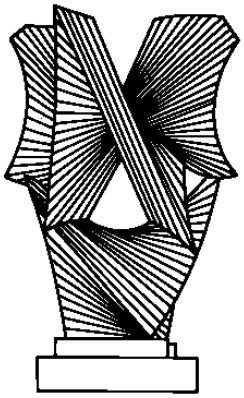
1993

The Economic Underpinnings of Patent Law

Kenneth W. Dam

CHICAGO

JOHN M. OLIN LAW & ECONOMICS WORKING PAPER NO. 19
(2D SERIES)



THE ECONOMIC UNDERPINNINGS OF PATENT LAW

Kenneth W. Dam

THE ECONOMIC UNDERPINNINGS OF PATENT LAW

Kenneth W. Dam*

Patents play a crucial role in the economy. The economic principles underlying the patent system have not always been well understood, especially in the courts. In part, the difficulty lies in two circumstances: first, that innovation is essentially the creation of information, which has different economic characteristics from goods, and second, that the patent system, while effectively dealing with this primary problem of the special nature of innovation, nonetheless creates secondary economic problems. And in part the esoteric nature of patent law has obscured the way in which patent law doctrines deal with these secondary problems. This article, after analyzing the secondary economic problems created by the patent solution to the information aspect of innovation, will show in detail how patent law has effectively, if often inarticulately, minimized the impact of these problems.

To start with, it is important to recognize the primary problem that the patent system solves. This problem--often called the appropriability problem--is that if a firm could not recover the costs of invention because the resulting information were available to all, then we could expect a much lower and indeed suboptimal level of innovation. In short, the patent system prevents others from reaping where they have not sown and thereby promotes R&D investment in innovation. The patent law achieves this laudable end by creating property rights in inventions. In creating these property rights known as patents, however, secondary problems are created that can lead to market distortions. To take the most often discussed example, it is often said that since patent law gives the patentee the power to exclude others from practicing the invention, a monopoly may be created, leading to restriction of production, a supracompetitive price, and what economists call an efficiency or deadweight loss.

It is the thesis of this article that patent law has used an economic approach to minimize such potential distortions and inefficiencies. In most cases, this economic approach has been adopted unconsciously. Although the failure to use economic terms has obscured the economic contribution patent law has made, we must recognize that the misuse of economic concepts can be a danger. For example, the tendency to brandish economic terms, particularly the talisman of

---

* Max Pam Professor of American and Foreign Law, University of Chicago Law School. The author would like to thank, for their comments on earlier versions of this paper, David Friedman, Edward Gershuny, William Landes, Marshall Phelps, Richard Posner, Robert Sherwood, Victor Siber, and Roger Smith. The author would like to express his appreciation for the support of the Jerome S. Weiss Faculty Research Fund at the University of Chicago Law School.

"monopoly," led the Supreme Court seriously astray in the period stretching from the 1930s to the 1970s. Though using an economic term, the Court was in fact applying an essentially political doctrine.[1] More recently, patent law decisions have returned to a more soundly based approach.

In discussing the economic underpinnings of patent law, it is well to remember that this branch of the law is based squarely on an economic policy articulated in the Constitution. This policy, to promote "the Progress of Science and the useful Arts," can be thought of as an industrial policy in today's terms because it uses legal intervention to decide what technologies to promote.[2] But unlike most industrial policies it creates property rights in order to allow a market system to function. And it chooses these technologies not by a process of bureaucratic or political evaluation of which technologies are the most worthy of government support but rather through a set of prior rules that create a system determining when property rights will be created in inventions.

Patent law operates through legal doctrine, not through administrative means. To be sure, the patent office necessarily uses administrative processes in applying patent law doctrine. But unlike a typical economic regulatory agency it does not normally hold trial-type hearings as a way of making or changing policy. Nor does it normally use a rule-making process for particular industries or technologies. Rather the patent office proceeds much like a court, applying the principles of patent law on a case by case basis; the same is especially true of courts reviewing patent office decisions and courts facing patent issues as an original matter in infringement cases.

Whether the patent law approach is inherently preferable to a hearing or rule-making based regulatory approach is beyond the scope of this paper, but there is no apparent reason to believe that a regulatory approach would do better. On the other hand, there is reason indeed to believe that the patent law approach is preferable to a legislative approach that involved industry by industry subsidies or other market advantages, especially in view of the rent-seeking and pork barrel features of any legislative approach.[3] The point of this

---

[1] See discussion infra at pp. 21–22.

[2] Art. I, §8, cl. 8. This clause of the Constitution, which seeks to secure "for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries," is also the basis for copyright protection. Trademark protection, in contrast, is based on the common law, although the Lanham Act, which gives advantages to registrants, is based on the Commerce Clause. Trade secret protection is based essentially on the law of contracts and torts. See David D. Friedman, William M. Landes and Richard A. Posner, Some Economics of Trade Secret Law, 5 J. of Econ. Perspectives 61 (1991). A Uniform Trade Secrets Act has been adopted in a number of states.

[3] A fourth possible approach to stimulating innovation is one commonly used in promoting basic science through government subsidy--the peer review process used by the National Science

article, however, is not to come to final conclusions on the relative advantages of the patent law approach over the alternative regulatory and legislative approaches to promoting innovation but rather to make clear the effectiveness of the approach used in patent law.

I.

At the outset it is important to consider the three principal secondary economic problems that patent law must face in solving the primary appropriability problem. These three problems--which may for shorthand be referred to as the monopoly, rent-seeking and inhibition-of-future-innovation problems--are often put forward under one rubric or another as objections to patents. After examining the nature and seriousness of these three problems, the discussion will turn to how patent law doctrine in fact reduces their practical impact.

1. The first problem is one that captured perhaps too much attention in the 1930's-1970s period. That is that the right to exclude may create a monopoly. Indeed, it became conventional to say that a patent is a monopoly.[4] Nonetheless, it is readily apparent that the right to exclude another from "manufacture, use and sale" may give no significant market power, even when the patent covers a product that is sold in the market. Indeed, without the benefit of empirical research, it is entirely plausible to conclude that in the great bulk of instances no significant market power is granted. We must bear in mind that leading companies may obtain 1,000 or more patents in a single year,[5] and yet many such firms are unlikely ever to obtain even a single monopoly in any market.[6]

Nonetheless, many patents, especially those that achieve commercial success, do result in the patentee enjoying economic rent.[7] A patent that reduces the cost

---

Foundation and other governmental grant-making agencies. This approach has been used thus far mostly for the promotion of basic science research. A fifth approach, often suggested but seldom put into practice (except indirectly through Nobel prizes, Presidential medals and the like) is a system of awards for innovations. Still a sixth possible approach--competitive bidding--is discussed briefly infra at 17–18.

[4] See discussion infra at 21–22.

[5] In 1991 the most frequent U.S. patentee received 1,156 patents and even the tenth most frequent received 680 patents. Global Innovation: Who's in the Lead, Business Week 68 (Aug. 3, 1992).

[6] On the great variability in the value of patents, see Wesley M. Cohen and Richard C. Levin, Empirical Studies of Innovation and Market Structure, in Richard Schmalensee and Robert D. Willig, Handbook of Industrial Organization, Vol. II, pp. 1059, 1062-1064 (1989).

[7] It is worth recalling, however, that the commercial success of the product may be more a result of superior marketing, management, and similar factors than of the invention itself. Robert P. Merges, Commercial Success and Patent Standards, 76 Calif. L. Rev. 803 (1988).

of making a product will permit the patentee to enjoy economic rent. To be sure, this statement assumes that other producers are not able to use the innovation to reduce cost, but that is precisely the purpose of the power to exclude from "manufacture, use and sale" granted by a patent. The economic rent received by the patentee is, in the normal case, measured by the difference between the patentee's per unit costs and competitors per unit costs (to the extent attributable to the patented innovation) multiplied by the patentee's volume.[8]

Economic rents are common in the economy. They are enjoyed wherever an economic actor has a cost advantage that competitors cannot match, for legal or other reasons. A legal reason might be some form of regulatory constraint or a subsidy, stemming for example from some form of industrial policy. But rents may arise from more natural causes. The advantage of superior location is a common example in real estate. Superior talent in the arts and professional sports is another.

The concept of economic rent is a more useful concept than monopoly for analyzing patent law. In the typical patent case production will either remain the same or increase compared to the pre-patent situation.[9] As a result of the invention, protected by the patent, the inventor has a cost advantage that allows him to make more money--economic rent--than his competitors. In that sense there is no restriction of production and hence no monopoly.

Of course, if we assume that the innovation were open to all, then all producers would gain the same cost advantage and the economic rent would be competed away; production would rise as cost fell, and in that sense one could say that the patent restricts production and causes a deadweight loss. But even in this second case we can discern that the term monopoly does not add to our understanding. In the first place, the R&D that led to the invention might never have occurred in the absence of the incentive of patentability. Second, even if the invention had occurred, the inventor might have chosen, assuming the circumstances permitted (say, in the case of a process patent), to keep the invention a trade secret, in which case calling the patent a monopoly makes an assumption of fact that it not justified. And third, as noted above, if the patented

---

[8] Where the patentee licenses the patent, royalties are the mechanism by which the economic rent is collected.

[9] Output will expand compared to the pre-patent position if the reduction in cost occasioned by the invention is sufficiently large: With minor discoveries, consumers continue to buy the same quantity at the same price, so they are unaffected by the discovery. With major discoveries, price falls and quantity rises so that consumer surplus rises. Dennis W. Carlton and Jeffrey M. Perloff, Modern Industrial Organization 679 (1990). See more generally id. at 666–79, including Figure 20.3(b) and accompanying discussion.

invention lowers cost sufficiently, then output will expand beyond the pre-invention level, thereby rendering the conclusion that patents restrict production at odds with observed fact.[10] For these reasons, it would be more useful to restrict the concept of monopoly to circumstances where the patents are used as a device to mask what one would otherwise call a monopoly[11] or where patent licenses are used, as in certain classic antitrust cases, as a device for implementing anticompetitive agreements.[12] Not only do the antitrust laws attempt to look through such subterfuges to penalize underlying anticompetitive behavior but the patent law itself limits any monopoly profits that might be derived from patents.[13]

2. Using the term economic rent rather than monopoly promotes clearer thinking, but it does not eliminate economic policy issues. On the contrary, because a patent's right to exclude is bestowed by deliberate government policy, the magnitude of the rent seeking that ensues deserves to be examined as a matter of economic policy in weighing the costs and benefits of the patent system. By rent seeking, we mean simply that firms and individuals will invest resources to obtain patents (not just in the process of obtaining a patent but also in the research and development to make the invention). The social harm from rent seeking has been analogized by Landes and Posner to the search for lost treasure; allowing any and all parties to search for the same treasure may involve a waste of scarce resources.[14]

Rent seeking is undeniably a general problem in the economy, and not just in patents, but in relation to patents it can easily be overemphasized. In high technology industries, for example, investment in research and development is itself a major form of competition and leads directly to consumer benefits in the form of new products and lower prices. This result may be treated analytically as lower costs to the innovator but from a dynamic viewpoint may have an even more important consequence for the economy--the ability of customers to obtain

---

[10] For an article reaching the same conclusion with respect to the weaknesses of the concept of monopoly with respect to patents, but using a somewhat different line of argument, see Edmund W. Kitch, Patents: Monopolies or Property Rights, 8 Res. in Law and Econ. 31 (1986).

[11] See e.g., SCM v. Xerox Corp., 645 F.2d 1195, 1205 (2d. Cir. 1981).

[12] See the interpretation of United States v. General Electric Co., 272 U.S. 476 (1926), in Richard A. Posner, Economic Analysis of Law 292 (4th ed. 1992).

[13] See discussion infra at pp. 11–14.

[14] William M. Landes and Richard A. Posner, Trademark Law: An Economic Perspective, 30 J. Law and Econ. 265, 267-268 (1987). See also Yoram Barzel, Optimal Timing of Innovations, Rev. of Econ. and Stat., Vol. L, p. 348 (1968). A further aspect of rent seeking beyond unnecessary duplication of R&D expenditures is that the race for the patent will cause R&D expenditures to be made at a faster than optimal rate. See George S. Tolley, James H. Hodge and Mark A. Grenchik, The Economics of R&D Policy 177–78 (1985).

inputs to their own production that permit them to achieve what they could never accomplish before. The expansion of output and the reduction in price achieved through technological progress resulting from research and development may be quite remarkable, far beyond any possible social loss from rent seeking. For example, Rappaport and Halevi found that in the computer industry, as a result of "the relentless advance of its own technology," prices to end-users measured in MIPS (millions of instructions per second) fell from about $250,000 in 1980 to less than $2,500 in 1990.[15]

In some industries, moreover, the pace of research and development and the market interdependencies between inventions may be such that firms choose to cross-license their competitors. Taking the computer industry once more as an example, firms cross-license most product patents, including future patents, for an agreed period. They do so because they value freedom of action more highly than either exclusive use or royalty income. For such firms economic advantage comes directly from being the first to the market with the application of a discovery rather than from being able to exclude a competitor. Even though side payments between two computer firms based on the relative strength of their patent portfolios are common, it is hard to attach much importance to any rent-seeking "waste" resulting from the research and development competition of firms in such industries.

Finally, rent seeking stemming from the patent system should, in public policy discussions, be placed in perspective with the rent seeking that would undeniably stem from other forms of industrial policy. If government chooses to promote the fortunes of one industry, or one firm, at the expense of another through subsidies, licensing or similar interventionist policies, then rent seeking is inescapable. Moreover, the resources expended in obtaining those government benefits would be unlikely to have the dynamic benefits that one observes from competition in research and development.

Nonetheless, rent seeking is to some as yet unmeasured extent a concomitant of a patent system. As we shall see, a number of patent law doctrines have the effect of reducing rent seeking behavior.[16]

3. A third problem faced by the patent system in promoting innovation is achieving an appropriate flow of innovation over time. As we shall see, overly broad patent protection can inhibit future innovation. Therefore, it is useful to think of this third problem as seeking an economically optimal balance between

---

[15] Andrew S. Rappaport and Shmuel Halevi, The Computerless Computer Company, Harvard Business Review 69, 70 (July-Aug. 1991). For comparable data on a much earlier period and for an explanation, see Gregory C. Chow, 42 Am. Econ. Rev. 1117 (1967).

[16] See discussion infra at pp. 17–19.

innovation today and innovation tomorrow. Patent law has a number of rules that help to solve that problem.[17]

II.

Before beginning the analysis of how patent law meets the three principal problems discussed in the prior section, it is essential to make clear how patent law relies on property concepts to achieve its ends. As we shall see, the statute is clear on this point, but the Supreme Court has, from an economic point of view, somewhat muddied the property characteristics of a patent. Nonetheless, the patent system today is undeniably a property rights system.

The Patent Act straightforwardly declares that "patents shall have the attributes of personal property." Among these attributes is the right of alienation, known as assignment. As in the case with many other forms of property, there is a recording system for assignments. Failure to record makes an assignment "void as against any subsequent purchaser or mortgagee for a valuable consideration, without notice."[18]

Patents differ from many forms of property in that they come into existence through an administrative proceeding, a patent proceeding in the Patent and Trademark Office of the Department of Commerce. One seeking a patent files an application, containing a specification (describing the invention and how to make and use it) and one or more claims (pointing out and distinctly claiming the subject matter of the invention, somewhat analogous to the metes and bounds of real property).[19] The application is assigned to a patent examiner who, aided by references in the application and information in the patent office files, proceeds to examine whether the invention is entitled to a patent.[20] In applying statutory criteria for patentability, he will be interested in prior patents and other "prior art" (that is, prior sale, description in a publication and the like) that may demonstrate that the putative invention lacks novelty (i.e., is not a new invention) or would have been obvious to one skilled in the particular technical

---

[17] See discussion infra at pp. 19–20.

[18] 35 USC. §261. For precision in exposition, this article deals exclusively with U.S. patent law. While there are major differences among national patent systems, the similarities dominate over differences.

[19] 35 USC. §112. On claims drafting practice, see Robert H. Choate, William H. Francis, and Robert C. Collins (eds.), Cases and Materials on Patent Law 422-426 (3d ed. 1987).

[20] The Patent and Trademark Office is a high-volume organization. In Fiscal 1991 over 178,000 patent applications were filed and just over 100,000 patents were issued. At the end of that fiscal year the office had 1,890 patent examiners. Average "pendency time" for patent applications was about 18 months. Annual Report, Patent and Trademark Office 22 (Fiscal '91).

art or otherwise fails to meet the statutory criteria for patentability.[21] The applicant and the patent examiner will normally communicate with each other in a formal way under Patent Office procedures,[22] but the public or even other applicants in a particular field are not advised of the application by the Patent Office, either by publication or otherwise. In that sense, a patent proceeding is an ex parte proceeding and a secret one to boot.[23] However, when two patent applications conflict, an interference is declared, and a special board is invoked to deal with patentability issues and, in particular, to determine which invention has priority; in that situation, the parties to the interference become aware of the other's application.[24]

Because a patent proceeding is generally ex parte, an invention cannot normally be challenged as unpatentable except in court proceedings after issuance of the patent.[25] Normally such a challenge first arises when the patentee sues for infringement and the alleged infringer raises invalidity as a defense. And because of the ex parte character of patent proceedings, the courts have placed a high premium on not only the truthfulness of the applicant's statements but also the completeness of those statements with regard to prior art. Thus, misrepresentation by the applicant or failure to disclose material information may lead not only to the invalidity of the entire patent[26] but also an antitrust violation.[27]

Remedies for infringement of a patent are, with limited exceptions, those appropriate for property. Injunctions, both permanent and temporary, are

---

[21] 35 USC. §§ 102-103.

[22] Communication between applicant and examiner in the course of "prosecution" is normally in writing. 35 C.F.R. §1.2. After the first official action by an examiner an "interview" between a representative of the applicant and the examiner is possible. 37 C.F.R. §1.33. Telephone calls are permitted in limited situations. Manual of Patent Examining Procedure §713.01-05 (5th ed. 1989); see Donald S. Chisum, Patents, Vol. 3, §11.03[2][a](1992).

[23] Under 35 USC. §122, applications are to be kept in confidence. Even the Freedom of Information Act does not provide authority for disclosure; rather applications are materials "specifically exempted from disclosure by statute" under 5 USC. §552(b)(3). Iron & Sears v. Dann, 606 F.2d 1215 (D.C.Cir. 1979).

[24] The applicant may appeal a rejection by the examiner to a Board of Patent Appeals and Interferences within the Patent Office. On intra-Patent Office appeals and on appeals to the Federal courts, see generally Chisum, supra note 22, at Vol. 3, §11.06 (1992).

[25] Limited exceptions, beyond interference proceedings just discussed, are so-called "public use" proceedings and protests. See Chisum, supra note 22, at Vol. 3, §11.03[3].

[26] J. P. Stevens & Co. v. Lex Tex, Ltd., 747 F.2d 1553 (Fed. Cir. 1984).

[27] Walker Process Equipment, Inc. v. Food Machinery & Chemical Corp., 382 US 172 (1965).

available against infringers upon proof of validity and infringement.[28] To be sure, patents can be invalidated in a judicial proceeding if they should not have been issued by the patent office in the first place, but title to other forms of property can also be nullified in court. Further, patents can be rendered unenforceable for reasons other than that they should not have been issued; the most common example is patent misuse.[29] In any event, statutes increasingly call for forfeiture of tangible property for certain kinds of misconduct.[30] Legal differences between patents and other forms of property can therefore easily be exaggerated.

The status of a patent as property is nonetheless qualified, from an analytic point of view, by the measure of damages for infringement. The rule for damages is a mixed property and liability rule.[31] Until the Supreme Court decision in Aro Manufacturing Co. v. Convertible Top Replacement Co. ,[32] the rule was that the patentee was entitled to the infringer's profits from the infringement.[33] That was a property rule of damages. In the Aro Manufacturing case, Justice Brennan, speaking for only four members of the Court, interpreted a 1946 amendment to the Patent Act to require that the recovery be limited to the patentee's losses.[34] This limitation, in contrast, is a liability rule. No matter that neither the language of the statute nor the legislative history required this change in the law. As in other cases we shall come to, the Supreme Court found a way to limit the strength of the patent right by limiting its value in infringement litigation.

For a number of reasons, however, the Aro limitation may not be as important as the liability/property rule dichotomy might suggest. In the first place, since a patentee may seek an injunction, including a preliminary injunction pending trial, the patentee will normally be able to bring an infringer to the bargaining table where the parties will have an incentive to agree to license or even assign the patent right to the infringer if he can more efficiently exploit the patent. Of course, an action will not normally be brought until some damages have accrued, since it is through sales of an infringing product that the patentee

---

[28] See generally Chisum, supra note 22, at Vol. 5, §20.04(1992). On the requisites of an antitrust violation based on fraud on the Patent Office, see Brunswick Corp. v. Riegel Textile Corp., 752 F.2d 261 (7th Cir. 1984) (Posner, J.).

[29] See discussion infra at 14.

[30] The U.S. Criminal Code calls for forfeiture of both real and personal property which is an instrumentality in the commission of certain crimes having to do with narcotics and racketeering. 21 USC. §§853(a)(2) and 881(a)(7). See Calero-Toledo v. Pearson Yacht Co., 416 US 663 (1974), and David J. Fried, Rationalizing Criminal Forfeiture, 79 J. of Crim. Law and Criminology 328 (1988).

[31] On property and liability rules, see Guido Calebresi and A. Douglas Melamed, Property Rules, Liability Rules, and Inalienability: One View of the Cathedral, 85 Harv. L. Rev. 1089 (1972).

[32] 377 US 476 (1964).

[33] Westinghouse Elec. and Mfg. Co. v. Wagner Elec. and Mfg. Co., 225 US 604, 614 (1912).

[34] 377 US 476, 503-507 (1964).

normally learns of the infringement of a product patent; and even a temporary injunction cannot be obtained until a clear showing of validity and infringement has been made as a preliminary matter.[35]

A more important limitation on the Aro liability rule is that the statute itself and subsequent lower court, including Federal Circuit, decisions sharply limit that precedent. The statute provides that the recovery cannot be less than a reasonable royalty,[36] and the Federal Circuit has held that the infringer's anticipated profits are a factor in determining a reasonable royalty.[37] In addition, the Patent Act permits a court to award treble damages for willful infringement. While the Aro precedent can still be considered to some uncertain extent a qualification of the property rule for recovery, one can nevertheless postulate an efficiency justification for Aro. If the infringer is more efficient than the patentee, say as a manufacturer of the patented product, then in principle the former will be able to manufacture and sell, pay damages measured by the loss to the patentee, and still be ahead. Nonetheless, the Aro rule is misguided in its approach because, as noted above, the patentee's ability to seek an injunction in those circumstances would provide a basis for negotiation, and if the infringer can put the patent to more profitable use than the patentee, one can anticipate that the patentee will have an incentive to license the patent to him, making both of the parties better off.[38]

III.

---

[35] On the "clear showing" of validity and infringement required for preliminary injunctive relief, see Atlas Powder Co. v. Ireco Chemicals, 773 F.2d 1230, 1233 (Fed. Cir. 1985). On whether this newer standard is stricter than the normal Federal rule for preliminary injunctions in nonpatent matters (as was once the case), see Robert Patrick Merges, Patent Law and Practice 756-759 (1991).

[36] 35 USC. §284.

[37] TWM Mfg. Co. v. Dura Corp., 789 F.2d 895 (Fed. Cir. 1986). Moreover, the infringer's actual profits can be used to prove anticipated profits. Trans-World Mfg. Corp. v. Al Nyman & Sons, Inc., 750 F.2d 1552, 1568 (Fed. Cir.1984). Quite large damage awards have followed these developments. See Lawrence G. Kastriner, The Revival of Confidence in the Patent System, 37 J. of Pat. Off. Soc. 5, 14-15 (1991).

[38] It is by no means certain that the patentee and the infringer will actually reach agreement and certainly not that they will do so promptly. The patentee and infringer are in a position that economists refer to as "bilateral monopoly" and though both have much to gain by agreement in the situation postulated, each individually would have more to gain if he could capture a disproportionate share of the potential saving. As a consequence the negotiation between them is likely to be strenuous and complicated with a good deal of "strategic behavior," and will quite possibly in the end lead to no agreement at all, to the detriment of both. See the explicit and detailed discussion of this problem by Judge Posner in a nonpatent context involving however both a property right and an injunction in Walgreen Co. v. Sara Creek Property Co., 966 F.2d 273 (7th Cir. 1992).

Turning to the patent law's treatment of the first principal economic problem outlined above, we find that although patents are property rights, both courts and academics have been prone to refer to them as monopolies. This tendency has led to mischief in the Supreme Court,[39] but nonetheless we shall see that patent law contains a number of doctrines that limit any monopoly profits.

In analyzing the patent system, most economists, recognizing that patents are essential to stimulate innovation, have focused on the question of the optimal life of a patent. Nordhaus argued that "a longer life means that the monopoly on information lasts longer and thus there are some losses from inefficiencies associated with monopoly." He therefore sought to balance the monopoly inefficiencies with the "larger amount of output for a given level of inputs" generated by the incremental investment stimulated by a patent.[40] Other economists have pointed out that length is but one dimension of a patent and that breadth is equally important.[41]

The issue of patent length is resolved by legislation--seventeen years from date of grant.[42] This legislative limitation is cemented through the judicially created double patenting rule. When a new patent would, by overlaying an applicant's earlier patent, lead to a power to exclude that would extend beyond the seventeen years' duration of the latter, the patent application will be rejected, unless the applicant files a "terminal disclaimer" limiting the term of the new patent to the expiration date of the earlier patent. The economic purpose is to "prevent the extension of the term of a patent."[43]

Although the basic term is seventeen years, several qualifications should be noted. First, the term can be extended in certain cases where regulatory review has delayed commercial marketing of a product (as in the case of Federal Drug Administration regulation of pharmaceuticals).[44] On the other hand, rules inducing early filing of patent applications[45] may result in the patent issuing, and

---

[39] See discussion infra at pp. 21–22.

[40] William D. Nordhaus, Invention, Growth and Welfare 76 (1969). For other elaborations of the Nordhaus approach, see F. M. Scherer and David Ross, Industrial Market Structure and Economic Performance 625 n. 30 (3d ed. 1990).

[41] E.g., Richard Gilbert and Carl Shapiro, Optimal patent length and breadth, 21 RAND J. of Econ. 106 (1990); Paul Klemperer, How broad should the scope of patent protection be?, 21 RAND J. of Econ. 113 (1990).

[42] 35 USC. §154.

[43] In re Longi, 759 F.2d 887 (Fed. Cir. 1985). Terminal disclosures are provided for in the general disclaimer provisions of the Patent Act, 35 USC. §253. For more on the double patenting doctrine, see Merges, supra note 35 at 636-638.

[44] 35 USC. §156.

[45] See discussion infra at p. 18.

hence the term beginning to run, well before the patentee has developed a commerciably viable product, thereby de facto shortening the period in which the product is protected.[46] This latter limitation on de facto length is of major practical importance because many fundamental patents are not successfully commercialized for a decade or even substantially longer after issuance.[47]

Unlike the patent length issue, the breadth issue is not addressed explicitly in the Patent Act. Rather it is resolved by the courts implicitly in interpreting a particular patent's claims and in giving content to a variety of patent law doctrines. One of those doctrines is the doctrine of equivalents, which permits an action for infringement in limited circumstances even though no literal infringement of the claims as written has occurred.[48] This doctrine, which finds infringement where a device "performs substantially the same function in substantially the same way to obtain the same result"[49] as a patented device, is designed to deal with "competitors who appropriate the essence of an invention while barely avoiding the literal language of the claims."[50] The doctrine of equivalents cannot be used, however, to include what would not have been patentable.[51] On the contrary, its main effect from the standpoint of breadth is to give broad scope to pioneer inventions while limiting the scope of mere improvements.[52]

This first set of doctrines is patent law's answer to those who object that although a power to exclude may be justified for a major invention, there is no reason to grant seventeen years of monopoly profits to one who invents something that would have been invented anyway by someone else in a few

---

[46] Because of the disclosure requirements discussed infra at p. 20, competitors are likely to be in the position to market a competing product immediately upon expiration of the legal term. Where regulatory testing would be required, the competitor is even entitled under 35 USC. §271(e)(1) to make, use and sell even during the patent period in order to obtain regulatory approval to compete immediately after expiration of the statutory period. Eli Lilly and Co. v. Medtronic Inc., 496 US 661 (1990).

[47] See Edmund W. Kitch, The Nature and Function of the Patent System, 20 J. of L. and Econ. 265, 272 (Table I) (1977).

[48] See generally Robert P. Merges & Richard R. Nelson, On the Complex Economics of Patent Scope, 90 Col. L. Rev. 839 (1990).

[49] Sanitary Refrigerator Co. v. Winters, 280 US 30, 42 (1929).

[50] London v. Carson Pirie Scott & Co., 946 F.2d 1534, 1538 (Fed. Cir. 1991).

[51] Wilson Sporting Goods Co. v. David Geoffrey & Associates, 904 F.2d 677 (Fed. Cir. 1990). The doctrine of equivalents cannot, for example, extend the scope of protection "to encompass anything in the prior art," Senmed, Inc. v. Richard-Allan Medical Industries, Inc., 888 F.2d 815, 821 (Fed. Cir. 1989), or to grant protection encompassing a claim surrendered in Patent Office proceedings, see Biodex Corp. v. Loredan Biomedical, Inc., 946 F.2d 850, 862-863 (Fed. Cir. 1991).

[52] Hughes Aircraft Co. v. United States, 717 F.2d 1351, 1362 (Fed. Cir. 1983). See discussion in Chisum, supra note 22, at Vol. 4, §18.04[2}; and Merges, supra note 35, at 699–705 (1992).

years. As we have just seen, patent law does in fact make a major distinction between landmark inventions and lesser inventions. To be sure, the distinction operates on the breadth rather than the length dimension of the patent grant. But patent length is prescribed by statute, and what is remarkable is that patent law doctrine achieves a somewhat similar result by operating on the dimension open to it--breadth.[53]

A second set of doctrines serves to restrict de facto breadth to allow for innovations that might be thought to be governed by the literal claims of a prior patent. For example, the doctrine of equivalents just considered may also operate in reverse to narrow scope where "a device is so far changed in principle from a patented article that it performs the same or a similar function in a substantially different way." [54] Similarly, new and nonobvious uses of a known product may be patentable as a process patent,[55] thereby de facto limiting the scope of an existing product patent so that it does not, in the circumstances, deter innovation.[56] Still another example is that an inventor who improves upon a prior patented innovation may be entitled to an improvement patent on the subject matter of an existing patent.[57] The second patentee may not be able to exploit the improvement patent without a license from the first patentee, but neither can the first patentee use the improvement without a license from the

---

[53] A critic might still object that although the amount of "monopoly profits" (determined by length times breadth) may be reduced by a roughly comparable amount by the pioneer versus lesser invention distinction described in the text, it is still wrong to exclude competitors for the full seventeen year term. This emphasis on length of protection perhaps arises from the classroom tendency to focus on one invention and one patent at a time. If the invention is indeed a minor one, in the sense that it was going to occur in a few years anyway, then it is likely that coming along behind it in another few years is another invention and, on the assumption that the first patent results in monopoly profits, the second patent is likely to displace the first from the market or at least to deprive the first of monopoly profits during the remainder of the nominal seventeen year term. (Of course, minor innovations--whether the first or the second--are more likely to run afoul of the nonobviousness requirement of 35 USC. §103 and thereby to be unpatentable.) In short, another way of looking at the relation between patent term and monopoly profits is that the seventeen year term is a legal concept, not necessarily an economic reality.

[54] Graver Tank & Mfg. Co. v. Linde Air Products Co., 339 US 605, 608 (1950). Indeed, new and unobvious uses of a known product may be patentable as a process patent, Chisum, supra note 22, at Vol. 1, §1.03[8], thereby limiting the scope of an existing product patent so that it does not, in the circumstances, deter innovation. See Merges, supra note 35, at 154 (1992).

[55] 35 U..S.C. §100(b). See Chisum, supra note 22, at Vol. 1, §1.03[8] (1992).

[56] Merges, supra note 35, at 154 (1992), gives as a hypothetical example a patented leather tanning compound that turns out to be an effective anti-AIDS drug. Not only can the discoverer of the new use obtain a process patent, thereby advancing innovation, but the existing product patentee gains as well because a product patent license must be obtained to practice the process. Id. at 154. See note 58 infra and accompanying text.

[57] 35 USC. §101.

improvement patentee. A likely result of this mutual blocking situation is a negotiation to allow both patents to be used.[58]

A third set of doctrines may be applied to reduce monopoly profits wherever they may be thought to exist. While leaving length at seventeen years and not formally touching breadth, they nevertheless restrict use of any monopoly power. The rules dealing with price-fixing, tie-ins, and the like cluster under the banner of patent misuse.[59] Because patent misuse has become de facto a branch of antitrust law,[60] its impact goes well beyond the scope of this article, but there is no doubt that many concerns, real and imagined, about monopoly arising from patents can be addressed by the misuse doctrine.

A final set of doctrines may be considered as narrowing the breadth of patents, albeit in an extreme sense. These are the doctrines that lead to no patent being issued: novelty, utility and nonobviousness.[61] Referring to these doctrines as limiting patent breadth might be thought a semantic trick, since denial of a patent would be equated to zero breadth. However, these same doctrines can be used to invalidate only certain claims in a patent, thereby limiting its scope to what is truely new, useful and not obvious to one skilled in the art. When so used, these doctrines thus reduce the scope of any resulting monopoly.

IV.

We have already seen that monopoly is a confusing concept when applied to patents because the grant of a patent need not lead to a monopoly in the sense of market power. We have also seen that economic rent is a more useful concept

---

[58] See discussion in Merges, supra note 35, at 724–30 (1992).

[59] That the patent misuse doctrine may reduce a patentee's profit is not to say that this is a wise use of the doctrine in every case. Take the case of tie-ins, which are often analyzed as a method of price discrimination and practiced by a patentee because they are in the circumstances the least expensive method of discrimination available to him. See, e. g., Richard A. Posner and Frank H. Easterbrook, Antitrust 802-806 (2d ed. 1981). Since "there is no prohibition against a patent owner's using price discrimination to maximize his income from the patent," USM Corp. v. SPS Technologies, Inc., 694 F.2d 505 (7th Cir. 1982), it makes little sense to prohibit the practice through the indirect technique of a tie-in.

[60] A great overlap betwen the patent misuse doctrine and the antitrust doctrine of the same name should not obscure the fact that the patent doctrine "arose before there was any significant body of antitrust law, and reached maturity long before that law...attained its present broad scope." MSM Corp. v. SPS Technologies, Inc., 694 F.2d 505, 510 (7th Cir. 1982) (Posner, J.).

[61] 35 USC. §101 ("useful"), §102 ('Novelty"), and §103 ("Non-Obvious Subject Matter"). For an introductory treatment, see Donald S. Chisum and Michael A. Jacobs, Understanding Intellectual Property Law §2C[2]-[4] (1992).

than monopoly. A strong theme in the law and economics literature is that rent seeking is primarily wasteful and should be minimized.

In considering how the rent seeking minimization approach applies in the patent context, it is worth keeping in mind several considerations. In particular, the implication that rent is all waste is wide of the mark. Economic rent is the price paid by the patent system to deal with the appropriability problem. In the context of the normal classroom case of one invention covered by one patent, the patent is a necessary institution to induce the R&D investment necessary for the invention and therefore economic rent is inescapable.[62] Moreover, when one thinks of patent law as a form of industrial policy and is therefore concerned with R&D activities of firms and industries within the economy, several practical observations sets the rent seeking analysis in a more realistic context than the typical classroom discussion.

In industry, and particularly in high-technology industry, a steady stream of R & D investments is required if a firm is to remain in business. Long-run marginal cost for its innovations is definitely positive, and it must price products, patented or not, to recover this cost over time. Conceptually this is the same point as in the one-invention, one-patent case, but the impact of the absence of patent protection on R&D expenditures is more intuitively obvious, in part perhaps because certain widely-held assumptions about a lone inventor's non-monetary motivations no longer intrude on the discussion. The industrial model also highlights the fact that the classroom assumption of zero marginal costs after invention gives a truncated picture of the industrial nature of innovation. Many companies have found the cost of communicating the actual information necessary to move an invention out of the laboratory and onto the factory floor and from there to the marketplace to be high indeed, sometimes prohibitively high.[63] At a theoretical level one may avoid this practical complication by saying that it is unpatentable know-how that is the costly thing to communicate (as opposed to the abstract invention, which remains costless to communicate). But the fact is that many companies spend a great deal of money trying to reduce a patented invention to a marketable product.

In any case, taking the issue presented in economics discussions as applicable in important cases, the rent-seeking problem is how to avoid a waste of resources as economic actors compete to obtain an exclusive right to collect

---

[62] See discussion supra at pp. 1 and 3–4.

[63] For management perspectives on the difficulties of bridging the gulf between R&D and success in product markets, see John Seely Brown, Research that Reinvents the Corporation, 69 Harv. Bus. Rev. 102 (1991); William Taylor, The Business of Innovation, 68 Harv. Bus. Rev. 97 (1990); T. Michael Nevens, Gregory L. Summe, and Bro Uttal, Commericalizing Technology: What the Best Companies Do, 68 Harv. Bus. Rev. 154 (1990).

economic rent. Expenditures to obtain a valuable patent right can take two main forms, expenditures of resources in the patenting process itself and R&D expenditures.

With respect to the costs of the patenting process, these are on the whole an inevitable cost of the administration of a particular property rights system, analogous to a registration system for other kinds of property or the use of the court system to enforce property rights. In fact, where the right to the patent is clear and there are no interference proceedings within the patent office, the cost per patent is relatively modest.[64] Where substantial costs arise is where there is a dispute over the infringement of patents. Most of these costs are part and parcel of a more general problem of the high costs of litigation, especially in the United States, and are not peculiar to patents.[65] Land too may cost nothing to produce, but litigation over boundaries or title may be equally expensive where the stakes are high.

As to the second aspect of waste from rent seeking, duplication of R&D expenditures as parties race for the Holy Grail of a patent, the law has crafted a number of doctrines that work to minimize such expenditures. Before examining those doctrines, however, it is well to note that rent seeking is to some extent another word for competition. Firms within an industry compete through research and development. In a number of industries as much as 10 percent or sometimes considerably more of sales may be devoted to product and process innovation. Indeed, many resulting innovations do not lead to patents. Trade secret protection plays some role, but much innovative activity receives its business justification simply by permitting the firm to reach the market first with a product (or in most industries a new feature of an established product); other firms are sure to follow but only after the time required for copying or reverse engineering.

Yet even if all R&D were to be eventually encapsulated in patents, it would not follow that all duplicative R&D should be considered wasteful. By analogy, we do not normally consider the opening of a new gasoline station or grocery store near an existing one to be an example of waste, or at least not one with which public policy should be concerned, even though we believe that only one

---

[64] Patent Office fees have risen, however, as the Patent Office has become fully user-fee funded. Patent and Trademark Office, Annual Report 2 (Fiscal '91). The fee structure is complicated but in the simplest case involves a $690 filing fee and a $1130 issuance fee (less for small entities). 37 C.F.R. §§1.16, 1.18. The introduction of periodic maintenance fees, at an escalating rate, for maintaining an issued patent in force also plays a role. 37 C.F.R. §1.20. Of course, these fees may be dwarfed by legal costs in drafting the claims and prosecuting the patent, not to speak of enforcing it subsequently against infringers if legal action is necessary.

[65] Report of the Advisory Comm. on Patent Law Reform 75-80 (1992).

can survive and we know that some economic rent of location may accrue to the survivor. Rather we consider the competition induced by the new entrant to lead to a better outcome than would accrue through legal protection of the existing firm. So too we cannot have much confidence that some of the natural alternatives to competition in R&D would increase social welfare. One could, for example, use competitive bidding to choose the semiconductor firm to develop the next generation of computer memory chips and thereby capture any economic rents from patents derived. Or a government agency could simply contract, after competitive bidding, for delivery of a drug yet to be discovered with specified desirable medicinal properties (by analogy to military procurement contracts calling for delivery of aircraft with as yet unattained performance characteristics).

Both of these examples involve competitive bidding, which is normally a superior method of dealing with economic rent consequences of allocating scarce rights.[66] But competitive bidding suffers from two possible infirmities in innovation situations: the difficulty of defining exactly what it is that is to be allocated exclusively (since we cannot easily define an invention before it has occurred) and the likelihood of a great deal of rent seeking in the form of efforts to influence governmental choice (witness defense contracting in the United States). Hence, when we consider the alternatives, it seems unwise to condemn competitive R&D as undesirable rent seeking.

Recognizing then that rent seeking can be exaggerated as a problem, it is worth remarking how patent law limits rent seeking without notably discouraging desirable competitive R&D activities. The patent issuance system itself has the effect of transmitting knowledge that a new patent has been issued and that, the scope of the invention having been captured, R&D of other firms can be terminated or redirected. Moreover, the disclosure required in a patent application, once made public by the issuance of the patent, may convey important technical information that will allow other firms to climb onto the patentee's shoulders in seeking improvements or wholly new inventions.

An entirely different approach to reducing rent seeking is to be found in the nonobviousness requisite. Because this statutory requirement eliminates patents on low-contribution discoveries, it thereby eliminates one form of competition that may be considered wasteful.[67] After all, a patent on something obvious may

---

[66] See the analysis of the allocation of rights to exploit publicly owned resources in Kenneth W. Dam, Oil Resources (1976).

[67] Edmund W. Kitch, Graham v. John Deere Co.: New Standard for Patents, 1966 Sup. Ct. Rev. 293. I use the term "low contribution" rather than "low cost" because the nonobviousness requirement is not concerned with the costs incurred by the patent applicant in coming up with the putative invention. What counts is whether the contribution made to the economy is sufficient

nonetheless be worth a great deal due to the power to exclude others. And the very obviousness of the invention may lead a correspondingly large number of inventors to seek the prize of a patent.

Other doctrines of patent law bear on rent seeking. For example, rules favoring early applications for patents tend to reduce rent seeking by inducing early elimination or redirection of R&D by rival firms upon issuance.[68] Rules on priority of invention provide an incentive for early filing. Under U.S. law one who invents first (the "senior inventor") may lose priority, and hence the patent, to one who invents later (the "junior inventor") if the senior inventor deliberately suppresses or conceals the invention; indeed, mere passage of time has been held to give rise to an inference of deliberate suppression or concealment.[69] Countries that use the first-to-file rather than the first-to-invent rule in force in the United States even more vigorously discourage wasteful rent-seeking by promoting earlier filing, albeit perhaps creating other problems.[70]

Another characteristic of the patenting process also permits rent seeking longer than might be desirable from an economic perspective. That is the secrecy of the application and patent office review process.[71] The primary purpose of secrecy, which has been said to be "close to the core of the patent system," is to avoid deterring inventors "from seeking patent protection in the first place" and opting for trade secret protection.[72] Since rival firms will not normally know, or at least often cannot be sure, that a patent application has been filed, they may be inclined to continue R&D even though they will later learn, on issuance of the patent, that they should have ceased or redirected their R&D efforts. Of course, a firm may issue a press statement on a new invention, indicating that a patent

---

to substain patentability. To say that the putative invention is obvious is to say that the contribution is deemed inadequate.

[68] See Kitch, supra note 47 at 269–70.

[69] Peter D. Rosenberg, Patent Law Fundamentals, Vol. 2, §10.04[4]. Similarly, the rule barring patentability of inventions that have been in public use or on sale for more than one year also discourages delayed patenting. 35 USC. §102(b).

[70] See Gregory J. Wrenn, What Should Be Our Priority—Protection for the First to File or the First to Invent?, 72 J. of Pat. Off. Soc. 872 (1990). A central problem created by a first-to-file system from an economic viewpoint would likely be less disclosure in the patent itself, say with respect to "best mode," because the applicant might feel forced to file without taking time to determine how best to use the invention. See discussion of the economic function of enablement and best mode disclosure infra at 20. It is possible to combine a first-to-file system with delayed disclosure mandated as a condition of final issuance of the patent, thereby seeking the "best of both worlds." See Report of Advisory Comm. on Patent Law Reform 53 (1992), which recommended however abolishing the best mode requirement. See also Report of President's Comm. on the Patent System, "To Promote the Progress of...useful Arts" 8–9 (1966).

[71] 35 USC. §12.2.

[72] Iron & Sears v. Dann, 606 F.2d 1215, 1221 (D.C. Cir. 1979).

application has been filed or shortly will be filed, and many firms place "patent pending" notices on new products, thereby tending to reduce rent seeking by others.[73]

Whether secrecy is thus a significant contributor to rent seeking is uncertain. If secrecy is judged to create such a problem, one possible solution would be to publish applications as advice to rival R&D organizations so that they could assess the likelihood of patent issuance and then cease or redirect R&D expenditures, thereby reducing waste. It seems likely, however, that such a procedural change would lead to either a formal or informal pre-grant opposition practice before the patent examiner. Such pre-grant opposition might stimulate rent-seeking in the form of legal expenditures to block patent grants but without necessarily reducing rival R&D expenditures wherever there was a question about the patentability of the putative invention.[74]

V.

A patent system operates over time. To be an efficient system it must optimize the flow of innovation over time. The patent system must thus balance innovation today against innovation tomorrow. This objective is complementary to the objective of reducing rent seeking. A patent system should not only avoid wasteful competitive R&D but it should also avoid encroaching on future R&D that is socially desirable.

Patent law does indeed contain a number of rules that, balancing innovation today against innovation tomorrow, limit the encroachment on future R&D. Most obvious are those rules--novelty and nonobviousness--that limit the scope of the patent to what has actually been invented. Rules that would allow the

---

[73] The legal function of a "patent pending" notice is murky. Although 35 U..S.C. §287 makes the marking of a patented article a prerequisite to the recovery of damages against an infringer who does not have actual notice of the patent, a "patent pending" notice does not accomplish the statutory result. State Industries, Inc. v. A. O. Smith, 751 F.2d 1226, 1236 (Fed. Cir. 1985). At most such a notice constitutes notice that "the marked articles...may be subject to incohate patent rights and future protection." Conopco, Inc. v. May Dep't Stores Co., 784 F. Supp. 648, 675 (E.D. Mo. 1992). See however an older case, Steinhal v. Arlington Sample Book Co., 94 F.2d 748 (3d Cir. 1938). Thus, a "patent pending" notice is today more a commercial than a legal instrument.

[74] In Japan the requirement of disclosing patent applications leads to pre-grant opposition in numerous cases, see Janusz A. Ordover, A Patent System for Both Diffusion and Exclusion, 5 J. of Econ. Perspectives 43, 45–46 (1991). A recent Advisory Commission reporting to the Secretary of Commerce, although recognizing that publication is sometimes unduly delayed, resisted shortening the period beyond 24 months from filing. Advisory Comm. on Patent Law Reform 61–62 (1992). From the standpoint of discouraging rent seeking, publication of applications is in a sense a half-way house to a first-to-file system, discussed supra at 18.

patent to reach beyond the inventor's contribution would discourage innovation by others in the intervening area.[75]

Professor Kitch has pointed out that at least with respect to so-called pioneer inventions a patent may extend beyond what the inventor has actually reduced to practice. Kitch argues that this "prospecting function" of the patent system is desirable because it leads to more efficiency in investment subsequent to patent issuance through exclusive ownership of the right to exploit the invention, including the power to organize industry-wide exploitation through licensing.[76] Kitch's thesis in this respect has been criticized as not representing the reality of patent law and practice.[77]

Whatever the merits of the dispute between Kitch and his critics, it is important that the line between the patented and the unpatented be clearly demarcated in the patent itself, rather than being left to future litigation, so that a green light is given to R&D beyond that line. The patent system accomplishes this result not only by complex rules that have been worked out about what can and cannot be claimed but also by the craft of patent lawyers who have developed the skill of drafting so that the claims cover what is intended, no more and no less.

In a number of smaller ways the patent system avoids unduly inhibiting innovation over time. Since most scientists and engineers do their R&D work without patent lawyers at their sides, their normal work should not be hampered by unexpected patents. In this respect the nonobviousness requirement plays an important prophylactic role. It sharply limits littering of the innovation landscape with land mines consisting of patents on what those skilled in the trade would assume to be in the public domain.

Another way in which the patent system promotes future innovation is through public disclosure. Upon issuance, a patent communicates a considerable amount of information that can help other would-be inventors including rival firms. Beyond the patent claims, which may speak volumes to those skilled in the art, the requirement that the disclosure be enabling--that is, that it enable one skilled in the art to make and use the invention[78]--normally assures that the

---

[75] On the other hand, too narrow protection could lead inventors to choose trade secret as opposed to patent protection, thereby adversely affecting subsquent innovation. Suzanne Scotchmer, Standing on the Shoulders of Giants: Cumulative Research and the Patent Law, 5 J. of Econ. Perspectives 29, 39 (1991).

[76] Kitch, supra note 47, at 275-280, 285–86.

[77] Roger L. Beck, The Prospect Theory of the Patent System and Unproductive Competition, 5 Res. in Law and Econ. 193 (1983); Rebecca S. Eisenberg, Patents and the Progress of Science, 56 U. Chi. L. Rev. 1017, 1042 n. 108, 1043 n. 114 and n. 117 (1989).

[78] 35 USC. §112.

patent document is not so abstract as to be useless to the skilled reader.[79] Finally, the further requirement that the specification state the "best mode contemplated by the inventor of carrying out his invention" carries the disclosure further in a way that may push practical technical knowledge ahead more rapidly than would otherwise be the case and promote invention by others.[80]

VI.

An important part of the argument above is that the courts have done a reasonably good job, consciously or unconsciously, of applying an economic approach in patent cases. It was not always so.

U.S. patent law has developed over two centuries. For a dozen or more decades it was a specialized field, treated with respect by courts of general jurisdiction, which did not challenge its basic precepts. One can read Nineteenth Century patent cases, even of the Supreme Court, with the sense that the courts were dealing with a subject akin to private law, recognizing perhaps that patents were property rights.

In the Twentieth Century, however, the Supreme Court began to treat patent law issues as public policy issues. More specifically, the Court viewed patent law as public law in which it should fashion new rules to achieve what it considered desirable public policy goals. This attitude shows up most strongly in antitrust cases. Here the confusion between patents and monopolies was the core of the problem.

The formula that a patent is a monopoly shows up repeatedly in Supreme Court antitrust cases.[81] To be sure, the Court recognized as early as the 1958

---

[79] The judicially developed doctrine that a person skilled in the art must be able to make or use the invention without undue experimentation, In re Vaeck, 947 F.2d 488 (Fed. Cir. 1991), also appears calculated to avoid wasteful R&D expenditures.

[80] 35 USC. §112; see Imperial Chemical Industries v. Barr Laboratories, 795 F.Supp. 619, 625 (S.D.N.Y. 1992) (through the enablement and best mode requirements "the public benefits by the advance of science and the useful arts"). For a thoughtful criticism of the best mode requirement, suggesting that the "subjective" quality of the requirement leads to litigation costs exceeding disclosure value, see Report of the Advisory Commission on Patent Law Reform 100-103 (1992) On the important issue of when follow-on improvements should be patentable, especially to the extent that the enablement and best mode disclosures of the prior patent foreshadow the improvement, see the "signaling" discussion in Mark F. Grady and Jay I. Alexander, Patent Law and Rent Dissipation, 78 Va. L. Rev. 305 (1992), and Robert L. Merges, Rent Control in the Patent District, 78 Va. L. Rev. 359, 360-365 (1992).

[81] International Salt Co. v. United States, 332 US 392, 395 (1947): ("The...patents confer a limited monopoly...."); Morton Salt Co. v. G. S. Suppinger Co., 314 US 488, 491 (1942) ("[R]espondent is making use of its patent monopoly....") See also Zenith Radio Corp. v. Hazeltine Research, Inc., 395 US 100, 135-136 (1969).

Northern Pacific case that "it is common knowledge that a patent does not always confer a monopoly over a particular commodity."[82] But even after Northern Pacific antitrust policy hostility to patents continued in the Supreme Court to as late as 1984, when it warned against "[a]ny effort to enlarge the scope of the patent monopoly by using the market power it confers to restrain competition in the market for a second product...."[83]

If this hostility had been limited to antitrust cases, it might not have been so serious because "the patent equals monopoly" formula tended to be used to bolster a per se approach to tie-ins and more generally to provide a base for the now heavily discredited leverage theory.[84] The same hostility toward patents was to be found, however, in patent validity cases as well. The concurring opinion of Justice Douglas in the Supermarket case is an example, perhaps extreme:

> Every patent is the grant of a privilege of exacting tolls from the public....Congress never sanctioned the patenting of gadgets....The fact that a patent as flimsy and as spurious as this one has to be brought all the way to this Court to be declared invalid dramatically illustrates how far our patent system frequently departs from the constitutional standards which are supposed to govern.[85]

The Court's hostility to patents was so great that Justice Jackson was led to complain that "the only patent that is valid is one which this Court has not been able to get its hands on."[86] The Court operationalized this hostility in patent (as opposed to antitrust) cases not through a monopoly analysis as such but rather through the technique of raising the standard of invention by importing such exotic standards as "the flash of creative genius" test.[87] But when legislation eliminated such tests in favor of a simpler and easier to meet "nonobviousness"

---

[82] Northern Pacific Railway Co., v. United States, 356 US 1, 10 n. 8 (1958).

[83] Jefferson Parish Hospital District No. 2 v. Hyde, 466 US 2, 16 (1984).

[84] On the shortcomings of the leverage theory, see Richard A. Posner, Antitrust Law 172-174 (1973); Ward S. Bowman, Jr., Tying Arrangements and the Leverage Problem, 67 Yale L.J. 19 (1947). But see the effort to rehabilitate the leverage theory in part in Louis Kaplow, Extension of Monopoly Power through Leverage, 85 Col. L. Rev. 515 (1985).

[85] A. & P. Tea Co. v. Supermarket Equipment Corp., 340 US 147, 154, 155, 158. The Douglas opinion reveals that he thought that patents had to "serve the ends of science" by "making a distinctive contribution to scientific knowledge." Id. at 154 Douglas apparently overlooked the Constitutional purpose of advancing the "useful Arts."

[86] Jungersen v. Ostby & Barton Co., 335 US 560, 571, 572 (dissenting opinion).

[87] Cuno Engineering Corp. v. Automatic Devices Corp., 314 US 84, 91 (1941).

test in 1952,[88] the federal courts, following the Supreme Court's leadership, continued to invalidate the majority of patents arising in infringement litigation.[89]

The establishment of the Federal Circuit in 1982 through legislation created a new framework for the administration of the patent laws. In lieu of patent cases coming before the various unspecialized regional federal Courts of Appeals, a new specialized federal appellate court, the Court of Appeals for the Federal Circuit, was established.[90] In general, it was granted exclusive authority over, among other things, patent appeals from Federal district courts as well as from the Board of Patent Appeals and Interferences of the Patent Office.[91]

The creation of the Federal Circuit put an end to Supreme Court-created irrationalities in the patent laws in several ways. First, the legislation, by eliminating most opporunities for a conflict in circuits, did away as a practical matter with Supreme Court jurisdiction in patent cases.[92] Second, the Federal Circuit, which thereby became effectively the final voice on patent law, resisted the monopoly characterization of patents, even in the antitrust context. Early in its life it declared unequivocally, "The patent system, which antedates the Sherman Act by a century, is not an 'exception' to the antitrust law, and patent rights are not *legal monopolies* in the antitrust sense of that word."[93] Today the unchallenged leadership of the Federal Circuit, as the highest patent court of the land, has led not only to greater respect for patents and a higher percentage of validity judgments in favor of patentees but also less of a gun-slinging attitude toward patent issues.[94]

---

[88] See the addition in 35 USC. §103 of a sentence stating: "Patentability shall not be negatived by the manner in which the invention is made."

[89] Lawrence Baum, The Federal Courts and Patent Validity: An Analysis of the Record, 56 J. of the Pat. Off. Soc. 758, 760-762 (1974).

[90] Federal Courts Improvements Act of 1982, P.L. 97-164, 96 Stat. 25 (1982). For a general review of the role and performance of the Federal Circuit, see Rochelle Cooper Dreyfus, The Federal Circuit: A Case Study in Specialized Courts, 64 N.Y.U.L.Rev. 1 (1989). For a detailed analysis of the Federal Circuit's decisions, see Robert L. Harmon, Patents and the Federal Circuit (2d ed. 1991).

[91] For details, see Robert L. Harmon, Patents and the Federal Circuit 495–554 (2d ed. 1991).

[92] With exclusive appellate review of patent cases in the Federal Circuit, a split in circuits on a patent issue is unlikely.

[93] American Hoist & Derrick Co. v. Sowa & Sons, 725 F.2d 1350, 1367 (Fed. Cir. 1984) (emphasis in original). In Abbott Laboratories v. Brennan, 952 F.2d 1346, 1355 (1991), the Federal Circuit held that a patent gave rise to no "presumption of market power." The Justice Department has accepted the Federal Circuit's approach in this respect. See the Antitrust Division's Antitrust Enforcement Guidelines for Int'l Operations §3.6 (1988).

[94] See generally Ronald B. Coolley, What the Federal Circuit Has Done and How Often, 71 J. of Pat. Off. Soc. 385 (1989); Kastriner, supra note 37.

On the other hand, the Federal Circuit has tended to take a narrow technical view in its opinions, thereby masking the policy issues at stake. Economic considerations seldom emerge on the surface of the reported opinions.[95] Yet the economic considerations underlying patent doctrines need not be stated in technical economic terms. For example, in the recent ICI case, the Southern District of New York made clear in simple and straightforward language the economic role of the enablement and best mode requirements in balancing innovation today against innovation tomorrow: "One of the main reasons for the Patent Code is to encourage inventors to make the necessary disclosures to permit others to advance the art; inventors may not keep secret information intended for that purpose."[96]

Because patent law is so crucial to the economic system and because patent doctrines play such an important role in shaping how patent law promotes innovation while minimizing problems associated with the power to exclude, the economic role of patent law deserves greater attention from the courts. Although the Federal Circuit is by design a specialized court, we can anticipate that that court will become more explicit about the economic underpinnings of patent doctrines. At a time when public focus on technology and the role of government in promoting it has never been higher, it would serve neither the patent system nor public policy toward technology to obscure the role of the patent system in a thicket of technical patent law rules unapproachable by those unskilled in that arcane art.

---

[95] An exception, and in any event limited to a standing issue on appeal from a District Court case, is Animal Legal Defense Fund v. Quigg, 932 F.2d 920, 934–35 (Fed. Cir. 1991) For another exception see also a trademark case involving antitrust counterclaims, US Philips Corp. v. Windmere Corp., 861 F.2d 695 (Fed. Cir. 1988). See also the reference to In re Longi, supra at note 43.

[96] Imperial Chemical Industries v. Barr Laboratories, 795 F.Supp. 619, 621 (Fed. Cir. 1992). Simple as this formulation is, the economic purpose of permitting others to innovate is rarely advanced as a purpose of the best mode requirement. See, e.g., the exhaustive article by Kenneth R. Adams, What's Better, What's Best–The Best Mode Requirement in U.S. Patent Practice, 73 J. of Pat. Off. Soc. 811 (1991), esp. at 812–13.

Readers with comments should address them to:

Kenneth W. Dam
Max Pam Professor of American and Foreign Law
University of Chicago Law School
1111 East 60th Street
Chicago, IL 60637

Chicago Working Papers in Law and Economics
(Second Series)

1. William M. Landes, Copyright Protection of Letters, Diaries and Other Unpublished Works: An Economic Approach (July 1991).
2. Richard A. Epstein, The Path to *The T. J. Hooper*: The Theory and History of Custom in the Law of Tort (August 1991).
3. Cass R. Sunstein, On Property and Constitutionalism (September 1991).
4. Richard A. Posner, Blackmail, Privacy, and Freedom of Contract (February 1992).
5. Randal C. Picker, Security Interests, Misbehavior, and Common Pools (February 1992).
6. Tomas J. Philipson & Richard A. Posner, Optimal Regulation of AIDS (April 1992).
7. Douglas G. Baird, Revisiting Auctions in Chapter 11 (April 1992).
8. William M. Landes, Sequential versus Unitary Trials: An Economic Analysis (July 1992).
9. William M. Landes & Richard A. Posner, The Influence of Economics on Law: A Quantitative Study (August 1992).
10. Alan O. Sykes, The Welfare Economics of Immigration Law: A Theoretical Survey With An Analysis of U.S. Policy (September 1992).
11. Douglas G. Baird, 1992 Katz Lecture: Reconstructing Contracts (November 1992).
12. Gary S. Becker, The Economic Way of Looking at Life (January 1993).
13. J. Mark Ramseyer, Credibly Committing to Efficiency Wages: Cotton Spinning Cartels in Imperial Japan (March 1993).
14. Cass R. Sunstein, Endogenous Preferences, Environmental Law (April 1993).
15. Richard A. Posner, What Do Judges and Justices Maximize? (The Same Thing Everyone Else Does) (April 1993).
16. Lucian Arye Bebchuk and Randal C. Picker, Bankruptcy Rules, Managerial Entrenchment, and Firm-Specific Human Capital (August 1993).
17. J. Mark Ramseyer, Explicit Reasons for Implicit Contracts: The Legal Logic to the Japanese Main Bank System (August 1993).
18. William M. Landes and Richard A. Posner, The Economics of Anticipatory Adjudication (September 1993).
19. Kenneth W. Dam, The Economic Underpinnings of Patent Law (September 1993).
20. Alan O. Sykes, An Introduction to Regression Analysis (October 1993).
21. Richard A. Epstein, The Ubiquity of the Benefit Principle (March 1994).
22. Randal C. Picker, An Introduction to Game Theory and the Law (June 1994).
23. William M. Landes, Counterclaims: An Economic Analysis (June 1994).
24. J. Mark Ramseyer, The Market for Children: Evidence from Early Modern Japan (August 1994).
25. Robert H. Gertner and Geoffrey P. Miller, Settlement Escrows (August 1994).

26. Kenneth W. Dam, Some Economic Considerations in the Intellectual Property Protection of Software (August 1994).
27. Cass R. Sunstein, Rules and Rulelessness, (October 1994).
28. David Friedman, More Justice for Less Money: A Step Beyond *Cimino* (December 1994).
29. Daniel Shaviro, Budget Deficits and the Intergenerational Distribution of Lifetime Consumption (January 1995).
30. Douglas G. Baird, The Law and Economics of Contract Damages (February 1995).
31. Daniel Kessler, Thomas Meites, and Geoffrey P. Miller, Explaining Deviations from the Fifty Percent Rule: A Multimodal Approach to the Selection of Cases for Litigation (March 1995).
32. Geoffrey P. Miller, Das Kapital: Solvency Regulation of the American Business Enterprise (April 1995).
33. Richard Craswell, Freedom of Contract (August 1995).
34. J. Mark Ramseyer, Public Choice (November 1995).
35. Kenneth W. Dam, Intellectual Property in an Age of Software and Biotechnology (November 1995).
36. Cass R. Sunstein, Social Norms and Social Roles (January 1996).
37. J. Mark Ramseyer and Eric B. Rasmusen, Judicial Independence in Civil Law Regimes: Econometrics from Japan (January 1996).
38. Richard A. Epstein, Transaction Costs and Property Rights: Or Do Good Fences Make Good Neighbors? (March 1996).
39. Cass R. Sunstein, The Cost-Benefit State (May 1996).
40. William M. Landes and Richard A. Posner, The Economics of Legal Disputes Over the Ownership of Works of Art and Other Collectibles (July 1996).
41. John R. Lott, Jr. and David B. Mustard, Crime, Deterrence, and Right-to-Carry Concealed Handguns (August 1996).
42. Cass R. Sunstein, Health-Health Tradeoffs (September 1996).
43. G. Baird, The Hidden Virtues of Chapter 11: An Overview of the Law and Economics of Financially Distressed Firms (March 1997).
44. Richard A. Posner, Community, Wealth, and Equality (March 1997).
45. William M. Landes, The Art of Law and Economics: An Autobiographical Essay (March 1997).
46. Cass R. Sunstein, Behavioral Analysis of Law (April 1997).
47. John R. Lott, Jr. and Kermit Daniel, Term Limits and Electoral Competitiveness: Evidence from California's State Legislative Races (May 1997).
48. Randal C. Picker, Simple Games in a Complex World: A Generative Approach to the Adoption of Norms (June 1997).
49. Richard A. Epstein, Contracts Small and Contracts Large: Contract Law through the Lens of Laissez-Faire (August 1997).
50. Cass R. Sunstein, Daniel Kahneman, and David Schkade, Assessing Punitive Damages (with Notes on Cognition and Valuation in Law) (December 1997).

51. William M. Landes, Lawrence Lessig, and Michael E. Solimine, Judicial Influence: A Citation Analysis of Federal Courts of Appeals Judges (January 1998).
52. John R. Lott, Jr., A Simple Explanation for Why Campaign Expenditures are Increasing: The Government is Getting Bigger (February 1998).
53. Richard A. Posner, Values and Consequences: An Introduction to Economic Analysis of Law (March 1998).
54. Denise DiPasquale and Edward L. Glaeser, Incentives and Social Capital: Are Homeowners Better Citizens? (April 1998).
55. Christine Jolls, Cass R. Sunstein, and Richard Thaler, A Behavioral Approach to Law and Economics (May 1998).
56. John R. Lott, Jr., Does a Helping Hand Put Others At Risk?: Affirmative Action, Police Departments, and Crime (May 1998).
57. Cass R. Sunstein and Edna Ullmann-Margalit, Second-Order Decisions (June 1998).
58. Jonathan M. Karpoff and John R. Lott, Jr., Punitive Damages: Their Determinants, Effects on Firm Value, and the Impact of Supreme Court and Congressional Attempts to Limit Awards (July 1998).
59. Kenneth W. Dam, Self-Help in the Digital Jungle (August 1998).
60. John R. Lott, Jr., How Dramatically Did Women's Suffrage Change the Size and Scope of Government? (September 1998)
61. Kevin A. Kordana and Eric A. Posner, A Positive Theory of Chapter 11 (October 1998)
62. David A. Weisbach, Line Drawing, Doctrine, and Efficiency in the Tax Law (November 1998)
63. Jack L. Goldsmith and Eric A. Posner, A Theory of Customary International Law (November 1998)
64. John R. Lott, Jr., Public Schooling, Indoctrination, and Totalitarianism (December 1998)
65. Cass R. Sunstein, Private Broadcasters and the Public Interest: Notes Toward A "Third Way" (January 1999)
66. Richard A. Posner, An Economic Approach to the Law of Evidence (February 1999)
67. Yannis Bakos, Erik Brynjolfsson, Douglas Lichtman, Shared Information Goods (February 1999)
68. Kenneth W. Dam, Intellectual Property and the Academic Enterprise (February 1999)
69. Gertrud M. Fremling and Richard A. Posner, Status Signaling and the Law, with Particular Application to Sexual Harassment (March 1999)
70. Cass R. Sunstein, Must Formalism Be Defended Empirically? (March 1999)
71. Jonathan M. Karpoff, John R. Lott, Jr., and Graeme Rankine, Environmental Violations, Legal Penalties, and Reputation Costs (March 1999)

72. Matthew D. Adler and Eric A. Posner, Rethinking Cost-Benefit Analysis (April 1999)
73. John R. Lott, Jr. and William M. Landes, Multiple Victim Public Shooting, Bombings, and Right-to-Carry Concealed Handgun Laws: Contrasting Private and Public Law Enforcement (April 1999)
74. Lisa Bernstein, The Questionable Empirical Basis of Article 2's Incorporation Strategy: A Preliminary Study (May 1999)
75. Richard A. Epstein, Deconstructing Privacy: and Putting It Back Together Again (May 1999)
76. William M. Landes, Winning the Art Lottery: The Economic Returns to the Ganz Collection (May 1999)
77. Cass R. Sunstein, David Schkade, and Daniel Kahneman, Do People Want Optimal Deterrence? (June 1999)
78. Tomas J. Philipson and Richard A. Posner, The Long-Run Growth in Obesity as a Function of Technological Change (June 1999)
79. David A. Weisbach, Ironing Out the Flat Tax (August 1999)
80. Eric A. Posner, A Theory of Contract Law under Conditions of Radical Judicial Error (August 1999)
81. David Schkade, Cass R. Sunstein, and Daniel Kahneman, Are Juries Less Erratic than Individuals? Deliberation, Polarization, and Punitive Damages (September 1999)
82. Cass R. Sunstein, Nondelegation Canons (September 1999)
83. Richard A. Posner, The Theory and Practice of Citations Analysis, with Special Reference to Law and Economics (September 1999)
84. Randal C. Picker, Regulating Network Industries: A Look at *Intel* (October 1999)
85. Cass R. Sunstein, Cognition and Cost-Benefit Analysis (October 1999)
86. Douglas G. Baird and Edward R. Morrison, Optimal Timing and Legal Decisionmaking: The Case of the Liquidation Decision in Bankruptcy (October 1999)
87. Gertrud M. Fremling and Richard A. Posner, Market Signaling of Personal Characteristics (November 1999)
88. Matthew D. Adler and Eric A. Posner, Implementing Cost-Benefit Analysis When Preferences Are Distorted (November 1999)
89. Richard A. Posner, Orwell versus Huxley: Economics, Technology, Privacy, and Satire (November 1999)
90. David A. Weisbach, Should the Tax Law Require Current Accrual of Interest on Derivative Financial Instruments? (December 1999)
91. Cass R. Sunstein, The Law of Group Polarization (December 1999)
92. Eric A. Posner, Agency Models in Law and Economics (January 2000)
93. Karen Eggleston, Eric A. Posner, and Richard Zeckhauser, Simplicity and Complexity in Contracts (January 2000)
94. Douglas G. Baird and Robert K. Rasmussen, Boyd's Legacy and Blackstone's Ghost (February 2000)

95. David Schkade, Cass R. Sunstein, Daniel Kahneman, Deliberating about Dollars: The Severity Shift (February 2000)
96. Richard A. Posner and Eric B. Rasmusen, Creating and Enforcing Norms, with Special Reference to Sanctions (March 2000)
97. Douglas Lichtman, Property Rights in Emerging Platform Technologies (April 2000)
98. Cass R. Sunstein and Edna Ullmann-Margalit, Solidarity in Consumption (May 2000)
99. David A. Weisbach, An Economic Analysis of Anti-Tax Avoidance Laws (May 2000)
100. Cass R. Sunstein, Human Behavior and the Law of Work (June 2000)
101. William M. Landes and Richard A. Posner, Harmless Error (June 2000)
102. Robert H. Frank and Cass R. Sunstein, Cost-Benefit Analysis and Relative Position (August 2000)
103. Eric A. Posner, Law and the Emotions (September 2000)
104. Cass R. Sunstein, Cost-Benefit Default Principles (October 2000)
105. Jack Goldsmith and Alan Sykes, The Dormant Commerce Clause and the Internet (November 2000)
106. Richard A. Posner, Antitrust in the New Economy (November 2000)
107. Douglas Lichtman, Scott Baker, and Kate Kraus, Strategic Disclosure in the Patent System (November 2000)
108. Jack L. Goldsmith and Eric A. Posner, Moral and Legal Rhetoric in International Relations: A Rational Choice Perspective (November 2000)
109. William Meadow and Cass R. Sunstein, Statistics, Not Experts (December 2000)
110. Saul Levmore, Conjunction and Aggregation (December 2000)
111. Saul Levmore, Puzzling Stock Options and Compensation Norms (December 2000)
112. Richard A. Epstein and Alan O. Sykes, The Assault on Managed Care: Vicarious Liability, Class Actions and the Patient's Bill of Rights (December 2000)
113. William M. Landes, Copyright, Borrowed Images and Appropriation Art: An Economic Approach (December 2000)
114. Cass R. Sunstein, Switching the Default Rule (January 2001)
115. George G. Triantis, Financial Contract Design in the World of Venture Capital (January 2001)
116. Jack Goldsmith, Statutory Foreign Affairs Preemption (February 2001)
117. Richard Hynes and Eric A. Posner, The Law and Economics of Consumer Finance (February 2001)
118. Cass R. Sunstein, Academic Fads and Fashions (with Special Reference to Law) (March 2001)
119. Eric A. Posner, Controlling Agencies with Cost-Benefit Analysis: A Positive Political Theory Perspective (April 2001)