originating firm kept exclusive rights. According to an authoritative history of DuPont, this caused serious friction during the term of the agreement.⁸³ And there is evidence from a case involving another pool that, as one might predict, pool members act strategically in an effort to maximize their share of the pool’s revenues.⁸⁴

Even apart from the continuing transaction costs attendant on operation of a pool, the costs of initially negotiating a pooling agreement will often be steep. These are a product of (1) differing assessments of the technological merits of the contributions of the members of the pool; (2) private information held by each member concerning the precise characteristics of the technology and the details of the patent position (all relevant prior art, etc.), and (3) strategic bargaining possibilities created by the negotiations over the potentially large “pooling surplus” that may result from the creation of the pool.⁸⁵ The fact that pools have arisen so often in the past despite these costs says a great deal about the cost *savings* firms expect from these institutions. The lengthy negotiations between firms trying to create a single DVD pool, and ultimately the dual pools that formed, serve as a modern reminder.

It is also worth noting that some pools have been formed only with the help of a “visible hand” to overcome the collective action problem inherent in group bargaining. In several cases where technology useful to the military was not being developed because of a logjam of conflicting property rights, the lurking threat of the eminent domain power contributed to the formation of patent pools.⁸⁶ In at least one case, a long-term industry patent pool was formed in the wake of the government’s forced licensing; this pool itself embodied an interesting governance structure built on an industry-wide practice of technology exchange through IPR licensing.⁸⁷ The emergence of these pools suggests an interesting avenue for future government policy: encouraging firms to contract around their patents as an alternative to more forceful government intervention, e.g., a compulsory licensing scheme.

C. Recent Pools in Consumer Electronics: MPEG-2 and DVD

Recently, a number of companies have joined together to form patent pools encompassing various aspects of digital media used in consumer electronics products. The MPEG-2 pool, covering patents on data compression technology, came first in 1995; followed by a pair of related pools concerning Digital Versatile Discs (DVDs). The Antitrust Division of the Department of Justice has finalized and approved all three pools in business review letters. The MPEG-2 pool and the DVD patent pools illustrate an important recent variant on the themes discussed in this section and will be described in detail. These pools join together some features of both the mega-pools and the simpler, contract-based pools. They thus represent an interesting new breed of patent pool: they are less comprehensive than the “mega-pools,” since they are concerned only with one technology, rather than *all* patents in an industry. Yet they are more substantial than pools based on simple cross-licenses, because they include various adjustment mechanisms, most importantly for adding new patents and recalibrating royalty shares. Most importantly, they carry forward crucial features of pools from the past, and thus continue to demonstrate the viability of private institutional solutions to the transaction costs imposed by widespread patent blockages in established industries.

1. MPEG-2

The MPEG-2 pool began as an agreement among nine patent holders⁸⁸ to combine 27 patents that are needed to meet an international standard known as MPEG-2 video compression technology. The Moving Picture Experts Group of the International

Standards Organisation (ISO) and the International Electrotechnical Commission established the MPEG-II standard in 1995.⁸⁹ The pool was an outgrowth of the creation of this standard. Under the pooling agreement, the patent holders all license their MPEG-2 patents to a central administrative entity known as MPEG LA, based in Denver. MPEG LA is essentially a licensing agent; it administers the pool on behalf of the members. MPEG LA licenses the group's patent portfolio to third parties who will manufacture products to meet the MPEG-2 standard. Like many pools, the MPEG group has grown: it now includes 14 patent holders and 56 essential patents.⁹⁰

The MPEG-2 pool reflects many of the essential features of the mega-pools of yesteryear:

- “One-stop shopping” for patent/technology inputs into manufacturing processes;⁹¹
- An institutional structure reflecting weighted representation among patentees;
- Expert administrative valuation procedures for (1) determining royalty splits among members and (2) “blanket” licensing charges to licensees;
- A negotiation framework for determining whether new technologies merit addition to the pool; and
- A pre-agreed procedure for settling disputes.

In every sense, MPEG LA is an institution, as opposed to a simple one-time transfer of rights. It has a governance structure and a set of internal rules (codified in a formal “charter”⁹²). Most importantly from the point of view of the framework described here and in my 1996 *California Law Review* article, there is a permanent administrative procedure for evaluating new technologies. The pool is charged with determining whether new patented technologies are appropriate for inclusion in the pool.⁹³ (To give some sense

of the complexity involved, the MPEG lawyers began by studying over 8,000 patent abstracts, owned by over 100 companies and inventors; narrowed the field to 800 patents, and eventually identified the 27 Essential Patents, most of which also have foreign counterparts.)⁹⁴ New patents are being added all the time as they are being granted by patent offices around the world.⁹⁵ There is also a mechanism for recalibrating the internal royalty split among members in light of the new technology when a new patent is included in the pool.⁹⁶ This is an example of an internal “liability rule,” i.e., a set of rules and norms for determining the value of a new, patented technology. The administrative structure of the pool substitutes technical expertise by the members (and the pool’s staff) for that of the courts. This effectively converts members’ property rights from “property rule” entitlements to administratively-determined liability rule entitlements.

Like the older mega-pools, the MPEG-2 pool separates patents into different classes, to ease administration. The backbone of the organization is what the charter calls “Essential Patents”: the basic complementary technologies that in effect comprise the MPEG-2 standard. The charter also recognizes another type of patented technology, which it calls “Related Patents.” These are technologies that implement, build on, or employ the MPEG-2 standard in electronic components, software, and the like.⁹⁷ Related Patents are classic improvement patents: technologies embodying them would infringe the MPEG-2 standard if unlicensed, but they add value in some way, for example, by applying MPEG-2 in a new electronic device or application (such as, apparently, the internet).

As a mechanism for integrating Related Patents into the pool, the MPEG-2 pool has some novel features. The charter allows individual MPEG-2 members to “opt out” of

the pool with respect to a single licensee. The purpose of this provision, called “Partial Termination,” is to provide bargaining leverage to an MPEG-2 member that is negotiating for a license to a complementary patent held by an MPEG-2 licensee. Any MPEG-2 member thus can partially terminate when the licensee has (a) brought a lawsuit or other proceeding against the MPEG-2 Licensor for infringement of a licensee patent and (b) refused to grant the MPEG-2 Licensor a license under that patent on “fair and reasonable terms and conditions.”⁹⁸

The role of the partial termination right in encouraging patent right integration is explained in the Department of Justice Review Letter that cleared the pool of antitrust concerns (discussed in more detail below):

[T]he partial termination right may have procompetitive effects to the extent that it functions as a nonexclusive grantback requirement on licensees’ Related Patents. It could allow Licensors and licensees to share the risk and rewards of supporting and improving the MPEG-2 standard by enabling Licensors to capture some of the value they have added to licensees’ Related Patents by creating and licensing the Portfolio. In effect, the partial termination right may enable Licensors to realize greater returns on the Portfolio license from the licensees that enjoy greater benefits from the license, while maintaining the Portfolio royalty at a level low enough to attract licensees that may value it less. This in turn could lead to more efficient exploitation of the Portfolio technology.⁹⁹

The Department of Justice concluded that the partial-termination clause appeared unlikely to be anticompetitive because of the “potentially significant procompetitive effects and the limited potential harm it poses to Portfolio licensees’ incentives to innovate.”¹⁰⁰

2. DVD

A DVD is a high volume digital storage medium said to be the successor to Compact Disc (CD) technology. DVD discs can hold more than seven times as much data as CD's. The market for DVD hardware and software is projected to be worth more than \$28 billion by 2001.¹⁰¹ As with MPEG-2, a multi-firm standards group declared a standard for DVD technology. Also as with MPEG-2, multiple firms hold important patents on the elements of this standard. In late 1995, it was reported that four "core" DVD¹⁰² developers of a ten-member DVD consortium would enter into a patent pooling agreement to administer the licensing of DVD patents.¹⁰³ The core members, Philips, Sony, Matsushita and Toshiba, reportedly extended an open invitation to secondary patent holders claiming rights to DVD-related patents.¹⁰⁴

In August, 1996, after a period of failed negotiations among the core consortium members, Sony and Philips announced that they would form their own DVD pool, with Philips to be the licensor.¹⁰⁵ Philips stated that "[t]here were so many differences of opinion that we could not wait for these to be settled."¹⁰⁶ Pioneer Electronics subsequently joined this three-firm pool. Six months later, Hitachi, Matsushita, Mitsubishi, Time Warner, Toshiba and JVC formed their own patent pool. Industry analysts warned that without a single, unitary pool, the price of DVD technology would increase since a piecemeal licensing system would push the cost of the technology higher.¹⁰⁷ One industry analyst reported that "[t]he hope within the industry had been that [through a patent pool] 'everyone would take a little less for the common good.'"¹⁰⁸

The Department of Justice recently cleared both DVD patent pools. The Sony, Philips and Pioneer pool received its clearance in December 1998. Even though the

formation of these separate patent pools precluded the opportunity for a one-stop-shop for DVD licensing, the Antitrust Division recognized that the patent pools would at least reduce DVD-related transaction costs. Now companies that want to manufacture DVD discs or equipment have only to deal with these two pools, instead of the ten separate firms that formed them. The Division reached similar conclusions after reviewing the arrangements of the two pools: “[I]t appears that the proposed arrangement is likely to combine complementary patent rights, thereby lowering the costs of manufacturers that need access to them in order to produce discs, players and decoders in conformity with the DVD-Video and DVD-ROM formats.”¹⁰⁹

The story of the DVD patent pool is revealing. First, it provides a clear example of the relationship between standard-setting and patent pools. As with MPEG-2, the DVD pools grew out of industry standard-setting organizations. In some instances companies participating in standard-setting are required to agree in advance to license any patents essential to the standard on “a fair and nondiscriminatory basis on reasonable” terms.¹¹⁰ Even where there is no formal requirement along these lines, past practice exerts a powerful influence: having seen standards coalesce into pools, consumer electronics companies may simply expect this as the natural progression. It might not be stretching things to say that this industry is characterized by a norm of standard-setting, and then pooling. In any event, as a practical matter they often go hand in hand.

So in the normal course of events, firms begin to move toward standard-setting and pool formation when they recognize patent blockages in a promising new technology. The next step is to address the issues identified by anticommons theory: strategic behavior

and cognitive bias. Pool organizers employ a number of tactics to minimize the threat of strategic behavior. One is to hire an independent patent expert to evaluate the patents of the various aspiring pool members. For example, the owners of the patents in the MPEG-2 Patent Portfolio employed an independent patent expert to identify the essential patents to be included in the portfolio.¹¹¹ The DVD patent owners also retained patent experts to perform similar reviews in the separate patent pools.¹¹² Indeed, the DVD pools call for *standing* experts to perform periodic evaluations of prospective new patents for the pool.¹¹³

Presumably one reason for hiring an independent patent expert is to prevent strategic posturing. Independent review puts limits on bargaining. A company will find it difficult to argue that its technology is the key to the standard, and thus deserves the lion's share of pool revenue, if the independent expert finds otherwise. Independent experts also presumably cut down on the impact of the parties' "cognitive biases." A second opinion, particularly from a disinterested agent of the (presumably) neutral patent pool organization, is likely to be a powerful corrective to an intransigent pool member adamant about the importance of its contributions to the pool. It is no coincidence, for example, that the independent expert hired by one of the two DVD pools is required to be an expert in DVD technology.

Another technique for limiting strategic behavior is aimed at licensees. Pool members understand that the licensee-manufacturers have a strong incentive to acquire patents that cover one or more features of the standard. A licensee of the pool that happened to have a patent application covering some aspect of the technology pending

when the standard was announced might acquire such a patent, for instance. Such a patent, which would by definition be necessary for lawful use of the standard, are called “Essential Patents.” A calculating licensee could use such a patent to extract concessions from the pool members, given that those members would have to license any new patents on “essential” features of the technology falling within the standard. The Review Letter for the Sony DVD pool describes the pool organizers’ response to just this threat:

The grantback provision is likely simply to bring other “essential” patents into the Portfolio, thereby limiting holdouts’ ability to exact a supracompetitive toll from Portfolio licensees and further lowering licensees’ costs in assembling the patent rights essential to their compliance with the Standard Specifications. While easing, though not altogether eliminating, the holdout problem¹¹⁴ the grantback should not create any disincentive among licensees to innovate.¹¹⁵

The MPEG-2 pool agreement contained a similar grantback provision. The grantback obliges licensees to make available to all pool participants an essential patent at a “fair and reasonable royalty.”¹¹⁶ A licensee firm thus cannot hold back its own essential patents and simultaneously benefit from the cost savings afforded by the portfolio license. Thus the parties see the grantback clause as a way to limit future opportunism. In terms of the theory described earlier, licensees must agree in advance to be bound by the grantback if they are to receive a license. Potential holdouts are prevented *ex ante*, by prior agreement of the parties.

The DVD pools also preempt similar bargaining issues among pool members. The Sony Review Letter speaks of a confidential royalty allocation formula among the pool members, and the Toshiba pool has a more elaborate set of “Ground Rules for Royalty Allocation.”¹¹⁷ The DVD pools thus have many characteristics of the older mega-pools.

Put succinctly, they are operational institutions whose core missions are to regularize the valuation of key manufacturing patents.

However, in the DVD case two pools formed. As with the oil field unitization studies by Gary Libecap discussed earlier in this Chapter, even though the parties all understood there would be significant gains from reaching agreement, they were unable to amicably split the “cooperative surplus.” Each entity among the group has its own agenda or strategy. Toshiba, for example, stated initially it did not want to commit unless all ten members of the consortium agreed.¹¹⁸ Other firms obviously had different agendas; thus the impasse that resulted in dual patent pools. The time and expense involved in negotiating such a patent pool are evident. Although industry participants realized that an efficient licensing mechanism might be necessary because many separate entities held essential patents, various differences caused the pooling effort to bog down.

To summarize, the DVD pools represent the continuation of the tradition of industry-wide institution formation as a response to patent bottlenecks. The standing expert review, grantback provisions, and “Ground Rules for Royalty Distribution” are all earmarks of an ongoing, functioning institution designed to overcome the inherent problems of valuing complementary patents.

The DVD pools show the continuing importance of a “visible hand” in helping to overcome collective action problems. In this case, it was the hand of the Department of Justice which motivated Sony and Philips to strike out on their own to form a pool. Sony and Philips felt the close scrutiny of the Department of Justice, which had investigated an earlier Sony-Philips pool in CD technology. In 1995, the Department of Justice reached a

settlement with Philips and Sony regarding their highly profitable CD patent pool.¹¹⁹ The result of the settlement was that Philips-Sony could no longer force licensees to take a blanket license of the entire CD patent pool portfolio; rather, companies were allowed to obtain licenses under individual patents or groups of selected patents.¹²⁰ Philips officials stated that formation of the Sony-Philips DVD pool was “necessary to avoid being ‘accused of illegal behavior,’ noting that U.S. law says [that] holders must make patents available on [a] nondiscriminatory basis.”¹²¹ In reference to the Department of Justice’s questioning of Philips, Philips responded “[w]e don’t want to have a collision with the Department of Justice.”¹²²

3. Other New Pools

Perhaps inspired by the successful founding of these pools, a spate of other technologies (including digital video broadcasting,¹²³ synthetic fibres,¹²⁴ flat panel speakers,¹²⁵ and next-generation dynamic RAM memory chips¹²⁶) have been gathered into patent pools in recent years. The ubiquity of patent pools on the industrial landscape demonstrates that this is an institutional mechanism capable of simplifying transactions in a wide variety of industries. As more and more IPRs are issued, potential transaction costs will grow as well, making pools even more important.

D. Quasi-Pools: A Positive Role for Patents as “Bargaining Chips”

Despite these occasional roadblocks, patent pools often do take shape; and when they do, as we have seen, they serve to collect a host of beneficial transactions under one

roof. But talk of these transactional advantages leads naturally to a further question: can *informal* exchange norms also serve to regularize exchange in an industry? To put it another way, if pools can sometimes “substitute” for property entitlements, and if simple contracts can sometimes take the place of pools, can informal exchange norms emerge that serve some of the same functions as actual contracts?

In the semiconductor, consumer electronics, and chemical industries patents have long been used as bargaining chips.¹²⁷ They facilitate technology trades, or at least settle or fend off infringement suits in a convenient way.¹²⁸ In other words, these industries have evolved a norm under which patents are used primarily as “currency” in cross-licensing.¹²⁹ In an operational sense, then, a loose “liability rule” exchange system prevails;¹³⁰ the legal right to exclude is rarely enforced fully, and firms therefore do not always seek permission of the rightholder first. Often they appear to go on about their business, sometimes infringing other firms’ patents in the process, with the intention of “settling up” later. Since industry members share a sense of the worth of individual patents, it is easy for firms to “trade off” infringement liabilities when they “settle up.” Remaining “balances” are then paid off in money damages. Indeed, firms share such an understanding of how the process works that they sometimes institutionalize the arrangement in advance by means of extensive cross-licensing agreements.

There are thus two key indicators that the operative norm at work in these industries deviates from the structure of the initial property rule: permission is not always sought first; and each firm agrees roughly on the value of individual patents. Perhaps this norm emerged because of economic forces in the industry such as rapid development and

mutually interdependent research efforts. Under certain circumstances it would be rational to systematically forego full enforcement of property rights, in exchange for reciprocal forbearance from competitors. In any event, these industries have developed exchange regimes based on property rule entitlements (patents) that have many earmarks of a well-functioning liability rule. Again, as we saw with both large-scale pools and their smaller, contract-based cousins, predictable expert valuation rules substitute for individuated arms-length bargains.

It is of course not incidental that informal norms, and the patent pools whose operation they emulate, appear to work when they are run by a close-knit group of experts with shared understandings of the technology, industry, and entitlements structure. These industries approximate the “close-knit” groups Ellickson elucidates so well.¹³¹

My positive account of industry cross-licensing norms contrasts with traditional descriptions. Some commentators, for instance, have argued that when patents serve only as bargaining chips they serve no useful purpose, except possibly to restrict entry into an industry.¹³² Others, while not condemning the practice outright, have appeared puzzled by this use of patents; it seems anomalous in light of accepted theories of patent protection, which emphasize the need for incentives to offset the public goods aspects of technology and the products that embody it.¹³³

III. Antitrust Review of Patent Pools

As the Antitrust Guidelines demonstrate, recent antitrust enforcement policy has begun to reflect the growing awareness that patent pooling can confer net social gains.

The burden of this Chapter is to describe how those gains come about, out of a background of strong property rights and high transaction costs. I have also tried to show that patent pools are in no sense unique – that, to the contrary, they are illustrative of a whole family of transactional institutions based around intellectual property rights. In so arguing, I have thus tried to connect this family to the larger study of economic institutions, of which it is undoubtedly a part.

The MPEG and DVD pools raised a number of important antitrust issues. Since anticompetitive activity represents the “dark side” pool formation, this section briefly addresses those issues.

Some MPEG-2 members were initially hesitant to form the pool because they feared that the royalty scheme would raise antitrust problems.¹³⁴ This concern highlights the continuing importance of antitrust issues on the formation of pools. Despite their apparent transactional advantages, patent pools – at least formal ones – were relatively rare from the 1940s until recently. It might be thought that this poses a challenge to the thesis that stronger IPRs encourage the formation of transactional mechanisms.

To the contrary, the explanation for the decline in patent pools can be found in government antitrust policy. Ever since myriad forms of interfirm cooperation were condemned in the “trust-busting era,”¹³⁵ firms have been reluctant to initiate industry-wide arrangements of every ilk, including pools.¹³⁶ Antitrust enforcement is a threat to a patent pool from three directions. First, government enforcement activity has often led to significant liability and operating restrictions under consent decrees.¹³⁷ Second, the threat of an antitrust suit by a licensee or would-be pool participant could put powerful

downward pressure on the pool's royalty prospects. Third, and perhaps most importantly, the threat of an antitrust suit by a *member* of the pool could be used to influence royalty or use negotiations. The threat of destabilizing intervention into the private ordering system could quite plausibly compromise the integrity of a pool's valuation procedures, thus undermining a major advantage of the pool arrangement. Given this multi-directional threat, even the latent (and, increasingly, historically distant) threat of government antitrust action appears to have been enough to make pool formation prohibitively risky.¹³⁸

To be fair, however, it is at least plausible that the declining popularity of patent pools owes its origins in part to the fact that most pools were in fact cartels, which are now more vigorously pursued by antitrust authorities.¹³⁹ Nevertheless, the relative scarcity of pools on the present landscape – especially given the increasing presence and strength of patents in many industries – suggests a classic case of excessive deterrence. Surely the optimal patent pooling policy is not completely *laissez faire*; but just as surely, it is not to discourage all pools. Although this is not the place to set out a complete test to determine the appropriate antitrust standard to apply, the tools do seem at hand to construct such a test. George Priest's 1977 article, stressing the degree of technological integration as the key indicia of a procompetitive pool, is certainly a good starting point.¹⁴⁰ To this might be added the thought that the determinations necessitated by the Priest approach are not at all unmanageable; they amount to no more than a large-scale application of standard tests for patent infringement.¹⁴¹ Where industry members are seen to pervasively infringe each other's patents, and where valuation and exchange mechanisms appear to serve no ulterior

purpose beyond setting compensation for these infringements, a real working pool is in effect.

At a minimum, pools which reduce the volume of licensing and lead to greater technological integration ought to be considered presumptively legal, whereas pools that do not add to interfirm technology adoption ought to be suspect. Surprisingly, though one might suppose that such a test would be difficult to administer, a quick review of the reported cases suggests otherwise. Perhaps fortuitously, the pools described in the caselaw seem to fall fairly readily on one side of the line or the other.¹⁴²

Although revising the antitrust test applied to patent pools would be a good start, we should go further. To bring about the full benefits of contractual liability rules in the patent sphere, it may actually make sense for the government to contribute to the formation of pools and other exchange mechanisms. European policymakers recently did just this with respect to CD-ROM patents.¹⁴³ One can imagine a similar effort in the U.S., for example a small group of technology exchange officers, perhaps working out of the Patent Office, whose function is to help bring together firms wishing to explore the possibility of pooling. Such an effort would also give the government a chance to prevent the most egregious misuses of pooling arrangements. At the very least, government policy should be neutral when an industry proposes the formation of a patent pool. The key to antitrust enforcement should be the bona fide efforts of people in the industry – including engineers and researchers – to value the technology administratively. Although court valuation is ineffective, as I have argued, court *oversight* of the institution charged with valuation ought to be tractable. Perhaps where it is not, where bona fide technology

valuation cannot be separated from cartelization, market division, and the like, pools should be restricted or abolished.

A series of papers by antitrust scholars Thomas Jorde and David Teece in recent years lend credence to these conclusions. Jorde and Teece argue in favor of liberal antitrust treatment of all manner of interfirm cooperation, including but by no means limited to joint ventures and “information sharing.” While they generate their predictions from a Schumpeterian-innovation framework, and couch them more in terms of antitrust policy, in broad terms we share the conclusion that policy ought to generally favor interfirm cooperation.¹⁴⁴

A. The Department of Justice’s New Outlook

Recent developments on the antitrust enforcement front show that Jorde and Teece are being heard. The potentially beneficial effects of patent pools are duly noted in the Department of Justice and Federal Trade Commission “Antitrust Guidelines for the Licensing of Intellectual Property,” issued in 1995.

Although the Guidelines state (not surprisingly) that the Department of Justice intends to maintain its vigil over the anticompetitive effects of patent pools (i.e., collective price or output restraints, price fixing, and market division), they also speak to the significant procompetitive benefits which patent pools may provide. In fact, the section on pools and cross-licensing begins:

Cross-licensing and pooling arrangements . . . may provide procompetitive benefits by integrating complementary technologies, reducing transaction costs, clearing blocking positions, and avoiding costly infringement litigation. By promoting the

dissemination of technology, cross-licensing and pooling arrangements are often procompetitive.

Additionally, in apparent response to its position that “[a]nother possible anticompetitive effect of pooling arrangements may occur if the arrangement deters or discourages participants from engaging in research and development, thus retarding innovation,” the Guidelines state that “such an arrangement can have procompetitive benefits, for example, by exploiting economies of scale and integrating complementary capabilities of the pool members, (including the clearing of blocking positions), and is likely to cause competitive problems only when the arrangement includes a large fraction of the potential research and development in an innovation market.”

The Guidelines’ section on patent pools ends by providing the following “safe-harbor”-like example:

Situation: [T]wo of the leading manufacturers of a consumer electronic product hold patents that cover alternative circuit designs for the product. The manufacturers assign several of their patents to a separate corporation wholly owned by the two firms. That corporation licenses the right to use the circuit designs to other consumer product manufacturers and establishes the license royalties. [T]he manufacturers assign to the separate corporation only patents that are blocking. None of the patents assigned to the corporation can be used without infringing a patent owned by the other firm.

Discussion: [T]he joint assignment of patent rights to the wholly owned corporation in this example does not adversely affect competition in the licensed technology among entities that would have been actual or likely potential competitors in the absence of the licensing arrangement. Moreover, the licensing arrangement is likely to have procompetitive benefits in the use of the technology. Because the manufacturers’ patents are blocking, the manufacturers are not in a horizontal relationship with respect to those patents. None of the patents can be used without the right to a patent owned by the other firm, so the patents are not substitutable. [T]he firms are horizontal competitors in the relevant goods market. In the absence of collateral restraints that would likely raise price or reduce output in the relevant goods market or in any other relevant antitrust market and that are

not reasonably related to an efficiency-enhancing integration of economic activity, the evaluating Agency would be unlikely to challenge this arrangement.

B. The MPEG-2 and DVD Review Letters

The Justice Department's approach is evidenced in its treatment of the MPEG-2 pool. The Antitrust Division of the Department of Justice issued a Business Review Letter approving this pool. The Division concluded:

Like many joint licensing arrangements, the agreements . . . for the licensing of MPEG-2 Essential Patents are likely to provide significant cost savings to Licensors and licensees alike, substantially reducing the time and expense that would otherwise be required to disseminate the rights to each MPEG-2 Essential Patent to each would-be licensee. Moreover, the proposed agreements that will govern the licensing arrangement have features designed to enhance the usual procompetitive effects and mitigate potential anticompetitive dangers.¹⁴⁵

The Antitrust Division first analyzed the patent pool in general. It highlighted the limitation of the Portfolio to "technically essential patents" as determined by an independent expert as a feature that "reduces the risk that the patent pool will be used to eliminate rivalry between potentially competing technologies."¹⁴⁶ The independent expert also plays a continuing role as an arbiter of essentiality when a new patent is submitted for inclusion in the portfolio. Patents adjudicated to be invalid or unenforceable will be deleted from the pool.

The division next analyzed whether the arrangement facilitated collusion and concluded that it did not. MPEG LA is prohibited from transmitting confidential information among the licensors and licensees. The division concluded that it appeared "highly unlikely that the royalty rate could be used during that period as a device to

coordinate the prices of downstream products” since the contemplated royalty rates would likely make up a tiny fraction of the prices of MPEG-2 products.¹⁴⁷

The Antitrust Division also found procompetitive the features concerning the use by and rights of the licensees:

The conditioning of licensee royalty liability on actual use of the Portfolio patents, the clearly stated freedom of licensees to develop and use alternative technologies, and the imposition of obligations on licensees’ own patent rights that do not vitiate licensees’ incentives to innovate, all serve to protect competition in the development and use of both improvements on, and alternatives to, MPEG-2 technology.¹⁴⁸

A law review article by DOJ staffers provides additional insight into how the Division viewed the MPEG-2 pool.¹⁴⁹ The article stresses the characterization of the horizontal, rather than vertical, structure of the pool. “The pooling arrangement promises to bring together complementary inputs (the 27 MPEG-2 patents), reduce double-marginalization problems and transaction costs (by creating a mechanism for one-stop shopping for most of the patents required to meet the MPEG-2 standard), and promote the dissemination of new technology.”¹⁵⁰ This characterization is based on the premise that the patents in the portfolio are essential to the implementation of the MPEG-2 standard and are complementary.

The DOJ staffers also emphasize the safeguards that render the MPEG-2 pool “unlikely to harm competition under a vertical theory—excluding or disadvantaging rivals or facilitating collusion.”¹⁵¹ The article points out several provisions of the arrangement that reduce the likelihood that the pool will anticompetitively disadvantage rivals:

First, the agreement commits the licensors to extend the portfolio license on nondiscriminatory terms to any party requesting a license. Second, no person was

prevented from submitting a patent for possible inclusion in the pool, and no person identified as having an essential patent was excluded from participation in the pool. Third, although MPEG LA only licenses the portfolio as a package, all of the pooled patents may be licensed from the pool members individually. This provides a “safety valve” against the pool being used to create a “two-level entry” problem.

Like the MPEG-2 pool, the Antitrust Division concluded that two recently-formed pools for DVD technology were not likely to be anticompetitive. Indeed, it would have been quite a surprise had Justice concluded otherwise, given the many similarities between the MPEG-2 and DVD pools. The pools for both include only essential patents – those required to implement a widely-accepted technological standard. Also in both, an independent patent expert determines “essentiality” on the basis of objective evaluation procedure. Both pools call for royalties that are small relative to the total costs of manufacture. In addition, licensing is nondiscriminatory, and individual licensees are free to strike deals with each patent holder. Finally, because of the structure and scope of the pool, innovation does not appear to be hampered.

C. Complementarity and Transaction Costs

The recently-approved pools will serve as a guide to action in other industries. But of course future pools will likely differ from MPEG-2 and DVD in at least some respects. Which features will be deemed “essential,” and how far may future pools vary yet still receive favorable treatment?

An exhaustive account of possible variations would be pointless. But one important variable is worth discussing. The two recent pools grew out of industry

standard-setting. While this is a common practice, not all technological blockages result from standards. Indeed, not all potential patent pools are the result of *strict* blockages. Should these pools be encouraged, too?

This comes down to a question of whether the transactional benefits of pooling outweigh the potential social costs. These costs, which would follow from the anticompetitive potential that follows from pooling, would likely take the form of restricted entry in the relevant industry, and ultimately higher consumer prices. Antitrust treatment of this issue would follow the Antitrust Guidelines cited earlier.

What economists call “strict complementarity” provides an appealing reason to approve a patent pool.¹⁵² In such a situation, none of the bargaining parties can realize *any* return on their assets in the absence of agreement. In such a case, the gains from cooperation are very large: in theory, *all* benefits of a given technology depend on agreement among the parties. But many times the patent landscape in an industry falls far short of strict complementarity. To take one example, assume there are two components that are essential for the proper functioning of a given product. Each of two firms holds a key patent on each of the components. Imagine it is possible for end-users to physically integrate the two components, but that it is much better if a manufacturer integrates the components into one marketable product. (Either it is cheaper to do so, or the resulting product works much better, or both.) In such a scenario, the patents are not strictly complementary. Both patentees can realize some economic gain by selling the components directly to end-users. But both can also realize much higher returns if they cross-license the patents and manufacture integrated products for sale to end-users.

What if the two firms in this scenario want to form a patent pool? I would argue that traditional “rule of reason” analysis ought to be applied during antitrust review. The gains from permitting integration ought to be weighed against the potential costs. And the same is true for the related case, where more than two manufacturers want to joint the pool. Specifically, as I have argued throughout this paper, antitrust authorities should recognize the potential for considerable savings in transaction costs that follow from industry-established transactional mechanisms. Thus some features of the recent MPEG-2 and DVD pools might be deemed essential. In particular, “open membership” and nonexclusive licensing (i.e., licensees’ right to take individual licenses from pool members outside the setting of the pool) are important mechanisms for preventing anticompetitive harm from pooling. But I would argue that strict complementarity, based on industry standards, should not be deemed essential to future pools.

IV. Conclusion

Patent pools continue to pose intriguing challenges to theorists of property rights. They challenge us to ask: should property rights be granted with some view toward post-grant transactions? And why are oil field unitization, Moscow retail property,¹⁵³ and perhaps gene fragment patents, different from established, technologically sophisticated industries? The three former cases exemplify an inability for multiple complementary rightholders to bargain to an effective solution, while the latter often develop an effective mechanism (the patent pool) to do just that. Why is that?

This is a young branch of theory, and we have as yet few data points. But a brief summary of transactional characteristics may be attempted. The idea is not to settle the debate, if such it is, but merely to take stock of what we know so far. In that spirit, consider the following table, which compares anticommons (Moscow store fronts, gene fragment patents), oil field unitization, and successful IP transaction institutions.

[Insert tablepool.wpd here]

The way forward from here is obvious. We need both more data, and more nuanced theory to account for it. And we also need a better understanding of when and how government policy can be brought to bear on these issues. For example, we are just beginning to see how patterns of post-grant transactions affect the economic impact of various property right entitlements. This will have obvious implications for our thinking about the proper contours of property right grants. At the same time, it is likely that in certain cases it will be very difficult or impossible to see far enough down the road to predict the post-grant landscape. In such cases, we must be sensitive to the need for rules and doctrines that permit the “visible hand” of government to prod or even force parties into transactions. This may be the only way to effectively reconcile a proliferating array of property rights with society’s need to assemble rights into useful bundles.

¹ Machlup, An Economic Review of the Patent System, Study No. 15 of the Subcomm. on Patents, Trademarks, and Copyrights of the Senate Comm. on the Judiciary, 85th Cong., 2d Sess. (1958) (economic overview of patent system as whole); Paul A. David, *Intellectual Property and the Panda's Thumb: Patents, Copyrights and Trade Secrets in Economic Theory and History*, in *Global Dimensions of Intellectual Property Rights in Science and Technology* 19 (Mitchel B. Wallerstein et al. eds., 1993).

² Machlup, *supra* note 1; William Nordhaus, *Invention, Growth and Welfare* (1969).

³ See Stephen Breyer, *The Uneasy Case For Copyright: A Study Of Copyright In Books, Photocopies, And Computer Programs*, 84 Harv. L. Rev. 281 (1970) for a summary of the older literature.

⁴ The phrase is from a letter from Thomas Jefferson. See XIII Writings of Thomas Jefferson (Andrew J. Lipscomb, ed., 1903), at 335.

⁵ See Kenneth J. Arrow, *Economic Welfare and the Allocation of Resources to Invention*, in *Essays in the Theory of Risk-Bearing* (1974), reprinted from Richard R. Nelson, ed., *The Rate and Direction of Inventive Activities* (NBER 1962).

⁶ See Robert P. Merges & Richard R. Nelson, *On the Complex Economics of Patent Scope*, 90 Colum. L. Rev. 839, 888-93 (1990) [hereinafter Merges & Nelson, *Patent Scope*]; Suzanne Scotchmer, *Standing on the Shoulders of Giants: Cumulative Research and the Patent Law*, 5 J. Econ. Persp. 29 (1991).

⁷ Michael A. Heller, *The Boundaries of Private Property*, 108 Yale L.J. 1163 (1999) [hereinafter Heller, *The Boundaries of Private Property*]; Michael A. Heller & Rebecca S. Eisenberg, *Can Patents Deter Innovation? The Anticommons in Biomedical Research*, 280 Science 698 (1998).

⁸ Michael A. Heller, *The Tragedy of the Anticommons: Property in the Transition from Marx to Markets*, 111 Harv. L. Rev. 621 (1998) [hereinafter Heller, *The Tragedy of the Anticommons*].

⁹ *Id.* at 674 (footnotes omitted):

If people hold multiple rights to exclude each other from a resource, they must incur the transaction costs of finding out with whom to negotiate. Despite the presence of transaction costs, people will be able in many cases to negotiate with each other to overcome an anticommons and put the property to more efficient use On the other hand, even if the number of parties and transaction costs are low, the resource still may not be efficiently used because of bargaining failures generated by holdouts, as sometimes seems to happen with Moscow storefronts.

Heller's references to "transaction costs" here and elsewhere reveal a tight connection with the economic theorizing of Oliver Williamson. *See, e.g.*, Oliver Williamson, *The Mechanisms of Governance* (1998); *The Economic Institutions of Capitalism* (1985).

¹⁰ Heller and Eisenberg, *supra* note 7.

¹¹ *Id.* at 699.

¹² *Id.*

¹³ Heller, *The Boundaries of Private Property*, *supra* note 7.

¹⁴ *Id.* at 1174-75.

¹⁵ Ronald Coase, *The Problem of Social Cost*, 3 J. L. & Econ. 1 (1960).

¹⁶ Harold Demsetz, *Toward a Theory of Property Rights*, 57 Am. Econ. Rev. 347 (1967).

¹⁷ Heller, *The Boundaries of Private Property*, *supra* note 7; Heller, *The Tragedy of the Anticommons*, *supra* note 8.

¹⁸ Heller and Eisenberg, *supra* note 7.

¹⁹ Guido Calabresi & A. Douglas Melamed, *Property Rules, Liability Rules, and Inalienability: One View of the Cathedral*, 85 Harv. L. Rev. 1089, 1092 (1972); Gary Libecap, *Contracting for Property Rights* (1989); Robert P. Merges, *Of Property Rules, Coase, and Intellectual Property*, 94 Colum. L. Rev. 2655 (1994) [hereinafter Merges, *Of Property Rules and Coase*].

²⁰ Heller, *The Tragedy of the Anticommons*, *supra* note 8, at 674.

²¹ Robert P. Merges, *Contracting into Liability Rules: Intellectual Property Rights and Collective Rights Organizations*, 84 Cal. L. Rev. 1293 (1996)

²² *See* Robert Ellickson, *Order Without Law: How Neighbors Settle Disputes* (1991); Robert

Ellickson, *Property in Land*, 102 Yale L.J. 1315, 1329 (1993).

²³ Libecap, *supra* note 19.

²⁴ *E.g.*, Robert P. Merges, *Contracting into Liability Rules: Intellectual Property Rights and Collective Rights Organizations*, 84 Cal. L. Rev. 1293 (1996); Peter Grindley and David J. Teece, *Managing Intellectual Capital: Licensing and Cross-Licensing in Semiconductors and Electronics*, 39 Cal. Mgt. Rev. 2-41 (1997).

²⁵ “ASCAP” stands for the American Society of Composers, Authors, and Publishers. It is a collective rights organization that acts as a nonexclusive licensing agency for the owners of musical composition copyrights. It, along with Broadcast Music Incorporated (BMI) issues most of the public performance licenses that permit copyrighted songs to be played on radio and television, in bars and restaurants, and in most other public places.

²⁶ *See* Robert P. Merges, *Contracting into Liability Rules*, *supra*, at 1338-1340.

²⁷ Heller, *The Tragedy of the Anticommons*, *supra* note 8, at 674:

Despite the presence of transaction costs, people will be able in many cases to negotiate with each other to overcome an anticommons and put the property to more efficient use. . . . On the other hand, even if the number of parties and transaction costs are low, the resource still may not be efficiently used because of bargaining failures generated by holdouts, as sometimes seems to happen with Moscow storefronts.

²⁸ *See* Part III, sections A and B for a description of differential royalty rates for different classes of licensees.

²⁹ This is a license, granted by law, from a rightholder to a user.

³⁰ For an explanation of why intellectual property rights are almost always property rule entitlements, see Merges, *Of Property Rules and Coase*, *supra* note 19.

³¹ Barry C. Field, *The Evolution of Property Rights*, 42 *Kyklos* 319 (1989). The version of the Field paper cited by Eggertsson is an earlier, unpublished draft.

³² Thrainn Eggertsson, *Economic Behavior and Institutions* 257 (1990). *But see* Robert Ellickson, *Property in Land*, 102 Yale L.J. 1315, 1329 (1993):

In sum, a shift from group to individual ownership of land substitutes the relatively cheap systems of self-control and boundary monitoring for the relatively costly system of pervasive intragroup monitoring.

Ellickson thus *assumes* that group monitoring is always more expensive. *See also id.*, at 1398 (ease of monitoring boundary crossings compared to difficulty of monitoring activities of group member on collective land).

³³ Standard Oil Co. (Ind.) v. United States, 283 U.S. 163, 167-68 (1931) (emphasis added).

³⁴ *See* Columbia Broad. Sys., Inc. v. ASCAP, 562 F.2d 130, 133, 133 n.17 (2d Cir. 1977) (“There is, moreover, some analogy to the patent pooling cases [O]n the surface, the pool of copyrights may be analogized to a pool of competing patents.”)

³⁵ On pools and cartels, see George Priest, *Cartels and Patent License Arrangements*, 20 J. L. & Econ. 309 (1977); Carl Kaysen and Donald Turner, *Antitrust Policy: An Economic and Legal Analysis* 164 (1959) (role of patent pools in Gypsum, Masonite, and Hartford-Empire glass cartels).

³⁶ I am not the first to make this point. *See* Alfred Kahn, *Fundamental Deficiencies of the American Patent Law*, 30 Am. Econ. Rev. 975 (1940) (“All things considered, it must be concluded that the pool is a distinct improvement over the patent law as originally contemplated in effecting technological advance under modern conditions.”)

³⁷ *See* Pooling of Patents: Hearings on H.R. 4523 Before the House Comm. on Patents, 74th Cong. 1140, 1144-45 (1935) [hereinafter *Patent Pooling Hearings*] (report by Charles A. Welsh, Jr., economist):

In all of the following major industries which the committee has included within the scope of its activities some form of patent consolidation are [sic] in use in an attempt to circumvent the existence of patent deadlocks and overlapping inventions: Automobile, agricultural machinery, aviation, building equipment and supplies, chemicals, communications, electrical-equipment industries, food industries, glass, machinery and machine equipment, mining, munitions, oil, office equipment and machinery, paper, radio, railroad equipment, rubber, steel, scientific instruments, utilities.

³⁸ *See, e.g.*, United States v. Birdsboro Steel Foundry & Mach. Co., Inc., 139 F.Supp. 244, 108 U.S.P.Q. 428 (W.D. Pa. 1956) (defendants were justified in entering into agreement to cross-license

patents for cooling beds used in steel mills, where, in absence of such agreement, cooling beds embodying the best features of both defendant's patents could not lawfully be made, and neither the defendants nor the public could obtain any benefit without agreement); *International Mfg. Co., Inc. v. Landon, Inc.*, 336 F.2d 723, 142 U.S.P.Q. 421 (9th Cir. 1964) ("No commercially feasible [swimming pool cleaning and filtering] device could be manufactured under one of the patents without infringing the other. For this reason, Cavenah and Pace were found to be blocking, or interlocking, patents.").

³⁹ See *Is New Technology Enough?: Making and Remaking U.S. Basic Industries* at 31 (Donald A. Hicks ed., 1988).

⁴⁰ See Ross Thomson, *Invention, Markets, and the Scope of the Firm: The Nineteenth Century U.S. Shoe Machinery Industry*, 18 *Bus. & Econ. Hist.* 140, 143 (1989) ("Patent control further strengthened [the] competitive positions [of the three largest firms] via pooling for the three major dry-thread firms (in conjunction with Elias Howe) . . .").

⁴¹ See Merges & Nelson, *Patent Scope*, *supra* note 6 at 888-93.

⁴² See, e.g., George Bittlingmayer, *Property Rights, Progress, and the Aircraft Patent Agreement*, 31 *J. L. & Econ.* 227 (1988) (describing accounting system for aircraft pool); William Greenleaf, *Monopoly on Wheels* 242-247 (1961) (describing automobile patent pool administration).

⁴³ See Floyd L. Vaughan, *The United States Patent System* 62-67 (1956); Merges & Nelson, *Patent Scope*, *supra* note 6, at 888-91; Bittlingmayer, *supra* note 41, at 227-228.

⁴⁴ Even these committees take on variable forms. See, e.g. *Suni-Citrus Products Co. v. Vincent*, 170 F.2d 850, 854, (5th Cir. 1948) (suit regarding pool constituted as trust involving patents owned by private inventor and State of Florida):

The trust agreement, between Vincent, the State and the Trustee, purported to pool certain patents by assigning them to the trustee, and to create a trust committee under whose directions the trustee would act. The powers of the committee included: the right to fix royalties; the right to include, in licenses, price fixing limitations upon the licensed products covered by the Neal patent when the prices had been fixed by members of the committee appointed by the State or other state representatives acting by virtue of legal authority in the State of Florida; and the right to include, in the licenses, price restrictions on products manufactured and sold in the State of

Florida if and when these prices are fixed by virtue of legal authority in the State of Florida. The trust agreement also fixed the percentage of royalties to be paid to the person entitled.

⁴⁵ Vaughan, *supra* note 42, at 40-50.

⁴⁶ On the general theme of the superiority of “private ordering” in patent pools, see Willis B. Rice, History of Patent Law, in *Patent Pool Hearings*, *supra* note 36, at 537. Despite the hostile tone of the pooling hearings, industry representatives sung the praises of administrative pooling arrangements. Consider the Testimony of Sidney R. Kent, President of Fox Film Corporation of New York:

[Representative] McFarlane: That brings us to this question: Do you think that a private corporation, having primarily as monetary interest, is a better group to have charge of and supervision of pooling of patents, rather than a governmental agency that might arbitrate and try to be fair to the industry as a whole?

Mr. Kent: You will not be offended with me if I answer that very frankly, will you Congressman
—

Mr. McFarlane: Go ahead.

Mr. Kent: When I say to you that governmental operation of anything, from the standpoint of industry or manufacture, can not possibly be as efficient as private manufacture. . . .

* * * *

Mr. Kent: [M]y personal opinion . . . is that if all the industry in this country were run as efficiently as the Bell Telephone and American Telephone and Telegraph . . . then we would have a pretty efficient set-up, both Government-wise and every other wise. . . . That is my personal opinion.

Id. at 501, 529-530.

⁴⁷ See Jacob A. Vander Meulen, *The Politics of Aircraft* 28 (1991) (original pooling agreement called for \$100 per airplane to major patentees, Glenn Curtiss and the Wright Brothers, up to a maximum of \$1 million). The original agreement was amended to reflect the growing prosperity of the industry soon thereafter. See *Manufacturers Aircraft Ass’n, Inc. v. United States*, 77 Ct. Cl. 481, 487 (1933):

The [pooling] agreement required the plaintiff to pay the remaining 87 ½ per centum of the royalties received from all sources in declared proportions of 67 ½ per centum to the Wright-Martin Aircraft Corporation and 20 per centum to the Curtiss-Burgess Airplane & Motor Corp., Inc. The agreement also contained a provision to the effect that within the period prior to November 1933, whenever and if said 87 ½ per centum payments to Wright and Curtiss had equalled a maximum of \$2,000,000 for each, the rate of royalty to be paid to plaintiff was automatically to change to a sum not exceeding \$25 an airplane.

⁴⁸ Vander Meulen, *supra* note 47, at 57.

⁴⁹ Manufacturers Aircraft Association -- Antitrust Laws, 31 Op. Att’y Gen. 166, 169 (1917) [hereinafter Attorney General, MAA Opinion] (prepared at the request of the Secretary of War, who had asked for a ruling on the legality of the MAA under the antitrust laws).

⁵⁰ *See, e.g., Patent Pooling Hearings, supra* note 36, at 775 (statement of Frank H. Russell, President of the Manufacturers Aircraft Association):

Any member company, to become a member, after he has bought a share of stock has to agree to exchange all patents which he may have either for nothing, or, if he feels that the patent has cost him a lot of money or is of great advantage to the art, or is bringing something to the development in the process which did not previously exist, he has the right to ask for a special royalty, and that reference is then sent to a board of arbitration which is made up of a member representing him or himself, a member of the association, and a third member who is selected by the other two.

⁵¹ Attorney General, MAA Opinion, *supra* note 49, at 169.

⁵² *See Patent Pooling Hearings, supra* note 36, at 775 (statement of Frank H. Russell).

⁵³ For example, a requested arbitration involving Boeing’s patented design for low-wing, twin-engine transport planes, said to have been used by Douglas and Lockheed, was noteworthy enough to warrant special mention in a history of the aircraft industry of the 1930s. *See* Vander Meulen, *supra* note 47, at 101.

⁵⁴ *Cf. id.* at 27-28 (“ . . . the agreement . . . was . . . an opening of the patents’ use to most anyone, but under organized conditions that would facilitate the industry’s development.”); Attorney General, MAA Opinion, *supra* note 49, at 170 (the MAA, “instead of restraining trade facilitates competition among the subscribers of that association . . .”).

⁵⁵ Attorney General, MAA Opinion, *supra* note 49, at 167:

The royalties to be paid under the cross-license agreement in respect to the patents of both the Wright-Martin and Curtiss corporations are materially lower than those previously demanded by the Wright-Martin Corporation alone.

⁵⁶ *Id.* at 172.

⁵⁷ *See* Greenleaf, *supra* note 41, at 246 (because of perception that original structure favored

small manufacturers, “certain alterations in the agreement made concessions to the major manufacturers . . .”).

⁵⁸ *Id.* at 245-246.

⁵⁹ In addition to the two tiers, many related groups of patents were excluded. (“Not included were the following categories of patents: design and special styling; special classes of motor vehicles, such as trucks, tractors, fire-engines, ambulances, and motor-buses . . .”) *Id.* at 245.

⁶⁰ *Id.* (“Not included were . . . basic and revolutionary patents.”)

⁶¹ *Id.* (“The plan . . . in large measure fulfilled the hope that the industry would be free of the heavy burdens of patent litigation.”)

⁶² Greenleaf, *supra* note 41, at 245. (“[E]ach signatory enjoyed reciprocal privileges of free licensing. . . . The plan operated with unqualified success”)

⁶³ Telephone interview with George Frost, Patent Lawyer, General Motors (retired), former General Motors representative to the American Automobile Manufacturers Association (AAMA), (Nov. 2, 1994).

⁶⁴ *See* Walton Hamilton, Patents and Free Enterprise, *reprinted in* Temporary National Economic Committee, 76th Cong., Investigation of Concentration of Economic Power 122 (Senate Comm. Print 1941):

It is hard to think of a form of cooperation between competitors which has brought as much benefit to the public as the cross-licensing agreement in respect to the automobile. The members of the trade are freed from the trouble and expense of struggling with patent problems. Their whole energies can go into improving their product, perfecting the process of manufacture, devising methods of marketing.

For more on Hamilton’s general views of patents and monopoly, see *id.* (pointing to corporate abuses of patents and stressing system’s contribution to monopoly).

⁶⁵ *Id.*

⁶⁶ *See* Greenleaf, *supra* note 41, at 246 (noting that original pool design benefited small companies especially, and “quickened the spread of technological knowledge to the far corners of the

industry . . .”).

^{67.} *Id.* at 250 (calling standardization the “most enduring and massive contribution of the Selden controversy”). The Selden controversy concerned George Selden’s claim to be the exclusive inventor of the gasoline automobile. *See generally id.*

^{68.} Rice, *supra* note 46, at 1128 (emphasis added).

^{69.} Indeed, a small line of cases deals with the enforceability of executory pooling agreements. *See S & B Rubber & Chem. Corp. v. Stein*, 7 N.Y.S.2d 553 (N.Y. 1938) (ordering specific performance of pooling agreement); *Dial Toaster Corp. v. Waters-Genter Co.*, 233 N.W. 870 (Minn. 1930) (pooling contract calling for pool entity to license pooled patents “on the best royalty basis obtainable” held too uncertain to permit specific performance decree).

^{70.} *See* Guido Calabresi & A. Douglas Melamed, *supra* note 17, at 1106, 1107 (describing a liability rule entitlement such as property subject to the state’s eminent domain authority as an entitlement subject to a “collective determination” of value, as opposed to a strictly private “market” valuation).

^{71.} *Kramer v. Commissioner*, 27 B.T.A. 1043, 1045 (1933). The description is drawn from a tax case apparently concerned with the income from the divided royalties. The case does not explain how several different entities came to own numerous patents issued to one inventor, the industrious Bostrom.

^{72.} *Id.*

^{73.} Royalty-free exchanges are also common, as in the case of the auto pool (described below). One case describes a patent pool that set up a royalty-free exchange of patents between two firms that concentrated on different technologies, but which occasionally made inventions relating to the other firm’s “core” technology. The pool allowed mutual access to patents in the “core” technology of each firm. *See Cutter Lab., Inc. v. Lyophile-Cryochem Corp.*, 179 F.2d 80, 91-92 (9th Cir. 1949) (upholding legality of pool that was the *raison d’etre* of the defendant Lyophile-Cryochem Corporation):

Sharp & Dohme, Inc., a corporation engaged in the manufacture and sale of drugs, owned a

series of patents on processes, products, containers and machinery within the field of freeze-dried drugs, including the Reichel patent in suit. The F. J. Stokes Machine Co., which manufactures machinery and apparatus used in the manufacture of drugs, owned a similar series of patents, including the Flosdorf patent in suit. These two companies formed the appellee Lyophile-Cryochem Corporation, to which they agreed to transfer the exclusive power to issue licenses under all patents within the freeze-dried drug field which each party then owned or might in the future acquire, and they agreed to endeavor to acquire such patents from any of their employees who might be connected with new inventions within the field. They also agreed to cause the new corporation “to grant licenses to others on such terms as, consistently with the maintenance of the strength of its patent rights and the good reputation of the products made pursuant to the patents, shall encourage maximum sales of the products and minimize sales resistance, and such licenses shall not be unreasonably withheld.”

The court later explained:

Stokes, interested in the manufacture of freeze-drying apparatus, conducts research for improvements in that apparatus. In the course of that research, it incidentally discovers improvements in freeze-drying processes and freeze-dried medical products. It is entitled to a patent monopoly on those improvements, but it cannot directly exploit those patents without going outside its normal field, which is machinery. Sharp & Dohme, on the other hand, is in a position to exploit the improvements. Moreover it is faced with the same problem, for it is in no position to exploit directly the improvements in machinery which it discovers in the course of its research. It is consistent with the spirit, as well as the letter, of the patent laws that each of these two companies should arrange to use the other in order to reap the rewards to which it is entitled as patentee and yet which it is in no position to reap by itself.

Id. at 93.

⁷⁴ Although the davenport bed pool was set up to cater only to the Seng company as an exclusive licensee, many pools license multiple manufacturers. *See, e.g., Emile Indus., Inc. v. Patentex, Inc.*, 478 F.2d 562, 565 (2d Cir. 1973) (patent pool in women’s hosiery production equipment) (alterations in original):

Burlington and Chadbourn created Patentex in 1955 “to acquire title [from them] to patents and methods of manufacturing women’s stretch stockings and processing yarns used in their manufacture [Patentex] license[d] other hosiery manufacturers under their patents and in turn receive[d] royalties for their use.” Thus, in return for royalty payments, Burlington and Chadbourn allowed their competitors to employ knitting technology which they had patented.

⁷⁵ For an example of a nascent pool that was seemingly organized before the parties truly reached agreement in these issues, see *Dial Toaster Corp. v. Waters-Genter Co.*, 233 N.W. at 871 (specific performance decree sought on contract to pool toaster patents; “Plaintiff asserts that anything from 25 to 35 cents a toaster would be a reasonable royalty. Defendant put the figure much higher.”).

⁷⁶ Cf. *Baker-Cammack Hosiery Mills, Inc. v. Davis Co.*, 181 F.2d 550, 85 U.S.P.Q. 94 (4th Cir. 1950). The pool in this case involved a corporation formed in 1946 to pool the 15 patents beneficially owned by three firms in the men’s hosiery industry, thereby enabling prospective licensees to deal with only one licensing source.

⁷⁷ See Ralph Cassady, Jr., *Monopoly in Motion Picture Production and Distribution: 1908-1915*, 32 S. Cal. L. Rev. 325 (1959). Cassady describes in depth the complicated division of royalty income among the participants, spelled out in the 1908 agreement between Armat, Biograph, Edison and Vitagraph, under which the four firms assigned “all of the patents of any importance in the early-day motion picture industry.” *Id.* at 331. The agreement also specified the royalties that were to be paid into the pool by licensees of the pool’s patents, i.e., movie exhibitors. On the role of the MPPC in the structure of the early film industry, see Catherine E. Kerr, *Incorporating the Star: The Intersection of Business and Aesthetic Strategies in Early American Film*, 64 Bus. Hist. Rev. 383, 390-91 (1990). For a good fictional account of the battle between the “patent” (i.e., MPPC pool) and “non-patent” forces in the early movie industry, see the movie *Nickelodeon*. (Columbia 1976).

⁷⁸ *Kobe, Inc. v. Dempsey Pump Co.*, 198 F.2d 416, 420 (10th Cir. 1952) (70 patents in pool; “the royalties exacted were a percentage of the proceeds of the sale of all pumps manufactured by licensees of [the pool entity]”).

⁷⁹ *International Mfg. Co., Inc. v. Landon, Inc.*, 336 F.2d at 729 (emphasis added):

The trial court found that, although the two patents were issued at different times, they together covered only a single article. No commercially feasible device could be manufactured under one of the patents without infringing the other. For this reason, Cavenah and Pace were found to be blocking, or interlocking, patents.

Landon’s first efforts to license manufacturers under the Cavenah patent alone were frustrated by the manufacturers’ unwillingness to accept Cavenah without also being licensed under Pace. In order to end this impasse, Robert M. Pace, then owner of the Pace patent, and Landon entered an agreement whereby (1) the Pace patent was assigned to Landon, (2) Landon granted Robert Pace a royalty-free, non-exclusive license under both patents, (3) Landon promised to license the patents collectively only, and

(4) *Landon and Robert Pace agreed to share royalties according to a set formula.*

No attempt was made to limit the number of licenses issued pursuant to this agreement. All licenses were offered under uniform terms and conditions to all who wished licenses.

⁸⁰ *Studiengesellschaft Kohle m.b.h. v. Dart Indus., Inc.*, 666 F. Supp. 674, 678 (D. Del. 1987):

Ziegler Pool Licenses . . . , granted jointly by Ziegler and Montecatini, gave licensees rights under both Ziegler and Montecatini patents at the standard sliding scale royalty rate of 5.5%. Montecatini, later known as Montedison, owned patents closely related to Ziegler's. Ziegler was to receive 30% of the royalties received under the Pool Licenses.

See also *United States v. Gen. Instrument*, 87 F. Supp. 157, 181 (D.N.J. 1949) (radio vacuum tubes):

[T]he grant on said three Letters Patents shall proceed from the Radio, Condenser Company instead of the Condenser Development Corporation, it being understood that the royalties payable thereon and on the remaining patents of said licenses be payable to the second contracting party, the said royalties being in turn payable by the Condenser Development Corporation one half to the Radio Condenser Company and the other half to the General Instrument Corporation.

Sometimes, the contractual division of royalties is left unspecified, or at least open to negotiation – creating a pool by “relational” contract. *See* *United States v. Birdsboro Steel Foundry & Mach. Co., Inc.*, 139 F. Supp. at 254. In *Birdsboro* the court upheld the legality of a pool between defendant Birdsboro and another firm Mesta, where Birdsboro had the right to manufacture steel mill cooling beds for both semi-finished products and merchant mills, Mesta had the exclusive right to sell into the merchant mill market, and Birdsboro was to manufacture cooling beds for Mesta to sell in the merchant mill market, subject to the following “fair pricing” clause in the pooling agreement:

The prices at which Birdsboro shall sell cooling beds to Mesta shall be fair and reasonable, and comparable in general to prices paid by Mesta to Birdsboro for cooling beds already bought, with due allowance made for general increases or decreases in the cost of labor and materials, taxes, etc. In any event, the prices charged by Birdsboro shall be such as to enable Mesta to sell in competition with equipment offered by others, and to allow Mesta a reasonable profit for such resale in competition; *Provided*, however, that Birdsboro shall not be required to manufacture cooling beds at competitive prices which shall result in a loss to itself. Should Birdsboro be unwilling to accept the order from Mesta for a cooling bed on that account, then Mesta shall have the right, notwithstanding anything herein stated in the contrary, to build such cooling bed itself or to have it built by others. Mesta shall use its best efforts to obtain such prices as to enable Birdsboro to make fair profits on the cooling beds herein contemplated. Mesta shall in no case quote prices for cooling beds without first having obtained prices from Birdsboro, unless such quotation is made based upon standard prices then in force between Mesta and Birdsboro.

Id. at 254.

Here the price adjustment under the fair pricing clause effectively caps the implicit royalty Birdsboro can charge on the technology it contributed to the pool, which is a rough form of apportionment.

^{81.} See David Hounshell & John Smith, *Science and Corporate Strategy: DuPont R & D, 1902-1980* 193-205 (1988).

^{82.} See *id.* at 199; 2 William Reader, *Imperial Chemical Industries: A History* 53 (1975) (“[T]here was a clause allowing either party to remove a ‘major invention’ from the agreement altogether, so that they could make special terms.”).

^{83.} Even so, the arrangement proved basically workable, breaking down only when the U.S. government dissolved the arrangement as an antitrust violation. See *United States v. Imperial Chem. Indus., Ltd.*, 105 F. Supp. 215 (S.D.N.Y. 1952).

^{84.} See *Hazeltine Research, Inc. v. Zenith Radio Corp.*, 239 F. Supp. 51, 72 (N.D. Ill. 1965) (emphasis added):

The dominant radio and electronics companies in Great Britain set up the British Patent Pool into which flow thousands of patents owned or controlled by the members and those affiliated with them in the plan. Among these companies are Electric & Musical Industries Ltd., General Electric Company, Ltd., Marconi’s Wireless Telegraph Co. Ltd., Philips Electrical Ltd., Pye Ltd., Murphy Radio Ltd., Rank Cintel Ltd., Standard Telephone & Cables Ltd., Gramophone Co. Ltd., E.K. Cole Ltd., and Cossor Ltd. The Hazeltine inventions and patents have been funneled into the Pool pursuant to an agreement with General Electric Co. Ltd. and the share of the Pool’s income allocated to these patents is split between General Electric Co. Ltd. and Hazeltine. Pursuant to this arrangement British inventions controlled by General Electric Co. Ltd. are licensed to Hazeltine for exclusive licensing use in its American territory and are included in its United States package licensing activities. *The Hazeltine-General Electric Co. Ltd. exclusive agreements were specifically devised to get the Hazeltine patents into the British Patent Pool in a manner which would provide for G.E.C. maximum bargaining power vis-a-vis the other Pool members on the division of the Pool income.*

^{85.} See Scotchmer, *supra* note 6; Stefan Fölster, *Firms’ Choice of R&D Intensity in the Presence of Aggregate Increasing Returns to Scale*, 13 J. Econ Behav. & Org. 387 (1990). On the possibility of bargaining breakdown in IPR transactions, see Robert Merges, *Intellectual Property Rights and Bargaining Breakdown: The Case of Blocking Patents*, 62 Tenn. L. Rev. 75 (1994) [hereinafter Merges,

Bargaining Breakdown].

⁸⁶ Bittlingmayer, *supra* note 41, at 230-32; Dykman, *Patent Licensing within the Manufacturer's Aircraft Association (MAA)*, 46 J. Pat. Off. Soc'y 646 (1964) (describing formation of industry licensing pool, at behest of government, because, "[n]o one would license the other under anything like a reasonable basis."). *See generally* Merges & Nelson, *Patent Scope*, *supra* note 6. *See also* General Tire & Rubber Co. v. Firestone Tire and Rubber Co., 489 F.2d 1105, 1140 (6th Cir. 1973) (describing a dispute arising from a World War II patent pool formed at the request of the U.S. government and administered by the Reconstruction Finance Corporation (RFC) in the area of synthetic rubber research.) The pool in this case was formed immediately after Pearl Harbor, according to the court, by the signing of contracts between the RFC and the big four of the rubber industry (Goodyear, U.S. Rubber, Goodrich and Firestone), both to manage and operate the synthetic rubber plants and to pool patents and conduct research for the government, the results of which would be shared royalty-free with the government and its "nominees" (i.e. the other rubber companies participating in the research agreements)."

The organizing contract for the pool read in part as follows:

7. Contractor hereby grants to RFC and its nominees (1) a royalty-free license to utilize without limitation any information or invention (whether or not patented) resulting from the research authorized by this contract, including the right to reproduce, disclose to others, and publish all such information or inventions, and including the right to make, use and sell thereunder, and (2) a royalty-free license to use any information or invention to which RFC or its nominees are entitled under the provisions of paragraph 5 above, including the right to reproduce, disclose to others, and publish all such information or inventions, but limited to the utilization of the same in the production, use or sale of general purpose synthetic rubber suitable for use in the manufacture of transportation items such as tires or camel-back, and (3) a royalty-free license with respect to any information or invention made available under the provisions of paragraph 6 above, limited to the utilization of the same in the manufacture, use or sale of rubberlike polymers, copolymers, mixed polymers and interpolymers of the compositions defined in paragraph 3 above.

Id. at 1143.

⁸⁷ *See* Bittlingmayer, *supra* note 41, at 232. (In 1917, following U.S. entry into World War I, "Congress passed legislation that would have condemned the patents," thus spurring the parties to negotiate an agreement).

⁸⁸. Current essential patent holders who are members of MPEG-2 (either by themselves or through related entities) are Columbia University, Fujitsu, General Instrument, Matsushita, Mitsubishi, Lucent, Philips, Scientific-Atlanta and Sony.

⁸⁹. On the economic importance of standard-setting committees, see Joseph Farrell & Garth Saloner, *Coordination Through Committees and Markets*, 19 *Rand J. Econ.*, 235 (1988).

⁹⁰. See MPEG LA <<http://www.mpegla.com>>.

⁹¹. By the beginning of 1998, Columbia University, ComStream, DX Antenna, Divicom, Dooin Electronics, Fujitsu, Gunzameory Computer, Kenwood, Matsushita/Panasonic, Mitsubishi, NDS, NTT, NextLevel, Nippon Steel, Philips, Pioneer, Samsung, Sampo, Sanyo, Scientific-Atlanta, Sharp, Sony (several divisions), Tadiran, Toshiba and JVC/Victor were all licensees.

Manufacturer royalty rates are as follows:

Consumer products (TV set top boxes, computers and the like) which incorporate an MPEG-2 encoder or decoder pay a royalty rate of \$4.00 per product (Art. 2.2, 2.3, 3.1.1, 3.1.2). Consumer products which incorporate both an encoder and decoder such as a camcorder are licensed for a total royalty of \$6.00 (Art. 3.1.4).

Packaged media such as DVD or other optical discs or magnetic tapes: for consumer use (\$.04 per disc or medium per "MPEG-2 Video Event," e.g., feature length film) or commercial use (\$.40 per disc or medium per "MPEG-2 Video Event").

"Distribution Encoding Products" -- generally those used in real time broadcasts and cable transmissions -- are \$4.00 per device per channel which is incorporated in the device. (Art. 2.5, 3.1.3). Royalty rates for "Transport or Program Stream Products" such as multiplexers are \$4.00 times the greater number of inputs or outputs.

Thus, for example, the royalty due from a film studio on a DVD disc sold to consumers incorporating a single "MPEG-2 Video Event" would be \$.04, or .16% of the retail price, assuming a price of \$25.00. If the disc incorporates a patent of each essential patent holder where the disc is

manufactured or sold, the gross pro rata royalty for each essential patent holder would be \$.0044, not considering any applicable taxes and licensing costs. The royalty due from a camcorder manufacturer which incorporates both an encoder and decoder would be \$6, or .15% of the retail price, assuming a price of \$400. If the camcorder incorporates a patent of each essential patent holder where the unit is manufactured or sold, the gross pro rata royalty for each essential patent holder would be \$.67, not including any applicable taxes and licensing costs.

⁹² The “Amended and Restated Limited Liability Company Agreement of MPEG LA,” cited extensively in the MPEG-2 Review Letter, *supra* note 98.

⁹³ The licensors’ request for a Business Review from DOJ says:
[E]xtreme care has been taken to insure that the proposed licensing program includes only blocking or essential patents and a structure has been devised both to remove from the program any patents hereafter shown to be non-essential and to include at a later date any other patents that are deemed essential.

Cf. Sabra Chartrand, “The Federal Government Will Allow A Group Of Companies To Unify Administration Of 27 Patents,” June 30, 1997, at D 8 (“Mr. [Baryn] Futa [president of MPEG LA, the corporate entity that administers the MPEG-2 pool] said that 27 patents ‘is only an introductory number’ and that more would be added.”).

⁹⁴ Barry Fox, *Replicators Risk Drowning In A Growing Pool Of Patents*, One to One, Mar. 18, 1998, at 63 [hereinafter Fox, *Replicators*].

⁹⁵ According to the trade press, for instance: “Lucent Technologies (Bell Labs) and Toshiba are expected to join [the pool] soon and add more patents.” *Id.*

⁹⁶ From the MPEG-2 “Request Letter” preceding the DOJ Review Letter:
The Agreement establishes an Administrative Committee (Article 3) consisting of a representative of each licensor. The Administrative Committee has responsibility for selecting the Licensing Administrator, and reviewing certain activities of the Licensing Administrator. The Licensing Administrator, however, and not the Administrative Committee or individual licensors, has exclusive responsibility to identify and solicit potential portfolio licensees, audit sublicensees, determine back royalties which potential licensees may owe, bring actions to

enforce a Portfolio License and other licensing administration matters (Article 3.5.4). The Agreement Among Licensors also provides the formula for apportioning royalty income among licensors (Article 5.1) as well as a basis for dividing any joint expenses or liability which may arise (Article 5.2, 5.3). The licensors agree to reimburse certain of the expenses which were incurred by CableLabs in connection with the patent search and other efforts to organize the proposed licensing program (Art. 5.3.2). The Agreement also provides the procedures for removing existing or adding new essential patents to the Portfolio License -- whether such new patents are held by the original licensors or other entities -- and provides that any new licensor will reimburse the original licensors \$25,000 for certain start-up expenses which the original licensors incurred (Articles 2, 6).

There is a cap on the upward revision of royalty rates over the short term, however:

The Portfolio License expires in 2000, but each licensee is given the option to renew the license for an additional period of five years (Art. 6.1). Licensees are assured that royalties will increase, if at all, by no more than 25% for the five year renewal period.

MPEG-2 Review Letter, *supra* note 98.

⁹⁷. The MPEG-2 Charter, at (1.23, defines The Portfolio license, like several of the relevant documents, defines “MPEG-2-Related Patent” as “any Patent which is not an MPEG-2 Essential Patent but which has one or more claims directed to an apparatus or a method that may be used in the implementation of a product or a service designed in whole or in part to exploit the MPEG-2 Standard under the laws of the country which issued or published the Patent.”

⁹⁸. MPEG-2 Portfolio License, § 6.3. The rationale for this provision is stated in MPEG-2’s

Review Letter request to the DOJ:

This provision is critical to prevent Portfolio licensees from taking unreasonable and unfair advantage of the fact that each Portfolio licensor already has agreed to license its patents on open, non-discriminatory terms at what would likely be a fraction of the royalties that would be payable if patents were licensed individually outside the Portfolio License. Without this provision, a Portfolio licensee could -- while enjoying the considerable benefits of the Portfolio License -- attempt to extract unreasonable terms for licensing its patent as a result of already being licensed under the Portfolio. Article 6.3 merely “evens the playing field”, puts the parties back into the bargaining position each would have been in but for the Portfolio License, and creates no competition issues. The individual licensor’s patents are only withdrawn from the Portfolio License when and if the licensee refuses to grant a license to the Portfolio licensor on fair and reasonable terms. Moreover, the ISO undertaking signed by each essential patent holder-licensor insures that the licensee will be able to obtain a license under the essential patent at issue, just not necessarily on the terms offered in the Portfolio License. Any potential licensee which objects to this provision remains free to negotiate individual licenses from essential patent holders.

⁹⁹. *See* Letter from Joel I. Klein, Acting Assistant Attorney General, Department of Justice,

Antitrust Division, to Gerrard R. Beeney, Esq. (June 26, 1997)

<<http://www.usdoj.gov/atr/pubdocs.html>>[hereinafter MPEG-2 Review Letter].

^{100.} *Id.*

^{101.} *The Future Of DVD Has Yet to Be Decided* (visited Aug. 6, 1999)

<<http://www.dvdinsider.com/news/database/view.asp?ID=679>>.

^{102.} DVD stands for "digital video discs," high-capacity compact discs capable of storing feature-length films as well as music and other forms of entertainment.

^{103.} *Four Companies to Oversee DVD Patent Pool*, Consumer Electronics, Dec. 18, 1995.

^{104.} *Id.*; see also, *Sony, Philips Break Ranks, Prepare DVD Licensing Fees*, Optical Memory News, Aug. 13, 1996.

^{105.} Andrew MacLellan, *Philips, Sony Pooling DVD Patents*, Electronic News, Aug. 5, 1996.

^{106.} *Id.*

^{107.} *Sony, Philips Break Ranks, supra.*

^{108.} *Id.*

^{109.} See Letter from Joel I. Klein, Assistant Attorney General, Department of Justice, Antitrust Division, to Carey R. Ramos, Esq. (June 10, 1999) <<http://www.usdoj.gov/atr/pubdocs.html>> [hereinafter Toshiba Review Letter].

^{110.} See Mark A. Lemley & David McGowan, *Could Java change everything? The competitive propriety of a proprietary standard.(Sun Microsystems Inc.'s software)*, Antitrust Bull., 1998 WL 16568455 (Sept. 22, 1998).

^{111.} MPEG-2 Review Letter, *supra* note 98.

^{112.} See Letter from Joel I. Klein, Assistant Attorney General, Department of Justice, Antitrust Division, to Gerrard R. Beeney, Esq. (Dec. 16, 1998) <<http://www.usdoj.gov/atr/pubdocs.html>>[hereinafter Sony Review Letter]; Toshiba Review Letter, *supra*

note 108.

^{113.} Sony Review Letter, *supra* note 112; Toshiba Review Letter, *supra* note 108.

^{114.} Any non-manufacturing owner of an “essential” patent, in contrast, can still be a holdout, having no need for either Portfolio License.

^{115.} See Sony Review Letter, *supra* note 112.

^{116.} See MPEG-2 Review Letter, *supra* note 98.

^{117.} Sony Review Letter, *supra* note 112; Toshiba Review Letter, *supra* note 108.

^{118.} Cf. “Video Notes,” Video Wk., Nov. 3, 1997 (Toshiba has now joined with five other companies -- Hitachi, JVC, Matsushita, Mitsubishi, and Time Warner -- to form its own pool). The prospect of dueling pools each possessing essential complementary patents poses interesting possibilities. It may enhance the bargaining position of its members vis-à-vis the other pool, and thus be a prelude to a single pool. It may also slow the introduction of a new technology, as licensees must negotiate with two entities. In effect, this situation mirrors the case of blocking patents. The same bargaining dynamic holds, with the added complication that each of the bargaining entity is a coalition of multiple firms. See Robert P. Merges, *Intellectual Property Rights and Bargaining Breakdown: The Case of Blocking Patents*, 62 Tenn. L. Rev. 75 (1995).

^{119.} “Justice Dept. Examining DVD Patent Situation,” Audio Week, Jan. 8, 1996.

^{120.} *Id.*

^{121.} “The law says we have to make our patents available in a non-discriminatory and timely manner. If this drags on too long, and we release the patents too soon before we introduce our product, that is illegal. Time was running out.” *Philips, Sony Pooling DVD Patents*, *supra* note 104.

^{122.} *Philips and Sony Offering DVD Patent Licenses*, Consumer Electronics, Aug. 5, 1996. In addition, an industry insider speculated that Sony and Philips had an additional purpose - that of compelling the other eight consortium members to get into the patent pool. Scott Berinato, *Licensing Disputes Said to Delay Sony DVD*, PC Week, Sept. 9, 1996.

¹²³. Fox, *Replicators*, *supra* note 93.

¹²⁴. Paul Durman, *Courtaulds Ends Patent Dispute*, *The Times* (London), Jan. 8, 1998 (describing patent pool for synthetic fibre “Tencel”).

¹²⁵. *Speaker Patent Fight Averted*, *Consumer Electronics*, Dec. 8, 1997, at 1.

¹²⁶. Andrew Maclellan, *Consortium Incorporates To Push SDRAM Technology*, *TechWeb News*, Jan. 28, 1998 (pool with 24 patentholder-members).

¹²⁷. *See* John Tilton, *International Diffusion of Technology: The Case of Semiconductors* 16 (1971); Hounshell & Smith, *supra* note 80.

¹²⁸. *Intellectual Property Rights in Science, Technology and Economic Performance* (Frank Rushing and Connie Brown, eds. 1990) (“[I]n each of these industries [that ranked patents low on the scale of appropriation mechanisms in a survey] at least half of the patentable inventions were patented. The reason seems to be that the prospective benefits of patent protection, including (besides royalties) whatever delay is caused prospective imitators and the use of patents as bargaining chips, are judged to exceed costs.”).

¹²⁹. *See, e.g.*, *Intel Corp. v. ULSI Sys. Tech., Inc.*, 782 F. Supp. 1467 (D. Or. 1991) (dispute over cross-license involving patented 80387 microprocessor math coprocessor), *rev'd*, 995 F.2d 1566 (Fed. Cir. 1993).

¹³⁰. *See* Merges & Nelson, *Patent Scope*, *supra* note 6, at 888-93.

¹³¹. Ellickson, *Property in Land*, *supra* note 29; Robert C. Ellickson, *Order Without Law: How Neighbors Settle Disputes* 164-166 (1991).

¹³². *See, e.g.*, Cecil Quillen, *Proposal for the Simplification and Reform of the U.S. Patent System*, 21 *Am. Intell. Prop. L. Ass'n Q.J.* 189 (1993).

¹³³. *See* David, *supra* note 1.

¹³⁴. In this regard, General Instrument, a member of the group, voiced its distaste for the royalty

scheme. “Use-Based MPEG Royalty May Have Merit.” Time Warner, a non-member, stated that “[m]aking such demands through a consortium of hardware manufacturers, some of whom have been included despite their ownership of unessential patents, smacks of price fixing, collusion and an attempt to monopolize.” See “Greed On The I-Way,” Info. L. Alert, Mar. 24, 1995, p. 1.

¹³⁵. These are reviewed in Donald Turner, *Legal Restrictions on Exploitation of the Patent Monopoly: An Economic Analysis*, 76 Yale L.J. 267 (1966).

¹³⁶. See Thomas Jorde and David Teece, *Innovation, Cooperation and Antitrust: Striking the Right Balance*, 4 High Tech. L. J. 1 (1989) (hereinafter Jorde and Teece, *Innovation and Antitrust*).

¹³⁷. See, e.g., Bittlingmayer, *Aircraft Pool*, *supra* note 41 (describing break-up of aircraft pool under the weight of a consent decree).

¹³⁸. Note in this respect that explicit antitrust “safe harbors” for industry-wide research consortia have contributed to the success of this form of R&D organization. See Jorde and Teece, *Innovation and Antitrust*, *supra* note 135.

¹³⁹. I mean to suggest that antitrust enforcement activities directed at patent pools have not always, or even usually, been misguided. In some cases, pools were so clearly masking cartels that they had to be broken up. See, e.g., *United States v. National Lead Co.*, 63 F. Supp. 513, 522-523 (S.D.N.Y. 1945), *aff’d* 323 U.S. 319 (1947), where the Antitrust Division produced a gun that was not only smoking, but also screaming and flashing:

Cornish, president of [National Lead], finds himself obliged to contribute to the correspondence [on the formation of the pool]. . . . The subject under discussion is apparently the proposed arrangement with the Blumenfeld companies: “May I call the proposed combination, for simplicity, a cartel?” And he defines it. “The whole purpose of the cartel is to obtain a monopoly of patents so that no one can manufacture it excepting the members of the cartel, and so can raise the prices by reason of such monopoly to a point that would give us much more profit on our present tonnage, but also prevent a growth in tonnage that would interfere with their greater profits in lithophone.” (Pl. Ex. 183.)

¹⁴⁰. Priest, *supra* note 35.

¹⁴¹. On these tests, see Robert P. Merges, *Patent Law and Policy* (1992), at Chapter 8,

Infringement.

^{142.} A different set of issues is presented where the pool is created out of a research program funded by the government. Fairness and access issues are more compelling under those circumstances. *See Semiconductor Industry: CEO Testifies on Challenges Facing U.S. Firms*, Edge, Aug. 5, 1991 (Reprinting testimony of Jerry Rogers, CEO of Cyrix, Inc., a small semiconductor company excluded from Sematech, the large (partly) government-financed R&D consortium for the industry):

Innovation sometimes depends on access to “patent pools” – licensing of multiple items of intellectual property that are interrelated but whose patents are held by various parties. Established companies with substantial patent portfolios can often swap their patent rights to gain access to these patent pools.

Smaller companies, although they possess innovative intellectual property, have not had the time to obtain patent rights. Therefore, they have fewer patents with which they can barter, thus either: 1) they can pay a 10-20 percent royalty to each patent holder in the pool; or 2) they can trade products, turning over the rights to all their innovative intellectual property and products before they are granted manufacturing in return.

“If entrepreneurial companies like Cyrix can be assured of a level playing field that gives us the same access to tax-supported research that large companies enjoy,” said Rogers, “and if we can be assured of protection -- not victimization -- by the nation’s patent laws, I am sure that we can make an even more substantial contribution to the nation’s competitive strength in the years ahead.”

^{143.} *Europe Advances Digital Gear*, Wall St. J., December 21, 1992, at A6:

The European Community Commission tentatively approved cross-licensing and other agreements between electronics companies to encourage development of digital compact cassettes and players. Firms and researchers may make, use or sell the products patented to other partners in the group. The EC said its move could restrict competition through pooling of patents, know-how and common specifications, but would advance technology and serve consumers.

See also Nick Louth, *Sony and Philips to Let Market Referee Audio Fight*, Reuters Financial Report, Oct. 9, 1991:

Philips said earlier it will pool patents with Sony over the latter's minidisc, while Sony for the first time endorsed the Dutch group's digital compact cassette (DCC). "Ultimately it is left to the consumer to decide," said analyst Angela Dean of brokers Morgan Stanley in London. The pooling of patents gives each firm access to the other's patents in the minidisc area. Analysts believe it would make no sense for Philips to hinder minidisc development by costly patent disputes when it expects to win in the market anyway.

By contrast, and to illustrate that the inhospitality tradition in the U.S. may not be dead, note that the Antitrust Division of the U.S. Department of Justice has announced an investigation of patent licensing practices in the CD-ROM field. See Dennis Kneale, *Sony-Philips Pact on CD-Licensing Fees Is Target of U.S. Antitrust Investigation*, Wall St. J., July 12, 1994, at A3:

Justice Department officials in recent weeks have sent out subpoenas to more than a dozen companies requesting documents outlining their dealings with Sony and Philips. The two companies signed a pact in the late 1970s to cross-license each other's basic patents on CD technology, according to industry executives. The agreement designated Philips to handle enforcement, collect fees from vendors and split the proceeds with Sony. . . .

The two companies' aggressive licensing program has enabled them to collect millions of dollars a year in patent fees while ensuring that new developments are compatible with the CD players they make and sell.

^{144.} See David Teece, *Information Sharing, Innovation, and Antitrust* (Haas School of Business, U.C. Berkeley, working paper 1993); Jorde and Teece, *Innovation and Antitrust*, *supra* (extolling virtues of cooperative R&D and marketing efforts).

^{145.} MPEG-2 Review Letter, *supra* note 98.

^{146.} *Id.*

^{147.} *Id.*

^{148.} *Id.*

^{149.} Willard K. Tom and Joshua A. Newberg, *Antitrust And Intellectual Property: From Separate Spheres To Unified Field*, 66 Antitrust L.J. 167, 219-221 (1997) (footnotes omitted).

^{150.} *Id.*

^{151.} *Id.*

^{152.} See, e.g., Joel Klein, *Cross-Licenses, Patent And Copyright Pools And The U.S. Antitrust Laws*, 73 Copyright World 44 (1997). Cf. Dennis W. Carlton & J. Mark Klammer, *The Need for Coordination Among Firms, with Special Reference to Network Industries*, 50 U. Chi. L. Rev. 446 (1983); Gene M. Grossman & Carl Shapiro, *Research Joint Ventures: An Antitrust Analysis*, 2 J.L. Econ. & Org. 315 (1986).

^{153.} Heller, *The Tragedy of the Anticommons*, *supra* note 8.