7-1983

An Economic Analysis of Royalty Terms in Patent Licenses

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America's reputation for ingenuity is under siege. The rate of technological innovation[1] and the growth rate of economic productivity[2] not only are below their historical rates, but are below the rates of many industrial countries. This turn of events has sent policymakers scrambling in search of corrective policies designed to restore America's lead in the development of new technology.[3]

One of the most effective devices for promoting technological innovation is the patent system. A patent grants the exclusive right to make, use, and sell an invention to an inventor who discloses the nature of the invention to the public.[4] Exclusive patent rights induce inventive activity because they offer the inventor the possibility of monopoly profits[5] and prevent

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1. *See* Arnold, *Innovation and the Patent System Role in It: A Patent Lawyer's Point of View,* 8 AM. PAT. L.A.Q.J. 131, 131 (1980).

2. *See* C. MCCONNELL, ECONOMICS 383 (8th ed. 1981).

> In the 1948-1966 period productivity—measured as output per worker per hour—rose at an average annual rate of 3.3 percent. That figure fell to 2.1 percent in the 1966-1973 period and then to only 1.1 percent in 1972-1978 . . . . Furthermore, . . . all the major industrial nations have been experiencing more rapid productivity growth since the mid-1960s than we have.

Id.

3. *See* Ginsburg, *Antitrust, Uncertainty, and Technological Innovation,* 24 ANTITRUST BULL. 635 (1979) (present uncertainty of antitrust law chills technological innovation). An empirical study concluded that the advance of scientific and technological knowledge accounted for 48% of the rise in output per worker between 1929 and 1969. C. MCCONNELL, *supra* note 2 (citing E. DENISON, ACCOUNTING FOR UNITED STATES ECONOMIC GROWTH, 1929-1969 at 131-37 (1974)). *See also* Ewing, *Innovation and Antitrust: Some thoughts on Government Patent Policy,* 60 J. PAT. OFF. SOC'Y 736, 737 (1978); Solow, *Technical Change and the Aggregate Production Function,* 39 REV. ECON. & STATISTICS 312 (1957).

4. The Constitution speaks of an "exclusive right" of inventors to their inventions for a limited period of time, U.S. CONST. art. I, § 8, cl. 8, but the patent statute actually grants "the right to exclude others from making, using, or selling [an] invention." 35 U.S.C. § 154 (1976).

5. A patentee is a monopolist in the sense that no one else may sell the patented invention without permission. *See* 35 U.S.C. § 154 (1976). But a monopoly position does not guarantee substantial profits. If there is no demand for the invention, there will be no profit. If there are close substitutes for the invention then, according to the theory of monopolistic competition, monopoly power is attenuated and profits will be no larger than normal. *See generally* E. CHAMBERLIN, THE THEORY OF MONOPOLISTIC COMPETITION: A RE-ORIENTATION OF THE THEORY OF VALUE (8th ed. 1962); J. WILSON & S. DARR, MANAGERIAL ECO-

competitors from freely appropriating the fruits of his or her research and development (R & D) expenditures.[6] The patent system thereby promotes the diffusion of new ideas, while creating an incentive for R & D.[7] The effectiveness of this incentive, however, depends upon the scope of patent protection,[8] the difficulty of obtaining a patent,[9] and the potential right of patentees to dispose of all or part of their patent rights.[10]

NOMICS: CONCEPTS, APPLICATIONS, AND CASES 297-301 (1979) (monopolistically competitive industry will attract new firms, causing each firm's market share to decrease until average revenue is equal to average cost). Thus, it is unusual for a patent monopoly to ripen into an economic monopoly. Hammond & Medlock, *Lessons Learned from Recent Licensing Cases,* in 2 TECHNOLOGY LICENSING 171 (T. Arnold & T. Smegal eds. 1982). In fact a survey of U.S. licensors found that they enjoy monopoly positions in only 27% of the cases, face two to five rivals in 34% of the cases, and more than five rivals in 39% of the cases. Caves, Crookell & Killing, *The Imperfect Market for Technology Licenses,* in HARV. INST. FOR ECON. RESEARCH 2 (No. 903, 1982) (citing F. CONTRACTOR, INTERNATIONAL TECHNOLOGY LICENSING: COMPENSATION, COSTS, AND NEGOTIATION 112 (1981)).

6. "[W]hoever without authority makes, uses or sells any patented invention . . . infringes the patent." 35 U.S.C. § 271(a) (1976). A patentee may enjoin infringement, *id.* § 283, or collect damages, *id.* § 284, to prevent appropriation of an invention.

7. *See* U.S. CONST. art. I, § 8, cl. 8; 35 U.S.C. § 101 (1976). *See also* Precision Instrument Mfg. Co. v. Automotive Maintenance Mach. Co., 324 U.S. 806, 815-16 (1945); SCM Corp. v. Xerox Corp. 645 F.2d 1195, 1203 (2d Cir. 1981) (public benefits from patents include disclosure of inventions, exploitation of inventions, and increased competition in the market place), *cert. denied,* 455 U.S. 1016 (1982). *But see* Turner, *Patents, Antitrust and Invention,* U. PITT. L. REV. 151, 152 (1976) (patent system inhibits research in areas with many existing patents and increases costs by shutting off most promising avenue of solving a particular problem).

8. The scope of patent protection is measured by the size of the market that a patentee is entitled to monopolize. This concept is similar to the problem of defining markets in antitrust cases. In the latter instance, identical products and very close substitutes constitute a market. The difficulty lies in measuring substitutability, and deciding how closely the substitute must mirror the product under consideration. *See* L. SULLIVAN, HANDBOOK OF THE LAW OF ANTITRUST § 12 (1979). In patent law the scope of patent protection extends to identical products and their functional equivalents, i.e., substitutes. P. ROSENBERG, PATENT LAW FUNDAMENTALS §§ 17.07-.07(1) (1980). One commentator recommends that the courts not attempt to adjust the scope of patent protection because they lack the expertise. W. BOWMAN, PATENT AND ANTITRUST LAW 51-52 (1973). In theory, a court cannot enlarge a patent beyond the scope of its claims as allowed by the Patent Office. Keystone Bridge Co. v. Phoenix Iron Co., 95 U.S. 274, 278 (1877). In practice, however, claims are not construed literally. *See, e.g.,* Merry Mfg. Co. v. Burns Tool Co., 335 F.2d 239, 244 (5th Cir. 1964) ("patent construction is seldom a matter of pure literalism").

9. The courts can affect the probability of patent approval by altering the interpretation of patentability requirements. *See infra* text accompanying notes 99, 102, 111.

10. *See infra* text accompanying notes 22-94. This Note deals primarily with the judicial attitude toward licensing of patent rights. Judicial treatment of patent scope and patentability standards are only discussed incidentally.

Economic factors such as potential monopoly profit and the risk[11] of innovation are primary determinants of the level of R & D expenditure.[12] The popular notion of the lone inventor discovering an invention during a flash of genius is not a realistic model of most innovation.[13] Rather, discoveries are generally the culmination of sustained efforts by organized research groups, usually big corporations with institutionalized R & D staffs.[14] As their R & D budgets grow, so does their output of inventions.[15] In the aggregate, the level of R & D expenditure is positively correlated with the rate of innovation.[16]

Efficient exploitation of a patent often requires patentees to license users of their inventions.[17] The courts, on the other hand, have proscribed many forms of license agreements[18] and

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11. Risk discourages innovation. *See infra* text accompanying notes 168-206. *See also* SCM Corp. v. Xerox Corp., 463 F. Supp. 983, 1013-14 (D. Conn. 1978), *remanded on other grounds,* 599 F.2d 32 (2d Cir. 1979) (the court was concerned about uncertainty in fashioning relief, since uncertainty is crucial to R & D plans); Arnold, *supra* note 1, at 137-40 (uncertainty is the most significant deterrent to R & D); Arnold, Aspelund, Brantley & Shurn, *An Overview of U.S. Antitrust and Misuse Law for Licensors and Licensees,* in 1 TECHNOLOGY LICENSING 43, 157 (T. Arnold & T. Smegal eds. 1982) ("If there are no certainties in the law of antitrust as applied to licensing of intellectual property, . . . would it surprise anybody that licensing diminishes—to the detriment of competition?"); Baxter, *Legal Restrictions on Exploitation of the Patent Monopoly: An Economic Analysis,* 76 YALE L.J. 267, 268 (1966) (invention is a risky economic activity); Ewing, *supra* note 3, at 737 (innovation is a relatively high risk enterprise); Ginsburg, *supra* note 3, at 684-86 (uncertainty crucially affects R & D decisions); Stedman, *Acquisition of Patents and Know-How by Grant, Fraud, Purchase and Grant-back,* 28 U. PITT. L. REV. 161, 163 (1967) (describing an IBM research venture as a $5 billion gamble); Udell, *To Promote the Progress of Science and Useful Arts: Public Law and Technological Innovation,* 19 IDEA 285, 289 (1977) ("The high cost and risk of innovation has caused many firms to reduce their R & D activity . . . .").

12. *See generally* J. SCHMOOKLER, PATENTS, INVENTION AND ECONOMIC CHANGE 47-59, 70-84 (1972) (Technological change is substantially affected by economic variables; in particular, the level of inventive activity in an industry is correlated to demand for the industry's product.). *See also* J. SCHMOOKLER, INVENTION AND ECONOMIC GROWTH 196-215 (1966).

13. *See* W. BOWMAN, *supra* note 8, at 36; J. GALBRAITH, AMERICAN CAPITALISM 86-87 (rev. ed. 1956).

14. *See* J. PARKER, THE ECONOMICS OF INNOVATION: THE NATIONAL AND MULTINATIONAL ENTERPRISE IN TECHNOLOGICAL CHANGE 29-35 (2d ed. 1978). In 1900, 18% of patents were received by corporations, compared to 63% in 1960. *Id.* at 35.

15. Kamien & Schwartz, *Market Structure and Innovation: A Survey,* 13 J. ECON. LITERATURE 1, 5 (1975).

16. *Id.* Since technological progress is one of the chief sources of economic growth, changes in the level of R & D and the rate of innovation have a significant impact on economic growth. *See supra* note 3.

17. *See infra* note 22.

18. *See infra* text accompanying notes 22-94.

discouraged patent licensing in general,[19] thereby diminishing the efficacy of the patent system as a stimulus to R & D. This negative attitude is attributable to fears that licensing will be used to protect invalid patents[20] and secure illegitimate extensions of monopoly power.[21] Part I of this Note reviews judicial treatment of certain royalty terms in patent licenses, describing the restraints the courts have imposed on the freedom of patentees to license their patents. Part II criticizes the reasoning and economic analysis behind the judicial restraints on licensing. This Part contends that the danger that royalty terms in patent licenses will be used to protect invalid patents or extend the scope of the patent monopoly has been exaggerated. Part III of this Note, therefore, proposes a new mode of analyzing royalty terms in patent licenses, whereby courts would balance the potential harms of particular royalty terms against their economic benefits.

I. A REVIEW OF ROYALTY TERMS IN PATENT LICENSING AGREEMENTS

A. The Threat of Anticompetitive License Terms

Whether a patentee chooses to license an invention or to develop and market the invention as a monopolist[22] depends on the profitability of the two alternatives. One factor influencing the profitability of licensing is the ability of the licensor to design a schedule of royalty payments from licensees that fully captures the profits of the patent monopoly to which a patentee is entitled.[23] If an effective plan for securing patent profits through royalty payments cannot be devised, patentees will

19. *See id.*

20. *See infra* notes 38-47 and accompanying text.

21. *See infra* text accompanying notes 48-57.

22. Once a patentee licenses other firms to manufacture and sell an invention, the patentee is no longer a monopolist in the market for the invention. A patentee can assign each licensee a geographical territory or a technological field of use of the invention, however, thereby segmenting the market for an invention and making each licensee a monopolist in a submarket. *See, e.g.,* Industrial Mach. Tool Co. v. Miami Window Corp., 234 F.2d 301, 304 (5th Cir. 1956) (territorial restriction); Brownell v. Ketcham Wire & Mfg. Co., 211 F.2d 121, 128 (9th Cir. 1954) (territorial restriction); General Talking Pictures Corp. v. Western Elec. Co., 304 U.S. 175, 179 (field of use restriction), *aff'd on reh'g,* 305 U.S. 124, 127 (1930).

A patentee is not required to license competitors. SCM Corp. v. Xerox Corp., 645 F.2d 1195, 1204 (2d Cir. 1982), *cert. denied,* 455 U.S. 1016 (1982); W.L. Gore & Assoc., Inc. v. Carlisle Corp., 529 F.2d 614, 623 (3d Cir. 1976). The decision whether to license an invention depends solely on the profitability of that option.

23. For a discussion of the difficulty of valuing an invention and establish-

tend to favor exclusive use instead of licensing; that is, they will be more likely to develop and market an invention as a monopolist.[24] To promote the widest possible dissemination of new ideas, including patented inventions,[25] patent law should encourage inventors to license others to use their inventions by granting patentees considerable freedom in establishing effective methods of collecting royalty payments.

Admittedly, licensing can create undeserved profits when used in connection with an invalid patent or as part of an illegal scheme to extend the patent monopoly. The problem of wrongly awarded, or invalid, patents partially stems from the huge volume of patent applications submitted to a decidedly understaffed Patent and Trademark Office.[26] The courts are appropriately concerned about the risk of illegitimate patent grants, and their careful scrutiny of licenses potentially protecting invalid patents is justified.[27] The other anticompetitive effect of licensing frequently cited by courts,[28] namely the extension of the patent monopoly, arises because inventions, and the right to their exclusive use, often provide substantial economic power.[29] The patented invention may provide leverage for a firm to gain an unfair advantage in another market,[30]

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ing royalty payment schedules in patent licenses, see *infra* note 192 and accompanying text.

Several other factors influence the profitability of licensing. Often licensees can produce or market an invention more efficiently than the patentee. *See infra* text accompanying notes 163-67. A patentee may not have the productive facilities to satisfy demand for a successful invention. *See infra* text accompanying notes 165-66. On the other hand, exclusive use of an invention is desirable because the patentee retains firm control over the price and quantity of the invention sold. Licensees may undercut the monopoly price the licensor desires. *See infra* note 98 and accompanying text.

24. Some patentees have no choice but to license; for example, if the inventor lacks the productive capacity to satisfy demand, and cannot easily expand capacity, then the patentee will choose to license in spite of difficulties in collecting royalties. In this case, judicial limitations on methods of collecting royalties reduce the profit of the licensor, and diminish the incentive to innovate.

25. *See* Sears, Roebuck & Co. v. Stiffel Co., 376 U.S. 225, 231-32 (1964); Compco Co. v. Day-Brite Lighting, Inc., 376 U.S. 234, 237 (1964) (emphasizing federal patent policy of public access to unpatentable articles).

26. The Patent Office seldom rejects an application if an inventor is persistent; hence, many questionable patents have been granted. *See* Duplan Corp. v. Deering Milliken, Inc., 444 F. Supp. 648, 750 (D.S.C. 1977), *modified on other grounds,* 594 F.2d 979 (4th Cir. 1979).

27. *See infra* text accompanying notes 38-47.

28. *See infra* text accompanying notes 48-57.

29. W. BOWMAN, *supra* note 8, at 54.

30. The economic power of the patent can be exploited in an arrangement called a tying agreement. In a tying agreement, the tying product (in this case the patented invention) is made available to the contracting party only if that

as well as the means to coerce licensees to accept unreasonable agreements.[31]

Economists find that anticompetitive business practices, such as invalid patents and illegally extended patent monopolies, are "allocatively inefficient"[32] in terms of where resources are placed in the economy as a result of such practices, and how that placement corresponds to consumer values.[33] Competitive markets are generally favored because such markets produce the variety and quantity of goods wanted by consum-

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party agrees to buy another product, the tied product, from the patentee. Tying is illegal if the patentee possesses economic power in the market for the tying good, and the tying arrangement results in an appreciable restraint of free competition in the market for the tied good. *See* Northern Pacific Ry. v. United States, 356 U.S. 1, 6 (1958). "Nowhere has the Supreme Court held, in a tie-in case involving a patented tying product, that the economic power of leverage to coerce a tie-in, as required by *Northern Pacific,* may be presumed from the existence of the patent." Lowin, *Whether Patented or Unpatented: A Question of the Economic Leverage of Patents to Coerce Tie-ins,* 23 IDEA 77, 101 (1982) (emphasis deleted). But showing that leverage exists in the market for the patented good is not difficult. *See, e.g.,* Morton Salt Co. v. G.S. Suppiger Co., 314 U.S. 488, 491 (1942) (respondent conditioned access to patented invention purchase of unpatented good from licensor).

> Tying is *per se* illegal if the court finds separate products tied, and legal if the court is persuaded that the two items are a single integrated whole to such a degree that it is unreasonable to treat the transaction as an illegal tie . . . . Tying is equally illegal when the "tying product" is a license under a patent which is granted only on condition of some staple commodity "tied product" being purchased from the patent owner.

Arnold, Aspelund, Brantley & Shurn, *supra* note 11, at 102-03 (emphasis in original).

31. Courts may find that coercion of a licensee constitutes an antitrust violation. For example, coercion to enter into a tying agreement would constitute such a violation. *See supra* note 30. Courts also refuse to enforce unfair licensing agreements by invoking the doctrine of patent misuse. Misuse is either a violation of the antitrust laws or an otherwise unreasonable restraint of trade outside the scope of the patent. Arnold, Aspelund, Brantley & Schurn, *supra* note 11, at 48. Relying on the equitable doctrine of unclean hands, courts refuse to enjoin infringement of a misused patent, *see, e.g.,* United States Gypsum Co. v. National Gypsum Corp., 352 U.S. 457, 465 (1957); Morton Salt Co. v. G.S. Suppiger Co., 314 U.S. 488, 502 (1942), even if the misuse did not affect the infringer. Arnold, Aspelund, Brantley & Schurn, *supra* note 11, at 48. The courts rely upon the per se and rule of reason standards applicable in antitrust litigation in determining whether there has been patent misuse. *See* Moraine Prods. v. ICI America, Inc., 538 F.2d 134, 144 (7th Cir.), *cert. denied,* 429 U.S. 941 (1976).

Misuse can be purged if the patentee refrains from the offensive behavior for a sufficient period of time. Arnold, Aspelund, Brantley & Shurn, *supra* note 11, at 147-51; Dieterich, *Antitrust Issues in the Development, Acquisition and Licensing of Industrial Property Rights,* in 1 TECHNOLOGY LICENSING 238 (T. Arnold & T. Smegal eds. 1982).

32. *See infra* note 34.

33. R. BORK, THE ANTITRUST PARADOX 91 (1978). *See also* F. SCHERER, INDUSTRIAL MARKET STRUCTURE AND ECONOMIC PERFORMANCE 16-18 (1980).

ers.[34] Monopolies, on the other hand, are generally disfavored because they restrict supply, causing the ultimate congregation of goods to deviate from that desired by consumers.[35] Society, however, has chosen to forgo the allocative efficiency of competitive markets in granting patentees monopolies in order to encourage inventive effort.[36] Nevertheless, courts have been hesitant to accept the allocative distortion caused by the patent monopoly when it comes to patent licensing.[37]

B. THE STARTING POINT: *LEAR* AND *BRULOTTE*

The Supreme Court first considered the possibility that the royalty terms of a patent license might protect an invalid patent, and consequently cause allocative inefficiency, in *Lear, Inc. v. Adkins*.[38] In 1952, Lear hired Adkins to solve gyroscope development problems, with Adkins agreeing to grant a license to Lear on any such invention "on a mutually satisfactory royalty basis."[39] Adkins invented an improved gyroscope and filed a patent application in 1954.[40] After six years and several rejections, the patent was finally approved.[41] Meanwhile, in 1955, the royalty terms of the license were agreed upon, providing that if "such a patent so issued is subsequently held invalid . . . Lear at its option shall have the right forthwith to termi-

34. Profit maximizing firms in a competitive market set price equal to marginal cost. This means that resources are efficiently allocated. This judgment is based on the assumptions that product price measures the benefit to society from an additional unit of a good, and marginal cost measures the cost of an additional good. So the equality of price and marginal cost implies that a competitive market selects an output such that the value of the last unit produced is equal to the value of the alternative goods sacrified by its production. C. MCCONNELL, *supra* note 2, at 528-30.

35. The distinctive feature of the monopoly situation is that the monopolist has created a gap between marginal cost and price, which means that social costs and social desires are no longer equated. Indeed, the monopolist has made his monopoly profit by creating an imbalance between cost and desire. With the restriction in output, moreover, the widget industry no longer needs as many resources as before. The unneeded resources must either lie idle, an obvious social waste, or migrate to other industries where the value of their marginal product will be less than it would be in the monopolized widget industry. The result, of course, is that they contribute less wealth as consumers define wealth, so that consumers would be better off if these resources could return to making widgets.

R. BORK, *supra* note 33, at 101. *See also* F. SCHERER, *supra* note 33, at 16.

36. *See supra* note 7.

37. *See infra* text accompanying notes 38-57.

38. 395 U.S. 653 (1969).

39. *Id.* at 657.

40. *Id.*

41. *Id.* at 660.

nate the specific license so affected."[42] In 1957, Lear claimed that a Patent Office Search disclosed a patent which fully anticipated Adkins discovery, so that Lear was no longer obligated to make royalty payments. Adkins sued Lear when the latter discontinued the royalty payments called for by the license agreement.[43] Notwithstanding the agreement requiring Lear to pay royalties until the patent had been declared invalid, the Supreme Court held that Lear could avoid all royalty payments accruing since the patent issued regardless of when the patent was declared invalid.[44]

The *Lear* Court resolved the conflict between federal patent law and state contract law in favor of federal law, enunciating a policy designed to protect the integrity of the patent system.[45] Consistent with this goal, the Court sought to provide licensees with an economic incentive to challenge questionable patent grants.[46] Harlan noted that "[l]icensees may often be the only individuals with enough economic incentive to challenge the patentability of an inventor's discovery. If they are muzzled, the public may continually be required to pay tribute to would-be monopolists without need or justification."[47] Essentially, Harlan expressed concern that patent licenses like the one in *Lear* protect invalid patents, creating allocative inefficiency.

In addition, courts scrutinize patent licenses to guard against a second source of allocative inefficiency: the illegal extension of the patent monopoly. License agreements requiring royalty payments after the expiration of the patent pose the threat of extending the scope of the patent monopoly. In *Brulotte v. Thys Co.*,[48] the Supreme Court considered such an agreement, in which licensees purchased patented farm equip-

42. *Id.* at 657.

43. *Id.* at 660. Lear had two factories using the invention. One of the factories ended royalty payments in 1957, and the other in 1959. *Id.* at 659-60.

44. *Id.* at 673-74. The Court referred Adkin's claim for royalties accruing before the 1960 patent issue to the state court. *Id.* at 675.

The Court also struck down the doctrine of licensee estoppel. *Id.* at 668-71. Before *Lear*, licensees were barred from challenging the validity of the licensed patent in litigation. *Id.* at 656.

45. "[E]nforcing this contractual provision would undermine the strong federal policy favoring the full and free use of ideas in the public domain." *Id.* at 674.

46. The Court felt that freeing licensees from the liability of royalty payments would provide an incentive to challenge possibly illegitimate patents. *Id.*

47. *Id.* at 670.

48. 379 U.S. 29 (1964).

ment and obtained a use license from the patentee. The licensing agreement required minimum annual royalty payments of $500 for a term exceeding the term of all of the several patents covering the machine. The license also prevented assignment and removal of the machines from their original location.[49]

Brulotte highlights the conflict between the patentee's desire to use a convenient form of royalty payment[50] and the Court's suspicion that the purpose and effect of the license was to create monopoly profits in excess of those authorized by the patent grant.[51] The lower court had held that the period of royalty payment provided "a reasonable amount of time over which to spread the payments for the use of the patent."[52] Justice Douglas disagreed, contending that the restriction on assignment and movement of the machines after expiration of the patent period was "a telltale sign that the licensor was using the licenses to project its monopoly beyond the patent period."[53] The Court, therefore, disallowed the royalty payments accruing after the patents expired,[54] reasoning that the licensor made "a bald attempt to exact the same terms and conditions for the period after the patents have expired as [it did] for the monopoly period."[55] Finding the licensing arrangement similar to a tie,[56] the Court declared it per se illegal.[57]

C. Anticompetitive Concerns in Licensing Cases After *Lear* and *Brulotte*

Using *Lear* and *Brulotte* as benchmarks, courts have scrutinized other licensing agreements with mixed results. The licensing of patent applications is generally permitted,[58] but contracts requiring royalty payments on invalid patents are not.[59] Often settlement agreements ending patent infringement

49. *Id.* at 29.
50. *Id.* at 31.
51. *Id.* at 32.
52. *Id.* at 31 (quoting Thys Co. v. Brulotte, 62 Wash. 2d 284, 291, 382 P.2d 271, 275 (1963)). Justice Douglas did not deny this argument; apparently he believed the threat of monopoly profits outweighed this benefit. 379 U.S. at 31.
53. 379 U.S. at 32.
54. *Id.* at 33-34.
55. *Id.* at 32.
56. *Id.* at 33. See *supra* note 30 for a discussion of tying.
57. 379 U.S. at 32. A licensor may require the payment of a lump sum royalty to be spread over a term of years beyond the life of the patent. Coast Metals, Inc. v. Cape, 205 U.S.P.Q. 154, 157 (D.N.J. 1979); Huyck Corp. v. Algany Int'l Corp., 193 U.S.P.Q. 200, 202 (M.D. Ala. 1977).
58. *See infra* notes 62-72 and accompanying text.
59. *See infra* notes 73-76 and accompanying text.

and patent validity litigation are not enforceable.[60] Finally, the licensing of a package of patents is not allowed if the licensee was forced to accept unwanted patents.[61]

The seminal case regarding application licensing is *Aronson v. Quick Point Pencil Co.*[62] *Aronson* involved a contract whereby a manufacturer, Quick Point, agreed to pay a royalty of five percent of the selling price of an invention. The contract provided, however, that if the invention was not patented within five years, the royalty would be reduced to 2.5%. Approval did not occur within the designated five years, and the patent was ultimately rejected. After paying the 2.5% royalty for a number of years, Quick Point sought a declaratory judgment that the agreement was unenforceable under *Lear* and *Brulotte*.[63]

The *Aronson* Court, in permitting enforcement of the agreement, found *Lear* inapposite since no ideas were withdrawn from public use.[64] Any competitor of Quick Point was free to manufacture and sell the invention. Furthermore, the Court reasoned, Quick Point benefited from the confidential disclosure of a trade secret.[65] If a licensor such as Aronson were not assured the same protection as the licensor of a trade secret, inventors would generally be discouraged from patenting.[66] Moreover, the leverage analysis of *Brulotte* did not disable *Aronson*'s licensing agreement,[67] despite Quick Point's assertion that Aronson relied on the economic value of the patent application to obtain monopoly profits on an invention that was not patentable.[68] The Court agreed that patent applica-

60. *See infra* notes 77-81 and accompanying text.
61. *See infra* notes 82-94 and accompanying text.
62. 440 U.S. 257 (1978).
63. *Id.* at 260.
64. *Id.* at 264.
65. An inventor may forgo patent protection and license an invention as a trade secret. *See, e.g.,* Warner-Lambert Pharmaceutical Co. v. John J. Reynolds, Inc., 178 F. Supp. 655 (S.D.N.Y. 1959) (product formula protected as a trade secret rather than by a patent), *aff'd per curiam,* 280 F.2d 197 (2d Cir. 1960). Although a licensor may obtain royalty payments for an indefinite period, *see id.* at 660-63, trade secrets are usually less valuable than patented inventions, since the licensor does not have a right to exclude independent inventors, or copiers, *see id.* at 665.
66. *See Aronson,* 440 U.S. at 267 (Blackmun, J., concurring). As demonstrated by the *Aronson* license, it is often most convenient for both parties to package trade secrets and application licenses together. Proscribing application licenses would preclude this possibility. Altman, *A Quick Point Regarding Perpetual Trade Secret Royalty Liability,* 61 J. PAT. OFF. SOC'Y 510, 532 (1979).
67. 440 U.S. at 264. *But see* Reich v. Reed Tool Co., 203 U.S.P.Q. 288 (1980) (patent application misused by tying arrangement).
68. *See* 440 U.S. at 265-66.

tions provide inventors with bargaining power,[69] but noted that such power depends on the parties' assessment of the likelihood of patent approval.[70] In this case, the parties were fully aware of the pendency of the application and the significant probability that it would not be approved. Quick Point placed a substantial value on exploiting the novelty of the device even if no patent issued.[71] Hence, the Court concluded that the schedule of royalty payments, "far from being negotiated 'with the leverage' of a patent, rested instead on the contingency that no patent would issue within five years."[72]

Licenses requiring royalty payments after a finding of patent invalidity are analytically similar to application licensing. Licensees who successfully challenge a patent are in a position much like Quick Point's. They are beneficiaries of a protected market position by virtue of their licenses,[73] which enables them to benefit from the patentee's research. This problem was considered in a 1980 district court case, *Grunewald v. Power Swing Partners*.[74] The license in that case provided that if the patent were ever found invalid, the minimum annual royalty would be reduced by one-half.[75] The court, finding the agreement invalid, recognized that the reduced royalty provision provided some incentive to challenge the validity of the patent, but concluded that any postvalidity royalty undermines the goal of *Lear,* namely, protecting the public from invalid patent monopolies.[76]

Courts have also applied the rationale of *Lear* to negate

69. *Id.* at 265.
70. *Id.*
71. *Id.* at 261-62.
72. *Id.* at 265. The Court in *Aronson* "refused to assume without proof that the mere *potential* for patent protection would provide enough leverage for the licensor to *coerce* the licensee into accepting indefinite trade secret royalty liability . . . ." Altman, *Is There an Afterlife? The Effect of Patent or Copyright Expiration on License Agreements,* 64 J. PAT. OFF. SOC'Y 297, 316-17 (1982) (emphasis in original).
73. Getting a head start in an industry created by an invention can be invaluable. "Quick Point was able to preempt the market in the earlier years and was long the only manufacturer of the Aronson keyholder . . . ." 440 U.S. at 260. *See also* Hammond & Medlock, *supra* note 5, at 183 (the original manufacturer of a new product has a lead time enabling that manufacturer to capture a greater market share); Hill, *The Licensing of Patent Applications: Legal and Competitive Effects,* 63 J. PAT. OFF. SOC'Y 483, 501 (1981) (a patent application licensee "bargains for a head start in the market by which it can obtain an advantage over competitors"). The former licensee of an invalid patent will also have a head start over nonlicensed competitors.
74. 9 Bankr. 512 (Bankr. S.D. Cal. 1980).
75. *Id.* at 516.
76. *Id.* at 520.

certain settlement agreements. Often a patentee and an alleged infringer will negotiate a license as part of a settlement agreement.[77] Such licenses are inherently inconsistent with the rationale of *Lear*,[78] which disfavors licensing agreements that deter patent challenges. Since settlement agreements by their very nature avoid patent litigation, courts will carefully scrutinize any included license provision under the *Lear* doctrine. The courts, however, are divided on the resolution of this conflict.[79] Some praise settlements as an efficient means of resolving disputes and therefore enforce settlement licenses fully,[80] while an equal number decry settlement licenses because of their ability to protect invalid patents.[81]

Whereas the goal of the *Lear* Court was to protect the public from monopolies created by invalid patents, the goal of the *Brulotte* Court was to restrain legitimate patentees from obtaining monopoly profits beyond the bounds of the patent grant. In deference to the *Brulotte* opinion, courts have analyzed package licenses, or licenses covering multiple patents, to guard against any illegal extension of monopoly power.[82] Specifically, if a licensee is coerced into accepting an unwanted patent in order to obtain a desired patent, then the package may be considered an illegal tying arrangement, with the de-

77. E. LOVELL, DOMESTIC LICENSING PRACTICES 10-11 (Experiences in Marketing Management, No. 18, 1968).

78. Rocform Corp. v. Acitelli-Standard Concrete Wall, Inc., 168 U.S.P.Q. 51, 53 (N.D. Ill. 1970) (An agreement not to contest the validity of a patent as part of a settlement agreement is not enforceable. The agreement presents a conflict between the policy favoring settlement versus the policy calling for the fullest possible litigation of validity. The latter must prevail.).

79. *See generally* Comment, *The Enforceability of Patent Settlement Agreements After* Lear, Inc. v. Adkins, 48 U. CHI. L. REV. 715 (1982) (arguing that patent settlement agreements should be enforced by their terms).

80. *See, e.g.*, Speed Shore Corp. v. Denda, 203 U.S.P.Q. 807, 811 (9th Cir. 1979) (settlement of patent litigation is favored if validity is not an issue); Rausburg Electro Coating Corp. v. Spiller & Spiller, Inc., 489 F.2d 974, 978 (7th Cir. 1973) (applying *Lear* would strip good faith settlement of any meaning); Pet Inc. v. Kysor Indus. Corp., 193 U.S.P.Q. 492, 496 (W.D. Mich. 1975) (cross-agreements not to sue for infringement and not to alter production in the direction of the other's product is permissible); Schlegel Mfg. Co. v. King Aluminum Corp., 381 F. Supp. 649, 655 (S.D. Ohio 1974) (judicial economy is more important than the concerns of *Lear*).

81. *See, e.g.*, United States v. Singer Mfg. Co., 374 U.S. 174, 197 (1963) (settlement of the issue of validity is not permitted); Standard Sanitary Mfg. Co. v. United States, 226 U.S. 20, 49 (1912) (if the agreement itself exceeds what is necessary to protect the patent rights it may violate the antitrust laws); Crane Corp. v. Aeroquip Corp., 504 F.2d 1086, 1092 (7th Cir. 1974) (a licensee may test the validity of a patent after entering into a consent judgment of validity).

82. *See, e.g.*, Beckman Instruments, Inc. v. Technical Dev. Corp., 433 F.2d 55, 61 (7th Cir. 1970), *cert. denied*, 401 U.S. 976 (1971).

sired patent constituting the tying product and the unwanted patent the tied product.[83]

Mobil Oil Corp. v. W.R. Grace & Co.,[84] a 1973 district court case, involved a package license in which Mobil offered W.R. Grace a defined field license[85] at an 8.4% annual royalty rate, or a package of five specific patents at a seven percent annual royalty rate.[86] W.R. Grace claimed that a mere 1.4% gap between the two royalty rates constituted evidence of tying.[87] The court rejected this argument, however, observing that uncertainty about the scope of the five patents would make enforcement of Mobil's rights against infringers costly and difficult,[88] the greater enforcement cost was passed along to W.R. Grace in the seven percent royalty rate, and the small gap between royalty rates simply reflected the cost advantage of the defined field license.[89]

Package licenses often involve the issue of postexpiration royalties as well.[90] Although the patents in a package typically have different expiration dates, license agreements usually call for continued royalty payments despite the expiration of some

83. *See* Duplan Corp. v. Deering Milliken, Inc., 444 F. Supp. 648, 696 (D.S.C. 1977) (compulsory package licensing constitutes illegal tying), *aff'd in part, rev'd on other grounds*, 594 F.2d 979 (4th Cir. 1979), *cert. denied*, 444 U.S. 1015 (1980); Arnold, Aspelund, Brantley & Shurn, *supra* note 11, at 130 (compulsory package licenses are not permitted).

Total sales is an acceptable base for royalty payments regardless of whether the entire product is covered by a patent, as long as the arrangement is for the mutual convenience of the parties. Dieterich, *supra* note 31, at 189, 252. But neither party may insist on royalty payments based on a formula not reasonably related to licensee use. Zenith Radio Corp. v. Hazeltine Research, Inc., 395 U.S. 100, 139-40 (1969).

84. 180 U.S.P.Q. 418 (D. Conn. 1973).

85. A defined field license is an agreement that the patentee will not challenge activities in a particular area of technical interest to the licensees under any patent. *See* P. ROSENBERG, *supra* note 8, § 16.01(2)(c).

86. 180 U.S.P.Q. at 420.

87. *Id.*

88. *Id.* at 425.

89. *Id.* Package licenses may also be challenged under the *Lear* doctrine. In Timely Products, Inc. v. Costanzo, 465 F. Supp. 91 (D. Conn. 1979), a license covered trade secrets, knowhow, and a patent. *Id.* at 94. The agreement did not include a provision reducing royalties in the event that the patent was found invalid. *Id.* The agreement was held unenforceable since no incentive existed for a licensee to challenge patent validity. *Id.* at 99.

90. *See, e.g.*, American Sec. Co. v. Shatterproof Glass Corp., 268 F.2d 769, 777 (3d Cir.) (license invalid where no reduction in royalties as patents in a mandatory package expired), *cert. denied*, 361 U.S. 902 (1959); Congoleum Indus., Inc. v. Armstrong Cork Co., 180 U.S.P.Q. 264, 271-72 (E.D. Pa. 1973) (license on knowhow and a patent application did not violate *Brulotte* by extending the patent right before the grant).

of the patents.[91] Courts have examined these agreements for violations of the *Brulotte* rule against postexpiration royalties, as well as for violations of the prohibition against mandatory package licensing. The Sixth Circuit found a license based on several patents with different expiration dates invalid because royalty rates did not decrease as the patents expired.[92] On the other hand, the Seventh Circuit, emphasizing that the agreement was voluntarily entered into, upheld a similar license.[93] Similarly, the Fourth Circuit has upheld license agreements involving multiple patents with differing expiration dates, although these agreements apparently called for a reduction in royalty payments as each patent expired.[94]

II. ALLOCATIVE EFFICIENCY LOSSES FROM INVALID PATENTS AND PATENT LEVERAGING

Courts reviewing patent licenses for anticompetitive tendencies have adopted an overly simplistic mode of economic analysis. Although noting possible sources of allocative distortion, they fail to quantify the distortion or to balance any possible gains in productive efficiency resulting from a given license. Close examination of standard patent agreements, the judicial fears they engender, and their overall economic effect on industry demonstrate the need for a new approach to restrictive patent licensing.

Assuming that settlement agreements and royalty payments on invalid patents do offer substantial protection to invalid patents, and that postexpiration and package licensing can extend the patent monopoly, the allocative distortion caused by these practices is probably not very large. Because these prac-

91. *See, e.g.,* Beckman Instruments, Inc. v. Technical Dev. Corp., 433 F.2d 55, 60 (7th Cir. 1970) (royalties required until last patent expired), *cert. denied,* 401 U.S. 976 (1971); American Sec. Co. v. Shatterproof Glass Corp., 268 F.2d 769, 771 (3d Cir.) (mandatory package license with royalties independent of patents used), *cert. denied,* 361 U.S. 902 (1959).

92. Rocform Corp. v. Acitelli-Standard Concrete Wall, Inc., 367 F.2d 678, 681 (6th Cir. 1971).

93. Beckman Instruments v. Technical Dev. Corp., 433 F.2d 55, 61 (7th Cir. 1970), *cert. denied,* 401 U.S. 976 (1971). *See also* Mobil Oil Corp. v. W.R. Grace & Co., 180 U.S.P.Q. 418, 453 (D. Conn. 1973); Finnegan v. Spiegl Farms, Inc., 234 Cal. App. 2d 408, 410, 44 Cal. Rptr. 645, 646-47 (1965) (licensing agreement involving five patents and a patent application does not extend beyond the life of the patents, in spite of the patent application).

94. *See* Western Elec. Co. v. Stewart-Warner Corp., 631 F.2d 333, 340 (4th Cir. 1980); Compton v. Metal Products, Inc., 453 F.2d 38, 46 (4th Cir. 1973), *cert. denied,* 406 U.S. 968 (1975).

tices make patent licensing more profitable,[95] they can, however, increase the rate of patent licensing relative to exclusive use.[96] Licensing may reduce the allocative distortion caused by the patent grant, since licensing is likely to make the postexpiration market for the patented invention more competitive.[97] In addition, monopoly restrictions are more difficult to maintain if the patented invention is licensed rather than limited to the exclusive use of the patentee; licensees have an incentive to cheat on the monopoly restrictions, and any cheating will reduce the allocative distortion.[98]

A. The Protection of Invalid Patents by License Agreements

The *Lear* doctrine bespeaks a concern that patent licenses may discourage or prevent licensees from challenging the licensed patent, thus insulating invalid patents from litigation. Although this concern is valid, it usually does not justify invalidating otherwise legitimate methods of obtaining royalty payments. Generally, if the potential monopoly profit from an invalid patent is large, nonlicensed parties with the ability and incentive to challenge the patent will exist.

As a first step in this reasoning, consider that there are four sources of patent invalidity—the negatives of the standard

95. A more efficient means of collecting royalty payments leads to lower possible costs and greater interbrand competition. Andewelt, *Technology Licensing and Antitrust Laws—The View from the Department of Justice,* in 1 Technology Licensing 401, 412-13 (1982).

96. *See supra* text accompanying notes 22-25.

97. Absent licensing, competition with the patentee can be delayed after expiration of the patent, because new producers and users of the invention face start-up costs and lead time before they can effectively compete. *See* F. Scherer, *supra* note 33, at 236. *See also* American Photocopy Equip. Co. v. Rovica, Inc., 257 F. Supp. 192, 199 (N.D. Ill. 1966) ("Where a patentee is certainly free not to license at all, we fail to see how competition is restrained by charging high royalties. Indeed, such licensing, if not beyond the scope of the patent grant, should be encouraged under anti-trust principles, as an alternative to monopoly, which would otherwise be present."), *aff'd,* 384 F.2d 813 (7th Cir. 1967), *cert. denied,* 390 U.S. 945 (1968); C. McConnell, *supra* note 2, at 667 ("Innovation can weaken and undermine existing positions of monopoly power . . . ."); Andewelt, *supra* note 95, at 405-06 ("To the extent that antitrust enforcement restrains exploitation of the technology, the total amount of innovation in the economy could decrease, and competition in the marketplace could be adversely affected.").

98. A licensee has an incentive to violate license restrictions designed to assure the licensor monopoly profits, by cutting the price below the monopoly price and expanding output. A cheating licensee profits at the expense of the licensor and other licensees, but consumers benefit from reduced prices and expanded output. *Cf.* W. Nicholson, Microeconomic Theory 312-17 (1972) (cheating is attractive to individual firms, but reduces industry profits).

of patentability. An invention is patentable if it is new, useful, and nonobvious; moreover, the applicant must be the first inventor of the subject matter of the patent application.[99] Hence, a patent is invalid if the invention is useless, duplicative, obvious, or lacking in novelty. Although the policy of *Lear* extends to all patents, regardless of the likelihood and nature of the invalidity claim,[100] license agreements can work to protect only patents invalid because of lack of novelty.[101]

For example, suppose a patent is invalid because the invention is useless.[102] Since the standard of utility is easily satisfied,[103] it follows that an invention that fails for lack of utility "will be of little or no profit to the inventor."[104] In this case, it does not matter whether a patent license preserves the invalid patent, since the harm to consumers is likely to be minimal if the subject matter of the patent is useless to them.

Nor does the fact that a patent duplicates another patent pose a threat to consumers, since the late-coming rival is simply appropriating part of the value of an existing patent monopoly, thereby increasing competition and reducing allocative distortion.[105] Nevertheless, the owner of the valid patent may be harmed by the late-comer's entry into the market, for the effect of competition in the patented product will reduce the

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99. The first party to submit a patent application for a particular invention has priority. If the application satisfies the patentability requirements it will be approved and all later applications concerning the same invention will be rejected. 35 U.S.C. § 102(e) (1976). The factors relevant to patentability are whether the invention is new, useful, and nonobvious to a practitioner in the field. *Id.* §§ 101, 103. The inventor must also be the first to conceive the invention, not merely the first to apply. *Id.* § 102(g); Breuer v. DeMarinis, 558 F.2d 22, 27-28 (C.C.P.A. 1977); P. ROSENBERG, *supra* note 8, § 10.01(2).

100. *See* Lear, Inc. v. Adkins, 395 U.S. 653, 671-74 (1969).

101. *See infra* text accompanying notes 112-17.

102. A useful invention

> may be applied to some beneficial use in society, in contradistinction to an invention, which is injurious to morals, the health, or the good order of society. It is not necessary to establish, that the invention is of such general utility, as to supersede all other inventions now in practice to accomplish the same purpose . . . . The law . . . does not look to the degree of utility . . . .

R. CHOATE, W. FRANCIS, CASES AND MATERIALS ON PATENT LAW 380 (2d ed. 1981).

103. *See id.*

104. *Id.*

105. The allocative distortion, and hence the harm to consumers, is less in a market with two firms (a duopoly) than in a monopoly, provided the duopolists do not cooperate. *Cf.* W. NICHOLSON, *supra* note 98, at 316-17 (an oligopoly is unlikely to achieve monopoly profits).

profit anticipated by the original inventor.[106] Consequently, the party with the best information and the strongest incentive to challenge a duplicative patent is the original inventor, a party who is unlikely to be bound by a license agreement to the subsequent patentee.

Patents that are invalid because the invention is not novel or is obvious ostensibly pose a threat to consumer well-being.[107] But the threat proves illusory. Nonlicensed firms in the same industry as the patentee, and potential entrants from outside the industry will have an incentive to challenge these patents.[108] As long as the cost of a patent suit is less than the potential royalty payments,[109] competitors and potential competitors of the patentee will have an incentive to seek a declaration of invalidity,[110] rather than accept a license.

Although nonlicensed parties have an incentive to challenge invalid patents, that incentive must be coupled with knowledge and proof of invalidity before a patent challenge is feasible. That information will be available if the invention

106. Monopoly profits from patents are a primary incentive for R & D. *See supra* note 7.

107. In these cases an illegitimate monopoly is established in a market for a potentially valuable product, such as the gyroscope in *Lear*. Even if the invention is not intrinsically valuable, an illegitimate patent or patents may be used to establish an illegal cartel. *See, e.g.,* Duplan Corp. v. Deering-Milliken, Inc., 444 F. Supp. 648, 683 (D.S.C. 1977) (a settlement agreement was used to establish a cartel), *modified,* 594 F.2d 979 (4th Cir. 1979), *cert. denied,* 444 U.S. 1015 (1980); Priest, *Cartels and Patent License Agreements,* 20 J.L. & ECON. 309, 377 (1977) (settlement agreements ending in cross-licensing agreements should be discouraged because they encourage firms to seek invalid patents and use them to establish illegal cartels).

108. If a firm is a monopolist providing a new product and is making supranormal profits, then in the absence of barriers to entry (besides the patent) other firms will be attracted to the industry, dissipating the monoply profits if they can successfully challenge the patent. *See* W. NICHOLSON, *supra* note 98, at 292-94. An entry barrier is an impediment to potential industry entrants, making it difficult or costly for them to compete with firms already in the industry. It is the source of monopoly power. *See id.*

109. Although a license may require continued royalty payments after a finding of invalidity, licensees will still be motiviated to challenge a patent if postinvalidity royalties plus litigation costs will be less than the royalties on a valid patent. The *Grunewald* court, in striking down a reduced royalty payment contingent upon a finding of invalidity, made the extreme suggestion that any royalty payment required on an invalid patent violates the *Lear* doctrine. Grunewald v. Power Swing Partners, 9 Bankr. 512, 520 (Bankr. S.D. Cal. 1980). In light of the benefits of *Grunewald* type licenses described in Part III of this Note, this proposal goes too far.

110. The courts are liberal in allowing declaratory judgments regarding patent infringement and validity. *See* Bresnick v. United States Vitamin Corp., 139 F.2d 239, 242 (2d Cir. 1943). One of the purposes of the Declaratory Judgment Act is to prevent patent owners from suppressing competition with threats of infringement suits. *See* Hanes v. Millard, 189 U.S.P.Q. 331, 335 (D.C. Cir. 1976).

fails the nonobviousness criterion; failure to meet this criterion of patentability necessarily implies that the invention was obvious to members of the industry.[111] In contrast, when the issue is lack of novelty, the information needed for a patent challenge might not be obtainable. On the facts of *Lear,* the belief that licensees need encouragement to challenge invalid patents is justified. The patent there was declared invalid because the invention had been anticipated in earlier patents.[112] The object of controversy was a gyroscope, a component of an aircraft navigation system and undoubtedly a sophisticated piece of technology.[113] In circumstances such as those in *Lear,* when a patentee and a prospective licensee negotiate a license agreement, there is apt to be asymmetry in the information available to the inventor and potential licensees about the invention.[114] Unless a prospective licensee has conducted research related to the invention, the only information available to outsiders will be that which the inventor discloses in the patent and during

111. Nonobviousness "appears to be the predominant ground in court decisions of invalidity." Kitti, *Patent Invalidity Studies: A Survey,* 20 IDEA 55, 56 (1978). *See also* F. SCHERER, *supra* note 33, at 440 (the critical hurdle to patentability is nonobviousness). In some cases, the information needed to challenge a patent on the grounds of obviousness will not be possessed by any member of the industry, not even the patentee. The test of obviousness was stated in Graham v. John Deere Co., 383 U.S. 1 (1966). "[T]he scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved." *Id.* at 17. A difficulty arises since a person having "ordinary skill" is charged with knowledge of all prior art disclosed at the time of invention. *See* Tokyo Shibaura Elec. Co. v. Zenith Radio Corp., 548 F.2d 88, 94 (3d Cir. 1977). Since prior art includes previous patents and publications, either foreign or domestic, National Rolled Thread Die Co. v. E.W. Terry Screw Prods., Inc., 541 F.2d 593, 596 (6th Cir. 1976), there may be a substantial disparity between the information held by the idealized person with ordinary skill in the field, and actual practitioners.

112. The Supreme Court did not rule on the validity of Adkin's patent. *See* Lear, Inc. v. Adkins, 395 U.S. 653, 675 (1969). The trial judge had found the patent invalid because it had been completely anticipated by prior art. *Id.* at 660. *See* Popeil Bros., Inc. v. Schick Elec., Inc., 494 F.2d 162, 164 (7th Cir. 1974); Harig Products, Inc. v. K.O. Lee Co., 195 U.S.P.Q. 292, 294 (N.D. Ill. 1977), *aff'd,* 594 F.2d 609 (7th Cir. 1979).

113. 395 U.S. at 654.

114. *See* C. LAYTON, TEN INNOVATIONS 148 (1972) (trouble with licensed oscilloscope was not discovered until licensee began production). *See also* Caves, Crookell & Killing, *supra* note 5, at 3.

> Technical knowledge possesses the classic property of asymmetrical access by the potential parties to a transaction to knowledge about the expected payout. The licensor has the relevant experience. If the licensee were fully able to evaluate the proferred technology, the license agreement would dwindle to a right to infringe the licensor's patents—not a rare outcome . . . .

Id.

the course of negotiation with prospective licensees.[115] If an invention is technically complex, a nonlicensee may not possess sufficient information to judge the validity of the patent.[116] Thus, the *Lear* doctrine should be limited to those cases in which the patent is invalid for lack of novelty and the invention is technically complex, for only in such cases will licensees be the only parties with both the incentive and the information to challenge the patent.[117]

Even when a patent license has the tendency to protect an invalid patent, several factors mitigate the allocative inefficiency suffered by society as a consequence of the patent grant. By discouraging patent challenges, these licenses avoid litigation costs[118] and protect valid patents from wrongful invalidation,[119] thus preserving the incentive to innovate. Furthermore, contrary to judicial opinion, invalid patent monopolies do not

115. The patent application must contain a written disclosure "of the invention, and of the manner and process of making and using it, in such full, clear, concise and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same." 35 U.S.C. § 112 (1976). *See In Re* Knowlton, 481 F.2d 1357, 1366 (C.C.P.A. 1973); *In re* Hirsch, 295 F.2d 251, 254 (C.C.P.A. 1961), *cert. denied,* 369 U.S. 888 (1962).

The potential licensees are likely to have as much information and expertise as the Patent Office in dealing with an invention. W. BOWMAN, *supra* note 8, at 25. The Patent Office is not a good predictor of the value of an invention; licensees are apt to be better predictors. *Id.* at 46. An invention that will probably not be patentable or valuable will not attract many application licenses, and will not sustain high royalty rates. A patent that is probably invalid, likewise, will not attract licensees at a high royalty rate.

116. Novelty may be defeated by several different factors, including the existence of foreign or domestic patents or publications antedating the licensed patent. 35 U.S.C. § 102 (1976). For a technically complex invention these sources of information may be difficult to locate. A licensee may be more likely to discover them than non-licensees, however, because patent licenses often include transfers of unpatented technical knowledge, *see* P. ROSENBERG, *supra* note 8, § 3.08, and because licensees often institute research programs to further develop the patented invention, *see* Caves, Crookell & Killing, *supra* note 5, at 11-12.

117. An alternative to relying on licensees to challenge patents was suggested by Bowman, who argued that the Department of Justice be allowed to initiate such challenges. *See* W. BOWMAN, *supra* note 8, at 254.

118. *See* E. LOVELL, DOMESTIC LICENSING PRACTICES 10-11 (1969); F. SCHERER, *supra* note 33, at 453 (cases involving petroleum cracking patents lasted 15 years and legal fees amounted to over $3 million). Licenses discouraging patent challenges are particularly valuable to small entrepreneurs whose patents are challenged by powerful rivals on either good or spurious grounds, and who often choose to settle out of court, giving up their exclusive position and licensing the challenger to avoid the cost and uncertainty of protracted litigation. *See id.* at 453.

119. *See, e.g.,* Graham v. John Deere Co., 383 U.S. 1, 18 (1966) (Court noted disparagingly the "notorious difference between the standards applied by the Patent Office and by the courts"); Timberg, *Antitrust Aspects of Patent Litigation, Arbitration, and Settlement,* 59 J. PAT. OFF. SOC'Y 244, 251 (1977) (one dis-

always evolve into bona fide economic monopolies. A patent grant will not create monopoly profits unless there is both a demand for the patented product and no close substitute, conditions which are not met for the majority of patents.[120] Finally, the allocative distortion caused by these practices should not be measured by the full duration of the invalid patent monopoly. Rather, the true cost of protective licensing is the allocative inefficiency that occurs during the extra time an invalid patent remains in force because patent challenges by licensees have been discouraged.

The cases following *Lear* that have struck down licensing restrictions because they diminish the incentive of licensees to challenge potentially invalid patents have cut too broad a swath.[121] If the patent is invalid because the invention is not useful, the subsequent technical invalidation is of little consequence. When the source of invalidity is duplication or obviousness, nonlicensed parties can challenge the patent.[122] Nonlicensed parties will also be able to challenge if the invention lacks novelty but is not technically complex. Only in cases like *Lear,* where licensing is important to gain information about an invention, should society be concerned about license restrictions protecting invalid patents.[123]

B. Extension of the Patent Monopoly as a Source of Allocative Distortion

While the risk that restrictive licenses will protect invalid patents is overstated, the economic theory that restrictive licenses extend the scope of the patent monopoly is clearly unsound. The monopoly extension theory is based on the presumption that a patentee, if not restrained, can use the

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trict court judge called the Patent Office the "sickest institution" ever invented).

"Because the possibility of a court invalidity judgment can make a newly issued patent a 'lottery ticket' . . . the perceived value of a patent to the patentee is almost certainly affected." Kitti, *supra* note 111, at 55-56.

120. *See supra* note 5.

121. The courts have not considered the relationship between the source of patent invalidity and the need to stimulate patent challenges by licensees. *See supra* text accompanying notes 38-94.

122. Most patent validity challenges focus on these grounds. *See supra* note 111.

123. There is also a danger that invalid patents may be used to establish an illegal cartel. In Duplan Corp. v. Deering-Milliken, Inc., 444 F. Supp. 648, 683 (D.S.C. 1977), *modified,* 594 F.2d 979 (4th Cir. 1979), *cert. denied,* 444 U.S. 1015 (1980), the court found that an agreement to settle patent litigation was actually a scheme to cartelize a market.

economic power of the patent to coerce licensees to pay excessive royalties, royalties on unwanted patents, or royalties for a term exceeding the length of the patent grant.[124] Consequently, a per se rule has been established against postexpiration royalties[125] and mandatory package licensing.[126]

Courts object to tying arrangements in patent licenses on the discredited patent leverage theory.[127] According to this theory, the patent needed by a licensee is a tying good, giving the licensor sufficient economic power to compel the licensee to purchase a tied product from the licensor at an above market price.[128] The theory breaks down at two points. First, if the patented invention has many close substitutes, the patentee will not have the requisite economic power in the tying product. If the patentee attempts to extract a monopoly price for his or her invention or otherwise impose burdensome terms for its use, such as requiring the licensee to purchase a second patent that is either unwanted or overpriced, prospective licensees will simply purchase a substitute instead of the patentee's invention.[129] Second, even if the patentee does possess economic power by virtue of a patent in one product, he or she cannot extend that monopoly to a second product by tying its purchase to the first. Any difference between the economic value of the second product and the price charged for it pursuant to the tie will simply be treated by a licensee as an increase in the price demanded for the patented product. Faced with such a condition on the acquisition of the invention, a potential licensee will either decrease his or her use of the invention or decline to take a license at all. In either case, the patentee has not extended his or her monopoly in the tying product to the tied product; the demand curve for the tying product establishes an upper limit on the price, after deducting the market price of the tied product, that the patentee can extract for the package.[130]

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124. *See* W. BOWMAN, *supra* note 8, at 54.

125. *See supra* notes 48-57 and accompanying text.

126. *See supra* notes 82-83 and accompanying text.

127. *See* W. BOWMAN, *supra* note 8, at 55 ("patent leveraging, in a word, is no more plausible than lifting oneself by one's bootstraps"); Andewelt, *supra* note 95, at 409 ("The means chosen by the patentee for extracting royalty payments for a patent license is neither necessary nor likely to raise competitive problems."); Baxter, *supra* note 11, at 323 (package licensing of technologically related patents with a common royalty base should be permitted); Posner, *Exclusionary Practices and the Antitrust Laws,* 41 U. CHI. L. REV. 506, 508 (1974) (leveraging theory is incorrect).

128. *See supra* note 30.

129. *See supra* note 5.

130. *See* Posner, *supra* note 127, at 508-10. *See also* Baxter, *supra* note 11, at

The foregoing analysis applies in particular to postexpiration licensing. In postexpiration licensing, the tying product is the preexpiration license and the tied product is the postexpiration license. Since the postexpiration license is useless to the licensee, he or she will simply regard it as part of the price for the preexpiration license. Accordingly, a rational licensee would not pay more for a license requiring royalty payments after the expiration of the underlying patent than for one which terminated upon expiration of the patent. Similar analysis applies to most forms of package licensing. If the tied patents in the package are useless to the licensee, he or she will treat any part of the royalty attributable to them like the royalties charged for the postexpiration license in the preceding example—that is, the licensee will treat them as part of the price for the wanted patent. The licensee may, however, find the tied patents useful. In that case, the licensee will treat the difference between the price of the tied patent and the price of any close substitutes as part of the price for the tying patent, which has no close substitutes. Consequently, the difference between the actual and market price of the tied patent will be limited by what the licensee is willing to pay for the use of the tying patent. Moreover, if there are no close substitutes for the tied patents in the package, the patentee will already possess a monopoly in those inventions.

In each of the preceding examples, the patentee was unable to earn through a tying arrangement more than he or she could earn by setting the price on the original patented product at the profit maximizing level. Economists have recognized, however, that a tying arrangement can increase monopoly profits when used as a vehicle for price discrimination.[131] Price discrimination is the practice of charging low prices to customers deriving minimal benefit from the purchase of a commodity, while charging higher prices to customers valuing the commodity more, thus generating greater revenue than could be obtained by charging a uniform monopoly price.[132] Market power

319 (if the price of the tied product is greater than its market price, then the patentee must offer a reduction of the royalty rate on the tying patent).

131. *See* Baxter, *supra* note 11, at 368-69; Posner, *supra* note 127, at 510-13. Posner does not necessarily object to price discrimination by patentholders, however. *See infra* note 138.

The social harms of price discrimination arise from its possible use as a means of predation by sellers, or as a source of price discount to powerful buyers in preference of smaller buyers. L. SULLIVAN, *supra* note 8, §§ 219, 222.

132. According to the normal definition of price discrimination used by economists, "if the ratio between the marginal cost and the price are the same

alone does not allow a seller to practice price discrimination.[133] For price discrimination to be successful, customers must have differing preferences for the seller's product, preferences which the seller is able to measure, and the seller must be able to segment the market between high-price and low-price customers to prevent arbitrage.[134] A patentee can engage in price discrimination through mandatory package licensing whenever one of the patented inventions is a product consumed in the course of using a process invention covered by another patent in the package. The licensee's demand for the patented product indicates the intensity of a licensee's use of the related process patent, and thus the value of the process patent to the licensee.[135] The package license would stipulate minimal royalties for the use of the process innovation but require inflated royalties on the product innovation. The excess royalty charged for the patented product would serve as an additional royalty on the patented process, thus permitting the patentee to exact higher royalty payments from high-intensity users, to whom the process is undoubtedly more valuable.[136] In this case, the patents confer the requisite market power as well as the means to segment the market, while the mandatory purchase of the product license serves as a "counting device," enabling the licensor to measure the preferences of licensees for the process license.[137]

It should be noted, however, that no leverage is involved in

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for [two] sales no . . . discrimination has occurred." L. SULLIVAN, *supra* note 8, § 219. Alternatively, the law looks for a price differential on separate sales of the same commodity. *Id.* The normal economic definition is not useful in the case of patent licenses. Since the marginal cost of licensing is essentially zero, ratios between price and marginal costs cannot be formed.

133. *See* Baxter, *supra* note 11, at 368-69.

134. *See* F. SCHERER, *supra* note 33, at 315. *See also* W. BOWMAN, *supra* note 8, at 100-16.

135. *See* W. BOWMAN, *supra* note 8, at 100-16; Baxter, *supra* note 11, at 368-69.

136. *See* W. BOWMAN, *supra* note 8, at 103-04.

137. Profesor Baxter has suggested another way in which mandatory package licensing may be used as a price discriminating device. If the alternative to package licensing would be to offer each individual patent at a uniform price to all potential licensees, the patentee would be unable to obtain the highest possible price from licensees willing to pay a comparatively high price for one of the patents, because to do so would be to lose the business of licensees willing to pay only lesser amounts. But if different licensees place different relative values on various patents, a patentee might increase his or her profits by combining the different patents into a package. Although different licensees might assign different values to each patent in the package, the maximum values assigned by each licensee to the package may be more uniform than the values assigned to each patent. Thus the patentee can charge a higher uniform price for the package than the aggregate uniform price he could charge for each patent in the package. *See* Baxter, *supra* note 11, at 324-25.

the above situation; the patentee simply uses the product license to extract the full monopoly return to which he is entitled by virtue of his patent grant in the process innovation.[138] Moreover, the device reduces the allocative distortion caused by the patent monopoly in the process innovation, since by discriminating the patentee will be able to increase profits by licensing additional users.[139] Of course, price discrimination may not have an output-increasing effect if, absent price discrimination, the patentee would have maximized profits at the lowest price any potential licensee was willing to pay for the process. In this latter situation, price discrimination is simply a means of appropriating the consumer surplus[140] from high-price customers.[141]

Whether mandatory package licensing should be condemned simply because it can be used to appropriate consumer surplus is doubtful. In order for price discrimination to be effective, consumers must have differing preferences for the patents in the package.[142] If the package involves technologically related patents producing the same end product, which is typically the case, potential licensees are likely to have similar preferences with respect to each patent in the package;[143] that is, the demand curve for each patent is likely to be relatively flat, so that consumer surplus will be minimal even if a uniform price is charged.[144] Moreover, the patentee can achieve price

138. *See* W. BOWMAN, *supra* note 8, at 64-65 ("exploiting the full value [of] a patent" requires patent discrimination); *id.* at 101 ("[P]rice discrimination [is a] means by which a patentee maximizes the return ascribable to the differential advantage the patent affords. Leveraging to a new monopoly is not involved."); Posner, *supra* note 127, at 513-14 ("If one thought that the patent laws tended to undercompensate inventors, resulting in a suboptimal rate of innovation, one might want to encourage price discrimination in order to increase the amount of investment in inventive activity.")

139. A monopolist charging a uniform price restricts output below the perfectly competitive level, causing allocative inefficiency. *See supra* notes 34-35. A monopolist practicing perfect price discrimination, where each customer is charged the maximum price he or she is willing to pay, chooses an output equal to the output of a perfect competitor, thus eliminating the allocative distortion. *See* Posner, *supra* note 127, at 510-13. Price discrimination is unlikely to be perfect, however, and imperfect price discrimination may result in an increase or a decrease of monopoly output. *See* W. BOWMAN, *supra* note 8, at 111. In many instances, however, price discrimination assuredly raises output. *See id.* at 111-12.

140. Consumer surplus is "the difference between the maximum price that a consumer is willing to pay for an item and the actual price that is paid." M. VESETH, INTRODUCTORY MICROECONOMICS 271 (1981).

141. *See* P. AREEDA, ANTITRUST ANALYSIS ¶429 (3d ed. 1981).

142. *See* W. BOWMAN, *supra* note 8, at 103.

143. *See* Baxter, *supra* note 11, at 326.

144. Of course, when the consumer surplus obtainable by price discrimina-

discrimination through other apparently legal licensing arrangements.[145] For example, suppose a market can be segmented into high-intensity users who assign a high value to a particular patented invention and low-intensity users who assign a lower value to it. To maximize profits, a patentee could simply license the invention at a royalty rate related to output or some other measure of use. Finally, the fewer the number of potential licensees for a patented invention, the less likely the patentee will be to license at a uniform price.[146] It may be more efficient in such circumstances to bargain individually with each potential licensee on a patent-by-patent basis for a price related to the elasticity of each licensee's demand for the invention.[147]

III. PATENT LICENSING AS A SOURCE OF PRODUCTIVE EFFICIENCY

A. A NEW PARADIGM FOR THE ECONOMIC ANALYSIS OF LICENSING AGREEMENTS

Traditional judicial treatment of patent licenses has been unduly harsh to patentees,[148] and has overstated the cost of seemingly anticompetitive royalty plans. Courts have con-

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tion is very small, the additional incentive to innovate provided by price discriminating royalty terms is equally small. *Cf. supra* notes 5-7 and accompanying text (discussing ways in which patent system provides incentive to innovate).

145. *See, e.g.,* Baxter, *supra* note 11, at 326.

146. *See id.*

147. *Id.* Historically, patentees have felt that they have the right to charge different royalties to different licensees for the use of the same patent. Nevertheless, there is some case law to the effect that discriminatory rates can constitute patent misuse or an unfair method of competition under § 5 of the Federal Trade Commission Act, 15 U.S.C. § 45 (1976). *See, e.g.,* LaPeyre v. Federal Trade Comm'n, 366 F.2d 117, 121 (5th Cir. 1966) (patentee of shrimp processing machine charged higher rental rate in sections of country with higher wages); Peelers Co. v. Wendt, 260 F. Supp. 193, 201-02 (W.D. Wash. 1966) (upholding jury verdict against patentee of shrimp processing machine); Laitram Corp. v. King Crab, Inc., 244 F. Supp. 9, 17 (D. Alas.) (same), *modified,* 245 F. Supp. 1019 (1965). On the other hand, there is case law upholding discriminatory rates. *See, e.g.,* Bela Seating Co. v. Poloron Prods., Inc., 438 F.2d 733, 738 (7th Cir.) (no antitrust violation as there were rational bases upon which patentee could refuse to grant defendant a license on the same terms as previous license to a third party), *cert. denied,* 403 U.S. 922 (1971); La Salle Street Press, Inc. v. McCormick & Henderson, Inc., 445 F.2d 84, 95-96 (7th Cir. 1971) (patentee can consider factors affecting his own business in determining to whom a license will be offered and on what conditions).

148. During the last few decades courts faced with patent-antitrust conflicts have tended to prefer antitrust law over patent law. This tendency is perhaps a product of the increased use of an analytical approach in the adjudication of economic issues. Available analytical

demned licenses on grounds of allocative inefficiency while ignoring the possible productive efficiencies inherent in most royalty plans.[149]

The concept of "productive efficiency refers to the effective use of resources by particular firms,"[150] including efficient manufacture and distribution of products, the efficient production and dissemination of information, and efficient planning for uncertainty.[151] Patent licensing can contribute to all of these types of productive efficiency, particularly by permitting firms to cope efficiently with the uncertainty inherent in R & D.

Economists evaluate the social worth of business practices and government intervention in the economy by estimating the resultant allocative and productive efficiency, and balancing gains of one type of efficiency against losses of the other.[152]

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tools are far more sensitive in identifying and validating antitrust dangers than patent benefits.

L. SULLIVAN, *supra* note 11, § 177. *See also* Arnold, Aspelund, Brantley & Shurn, *supra* note 11, at 157 (for patent licensors there are "not *any* completely safe harbors" offering protection from antitrust laws) (quoting the former chief of the Patent Group of the Antitrust Division of the Department of Justice). But since *GTE Sylvania, see infra* notes 153-56 and accompanying text, the attitude has been changing. *See, e.g.,* Aronson v. Quick Point Pencil Co., 440 U.S. 257 (1979); United States v. Westinghouse Elec. Co., 648 F.2d 642 (9th Cir. 1981); SCM Corp. v. Xerox Corp., 645 F.2d 1195 (2d Cir. 1981), *cert. denied,* 455 U.S. 1016 (1982); Berkey Photo, Inc. v. Eastman Kodak Co., 603 F.2d 263 (2d Cir. 1979), *cert. denied,* 444 U.S. 1093 (1980). *See also* Arnold, *supra* note 1, at 137 ("The law of technology transfer is grossly uncertain [and] antitransfer."); Bender, *Technology Transfer Lessons from Selected Cases,* in 2 TECHNOLOGY LICENSING 164 (T. Arnold & T. Smegal eds. 1982) (courts becoming less reluctant to accord patents a right and reason to exist); Hammond & Medlock, *supra* note 5, at 169-70 ("trend toward encouraging innovation and securing a just reward to inventors").

149. *See supra* text accompanying notes 38-94. *But see* Turner, *supra* note 7, at 155-56 (§ 7 of the Clayton Act not applicable to high risk exclusive patent licenses).

150. R. BORK, *supra* note 33, at 91.

151. *See* W. NICHOLSON, *supra* note 98, at 412-18. Productive efficiency requires that sources be allocated efficiently among firms, that firms use the resources efficiently, and that firms produce an efficient combination of outputs. *Id.*

"It is a common misconception that a monopolist's increased efficiency redounds only to the monopolist's benefit . . . . If marginal cost is lowered, the intersection with marginal revenue moves to the right, indicating a larger output and a lowered price. That benefits consumers as well as the monopolist." R. BORK, *supra* note 33, at 101.

152. *See, e.g.,* R. BORK, *supra* note 33, at 91-110.

> [Productive and allocative] efficiency make up the overall efficiency that determines the level of our society's wealth, or consumer welfare. The whole task of antitrust can be summed up as the effort to improve allocative efficiency without impairing productive efficiency so greatly as to produce either no gain or a net loss in consumer welfare.

Id. at 91.

The Supreme Court implicitly endorsed the application of this mode of economic analysis to antitrust cases in *Continental T.V. v. GTE Sylvania*.[153] Before *GTE Sylvania*, courts scrutinized and often banned vertical restrictions placed by manufacturers on the marketing of their products by wholesalers and retailers because of the negative effect of such restrictions on allocative efficiency.[154] In *GTE Sylvania*, however, the Court recognized that vertical restraints often produce efficiencies in the marketing of a product.[155] The vertical restraint in that case was upheld because the gain in productive efficiency outweighed any possible loss of allocative efficiency.[156]

Antitrust law expresses a commitment to maintaining free

> Whether one looks at the texts of the antitrust statutes, the legislative intent behind them, or the requirements of proper judicial behavior, therefore, the case is overwhelming for judicial adherence to the single goal of consumer welfare in the interpretation of the antitrust laws. Only that goal is consistent with congressional intent, and, equally important, only that goal permits courts to behave responsibly and to achieve the virtues appropriate to law.

Id. at 89. See also F. SCHERER, *supra* note 33, at 9-44 (describing the economic approach to evaluating antitrust policy and the business practices it regulates); Abbott, *Paradox Regained: Towards a "New Economic Approach" to Vertical Restraints Policy*, 48 GEO. WASH. L. REV. 565, 584-86 (1980) (courts should weigh consumer welfare against productive efficiency to evaluate the desirability of vertical restraints); Baker, *Interconnected Problems of Doctrine and Economics in the Section One Labyrinth: Is* Sylvania *a Way Out?*, 67 VA. L. REV. 1457, 1458 (1981) (the function of antitrust law is the maximization of consumer welfare).

153. 433 U.S. 36 (1977).

154. *See, e.g.*, United States v. Arnold, Schwinn & Co., 388 U.S. 365, 381-82 (1967). Courts traditionally emphasize allocative efficiency without considering productive efficiency in patent cases. *See supra* text accompanying notes 38-94. *See also* Dietrich, *supra* note 31, at 269-70 (non-restrictive patent licenses are not subject to scrutiny under § 1 of the Sherman Act, while restrictive patent licenses are).

155. 433 U.S. at 54-57.

156. *Id.* at 57-59. *See* Posner, *The Rule of Reason and the Economic Approach: Reflections on the* Sylvania *Decision*, 45 U. CHI. L. REV. 1, 2, 12-13 (1977).

Likewise, many contracts in patent rights appear to be anticompetitive, but on closer analysis are found to enhance efficiency. *See, e.g.*, United States v. General Elec. Co., 272 U.S. 476, 490 (1926) (patent license and license restrictions evaluated under rule of reason); United States v. Studiengesellschaft Kohle m.b.H., 670 F.2d 1122, 1128-29 (D.C. Cir. 1981) (when reviewing a restrictive patent license the court avoided the analysis of the per se cases and, referring to *GTE Sylvania*, invoked a rule of reason standard); Berkey Photo, Inc. v. Eastman Kodak Co., 603 F.2d 263, 302 (2d Cir. 1979) (court applied *GTE Sylvania* to a restrictive trade secret licensing agreement), *cert. denied*, 444 U.S. 1093 (1980). In general, the Department of Justice now applies the rule of reason to antitrust review of patent licenses. *See* Arnold, Aspelund, Brantley & Shurn, *supra* note 11, at 153-55. The Department of Justice also has shifted its test of mandatory package licenses from a per se test to a rule of reason test. *Id.* The Department of Justice reviews royalty schemes by applying the rule of reason and weighing the goal of efficient valuation of a patent against the risk of allocative inefficiency in the form of cartelization. *See id.* at 154.

and open business competition.[157] Patent law, on the other hand, forecloses competition as a reward to inventors.[158] The conflict between antitrust and patent law is most evident in determining the methods a patentee may use to exploit the patent monopoly.[159] Recent cases dealing with patent application licensing[160] and licenses resulting from settlement agreements[161] indicate, however, that the courts are retreating from their earlier harsh attitude toward patent licenses. This is consistent with the philosophy of *GTE Sylvania,* which calls for a balancing of allocative efficiency losses against productive efficiency gains when evaluating royalty terms in patent licenses.[162]

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157. *See* Apex Hosiery Co. v. Leader, 310 U.S. 469 (1940).

> The end sought was the prevention of restraints to free competition in business and commercial transactions which tended to restrict production, raise prices or otherwise control the market to the detriment of purchasers or consumers of good and services, all of which had come to be regarded as a special form of public injury.

Id. at 493. *See also* SCM Corp. v. Xerox Corp., 645 F.2d 1195, 1210 (2d Cir. 1981) (the purpose of antitrust law is to protect competition in the marketplace), *cert. denied,* 455 U.S. 1016 (1982).

158. *See supra* note 7 and accompanying text.

159. *See* Selinger, *Patent Licensing in the Afterglow of* Sylvania: *Practicalities of Life under the Rule of Reason,* 63 J. PAT. OFF. SOC'Y 353, 360-61 (1981) ("When, however, a patentee attempts to exploit his patent in a manner which exceeds the scope of his exclusionary right, his actions are then subject to . . . restraints, such as the antitrust laws . . . .").

160. In *Aronson* the Court refused to find that a patent application inherently had the economic power to support a tying agreement. *See supra* notes 67-72 and accompanying text. *But cf. supra* note 30 (patents invariably are found to have the economic power necessary to support a tying arrangement).

161. *See* Aro Corp. v. Allied Witan Co., 531 F.2d 1368, 1373 (6th Cir.) (a patent license, part of a settlement agreement, escaped the scrutiny of *Lear* because the potential allocative distortion that could be created by the patent was minimal), *cert. denied,* 429 U.S. 862 (1976).

162. *See* Selinger, *supra* note 159, at 373-76. "[A]s a result of the shift from *Schwinn* to *Sylvania,* a patentee who is willing to face the uncertainty engendered by a rule of reason defense can now engage in more creative licensing . . . . At least some vertical restraints [in patent licenses] are likely to be deemed reasonable in nature and scope . . . ." *Id.* at 373.

> Since any given technology is one of many inputs that can be used in the manufacture and marketing of a product, licensing of technology in a sense can be viewed as a vertical arrangement. Because a manufacturer faces competition from substitutes for his products, the manufacturer has every incentive to structure a vertical arrangement to achieve the lowest possible cost in the manufacture and distribution of the product. Thus, the manufacturer has every incentive to obtain the most efficient technology for manufacture of the product, so long as the costs of obtaining the technology do not outweigh the benefits of using the technology. The lower the manufacturing costs, the better the product is positioned in competition with substitutes for it, and hence the more profit potentially available to the manufacturer. Lower manufacturing costs are in society's interest even when they do not translate into lower prices to consumers because the lower the manufacturing

B. RISK REDUCTION AS A SOURCE OF PRODUCTIVE EFFICIENCY

Effective royalty payment plans indirectly promote productive efficiency by encouraging licensing instead of exclusive use for marginal patent licensors.[163] Licensing an invention almost always makes the development process more efficient. Normally, license agreements stipulate that the licensee must report technical information and improvements of the invention to the licensor,[164] which effectively puts more R & D resources under the control of the patentee. Licensing also promotes acceptance of an innovation in an industry or in the market place, as the innovation achieves a reputation of success.[165] Furthermore, an inventor frequently lacks the resources to satisfy market demand for a new product or process,[166] since the cost and risk of expanding facilities is often prohibitive.[167] Licensing thus allows the patentee to make use of the existing productive facilities of competitors.

Effective methods of collecting royalties add to these efficiencies because they allow the patentee to cope more easily with the burdens of uncertainty in R & D. The magnitude of the uncertainty facing an innovator is enormous; the patent application process, technical development, production and marketing of an innovation, and the actions of competitors all generate uncertainty.

Economic theory supports the view that a licensor facing risk will forgo royalty revenue in order to implement risk re-

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costs, the lower the allocation of valuable resources necessary to manufacture the product, and therefore the more resources available for other parts of the economy.

Andewelt, *supra* note 95, at 406.

163. *See supra* notes 22-25 and accompanying text.

164. *See* C. LAYTON, *supra* note 114, at 87 (future development aided when licensees share in the process, feeding back their ideas); Bowman, *supra* note 5, at 9 ("[m]any such contracts . . . lead to productive efficiencies"); Caves, Crookell & Killing, *supra* note 5, at 17 (43% of sampled licenses contained such an agreement).

165. L. SULLIVAN, *supra* note 8, § 183.

166. Small corporations often need licensing since they lack the marketing organization necessary to commercialize an invention. C. LAYTON, *supra* note 114, at 87; F. SCHERER, *supra* note 33, at 414. The situation here is similar to cases involving vertical restraints on trade that have the effect of increasing market efficiency. *See, e.g.,* Continental T.V., Inc. v. GTE Sylvania, Inc., 433 U.S. 36 (1976); Cernuto, Inc. v. United Cabinet Corp., 595 F.2d 164 (3d Cir. 1979); Oreck Corp. v. Whirlpool Corp., 579 F.2d 126 (2d Cir.), *cert. denied,* 439 U.S. 946 (1978).

167. Some selectivity is possible. A patentee can license another party to either manufacture, use, or sell an invention. P. ROSENBERG, *supra* note 8, § 16.01(2)(b). Thus, a patentee with production facilities could license others to sell the invention.

ducing royalty terms. A rational entrepreneur invests the amount of resources in R & D that will maximize the expected discounted profit from an innovation.[168] Based on past experience and other available information, an entrepreneur considering an innovation calculates the probability of technical and commercial success, the probability of obtaining a patent, and the probable response of competitors.[169] These data are used to estimate the magnitude and variance of profit from innovation. The greater the variance of possible profit the less attractive is an R & D project.[170] The theory that greater risk results in reduced R & D follows from the assumption that entrepreneurs are risk averse.[171] If entrepreneurs were indifferent to risk, their goal would be to maximize expected profits.[172] An R & D project offering a certain return of $10,000 would be equally attractive to one offering a fifty percent probability of a $15,000 return and a fifty percent probability of a $5,000 return.[173] A risk averse entrepreneur, however, would prefer the certainty of $10,000, and would even prefer something less, perhaps a certainty of $9,000, to the more risky project.[174]

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168. W. NICHOLSON, *supra* note 98, at 156; F. SCHERER, *supra* note 33, at 292-93; J. WILSON & S. DARR, *supra* note 5, at 400. An entrepreneur calculates expected profits by multiplying the probability of receiving a particular profit by its value, and then summing the resulting terms. *See* J. WILSON & S. DARR, *supra* note 5, at 400.

169. Firms also consider the cost of R & D and the distribution of profits over time. *See generally* W. BOWMAN, *supra* note 8, at 36 ("the profit motive operates in the research and development aspect of business"); J. SCHMOOKLER, INVENTION AND ECONOMIC GROWTH (1966) (examining reasons for variations over a period of time in inventions in a given industry); J. WILSON & S. DARR, *supra* note 5 (discussing the use of economic analysis in the process of managerial decision making); Kamien & Schwartz, *supra* note 15 (survey of relationship between resource allocation to R & D and technical advance).

170. *See, e.g.,* J. WILSON & S. DARR, *supra* note 5, at 399-404 (forecasting uncertain cash flow from an investment project).

171. *See* Caves, Crookell & Killing, *supra* note 5, at 3 (assume risk aversion in a study of technology licensing). A risk averse firm prefers a certain return on investment over an uncertain return with the same value. *See* H. VARIAN, MICROECONOMIC ANALYSIS 108 (1978).

172. W. NICHOLSON, *supra* note 98, at 153-55; F. SCHERER, *supra* note 33, at 414.

173. Expected profits are the same in each situation. *See supra* note 168.

174. Empirical work indicates that licensors reduce royalty payments in order to gain risk reducing terms in patent licenses. Caves, Crookell & Killing, *supra* note 5, at 25. "If the licensor imposes some restrictions on the licensee . . . he reduces the licensee's potential rents and thus the stream of revenue that he can capture in that transaction. Therefore the presence of revenue-restricting terms in license agreements implies some sacrifice of expected revenue for another objective. *Id.* at 16. The more extensive the restrictions imposed on the licensee, the greater the royalty reduction tends to be. *Id.* at 18-19. Surveys reveal that risk reducing royalty arrangements are common; and most common when risk exposure is especially great. *Id.* at 16, 18.

The power of royalty provisions to reduce the burden of uncertainty is made apparent by examining four types of patent licenses: application, invalid patent, postexpiration, and package licenses. Application licensing is designed to cope with the uncertainty of patent approval and the amount of time it will take to obtain approval. Approval depends on the Patent Office's application of the patentability standards to each case.[175] These standards are difficult to apply, causing substantial uncertainty regarding patent approval.[176] Furthermore, the application itself takes an average of forty-two months to process.[177]

An inventor can reduce the burden of uncertainty of patent approval by licensing others to use the invention while the patent application is pending.[178] An inventor who lacks the ability to develop an invention obviously will wish to license his or her idea as soon as possible.[179] Application licensees assume the risk that if the patent application is denied they will have made royalty payments on an unpatentable invention.[180] To attract licensees under such conditions patentees will be forced to offer a reduced royalty rate.[181] According to economic theory, risk averse patentees should be willing to make such an offer.[182] Without application licenses the risk of a long delay before patent approval might be enough to discourage the research in the first place.

Potential rivals of a patent applicant may wish to develop a similar invention, but uncertainty about approval of the applicant's patent claim may deter them. If rivals obtain a license from the applicant with a guarantee of a continued license subsequent to patent approval, they can proceed with development. If potential competitors cannot get a license at this

175. *See supra* text accompanying note 99.

176. *See* F. SCHERER, *supra* note 33, at 440 (25% of patent applications are denied); Banner, *American Bar Association Address,* 61 J. PAT. OFF. SOC'Y 535, 537 (1979) (Patent and Trademark Office is severely understaffed and underfunded); Baum, *The Federal Courts and Patent Validity: An Analysis of the Record,* 56 J. PAT. OFF. SOC'Y 758, 761 (1974) (1648 out of 3666 contested patents were held valid).

177. W. BOWMAN, *supra* note 8, at 48.

178. *See supra* notes 62-72 and accompanying text.

179. A delay in licensing delays development by licensees, delays royalty payments, and diminishes the value of the invention as competing inventions are introduced.

180. Licensees "will often pay more, or risk paying for a longer time, in the hope of getting patent protection, instead of merely trade secret disclosure." Altman, *supra* note 72, at 317.

181. *See supra* note 174.

182. *See supra* notes 168-74 and accompanying text.

stage, they must gamble. They could proceed with development, hoping that the patent will not be approved or that a license will be obtainable after approval. Alternatively, the competitors could wait for patent approval before initiating development, in which case society loses the benefit of early development of a new invention by rivals of the inventor.[183]

Application licenses protect an inventor from the vicissitudes of the Patent Office, but regrettably a successful patentee cannot obtain similar protection from the courts. Patents are frequently challenged by competitors and invalidated by the courts.[184] A study of patent challenges revealed that only 1648 out of a sample of 3666 contested patents were held valid.[185] Despite the harsh reality of these statistics, courts continue to preclude licensing agreements requiring royalty payments after a patent is declared invalid.[186] A preferable approach would be to allow patent licenses requiring royalty payments on invalid patents as long as the hazard of protecting invalid patents is not substantial.[187] To obtain such a license, a licensor would

183. *See* Arnold, *Basic Considerations in Licensing,* in 1 TECHNOLOGY LICENSING 21 (T. Arnold & T. Smegal eds. 1982) (licensing often decreases the risk faced by the licensee); Caves, Crookell & Killing, *supra* note 5, at 16 ("We expect both licensors and licensees to favor license terms that reduce risks for them."). This problem is accentuated where patent approval is uncertain and time-consuming. *See* F. SCHERER, *supra* note 33, at 445 ("Development that entails the highest risks tends to be the least rapidly imitated.").

184. P. ROSENBERG, *supra* note 8, § 17.01, at 17-2 to 17-4. Suits for cancellation, infringement, and declaratory judgement of invalidity call into question the scope and validity of a patent. *Id.* at 17-4.

185. Baum, *supra* note 176, at 761.

186. *See, e.g.,* Grunewald v. Power Swing Partners, 9 Bankr. 512 (Bankr. S.D. Cal. 1980); *supra* text accompanying notes 74-76. The licensing agreement in *Grunewald* provided that if the patent were ever declared invalid, the minimum annual royalty would be reduced by one-half. 9 Bankr. at 516. The *Grunewald* Court failed to recognize the benefit offered by this type of licensing agreement—risk sharing. The fact that this type of agreement provides minimal additional incentive to challenge patent validity certainly should not bar a transaction that effectively reduces the harm caused by uncertainty from patent litigation. And although the parties who do not have patentable inventions receive an "undeserved" reward, it is because they were willing to settle for less than full monopoly profits if litigation ultimately determined their invention to be worthy of a patent. The licensee who must pay royalties after a patent is invalidated is not being treated unfairly. The risk of patent invalidity is assumed in order to gain access to an invention. A rational licensee will forego licensing if the terms of the license are unfavorable and the patent appears weak. If the patent is strong or the royalties charged by the licensor are minimal, then potential licensees will accept a license; but by hypothesis society gains little from the *Grunewald* rule in this case.

187. Such licenses would not allow the patentholder to extend the patent monopoly. A simplified example will show that the value of royalties collected under a *Grunewald* type license would not exceed royalties obtainable in the present system. Consider a world where ten patents are granted per year, and

find it necessary to discount the royalty rate on valid patents in order to entice the licensee to share the risk of a finding of invalidity.[188]

Besides patent approval and validity, the development process adds another major source of uncertainty. Two-thirds of industrial investment in innovation "is committed to new products which are either dropped before market introduction or fail to produce a satisfactory return."[189] After a patent is awarded, a new invention requires an average of five years of development before it is marketable.[190] On average, the cost of development is ten times the cost of invention.[191] Thus, most of the expenditure on R & D is made during this period, although the entrepreneur is uncertain of the value of an invention until it is marketed. The uncertainty arises because it is difficult to predict the size of the market, how rapidly the market will grow, and the amount potential buyers will be willing to pay.[192]

A patentee gains more from licensing if it is done early in

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each can be licensed for $500. All ten are licensed, but two are randomly invalidated, immediately after licensing. Since no royalties are paid on invalid patents, society pays the patentees $4,000 on the valid patents. Next, consider a world identical in all respects, except that royalties are collected on invalid patents. Patentees cannot continue to collect $500 per patent. In the first world, licensees paid an expected royalty of $400, since there was an 80% chance of paying $500 and a 20% chance of paying nothing. The $400 expected royalty payment was the largest payment the patent monopolists could extract from the licensees, and is equal to the royalty payment that will prevail in the new world. Thus society pays $400 to each of the ten patentees at a total cost of $4,000.

188. *See supra* note 174.

189. Udell, *supra* note 11, at 288. Given technical success, the chances of commercial success are about 40% according to J. PARKER, *supra* note 14, at 60, and between 10 and 30% according to Scherer, *The Economic Effects of Compulsory Patent Licensing,* 2 FINANCE AND ECONOMICS 18 (Monograph series 1977).

Between 37% and 80% of all new products fail. Udell, *supra* note 11, at 287. About 500 new products come on the market each month and 90% of them fail for lack of interest. U.S. NEWS & WORLD REP., May 1, 1978, at 45.

190. J. PARKER, *supra* note 14, at 56 (discussing commercial development of major innovations during the period 1945-64).

191. J. PARKER, *supra* note 14, at 51; Schellin, *The Innovating Process,* 8 AM. PAT. L.A.Q. 155, 155 (1980). The modal cost of R & D is between $250,000 and $400,000. F. SCHERER, *supra* note 33, at 415. Technical feasibility is determined with a relatively small investment, *id.* at 416, but significant development costs are often required to commercialize an invention, Kitch, *The Nature and Function of the Patent System,* 20 J.L. & ECON. 265, 276-77 (1977). *See* Arnold, *supra* note 183, at 33 (the cost of developing the J-59 jumbo jet engine was one-half billion dollars, and Rolls Royce went bankrupt developing a competitive engine).

192. *See* J. WILSON & S. DARR, *supra* note 5, at 214-16. "A technology's performance is often highly uncertain. The technology may not work properly in the new location; the demand for the product that embodies it may change;

the development process.[193] If licensees participate in development activities, the patentee is relieved of some of the cost and risk of development, and commercialization is likely to occur sooner.[194] If there are several potential licensees, they can be induced to accept early license agreements to ensure that they do not lag behind their rivals.[195] But early licensing calls for creative royalty schemes because of the difficulty of valuing an invention early in the development process.[196] Postexpiration licensing[197] and package licensing[198] satisfy this need.

Justice Harlan, dissenting in *Brulotte,* argued that postexpiration licensing, rather than resembling illegal tying, was instead a legal and convenient form of payment for the licensor, and possibly for the licensees.[199] Using this practice, a por-

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newer technologies may displace it." Caves, Crookell & Killing, *supra* note 5, at 3.

193. "Respondents stressed not so much the pecuniary cost saving from licensing as the lesser delay and risk involved in getting a diversifying product on the market through licensing rather than through solo efforts. The time saving is presumably important in part because the potential licensee's holdings of complementary assets and skills remain underutilized until the diversifying product generates a cash flow." Caves, Crookell & Killing, *supra* note 5, at 11-12.

194. *Id.* For a discussion of the cost and risk of the development process, see *supra* notes 189-92 and accompanying text.

195. A head start in manufacturing an invention provides a substantial economic advantage. *See supra* note 73.

196. The valuation of an invention at an early stage of development is difficult because of the high degree of uncertainty about patent validity, the success of development, and the response of competitors and customers. *See supra* notes 176, 184-85, 189-92 and accompanying text.

"[D]evelopments that entail the highest risk tend to be the least rapidly imitated." F. SCHERER, *supra* note 33, at 445. "New technology is more difficult and costly to transfer . . . and presumably places a higher premium on in-house competence for the licensee. An older product is more fully debugged and does not demand that the licensee hold a ready stock of complementary skills." Caves, Crookell & Killing, *supra* note 5, at 11.

197. *See supra* notes 48-57 and accompanying text.

198. *See supra* notes 82-94 and accompanying text.

199. Justice Harlan used the following hypothetical to illustrate the difficulty in valuing an invention and how postexpiration licensing surmounts the problem.

> At the time when the Thys patent still has a few years to run, a farmer who has been picking his hops by hand comes into the Thys retail outlet to inquire about the mechanical pickers. The salesman concludes his description of the advantages of the Thys machine with the price tag—$20,000. Value to the farmer depends completely on the use he will derive from the machine; he is willing to obligate himself on long credit terms to pay $10,000, but unless the machine can substantially outpick his old hand-picking methods, it is worth no more to him. He therefore offers to pay $2,000 down, $400 annually for 20 years, and an additional payment during the contract term for any production he can derive from the machine over and above the minimum amount he could pick by hand. Thys accepts, and by so doing, according to the

tion of all of the royalty payments could be delayed until the value of an invention was clear. Furthermore, licensees incur the greatest costs in the early stages of the development and marketing of an invention. Thus postexpiration royalty payments are a means of spreading out costs over time.[200]

Like postexpiration licensing, package licensing is also a means of reducing the effect of uncertainty on both patentees and licensees.[201] An inventor often secures a number of patents on related inventions and develops the inventions simultaneously.[202] The parties may be uncertain about the scope of patent protection provided by the different patents.[203] A package license surmounts this problem and is therefore an attractive method of obtaining royalty payments on hard to value inventions.[204]

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majority, commits a *per se* misuse of its patent. I cannot believe that this is good law.

Brulotte v. Thys Co., 379 U.S. 29, 38 (1964) (Harlan, J., dissenting) (footnote omitted).

The courts recognize that package licensing may be convenient for both the licensor and licensee and permit such licensing subject to the limitations of *Lear* and *Brulotte,* and a test of voluntariness. *See supra* notes 82-97 and accompanying text.

200. *Cf.* C. LAYTON, *supra* note 114, at 87 (growth of machine tool company slowed by development costs until license obtained).

201. *See* P. ROSENBERG, *supra* note 8, § 16.02(2).

202. *See, e.g.,* Automatic Radio Mfg. Co. v. Hazeltine Research, Inc., 339 U.S. 827 (1950) (several hundred patents covering radio components).

203. *See id.* at 833 (the license "was a convenient mode of operation designed by the parties to avoid the necessity of determining whether each type of petitioner's product embodies any of the numerous Hazeltine patents").

204. *See, e.g.,* Zenith Radio Corp. v. Hazeltine Research, Inc., 395 U.S. 100, 135, 139-40 (1969) (parties may agree to a provision measuring royalties by the licensee's total sales, if such a provision is dictated by convenience of the parties even though only some or none of the products employ the patented idea); Automatic Radio Mfg. Co. v. Hazeltine Research, Inc., 339 U.S. 827, 834 (1950) ("Sound business judgment could indicate that [royalty payments based on sales rather than use of a package of patents] represents the most convenient method of fixing the business value of the privileges granted by the licensing agreement."); Westinghouse Elec. & Mfg. Co. v. Wagner Elec. & Mfg. Co., 225 U.S. 604, 605, 620-22 (1912) (when the infringer, by commingling the elements, makes it impossible for the patentee to apportion the profits, the entire inseparable profit must be given to the patentee); Western Elec. Co. v. Stewart-Warner Corp., 631 F.2d 333, 339 (4th Cir. 1980) (a patentee is permitted to base royalty payments on the sales of a finished product if the patented product is a component of the finished product not regularly marketed by itself, and if the arrangement is at the convenience of the parties), *cert. denied,* 450 U.S. 971 (1981); Paper Converting Mach. Co. v. FMC Corp., 432 F. Supp. 907, 913 (E.D. Wis. 1977) (where only one feature is patented, but substantially the entire marketable value of total mechanism is attributable to that feature, recovery is based on value of the total mechanism), *aff'd mem.,* 588 F.2d 832 (7th Cir. 1978).

"Mandatory package licensing can be a very efficient method of licensing because it avoids the necessity for numerous separate, time-consuming, and

Moreover, effective methods of valuing inventions primarily benefit small entrepreneurs.[205] Large firms are less likely than small firms to license, because they have greater resources to devote to development and can better shelter themselves from risk.[206] Hence, the productive gains accruing to small innovators from risk reducing royalty terms tend to promote competition in the marketplace.

IV. CONCLUSION

By invoking the spirit of *Lear,* courts have thwarted attempts by patentees to include royalty terms in their licenses that discourage patent challenges by licensees. But courts have been too zealous in their vigil to protect the integrity of the patent system. Only when prospective licensees lack information about an invention that is unpatentable because it lacks novelty should the doctrine of *Lear* apply. In other cases, there will be parties other than licensees with a sufficient incentive to challenge possibly invalid patents. The royalty provisions that have been disallowed by the courts could be used to minimize the risk of patent invalidation and infringement, thereby increasing the incentive to innovate.

A fear that postexpiration licenses and mandatory package licenses can be used to extend the scope of the patent monop-

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costly negotiations between the parties." Andewelt, *supra* note 95, at 401, 410. The royalty base is only limited by the creativity of the parties if it is chosen for mutual convenience as the result of good faith bargaining. Zenith Radio Corp. v. Hazeltine Research, Inc., 395 U.S. 100, 138-39 (1969); Arnold, Aspelund, Brantley & Shurn, *supra* note 11, at 115. But if coercion is present a royalty scheme will be invalid. Warner-Jenkinson Co. v. Allied Chem. Co., 477 F. Supp. 371, 398 (S.D.N.Y. 1979); United States v. Westinghouse Elec. Corp., 471 F. Supp. 532, 543-45 (N.D. Cal. 1978), *aff'd in part, rev'd in part,* 648 F.2d 642 (9th Cir. 1981).

205. "[A]s the size of a firm increases, there is a decrease per dollar of R & D in (*a*) the number of patented inventions, (*b*) the percentage of patented inventions used commercially, and (*c*) the number of significant inventions." J. SCHMOOKLER, PATENTS, INVENTION AND ECONOMIC CHANGE 39 (1972). Small businesses contribute heavily to the rate of technological innovation. Udell, *supra* note 11, at 296.

206. Firms with large R & D programs, or a large number of investment projects in general, protect themselves from uncertainty by diversifying. *See generally* W. NICHOLSON, *supra* note 95, at 156; F. SCHERER, *supra* note 33, at 414. The principle is the same as in finance. An investor diversifies a portfolio of assets to reduce risk. W. NICHOLSON, *supra* note 95, at 157-58. With many different projects the favorable and unfavorable contingencies "cancel out," leaving less risk. F. SCHERER, *supra* note 33, at 415. Furthermore, if there are significant economies of scale, a small firm cannot efficiently produce an invention. *Id.* at 414. Also, marketing and distribution are usually more efficient in large firms, and for a new product this may be critical. *Id.*

oly has led courts to proscribe these methods of royalty payment. Analysis shows that the conditions necessary to expand monopoly power are not satisfied by these licensing agreements. Thus, the danger of allocative inefficiency posed by these practices is small, while their benefit in terms of reducing the burden of risk in the development process is clear.

The courts should reconsider their negative attitude toward these methods of royalty collection. Allowing patentees more freedom to license their patents will stimulate R & D and make the innovative process more efficient.