Trade Secrets and the Option Value of Involuntary Exchange

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A trade secret is proprietary but unpatented information that confers a competitive advantage on its owner. If someone steals a trade secret, the owner of the secret is entitled to a remedy that may include, in addition to damages, an injunction that forbids the thief from manufacturing a product that employs the owner's secret. Courts disagree, however, over whether such an injunction should continue after the trade secret becomes public knowledge—for example, through a patent application or marketing. Even when courts agree that the injunction should continue after the trade secret becomes public, they still disagree over whether the injunction should be perpetual or limited in duration. This article uses real option theory within a Schumpeterian framework of innovation and competition to clarify the conflict regarding the proper duration of an injunction to remedy the misappropriation of trade secrets. The optimal duration of such an injunction should be proportional to the option value implicit in the theft of the trade secret, which in turn will increase with the extent of sunk costs associated with the trade secret and the level of risk associated with innovative activity in the relevant market. Furthermore, the theft of a secret process differs in economic effect from the theft of a secret product design, yet courts have failed to discern this distinction when fashioning injunctive relief in trade secret cases. The three conflicting common law rules, as well as the default rule under the Uniform Trade Secrets Act, all are flawed on economic grounds. However, because the option value of trade secret misappropriation would be difficult for litigants to calculate and judges to evaluate in a given case, a reasonable proxy is the imposition of a perpetual injunction. Such an injunction would induce the innovator and thief to enter post-trial licensing negotiations under circumstances in which the thief had no bargaining power. As a consequence, the innovator would license the trade secret at its full opportunity cost, which would incorporate his best estimate of the option value associated with the thief's knowledge and exploitation of the secret before its public disclosure.

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I.   INTRODUCTION

A trade secret is proprietary information that confers a competitive advantage on its owner. It often concerns a manufacturing process or a product design. But unlike a patent, a trade secret is protected not by a statutory grant of exclusive ownership conditioned on public disclosure, but rather by nondisclosure and continued secrecy. Section 39 of the Restatement (Third) of Unfair Competition defines a trade secret as "any information that can be used in the operation of a business or other enterprise and that is sufficiently valuable and secret to afford an actual or potential economic advantage over others."[1] The classic example of a trade secret is the recipe for Coca-Cola.

If someone—such as a competitor, former employee, or licensee—steals a trade secret, the owner of the secret is entitled to a remedy that may include, in addition to damages, an injunction that forbids the thief from manufacturing a product that employs the owner's secret.[2] Courts disagree over whether such an injunction should continue after the trade secret

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1.   RESTATEMENT (THIRD) OF UNFAIR COMPETITION § 39 (1995). "A trade secret can consist of a formula, pattern, compilation of data, computer program, device, method, technique, process, or other form or embodiment of economically valuable information." *Id.* § 39, cmt. d. The definition of a trade secret in the Restatement (Third) of Unfair Competition builds upon the definition enunciated in 1939 in the original Restatement of Torts. *See* RESTATEMENT OF TORTS § 757, cmt. b, at 5 (1939) (explaining that a trade secret is "any formula, pattern, device or compilation of information which is used in one's business and which gives him an opportunity to obtain an advantage over competitors who do not know or use it"), *and* Kewanee Oil Co. v. Bicron Corp., 416 U.S. 470, 474-75 (1974). The Restatement (Second) of Torts does not contain a section on trade secrets.

2.   *See* ROGER M. MILGRIM, TRADE SECRETS § 7.081[1] (2000); AMÉDÉE E. TURNER, THE LAW OF TRADE SECRETS 427-58 (1962); Johnson, *Remedies in Trade Secret Litigation*, 72 NW. U.L. REV. 1004 (1978); Jack W. Berryhill, *Trade Secret Litigation: Injunctions and Other Equitable Remedies*, 48 COLO. L. REV. 189 (1977). Some states also make trade secret theft a crime. *See, e.g.,* N.Y. PENAL LAW § 155.30, 165.07 (McKinney 2000); *see also* Note, *Tightening the White Collar: The Criminalization of Trade Secret Theft*, 14 AM. CRIM. L. REV. 797 (1977). In addition, the theft of a trade secret by a foreign person or entity constitutes a federal crime under the Economic Espionage Act, 18 U.S.C. § 1831.

becomes public knowledge—for example, through its owner's filing of a patent application or through his marketing of the product incorporating the secret.[3] Even when courts agree that the injunction should continue after the trade secret becomes public, they still disagree over whether the injunction against the trade secret thief should be perpetual or limited in duration.[4]

Three cases from three different federal circuits exemplify this controversy. In *Shellmar Products Co. v. Allen-Qualley Co.*,[5] the Seventh Circuit in 1936 perpetually enjoined the thief from using the innovator's trade secrets even after the innovator's public disclosure of those secrets had enabled others to use the (former) secrets lawfully without the innovator's consent. At the other extreme, in *Conmar Products Co. v. Universal Slide Fastener Co.,*[6] the Second Circuit, in a 1949 opinion by Judge Learned Hand, enjoined the thief only until public disclosure occurred. Even under *Conmar,* however, the thief may not raise public knowledge as a defense to a perpetual injunction if his *own* misappropriation destroyed the secrecy of the information.[7] Finally, in *Winston Research Corp. v. Minnesota Mining & Manufacturing Co.*[8] the Ninth Circuit in 1965 enjoined the thief after public disclosure had occurred, but only for as long as the court estimated that it would have taken the thief lawfully to reverse engineer the secret. Although a split therefore exists between the circuits, that split has not elicited—and need not elicit—a resolution of the issue by the Supreme Court because trade secret law is state law.[9]

The Uniform Trade Secrets Act (UTSA), adopted by forty-five states and the District of Columbia at the time of this writing, does not resolve this conflict among injunction rules.[10] The UTSA creates a rebuttable

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3.   "Matters of public knowledge or general knowledge in an industry cannot be appropriated by one as his secret. Matters which are completely disclosed by the good which one markets cannot be his secret . . . . [A] substantial element of secrecy must exist, so that, except by use of improper means, there would be difficulty in acquiring the information." RESTATEMENT OF TORTS § 757, cmt. b, at 5-6 (1939); *see also* Forest Labs, Inc. v. Formulations, Inc., 299 F. Supp. 202, 207 (E.D. Wis. 1969), *aff'd in part and revised in part on other grounds*, 452 F.2d 621 (7th Cir. 1971) ("the issuance of a patent which clearly discloses all essentials of a process destroys any secrecy that previously attached to that process").

4.   This articles uses "perpetual" and "limited" to describe the duration of an injunction and avoids the term "permanent injunction" unless distinguishing that form of equitable decree from an interlocutory injunction.

5.   87 F.2d 104 (7th Cir. 1936), *cert. denied*, 301 U.S. 695 (1937).

6 .   172 F.2d 150 (2d Cir. 1949).

7.   *Id*. at 156.

8 .   350 F.2d 134 (9th Cir. 1965).

9 .   *See* American Can Co. v. Mansukhani, 742 F.2d 314, 334 (7th Cir. 1984).

10 .   14 U.L.A. 437 (1980). As of mid-2004, only Massachusetts, New Jersey, New York, Texas, and Wyoming had not enacted the UTSA. Both the UTSA and the Restatement (Third) of Unfair Competition explicitly allow injunctions for "threatened misappropriation." *Id.* at § 2: RESTATEMENT (THIRD) OF UNFAIR COMPETITION §§ 40-41. The definition of a trade secret in the Restatement (Third) of Unfair Competition, *id. at* § 39, was intended to be consistent with the UTSA definition, *supra*, § 1.

presumption that the *Conmar* rule shall apply. California's version of the UTSA, for example, provides: "Upon application to the court, an injunction shall be terminated when the trade secret has ceased to exist, but the injunction may be continued for an additional period of time in order to eliminate commercial advantage that otherwise would be derived from the misappropriation."[11] However, the UTSA gives no guidance as to what facts are relevant to rebutting that presumption, what the burden of proof is, or how one would calculate the proper duration of the additional amount of time for the injunction to run. Although the comments to the UTSA give further support to applying *Conmar*, their rationale is questionable, as will become apparent.

The choice of injunction rule takes on special significant in light of the recent growth of the "inevitable disclosure" doctrine. Some jurisdictions have used the "threatened misappropriation" wording found in both the UTSA and the Restatement (Third) of Unfair Competition to create a presumption that a former employee has, in certain circumstances, inevitably used without permission the proprietary information of his former employer.[12]

This article endeavors to resolve the conflict regarding the proper duration of an injunction to remedy the misappropriation of trade secrets. Part II examines the Supreme Court's evolving economic rationale for the existence of trade secret protection, beginning from the axiom that trade secret remedies should advance the same policies that motivate the substantive rights established by trade secret law.

Part III explains why the theft of a secret *process* differs in economic effect from the theft of a secret *product design*. Courts have neglected the important economic distinction between secret processes and secret product designs when fashioning injunctive relief in trade secret cases.

Part IV explains how trade secret misappropriation exemplifies involuntary exchange. Trade secrets result from sunk investment in risky innovative activity. Given uncertainty and asymmetric information, an insider's opportunity to steal a trade secret resembles a real option in the theory of corporate finance.

Part V introduces a Schumpeterian framework for analyzing trade secret misappropriation, which involves a cycle of innovation, theft, disclosure, and exploitation over time. Competition is "Schumpeterian" when firms compete to achieve positions of temporary market dominance from which they may be displaced by the next wave of product innovations. This view of

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11. *E.g.*, CAL. CIV. CODE § 3426.2(a) (West Supp. 2000).

12. *See, e.g.*, PepsiCo, Inc. v. Redmond, 54 F.3d 1262, 1271 (7th Cir. 1995) ("PepsiCo finds itself in the position of a coach, one of whose players has left, playbook in hand, to join the opposing team before the big game.").

sequential competition *for* the market is based on Joseph Schumpeter's familiar concept of "creative destruction."[13]

Part VI use this Schumpeterian framework to analyze *Conmar* (and the related default rule under the UTSA), *Winston Research,* and *Shellmar.* This analysis indicates that the optimal duration of an injunction should be proportional to the option value implicit in the theft of the trade secret, which in turn will increase with the extent of sunk costs associated with the trade secret and with the riskiness of investment in innovative activity in the relevant market. In this respect, none of the existing doctrinal approaches or the USTA default rule reflects correct economic analysis. The optimal standard is likely to produce outcomes that would fall between the *Shellmar* and *Winston Research* rules in terms of the duration of the injunction.[14] However, because the option value of trade secret misappropriation would be difficult for litigants to calculate and a court to evaluate in a given case, a reasonable proxy is the *Shellmar* rule. The imposition of a perpetual injunction would induce the innovator and thief to enter post-trial licensing negotiations under circumstances in which the thief had no bargaining power. As a consequence, the innovator would license the trade secret at its full opportunity cost, which would incorporate his best estimate of the option value associated with the thief's knowledge and exploitation of the secret before its public disclosure.

II.   THE SUPREME COURT'S EVOLVING ECONOMIC RATIONALE FOR TRADE SECRET LAW

To fashion the optimal injunctive remedy for trade secret misappropriation, one must start with a clear understanding of the legal and economic justification for the common law protection afforded trade secrets.

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13.   *See* JOSEPH R. SCHUMPETER, CAPITALISM, SOCIALISM AND DEMOCRACY 81-86 (Harper & Row 1942). For a Schumpeterian approach to remedies in antitrust cases involving high technology industries, see Howard A. Shelanski & J. Gregory Sidak, *Antitrust Divestiture in Network Industries*, 68 U. CHI. L. REV. 1 (2001).

14.   Apart from these three injunction rules emerging from discrete strands of judicial decisions, a fourth possible rule may have evolved outside the judicial process entirely. It is curious that the reported trade secret injunction cases do not involve some of the most technologically dynamic industries, such as software, computers, semiconductors, and telecommunications equipment. One possibility is that an extralegal norm has emerged in such industries not to litigate cases of trade secret misappropriation. Ronald Gilson has suggested a related hypothesis: that the unofficial rule against trade secret litigation derives not from industry standards, but from the inadequacy of legal remedies available within a particular jurisdiction. *See* Ronald J. Gilson, *The Legal Infrastructure of High Technology Industrial Districts: Silicon Valley, Route 128, and Covenants Not To Compete*, 74 N.Y.U.L. REV. 575, 602 (1999). He argues that an intellectual externality has resulted in Silicon Valley that has produced a thriving "high-velocity labor market" that encourages "an engine of continuous innovation." *Id*. at 590-91. It is outside the scope of this article to examine the possibility that extralegal norms in high-technology areas substitute for enforcement of trade secrets through litigation.

Questions like "How broad is the definition of a trade secret?" or "What conduct constitutes misappropriation?" are unintelligible if answered without regard to the question "How do trade secret remedies advance the objectives of trade secret law?"[15] Of course, this last question requires recognition of the objectives of trade secret law.

Section 757 of the first Restatement of Torts asserted in 1939 that, unlike a patent monopoly, trade secret protection "is not based on a policy of rewarding or otherwise encouraging the development of secret processes or devices," but instead "is merely [directed] against breach of faith and reprehensible means of learning another's secret."[16] Section 757 stated: "One who discloses or uses another's trade secret, without a privilege to do so is liable to the other if (a) he discovered the secret by improper means, or (b) his disclosure or use constitutes a breach of confidence reposed in him by the other in disclosing the secret to him, or (c) he learned the secret from a third person with notice of the facts that it was a secret and that the third person discovered it by improper means or that the third person's disclosure of it was otherwise a breach of his duty to the other, or (d) he learned the secret with notice of the facts that it was a secret and that its disclosure was made to him by mistake."[17] The Restatement's premise—that trade secret protection rests on a theory of tortious breach of a confidential relationship or upon a theory of an express or implied contract of confidentiality—reflected the Supreme Court's 1917 decision in *E.I. du Pont de Nemours Powder Co. v. Masland.*[18] There, Justice Oliver Wendell Holmes wrote for the Court, "The word 'property,' as applied to . . . trade secrets, is an unanalyzed expression of certain secondary consequences of the primary fact that the law makes some rudimentary requirements of good faith."[19] To Holmes, "the starting point" in a trade secret case was "not property or due process law, but that the defendant stood in confidential relations with the plaintiffs."[20]

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15. The same point has been made in the literature on antitrust remedies. *See* Shelanski & Sidak, *supra* note 13 (emphasizing consumer-welfare rationale for divestiture as an antitrust remedy in the *Microsoft* monopolization case); Abbott B. Lipsky, Jr. & J. Gregory Sidak, *Essential Facilities*, 51 STAN. L. REV. 5 (1999) (emphasizing consumer-welfare implications of open-access remedies in antitrust law); J. Gregory Sidak, Note, *Rethinking Antitrust Damages*, 33 STAN. L. REV. 329 (1981) (relating consumer-welfare model of substantive antitrust law to rules of antitrust damages).

16. *See* RESTATEMENT OF TORTS § 757, cmt. b, at 7 (1939).

17. *Id.* § 757. Comment b to section 757 elaborated: "It is not requisite that only the proprietor of the business know [the trade secret]. He may, without losing his protection, communicate it to employees involved in its use. He may likewise communicate it to others pledged to secrecy." *Id.* § 757, cmt. b, at 7.

18. 244 U.S. 100 (1917).

19. *Id.* at 102.

20. *Id.* For a contemporary defense of the logic of *Masland*, see Pamela Samuelson, *Privacy as Intellectual Property*, 52 STAN. L. REV. 1125 (2000). *See also* McClain, *Injunctive Relief Against Employees Using Confidential Information*, 23 KY. L.J. 248 (1935); Note, *Misappropriation of*

Before long, however, state courts declined to follow Holmes's reasoning in *Masland* that trade secrets are not property.[21] Rather, courts began to reason that trade secrets need not emanate from a contractual relationship, but can exist because the owner does not share that information with anyone else. In 1974 in *Kewanee Oil Co. v. Bicron Corp.*,[22] the Supreme Court abandoned as well the more important related premise of the Restatement of Torts and of *Masland*: that it is not the purpose of trade secret law to reward innovation. Chief Justice Burger wrote for the 5-4 majority and emphasized that, to the contrary, the economic purpose of trade secret law is to permit "the individual inventor to reap the rewards of his labor."[23] Although the "maintenance of standards of commercial ethics" and the "fundamental human right . . . of privacy" are important concerns of trade secret law,[24] they are not its ultimate purpose. Rather, these intermediate objectives, which are not ostensibly economic in character or purpose, are relevant principally because their attainment creates incentives for "the subsidization of research and development and . . . the increased economic efficiency within large companies through the dispersion of responsibilities for creative developments."[25] In addition, trade secret protection fosters the

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Trade Secrets, 53 TUL. L. REV. 215, 222-24 (1978); D. Kirk Jamieson, *Just Deserts: A Model to Harmonize Trade Secret Injunctions*, 72 NEB. L. REV. 515 (1993).

21. *E.g.*, California Intelligence Bureau v. Cunningham, 83 Cal. App. 2d 198, 188 P.2d 303, 306-07 (2d Dist. 1948); Progress Laundry Co. v. Hamilton, 208 Ky. 348, 270 S.W. 834, 835 (1925); Ultra Life Labs. v. Eames, 240 Mo. App. 851, 221 S.W.2d 224, 233 (1949); Spiselman v. Rabinowitz, 270 App. Div. 548, 61 N.Y.S.2d 138, 141 (1st Dep't 1946); *see also* National Starch Prods., Inc. v. Polymer Indus., Inc., 273 App. Div. 732, 79 N.Y.S.2d 357, 361-62 (1st Dept.) (distinguishing *Masland*); Richard A. Epstein, *Trade Secrets as Private Property: Their Constitutional Protection* (June 2003), Univ. Chicago Law & Econ. Olin Working Paper No. 190, *available at* http://ssrn.com/abstract_id=421340 ("The fact that the information is not shared with a single soul does not strip it of legal protection. Rather, the contrary seems to be true . . . . After all, we do not say that someone becomes the owner of property because he has leased it; rather the reverse is true: because he is the owner, he is normally in a position to lease the property.").

22. 416 U.S. 470 (1974); s*ee also* Paul Goldstein, Kewanee Oil v. Bicron Corp*.: Notes on a Closing Circle,* 1974 SUP. CT. REV. 81 [hereinafter Goldstein, *Closing Circle*].

23. 416 U.S. at 493. Dissenting in *Kewanee*, Justices Douglas and Brennan said: "A trade secret, unlike a patent, has no property dimension." *Id.* at 497 (Douglas, J., dissenting).

24. *Id.* at 481, 487 (majority opinion).

25. *Id.* at 482 (citing Wexler v. Greenberg, 399 Pa. 569, 578-79, 160 A.2d 430, 434-35 (1960)); *see also* Abbott Labs. v. Norse Chem. Corp., 33 Wis. 2d 445, 147 N.W.2d 529, 533-34 (1967). Writing shortly after the Court's decision, Paul Goldstein, *Closing Circle*, *supra* note 22, at 93, observed that, "while the *Kewanee* opinion referred to the state law's primarily economic motive for analogical purposes, the measure of the state law it ultimately took was not of the law's economic objective but of its economic effects, regardless of motive." He proposed that courts "measure the economic effect of other state laws which, though their objectives are predominantly and sometimes exclusively noneconomic, nonetheless bear significantly on the same national interests in competition endorsed in *Kewanee*." *Id.* On the "dispersion of responsibilities" rationale articulated in *Kewanee*, see David D. Friedman, William M. Landes & Richard A. Posner, *Some Economics of Trade Secrets*, 5 J. ECON. PERSPECTIVES 61, 67 (1991) ("[I]f the law refuses to enforce contracts in which employees promise not to spill the employer's trade secrets, employers may be led to reorganize their businesses in inefficient forms—perhaps by splitting up tasks among

dissemination of information because the innovator can license his secrets to others, confident that he has an enforceable right to that intellectual property.[26] This effect should, in turn, enhance the innovator's incentive to make sunk investments in R&D that might produce new technology whose patentability is inherently uncertain. This legal protection also should prevent wasteful expenditures on excessive plant security.[27]

Kewanee took an *ex ante* view of the innovation process rather than an *ex post* view. The Court recognized that, in an uncertain world, trade secret protection provides the innovator a safety net if his investment in R&D fails to produce valuable information that rises, with relatively high likelihood, to a patentable form: "Trade secret law encourages the development and exploitation of those items of lesser or different invention than might be accorded protection under the patent laws, but which items still have an important part to play in the technological and scientific advancement of the Nation."[28] In this sense, trade secret law and patent law serve identical purposes through complementary means. Trade secret protection encourages technological innovation by creating, through the definition of an enforceable property right, an incentive to make sunk investments in the creation of *appropriable* information.[29] It seems axiomatic that remedies for trade secret misappropriation ought to be designed to achieve that effect also.[30]

Since *Kewanee*, the Supreme Court has reiterated its conception of trade secret protection as a system of property rights intended to encourage innovation. In *Ruckelshaus* v. *Monsanto Co.* in 1984, the Court explicitly recognized a trade secret as property for purposes of the Takings Clause.[31] Moreover, the Court intimated that *Masland* did not mean what everybody had always thought—that trade secrets are *not* property. Rather, the Court, in an opinion by Justice Blackmun, said that "Justice Holmes [in *Masland*] did not deny the existence of a property interest; he simply deemed

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more employees so that each knows less, or by bringing in family members (even though they may be less competent) as employees . . . .").

26.   *Kewanee*, 416 U.S. at 493.

27.   *See* E.I. du Pont de Nemours & Co. v. Christopher, 431 F.2d 1012, 1016 (5th Cir. 1970), *cert. denied*, 400 U.S. 1024 (1971).

28.   *Kewanee*, 416 U.S. at 493. For an early (and evidently overlooked) expression of this proposition, see A.O. Smith Corp. v. Petroleum Iron Works Co., 73 F.2d 531, 538 (6th Cir. 1934) ("It is agreed, and we think correctly, that processes which are not patentable may yet be the subject of trade secrets.").

29.   This general expectation of complementarity between patent protection and trade secret protection should not exclude the possibility that innovators may regard secrecy and patenting as (imperfect) substitutes for some inventions. *See* James J. Anton & Dennis A. Yao, *Little Patents and Big Secrets: Managing Intellectual Property*, 35 RAND J. ECON. 1, 1 (2004).

30.   *See* MILGRIM, *supra* note 2, § 1.09 at 43 ("existence of a protectable property interest is the basis for equity jurisdiction . . . and for remedies such as . . . injunctive relief").

31.   467 U.S. 986, 1003-04 (1984).

determination of the existence of that interest irrelevant to resolution of the case."[32] Whether one chooses to accept Justice Blackmun's interpretation of Holmes at face value, or to regard it as a piece of hagiographic revisionism, it is clear that by 1984 *Masland* was not the authority it once was.

In 1989, Justice O'Connor's opinion for the Court in *Bonito Boats, Inc.* v. *Thunder Craft Boats, Inc.*[33] amplified the theme that federal patent law and state trade secret protection complement one another. Dicta in Chief Justice Burger's 1979 opinion for the Court in *Aronson* v. *Quick Point Pencil Co.* had suggested that state trade secret protection might be "offensive" to patent law's aim of public disclosure of new inventions.[34] Justice O'Connor reiterated in *Bonito Boats* that "the ultimate goal of the patent system is to bring new designs and technologies into the public domain through disclosure."[35] Would-be innovators and inventors, however, cannot always be certain that the final fruits of their R&D efforts would be patentable. Trade secret law serves as a safety net for such investment. It assures innovators that, even if they do not expect to receive patent protection for the fruits of their sunk investment in R&D, the product of that investment will nevertheless enjoy some legal protection. Justice O'Connor observed: "The protections of state trade secret law are most effective at the developmental stage, before a product has been marketed and the threat of reverse engineering becomes real. During this period, patentability will often be an uncertain prospect, and to a certain extent, the protection offered by trade secret law may 'dovetail' with the incentives created by the federal patent monopoly."[36] Moreover, compelling competitors to engage in reverse engineering also stimulates greater innovation because the exercise of reverse engineering sometimes yields new discoveries. "Reverse engineering of chemical and mechanical articles in the public domain," noted Justice O'Connor, "often leads to significant advances in technology."[37]

As noted earlier, trade secret law is state law. From *Masland* to the present, therefore, the Supreme Court's articulation of the rationale for trade

32. *Id*. at 1004 n.9. In 1987, the Court characterized a trade secret as property for purposes of the federal mail and wire fraud statutes. *See* Carpenter v. United States, 484 U.S. 19 (1987).

33. 489 U.S. 141 (1989).

34. 440 U.S. 257, 266 (1979).

35. *Bonito Boats*, 489 U.S. at 151.

36. *Id.* at 161. *Cf.* 1 HERBERT HOVENKAMP, MARK D. JANIS & MARK A. LEMLEY, IP AND ANTITRUST: AN ANALYSIS OF ANTITRUST PRINCIPLES APPLIED TO INTELLECTUAL PROPERTY LAW § 2.58-2.60 (Aspen Law & Business 2003) ("As a policy matter state trade secret protection should be allowed to exist alongside federal patent protection.").

37. *Id.* at 160. For legal and economic analyses of reverse engineering, see Pamela Samuelson & Suzanne Scotchmer, *The Law and Economics of Reverse Engineering*, 111 YALE L.J. 1575 (2002); Douglas Gary Lichtman, *The Economics of Innovation: Protecting Unpatentable Goods*, 81 MINN. L. REV. 693 (1997). For a skeptical assessment of the Court's economic reasoning in *Bonito Boats*, see John Shepard Wiley, Jr., Bonito Boats: *Uninformed But Mandatory Innovation Policy*, 1989 SUP. CT. REV. 283, 296-302 (1989).

secret law is dictum, except as insofar as that state law bumps against federal law. The Court as commentator nonetheless has gravitated toward an incentive-based, *ex ante* view of the law of innovation. This gravitation has generally coincided with the development of state law of trade secrets, which is typically derived from three main sources: the original Restatement of Torts, the UTSA, and the Restatement (Third) of Unfair Competition. Though some jurisdictions still rely on the original Restatement for administering injunctive relief for misappropriation of a trade secret,[38] the Restatement (Third) of Unfair Competition in 1995 was an attempt to incorporate the reasoning of the UTSA, and the majority of American jurisdictions now agree on the core principles of trade secret law, including the *ex ante* view of innovation.

What implication does that *ex ante* view have for the formulation of remedies for the misappropriation of trade secrets? If trade secret injunctions are intended to preserve the incentive to make sunk investments in innovative activities, they must restore the reward for successful innovation, which corresponds to the innovator's economic rent**.** The theft of a trade secret appropriates the quasi rents with which the innovator would recover his sunk costs in specialized investments in new technology.[39] Trade secret misappropriation resembles the problem of contractual opportunism[40] or regulatory holdup.[41] The analogy is to the real option value inherent in a party's right to breach a contract and thereby expropriate the other party's quasi rent,[42] or to the option of an access seeker in a regime of mandatory network unbundling to compel the use of another's property at an artificially low, regulated price.[43]

As Part IV will more fully explain, trade secret theft extracts rents that the innovator otherwise would legitimately earn. The output of the firm that

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38.   *See* note 10 *supra*.

39.   *Cf.* J. GREGORY SIDAK & DANIEL F. SPULBER, DEREGULATORY TAKINGS AND THE REGULATORY CONTRACT: THE COMPETITIVE TRANSFORMATION OF NETWORK INDUSTRIES IN THE UNITED STATES 423-24 (Cambridge Univ. Press 1997) (discussing misappropriation of quasi rents through rate regulation).

40.   *See* Benjamin Klein, Robert G. Crawford & Armen A. Alchian, *Vertical Integration, Appropriable Rents, and the Competitive Contracting Process,* 21 J.L. & ECON. 297 (1978); Oliver E. Williamson, *Transaction Cost Economics: The Governance of Contractual Relations*, 22 J.L. & ECON. 233 (1979); *see also* Benjamin Klein & Keith Leffler, *The Role of Market Forces in Assuring Contractual Performance,* 89 J. POL. ECON. 615 (1981).

41.   *See* SIDAK & SPULBER, *supra* note 39, at 107; JEAN-JACQUES LAFFONT & JEAN TIROLE, A THEORY OF INCENTIVES IN PROCUREMENT AND REGULATION 54, 99-103 (MIT Press 1993).

42.   *See*, *e.g.*, Alexander J. Triantis & George G. Triantis, *Timing Problems in Contract Breach Decisions*, 41 J.L. & ECON. 163 (1998).

43.   *See* Jerry A. Hausman & J. Gregory Sidak, *A Consumer-Welfare Approach to the Mandatory Unbundling of Telecommunications Networks,* 109 YALE L.J. 417 (1999); Jerry A. Hausman, *Valuing the Effect of Regulation on New Services in Telecommunications*, 1997 BROOKINGS PAPERS ON ECON. ACTIVITY: MICROECONOMICS 1.

stole the trade secret depresses the price that the innovator may lawfully charge; the returns to the trade secret thief that exceed his incremental costs represent an *ex post* expropriation of the innovator's legitimate recovery of, and competitive return on, his sunk investment. With such theft, the innovator would not have faced a positive expected value when deciding whether to make his original investment. Hence, the innovator never would have made the sunk investment in the project that created the opportunity for the trade secret theft.

III.   DESIGN THEFT VERSUS PROCESS THEFT

A trade secret enables a firm to obtain an advantage over competitors that do not know or are not permitted to use such information. This ability gives the trade secret owner the opportunity to earn quasi rents and perhaps also economic rents. That is, it gives the innovator upward pricing flexibility, which is to say the ability to price above marginal cost for a sustained period of time.

Because of the existence of sunk costs, one cannot correctly equate upward pricing flexibility with market power. In the absence of sunk costs, the degree of economic power can be measured usefully by the size of the difference between price and marginal cost. Both price and marginal cost depend on the firm's output. Because a firm generally will produce the level of output that maximizes profit, economic power should be measured at this output. The firm's profit-maximizing output in turn depends on the market's price elasticity of demand, the firm's own market share, and the price elasticity of supply for the other firms in the market. Thus, for a given marginal cost function for the firm, these three factors determine the magnitude of the firm's economic rent.[44]

In the presence of sunk costs, however, this conventional measure is ambiguous because it does not discriminate monopoly rent from either quasi rent or transient entrepreneurial rents derived from innovation.[45] A downward shift in the firm's marginal cost function also will allow the firm to exact economic rent if competitors do not experience the same cost savings and thereupon lower prices to equal the new marginal cost of production. Courts have failed to recognize that a secret process influences the magnitude of the innovator's available rents differently than does a secret product design.

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    44. *See* William E. Landes & Richard A. Posner, *Market Power in Antitrust Cases*, 94 HARV. L. REV. 937, 944-52 (1981).
    45. *See, e.g.,* David J. Teece & Mary Coleman, *The Meaning of Monopoly: Antitrust Analysis in High-Technology Industries,* 43 ANTITRUST BULL. 801, 820-22 (1998) (discussing entrepreneurial rents derived from innovation).

Consider first the economic effects of misappropriation of process secrets. An analysis of the economic effects of product design secrets then follows.

A. *Process Secrets*

A secret process gives the innovator a lower marginal cost (and a lower average variable cost) function than his rivals, holding constant all other information regarding production. In a static sense (which ignores long-run incentives for investment and innovation), the value to society of the secret process is the savings that would result if all firms in the industry employed that process.[46] This amount also would be equal to the maximum profit to the innovator (less transactions costs) if he could license the secret process to all his competitors before public disclosure of the secret permitted it to become freely available.

By stealing a secret process, a firm lowers its marginal cost of production to that of the innovator and avoids the sunk cost of developing the process independently (or of purchasing a blanket license or per-unit license to use it). The trade secret thief will maximize profit by charging the price corresponding to the output where marginal revenue equals marginal cost. Assuming that the trade secret thief and the innovator have equal access to all other technologies for production, the thief's avoidance of these sunk licensing or R&D costs enables him to price only as low as the innovator's marginal cost. Thus, if the trade secret thief prices at marginal cost, misappropriation does not enable him to underprice the innovator, let alone monopolize the market.[47]

Nonetheless, it is common for an innovator to allege in trade secret litigation that the misappropriation of a process secret has enabled the thief to underprice the innovator.[48] How can this result occur? If the trade secret thief in fact charges a lower price than the innovator, it must be because the innovator continues to price above marginal cost (presumably up to long-run average incremental cost).[49] In other words, the trade secret thief is able to underprice the innovator only if the innovator persists in attempting to recover the sunk costs of his investment that created the trade secret. That is, the trade secret thief cannot underprice the innovator *unless the innovator*

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46.   *See* DONALD A. HAY & DEREK J. MORRIS, INDUSTRIAL ECONOMICS 450-51 (1979); *see also* FREDERIC M. SCHERER, INDUSTRIAL MARKET STRUCTURE AND ECONOMIC PERFORMANCE 442 (2d ed. 1980).

47.   *See* Sidak, Note, *supra* note 15, at 342 & n.49.

48.   *See, e.g.*, Franke v. Wiltschek, 209 F.2d 493, 494 (2d Cir. 1953); Tempo Instrument, Inc. v. Logitek, Inc., 229 F. Supp. 1, 3 (E.D.N.Y. 1964).

49.   On the relationship of long-run average incremental cost to marginal cost, see WILLIAM J. BAUMOL & J. GREGORY SIDAK, TOWARD COMPETITION IN LOCAL TELEPHONY 56-58 (MIT Press 1994).

tries to earn quasi rents with which to recoup the sunk costs of his investment that has produced valuable information.[50]

In addition to this expropriation of the innovator's quasi rents, misappropriation of a secret process reduces the innovator's ability to price above marginal cost by increasing the elasticity of supply of rival firms exploiting the formerly secret process. This loss of upward pricing flexibility is of the same magnitude as if the innovator had been able to license its secret process to rivals—except, of course, that the innovator receives as a reward only the cost savings on his *own* output rather than the cost savings on the entire industry's output.

B. *Product Design Secrets*

A secret product design gives the innovator upward pricing flexibility in a different manner than does a secret process. A secret design confers on the innovator's product either low consumer substitutability, or both low consumer substitutability and low producer substitutability. Stated differently, it is useful to consider two categories of economic effects resulting from the theft of a product secret. These two categories raise the underlying question of whether trade secret remedies give the same protection when proprietary information arises from novel flashes of insight as they do when proprietary information arises from substantial and sustained investment in R&D. Consider first the case of designs that result from costly investment.

Suppose that someone steals secret product designs that are too complex to be reverse engineered without a substantial investment of time, labor, and physical capital. The subsequent marketing of a copy of the innovator's product has three distinct economic consequences. First, it flattens the innovator's (residual) demand curve in direct relation to the share of the market that the trade secret thief supplies. This result simply reflects that the innovator has lost upward pricing flexibility—and hence the opportunity to earn economic rent and perhaps also quasi rent—because of increased consumer substitutability.

Second, the trade secret thief gains the consumer demand that the innovator lost. The degree to which this shifted demand for the thief's version of the product remains relatively price-inelastic depends on how well the innovator and the thief alike prevent the design's further disclosure or discovery (through either subsequent theft or reverse engineering).

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50. There is a possible scenario under which the thief can underprice the innovator, though it seems improbable. If the stolen process has substantial economies of scale (or substantial economies from cumulative output, as from learning-by-doing), and if the thief beats the innovator to market with a product that employs that stolen process, then the thief could have a lower marginal cost than the innovator.

Third, the trade secret thief avoids sunk costs of R&D that the innovator incurred—which, as shown earlier, gives the thief a lower average total cost schedule than the innovator, holding constant all other information regarding production. However, because the marginal cost of using the secret product design is zero for both the trade secret thief and the innovator, the thief's marginal cost of production will not be lower than the innovator's. Nonetheless, the trade secret thief will be able to underprice the innovator if the latter seeks to recover its sunk costs of R&D by charging a price that is high enough to earn quasi rents.

Now consider a novel design. It may be more likely than a costly technical design to result from inspired genius or luck rather than prolonged R&D. Nonetheless, the design brings into being a new product for which no reasonable substitutes currently exist—or, at least, a product highly differentiated from currently marketed substitutes. An example is the removable, self-stick note pad manufactured by Minnesota Mining & Manufacturing (3M) and sold since at least the early 1980s under the "Post-it" trade name.[51] Virtually all upward pricing flexibility that 3M might have enjoyed with respect to this product surely resulted from low consumer substitutability. As the innovator, 3M temporarily controlled 100 percent of the market for a relatively price-inelastic product. Yet the simplicity of the design—and the fact that any "secret" inherent in the design was immediately disclosed by the mere marketing of the product—implied that, at trivial cost, rival firms could (and did) reverse engineer the product and market substitutes. In this instance, producer substitutability rather than consumer substitutability constrained the innovator's upward pricing flexibility over time.

In the case of novel designs, misappropriation of the product design will not give the trade secret thief any significant advantage because the sunk costs necessary to duplicate the innovator's design are already trivial. Moreover, the marginal cost of production for both the thief and the innovator will be equal, by hypothesis. Nonetheless, misappropriation of the novel product design will flatten the innovator's residual demand curve in a shorter period of time than would the inevitable flood of substitutes supplied by imitators who lawfully copied the self-evident and formerly secret design.

Writing in 1934, the Sixth Circuit reasoned in *A.O. Smith Corp. v. Petroleum Iron Works Co.* that a secret design resulting from a flash of insight is no less entitled to trade secret protection than is a secret design requiring costly investment:

> The mere fact that the means by which a discovery is made are obvious, that experimentation which leads from known factors to an

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51. "Post-it" is a registered trademark of 3M, but the product's packaging bears no patent notice.

> ascertainable but presently unknown result may be simple, we think
> cannot destroy the value of the discovery to one who makes it, or
> advantage the competitor who by unfair means, or as the beneficiary of
> a broken faith, obtains the desired knowledge without himself paying
> the price in labor, money, or machines expended by the discoverer.
> Facts of great value may, like the lost purse upon the highway, lie
> along unnoticed upon the public commons. Hundreds pass by, till one
> more observant than the rest makes discovery.[52]

The Restatement of Torts in 1939 also seemed to distinguish novel designs
from costly but more seemingly inevitable ones that resulted from extensive
R&D. The Restatement suggested that a "novel invention" would more
deserve a perpetual injunction if misappropriated than would a "mechanical
improvement" that a legitimate imitator—the so-called "good mechanic"—
could easily reverse engineer:

> The nature of the secret is . . . an important factor in determining the
> kind of relief that is appropriate against one who is subject to liability
> [for trade secret misappropriation]. Thus, if the secret consists of a
> device or process which is a novel invention, one who acquires the
> secret wrongfully is ordinarily enjoined from further use of it and is
> required to account for the profits derived from his past use. If, on the
> other hand, the secret consists of mechanical improvements that a good
> mechanic can make without resort to the secret, the wrongdoer's
> liability may be limited to damages, and an injunction against future
> use of the improvements made with the aid of the secret may be
> inappropriate.[53]

These early views of trade secret remedies seem to accord greater deference
to creative genius than to laborious investment in R&D, perhaps on the
unstated premise that creativity is scarcer than the human and physical
capital necessary to innovate improvements on prior embodiments of
valuable information. From an economic perspective, however, greater
explanatory power comes from analyzing this doctrinal distinction in terms
of sunk costs and real options, as Part IV will show.

IV.   THE OPTION VALUE OF INVOLUNTARY EXCHANGE

The voluntary exchange inherent in market transactions enhances social
welfare because it makes both buyer and seller better off. The transaction
constitutes a Pareto improvement in welfare. This result holds even when the
seller is a monopolist. In a world of scarce resources, the selection of one
transaction implies a decision to reject or forgo others. Unless both the buyer
and the seller agree to terms, no transaction will occur. By its very nature,
voluntary exchange increases social welfare.

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52.   73 F.2d 531, 538-39 (6th Cir. 1934).

53.   RESTATEMENT OF TORTS § 757, cmt. b (1939).

Virtually all of microeconomic theory, however, rests on the assumption that parties engage in voluntary exchange. Discussions of involuntary exchange are absent from nearly all microeconomics textbooks. Nonetheless, we routinely observe several distinct forms of involuntary exchange.

One form of involuntary exchange occurs between the government and a private party. In these transactions, a large and diffuse body of economic agents are the intended beneficiaries. Examples are eminent domain, taxation, conscription, and opportunistic use of rate regulation of public utilities. In each case, one can find an externality justification for government imposition of an involuntary transaction on private parties. It may be the need to produce a public good, such as a highway, through the use of a highly specialized or localized asset (eminent domain). Or perhaps the need to provide national defense (conscription) or to fund more generally the production of national defense and other public goods (taxation). Or it may be the need to abate an externality such as air pollution, through land-use restrictions. This is certainly not to say that an involuntary transaction is the only means to achieve the desired governmental objective. Rather, it is simply to say that government compulsion is rationalized in each of these cases as a remedy for an external cost or free-rider problem. Several constitutional provisions regulate this form of involuntary transaction, either generically or specifically—the requirement of just compensation for takings of property,[54] the right to refrain from self-incrimination,[55] and the limitation on the quartering of soldiers immediately come to mind.[56]

A second form of involuntary exchange encompasses transactions between private parties and the government that specify other private parties as the immediate third-party beneficiary. Examples are compulsory licensing of copyrighted works, the essential facilities doctrine and related doctrines of forced sharing in antitrust law, and mandatory unbundling of telecommunications networks. Curiously, this form of involuntary exchange is not subject to any significant constraint under current judicial interpretation of the Constitution.[57]

A third form of involuntary exchange concerns transactions between private parties. Through the law of crimes and the law of torts, Anglo-American common law evolved as a social institution to address the consequences of involuntary exchange. The crime of robbery and the tort of conversion are after-the-fact attempts to rectify a transaction that arose from involuntary exchange—for example, because of the use or threat of violence,

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54. U.S. CONST. amend. V.

55. *Id*.

56. *Id*., amend. III.

57. *See, e.g.*, Verizon Communications Inc. v. FCC, 535 U.S. 467, 523-28 (2002).

or because of the use of deception or unauthorized access to another's property.

The misappropriation of a trade secret is another example of this third form of involuntary exchange.[58] It is the use, without compensation, of valuable information created by someone else. Moreover, one can characterize trade secret misappropriation as a real option to exploit another party's private innovation. That information concerns not only the technologies that the trade secret thief can profitably pursue, but also the technologies that have been revealed—through another party's trial and error—to be unsuccessful and thus should be avoided.[59] The distortion caused by the theft of a trade secret is exacerbated if a large portion of the assets required to create and exploit the secret is sunk.

Stated differently, because a person cannot redeploy the sunk investment that is required to discover a trade secret, it pays for him to "wait and see" how well other investments in that industry have performed before committing himself to investing his own capital.[60] Conversely, the thief can wait to see whether a particular technology belonging to another is worth stealing. Joseph Anton and Dennis Yao argue that "the amount of the innovator's disclosure is critical to the imitation decision."[61] In the case of trade secret theft, the amount of "disclosure" to the thief is total. The option value of involuntary exchange becomes especially large in Schumpeterian industries, where different competing technologies make it possible that one firm will leapfrog others. In such an industry, the decision to invest today is especially risky, because it may commit a firm to a particular technology that may reveal itself later to be inferior. The imitator, therefore, actually enjoys a "*second*-mover" advantage, for he can shift the risk of sunk investment in a new technology onto the innovator.

In other words, for the thief the option value of involuntary exchange encompasses the ability to concentrate on stealing only the fruitful results of someone else's risky investment. Although *Conmar, Winston Research*, and

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58. Friedman, Landes & Posner, *supra* note 25, at 69-70, argue that trade secret theft is distinguishable from intentional tort or crime when "the 'thief' brings about a social gain—approximated by the reduction in cost or improvement in quality that is brought about by greater competition as a result of breaking the trade-secret owner's information monopoly." They note, however, that reverse engineering is a superior substitute for theft as a means of discerning a trade secret. *Id.* at 70. They could have added, as Part V will explain, that the short-term social gain from trade secret theft would be significant only if (1) a long time elapsed between the theft and the secret's public disclosure and (2) no lawful imitators promptly emerged as competitors at the time of disclosure.

59. *Cf.* Anton & Yao, *supra* note 29, at 2 ("[I]f an innovation were known *a priori* to be minor, a competitor might prefer to remain with existing technology rather than imitate and risk legal damages.").

60. *See* Hausman & Sidak, *supra* note 43.

61. Anton & Yao, *supra* note 29, at 2.

Shellmar do not fully recognize the value of this second-mover advantage, the very definition of a trade secret does make this recognition in the sense that it presupposes that the secret information is "sufficiently valuable . . . to afford an actual or potential economic advantage over others."[62] If a secret were instead insufficiently valuable in this sense, then its misappropriation would support at most some lesser cause of action, such as the tort of trespass or conversion. Thus, a matter of legal definition that borders on a tautology actually highlights the selection bias inherent in the kind of proprietary information being misappropriated.

One can measure the value of the option to wait before making a sunk investment. Avinash Dixit and Robert Pindyck have estimated that the markup on the cost of capital that is necessary to account for the sunk nature of investment varies from investment to investment, but is often at least two hundred percent.[63] Stated differently, any project entailing significant sunk costs that yielded an expected return of between 100 and 200 percent of the cost of capital would no longer be justified. This analysis is applicable to trade secret theft—or to any form of involuntary exchange, for that matter. The misappropriation of a trade secret truncates the innovator's returns in the "good state" of the world. That truncation of positive returns is especially harmful when one considers that the sunken nature of investment in innovation raises the hurdle rate for investments. Investment in trade secrets typically entails not only investment in specialized capital equipment, but also investment in specialized labor—as is underscored by the fact that many trade secret cases involve former employees as defendants. Those labor costs are inherently and completely sunk once the expenditure on specialized labor is made. Because a firm cannot recover the resources invested in a failed sunk-cost investment and shift them to an alternative project, that risk will create a disincentive for the firm to invest in innovative activities, in the absence of adequate trade secret protection.[64]

The Dixit-Pindyck model explains the behavior of innovative firms in high-technology industries. Such firms face incentives, in addition to those related to the sunkeness of the investment, for delaying deployment of innovative processes and products. These incentives include the rapidity of technological change and the declining costs across cumulative outputs that inhere in many industries (such as those associated with computer hardware and software technologies). In the face of rapid technological change, a firm

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62. RESTATEMENT (THIRD) OF UNFAIR COMPETITION § 39 (1995).

63. *See* AVINASH K. DIXIT & ROBERT S. PINDYCK, INVESTMENT UNDER UNCERTAINTY 153 (Princeton University Press 1994). Similarly, Jerry Hausman, *supra* note 43, found that mandatory unbundling of incumbent local exchange carriers' networks at prices set by regulators equal to total element long-run incremental cost implied a real option for competitors worth approximately three times the allowed access price.

64. *See* Hausman & Sidak, *supra* note 43, at 462-63.

has a strong incentive, in addition to the incentive arising from the sunkeness of the investment, to delay investment as long as competitive forces will permit.

A simple example illustrates the point. The traditional view in microeconomic theory was that one should invest in any project that has a positive net present value of cash flows. Real option theory, however, shows that it may be better to wait if possible until some uncertainty is resolved and cost reduction can be achieved. That reduction in uncertainty is precisely the advantage that the trade secret thief enjoys. Assume initially, however, that the process of innovation is random across firms; firms do not select *ex ante* to be innovators or thieves of proprietary intellectual property. Consider, for example, a firm that traditionally builds routers for data networks. The firm must decide whether to develop a new dense-wave multiplexing technology for routers that costs, say, $1 billion today but has an uncertain return tomorrow. Suppose that, if the demand for the new routers is high, the firm will make $4 billion in profit. If, on the other hand, there is a bad outcome and the demand for the new routers is low, then the new technology will be unproductive, and the firm will gain nothing from owning it. If the probability of each outcome is 0.5, then the expected net cash flow of investing in the development of the new technology is, ignoring discounting, calculated as follows: (0.5 x $4 billion) + (0.5 x $0) − $1 billion = $1 billion.

Because the project has a positive expected net cash flow, one might think it optimal for the firm to take the role of the innovator—that is, make the investment today to develop the new technology. But that decision actually is not optimal. If the firm can delay making the investment, it can reduce the risk of bad outcomes by observing the experience of others and capturing the gains associated with deploying the superior technology later. The value of waiting is that the firm preserves the option *not* to make the investment of $1 billion if the bad state of the world occurs. To continue with the previous numerical example, the expected net cash flow of investing in the new technology *after* the market has witnessed its commercial success is, again ignoring discounting, calculated as follows: (1.0 x $4 billion) + (0.0 x $0) − $1 billion = $3 billion. In other words, the firm may decide that it is more profitable to pursue a strategy of being an imitator of new technology rather than an innovator. By waiting, the firm would increase its expected return. If the firm invests in developing new technology today, it sacrifices an option to invest tomorrow in imitating that new technology.

The choice facing the trade secret thief is even more favorable than that facing the imitator because the thief avoids making the $1 billion sunk investment to develop the secret product or process. Hence, the value to the thief of waiting to market a product containing the stolen trade secret is, again ignoring discounting, calculated as follows: (1.0 x $4 billion) + (0.0 x $0) − $0 = $4 billion. Of course, this calculation does not incorporate the

expected value of any damages that the thief subsequently may be ordered to pay the innovator. But what if the thief chooses not to wait to market a product? After all, he does not face the choice of whether or not to make a sunk investment. If the trade secret thief markets a product when there is still uncertainty about the innovator's new technology, his expected net cash flow is, ignoring discounting, calculated as follows: (0.5 x \$4 billion) + (0.5 x \$0) − \$0 = \$2 billion. In this numerical example, trade secret theft is still more attractive than investment in innovation.

V.   A SCHUMPETERIAN FRAMEWORK FOR TRADE SECRET MISAPPROPRIATION

The salient economic characteristics of trade secret protection can be seen in a simple model of innovation, theft, disclosure, and exploitation over time. That model shows the differences between the several different legal rules for enjoining one who has misappropriated a trade secret.

A patent may be regarded as the right of an innovator to deny use of his publicly disclosed invention for the term of the patent unless the user pays a specified royalty that is acceptable to the innovator. Trade secret protection is more limited. It enables the innovator to condition a third party's use of an undisclosed invention or body of information upon the payment of a royalty, but only until the secret has been disclosed to the public.[65] Thereafter, the royalty rate falls to zero, because the innovator no longer has the legal right to enjoin a third party's use of the secret. After disclosure, the only party whom the innovator might have the right to enjoin from using the trade secret is, depending on the applicable legal rule, someone who misappropriated the trade secret before its public disclosure.

To formalize this relationship, consider the following stylized facts and nomenclature, which are depicted in Figure 1. At time t_0, an innovator makes a sunk investment, which immediately results in the creation of valuable proprietary information entitled to trade secret protection. For simplicity, assume initially that the trade secret concerns a product design rather than a production process. (We will later relax this assumption.) The innovator operates in a Schumpeterian market, such that "winner takes all" or "winner takes most" competition occurs through technological innovation. Firms compete sequentially *for* the market, rather than simultaneously for share *within* a well-defined market.

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65.   As a matter of antitrust law, there is no legal barrier to "the owner of a trade secret . . . [being able to] collect royalties even after the trade secret has 'expired' through public disclosure." ABA SECTION OF ANTITRUST LAW, ANTITRUST LAW DEVELOPMENTS 985 (4th ed. 1997). Whether the owner of the (former) secret can successfully do so as an economic matter is a different question.

The Schumpeterian market is neither technologically static, nor does it have mature, predictable consumer demand. But the Schumpeterian market does face the prospect of interim competition through imitation: Between cycles of Schumpeterian displacement, there arises generic imitation of the innovator's technology and the product embodying the resulting design. In such a market, the extent to which imitation denies the innovator the opportunity to earn quasi rents will depend on whether or not the innovator's technology turns out to be patentable, which in turn will dictate the innovator's relative bargaining strength in licensing negotiations with would-be imitators. In the extreme case, the innovator's product will embody proprietary but nonpatentable information; as noted above, the royalty rate for such information upon its public disclosure will immediately fall to zero, as the innovator will have no legal rights, and thus no bargaining power, to condition use of the proprietary information on the payment of a mutually satisfactory royalty.

FIGURE 1: SCHUMPETERIAN CYCLE OF INNOVATION, TRADE SECRET THEFT, IMITATION, AND DISPLACEMENT
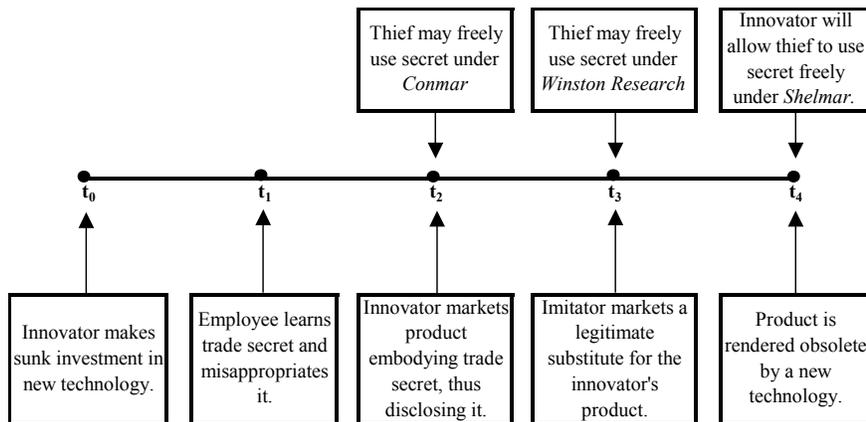
Assume that, at time t_1, a person learns the trade secret while it is still confidential, and that the person begins to act upon that information. For example, the person could be an employee who learns of his employer's new designs for proprietary products or processes. Assume for simplicity that the thief immediately quits his job and clandestinely begins to compete against his former employer (the innovator) through the unauthorized and uncompensated use of the employer's trade secret.

Assume further that, at time t_2, the innovator begins to market the new product embodying the trade secret, and thus the innovator publicly discloses the trade secret through marketing efforts or a patent application. The

disclosure fully reveals to the public the value of the trade secret. At an immediate royalty rate of zero for the now-disclosed trade secret, entry by n imitators occurs immediately. Of course, if the government ultimately issues a patent for the trade secret, the innovator will be able to enjoin the n imitators from using the invention embodying the (former) trade secret unless they pay a royalty that is acceptable to the innovator.

Entrants, however, cannot immediately bring to market their products that embody the innovator's former trade secret. Some set-up time is required. A lag thus ensues during which the n imitators produce their own generic substitutes for the innovator's product. At time t_3, the lag ends, when the imitators are ready to bring to market their own versions of the innovator's product. Assume that a Cournot equilibrium immediately drives down the price of the product incorporating the former trade secret to marginal cost, which by assumption is equal across all $n + 1$ firms in the market because of their identical access to the relevant production technology.[66] (Recall the initial assumption that the trade secret embodies a product design, not a production process.) As a consequence of the Cournot equilibrium, the innovator is denied any further opportunity to earn quasi rents on his proprietary information.

Finally, assume that, at time t_4, another firm introduces a product that embodies a new and different proprietary technology. Regardless of whether that new technology is entitled to patent protection or merely trade secret protection, assume that the product employing that new proprietary technology constitutes for consumers a substantial improvement in price and performance. An example might be the replacement of daisy-wheel impact printers with laser printers. A new round of Schumpeterian displacement thus occurs in the market, and the proprietary technology developed by the first innovator at time t_0 is now worthless. The life cycle of the product embodying that proprietary technology has ended. Stated differently, at time t_4, the innovator would not object to conveying, or allowing any one of the n lawful imitators to convey, to a trade secret thief the proprietary technology that the thief had previously misappropriated at time t_1 and may or may not have been enjoined from using in the interim. That willingness on the part of the innovator in the previous Schumpeterian cycle (from t_0 to t_4) now to engage in voluntary exchange with the trade secret thief arises because the technology is obsolete: If, hypothetically, voluntary exchange were to occur at time t_4, it would occur at a price of zero.

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66. *See, e.g.*, DENNIS W. CARLTON & JEFFREY M. PERLOFF, MODERN INDUSTRIAL ORGANIZATION 88 (Addison Wesley 3d ed. 2000) (explaining pricing under Cournot oligopoly). Previous analysis of innovation and imitation has used the Cournot assumption. *See, e.g.*, Anton & Yao, *supra* note 29, at 3.

If the trade secret concerns a production process rather than a product design, the analysis changes slightly in a manner more favorable to the thief. The thief can begin using the process at time t_1 and can market a product embodying that process *before* time t_2 if he can prevent others (particularly the innovator) from learning of the misappropriation. In other words, the thief may be able to beat the innovator to market.

VI.   PLACING THE INJUNCTION RULES WITHIN THE SCHUMPETERIAN FRAMEWORK

Within this economic framework we can now identify where, along the continuum in Figure 1, the respective rules of *Conmar*, *Winston Research*, and *Shellmar* fit.

A. *The Equilibrium under* Conmar *and the Uniform Trade Secrets Act*

Under *Conmar* and the default rule under the UTSA, the thief may freely use the trade secret at time t_2, provided that the thief did not cause the public disclosure of the trade secret. Stated differently, the thief implicitly acquires knowledge of the trade secret at time t_1 at a royalty rate of zero, and he acquires the right to exploit the secret commercially at time t_2, again at a royalty rate of zero. Thus, for a period of time equal to $t_2 - t_1$, the thief enjoys a head start over lawful imitators, including those who discover the innovator's trade secret through their own entirely lawful investments in reverse engineering.

The trade secret thief is able to act on inside information at time t_1, and he enjoys the benefits of asymmetric information with respect to the n-1 lawful imitators who can be expected to enter the market when information of the innovator's proprietary technology has entered the public domain. In this respect, the thief's head start in using the trade secret resembles insider trading of securities: In both cases, the person profits—relative to all n-1 other actors in the market—from the unauthorized use of material, nonpublic information that he did not create.

If the lag required for lawful imitators to bring a product to market (that is, $t_3 - t_2$) is greater than the thief's head start (that is, $t_2 - t_1$), then *Conmar* enables the trade secret thief, who by assumption has access to the same production technology as lawful imitators, to market an imitation product immediately at time t_2. Thus, for the period between time t_2 and time t_3, the secret thief and the innovator would divide the market as Cournot duopolists. Price for the product embodying the still-undisclosed trade secret would decline from the Schumpeterian monopoly level to the level for a two-firm Cournot equilibrium, which necessarily would be significantly higher than the n-firm Cournot equilibrium. The Cournot duopoly would cut the

innovator's ability to earn quasi-rents in half, relative to the Schumpeterian monopoly equilibrium.

At the same time, however, the thief would be able to earn significant economic rents until time t_3: The thief's marginal cost of using the innovator's proprietary technology would be zero by virtue of his trade secret misappropriation, which by definition entails no payment of royalties to the innovator on a per-unit (or any other) basis. Furthermore, the thief's other marginal costs would equal the innovator's, by assumption. Under these circumstances, *Conmar* creates a powerful incentive for a person to steal a trade secret, provided that he can conceal the theft and defer marketing a product embodying the secret until the moment that the innovator has disclosed the secret or an imitator has lawfully reversed engineered the product.

Consider now the earlier analysis of trade secret misappropriation as a real option. The trade secret thief acquires a real option. At time t_1 he acquires the "right" to use the innovator's then-secret technology at a royalty rate of zero *if* the innovator's further R&D efforts confirm (as manifested in product marketing or a patent application) the commercial potential of the technology at time t_2, or *if* a third-party imitator's own investments in reverse engineering of the innovator's trade secret confirm the commercial potential of the technology, also at time t_2. The trade secret thief acquires a second-mover advantage relative to the innovator and a "third-mover" advantage relative to the lawful imitator.

Courts applying *Conmar* have failed to anticipate and accommodate *Kewanee*'s subsequent message that trade secret protection should reward innovation. *Conmar* and its progeny emphasize that commercial morality—not the encouragement of innovation—is the concern of trade secret law. This conclusion reflects the underlying premise in *Conmar* that trade secret law rests on tort and contract principles, not property principles. Not surprisingly, courts rejecting the property law premise for trade secret protection have framed injunctive relief in a manner that is ill-suited to advancing *Kewanee*'s objective of promoting innovation.

This misdirection is understandable. Courts have no expertise with which to identify the optimal rate of technological change or the optimal amount of resources that society should encourage to be committed to R&D through the vehicle of trade secret protection.[67] Two factors contribute to this lack of expertise. First, the unpredictability of R&D implies that a court cannot

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[67]. This problem has long been recognized and is endemic to all public policies designed to encourage the production of information. *See* Kenneth J. Arrow, *Economic Welfare and the Allocation of Resources for Invention*, in ESSAYS IN THE THEORY OF RISK-BEARING 144, 161 (1970); Frank H. Easterbrook, *Insider Trading, Secret Agents, Evidentiary Privileges and the Production of Information*, 1981 SUP. CT. REV. 309.

determine *ex post* how substantial an insurance system a trade secret remedy would have had to have been *ex ante* to have induced the innovator to produce a given trade secret.[68] Second, changes in the level of secret innovation are by definition unobservable. Therefore, it should not be surprising that, lacking such expertise, courts instead focus on legal questions that they may be more competent or comfortable to answer—but questions nonetheless that may be tangential to the economic incentives that trade secret remedies create for innovation.

Conmar suffers from these deficiencies. "Courts have been accustomed to speak of trade secrets as property," wrote Judge Learned Hand for the Second Circuit in 1949 in *Conmar*, "and at times to deal with them as if they were."[69] This approach he considered "permissible and to some extent desirable" in cases where the trade secret thief acquired the information "by some wrongful means, like breaking into a factory, or copying formulae or blue prints."[70] However, relying on *Masland*, Judge Hand concluded that if "the dispute turns, as it does here, upon whether the wrongdoer has acquired a secret from the employee who has himself acquired it lawfully, the wrong consists in inducing him to break his contract, or to be disloyal to a confidence reposed in him; and in either case it is a species of tort—recognized now for over a century—of inducing an obligor to default upon an obligation."[71] After construing the employment contract in question and finding no clause prohibiting the employee from disclosing information after the relevant patent issued, Judge Hand refused to conclude that "a wrongful inducement to divulge the disclosure before issue [of the patent] should deprive the wrongdoer of his right to avail himself of the patentee's dedication" of his proprietary information to the public in return for a patent.[72] Consequently, the Second Circuit refused to apply the *Shellmar* rule.[73]

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68. *Cf.* SCHERER, INDUSTRIAL MARKET STRUCTURE AND ECONOMIC PERFORMANCE, *supra* note 46, at 416 (discussing economic studies of the "ex ante probability of technical success" in research and development).

69. 172 F.2d at 155.

70. *Id.*

71. *Id.* One commentator, writing in 1962, described *Conmar* as embodying "the conception of a trade secret as something protectable only by a relationship between discloser and disclosee based on confidence or contract. Without the relationship there is nothing, and once the secret is public, confidence must end because there is nothing over which the parties can behave in confidence, and there can be no confidence if the discloser is not at the mercy of the good faith of the disclosee." *See* TURNER, *supra* note 2, at 453-54.

72. 172 F.2d at 156; *see also* Picard v. United Aircraft Corp., 128 F.2d 632, 637 (2d Cir. 1942) (Hand, J.).

73. 172 F.2d at 155-56. One commentator has suggested that *Conmar* may be read narrowly as being "limited to secrets dedicated by the discloser to the public, and it states that the *Shellmar* cases are limited to penalizing disclosees who not only improperly use the secret, but improperly obtain it. Both these limitations are absent from some of the cases in each respective line of decision." *See* TURNER, *supra* note 2, at 444 (emphasis suppressed).

Judge Hand's opinion in *Conmar* suggests that the duration of a trade secret injunction ought to be a function of the method by which the trade secret was misappropriated, rather than a function of how the valuable information benefits its users, how it was discovered, and ultimately how its misappropriation will influence incentives for innovation. This proposition conflicts with the Supreme Court's subsequent rationale in *Kewanee*. As in *Conmar*, the misappropriation at issue in *Kewanee* resulted from the breach of a confidential relationship. The Second Circuit's refusal in *Conmar* to recognize a property interest and to enjoin the thief's use of the valuable information failed to encourage innovation in the manner that *Kewanee* eventually specified twenty-five years later. Only in an outrageous case—when the thief accomplishes his misappropriation by means of "breaking into a factory or copying formulae or blue prints"[74]—would *Conmar* deliver the protection that *Kewanee* considered essential to encouraging every form of innovation.

Judge Hand's reasoning is flawed on another economic ground. Unlike a contractual relationship, the theft of a trade secret is an involuntary transaction. It deprives the innovator of his opportunity cost in parting with the trade secret. If the innovator had a contractual relationship with the thief, then the theft of the trade secret also (and equivalently) denies the innovator his expectation interest under the contract. The proper objective of the remedy for theft of the trade secret should be to replicate the outcome of voluntary exchange, which would ensure for the innovator that he would receive the full opportunity cost of the trade secret when sharing it with the thief.[75] That opportunity cost is equivalent to the innovator's expectation interest measure of damages for breach of contract.

The aggregate social cost of following the *Conmar* rule may be substantial because it is the default injunction rule in the forty-six jurisdictions that have adopted the UTSA as of mid-2004. Given this special significance of *Conmar*, it is worth investigating the possibility that the Second Circuit silently retreated from that decision long ago, leaving a lesser precedent than meets the eye.

The Second Circuit decided *Franke v. Wiltschek* in 1953.[76] The case involved two salesmen who represented a manufacturer of compressed perfumed face cloths were shown a secret manufacturing process. The two later misappropriated and used the process to manufacture and sell a similar product. The district court enjoined the former salesmen from "making and

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74. 172 F.2d at 55.

75. *Cf.* SIDAK & SPULBER, *supra* note 39, at 274-76 (explaining the relevance of voluntary exchange to the determination of just compensation for a taking of property); *see id.* at 393-402 (establishing equivalence between expectation damages for breach of contract and the outcome of voluntary exchange).

76. 209 F.2d 493 (2d Cir. 1953).

selling full-sized face cloths compressed and sold as hard perfumed cylinders."[77] Notwithstanding that it had decided *Conmar* only four years earlier, the Second Circuit affirmed the perpetual injunction without any citation to *Conmar*, rejecting the argument that "relief should be limited to damages or to an injunction only during the period until the trade by legitimate means has caught up with the plaintiffs and their secret has become general."[78] The decision is even more remarkable in light of the fact that both *Conmar* and *Franke* were applications of New York common law in diversity jurisdiction, and one judge sat on both panels.[79] The Second Circuit concluded in *Franke* that even if the novelty of the trade secret is "slight and discoverable by a good mechanic . . . the authorities do not justify such uncertain, but presumably limited relief."[80] In considering the "good mechanic" argument in *Franke*, the Second Circuit observed that "[t]he suggestion for a more limited remedy appears to come from a single sentence at the end of Comment b"[81] of section 757 of the Restatement of Torts:

> There, after a lengthy discussion of protection for trade secrets in unexceptional form and definitely in accord with the cases cited above, with indeed stress upon the protection as "against breach of faith" rather than "reward to the inventor," as in the case of the "patent monopoly," the suggestion is added that, if "the secret consists of mechanical improvements that a good mechanic can make without resort to the secret, the wrongdoer's liability may be limited to damages, and an injunction against future use of the improvements made with aid of the secret may be inappropriate." The tentative and conditional nature of the suggestion is obvious on its face.[82]

In this respect, *Franke* shows the Second Circuit declining to reaffirm its previous application of *Conmar* as an interpretation of New York common law and, instead, suggesting a rationale for lengthier trade secret injunctions

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77. Franke v. Wiltschek, 115 F. Supp. 28, 31 (S.D.N.Y. 1953). The district court stated: "A trade secret is protected not because it is unknowable to others but because he who holds the secret is entitled to profit by it without unfair interference from his competitors developed through confidential relationships." *Id*. at 30. Saying that someone is "entitled to profit" suggests that he has a property right; nonetheless, the court cited sections 757 and 759 of the Restatement of Torts for this proposition, *id*., which, of course, rejected the property view of trade secrets. *See* text accompanying note 16 *supra*.

78. 209 F.2d at 496.

79. Judge Clark sat on both *Conmar* and *Franke*. The other panel members for *Conmar* were Judges Learned Hand and Augustus Hand. The other panel members for *Franke* were Judges Chase and Frank.

80. *Franke*, 209 F.2d at 496; s*ee also id*. at 499 ("nothing in the precedents suggests that breach of trust is legally permissible upon payment of limited damages assessed for a time by the court").

81. *Id*. at 498.

82. *Id*. (quoting RESTATEMENT OF TORTS § 757, cmt. b, at 7).

that is closer to the concern, subsequently articulated by the Supreme Court in *Kewanee*, over preserving incentives for sunk investments in innovation.[83]

Courts following *Conmar* have denied perpetual injunctions on grounds subsequently incompatible with *Kewanee*. In *Forest Laboratories, Inc. v. Formulations, Inc.*, a federal district court in Wisconsin endorsed *Conmar* as being "in accord with the Restatement [of Torts], which makes breach of faith an essence of the wrong."[84] To the extent that this reasoning rejects the property basis of trade secrets, it conflicts with *Kewanee* five years later.[85] But the greater problem with *Forest* is its premise that patent remedies and trade secret remedies are mutually exclusive. The trial court believed that, because the innovator had "dedicated his information to the public in return for a monopoly" when his patent was issued, it would be "inequitable" to give him "both a monopoly and a cause of action for subsequent disclosure" against the trade secret thief.[86]

The misconception in *Forest* that an innovator cannot benefit from both trade secret protection and patent protection reveals the major flaw in the *Conmar* line of cases: Those cases fail to recognize and give legal significance to the distinction between *ex ante* incentives for innovation and *ex post* outcomes of the innovative process. The *Forest* trial court incorrectly based its election-of-remedies notion on the observation that, although the innovator "had previously kept this information secret (the sine qua non of a trade secret), he has now decided that it shall no longer be his knowledge alone."[87] This *ex post* perspective contradicts *Kewanee*'s rationale that trade secret law is intended to foster innovation by providing a safety net for protecting information of uncertain or even doubtful patentability. *Forest*

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83. The same year that the Second Circuit decided *Franke*, the Oregon Supreme Court applied *Shellmar* to design secrets revealed by the marketing of a product. McKinzie v. Cline, 197 Or. 184, 252 P.2d 564 (1953). The court justified the perpetual injunction on the rationale that, "[i]f our system of private enterprise on which our nation has thrived, prospered and grown great is to survive, fair dealing, honesty and good faith between contracting parties must be zealously maintained." 197 Or. at 195, 252 P.2d at 569 (emphasis suppressed). In this respect, *McKinzie* anticipated *Kewanee*'s premise that the enforcement of commercial morality, although important by itself, also is a means to promote the efficient allocation of resources within a competitive marketplace. 197 Or. at 192, 252 P.2d at 568.

84. 299 F. Supp. 202, 207 (E.D. Wis. 1969), *rev'd in part*, 452 F.2d 621 (7th Cir. 1971).

85. In Reddi-Wip, Inc. v. Lemay Valve Co., 354 S.W.2d 913 (Mo. Ct. App. 1962), the innovator sought an injunction restraining a former contractor from making, using, or selling certain dispensing valves used in pressurized containers of fluffed products, such as whipped cream. As in *Conmar*, the Missouri Court of Appeals premised its discussion of trade secret law in *Reddi-Wip* on *Masland*'s statement that trade secrets are not property. *Id*. at 917. The court then rejected the *Shellmar* rule as "not applicable to a case where, as here, defendants' knowledge of plaintiffs' trade secrets was acquired during a normal, albeit confidential relationship, which has long since ceased, and the use of the alleged trade secrets occurred a substantial length of time after their voluntary disclosure by the issuance of patents to plaintiffs." *Id*. at 918.

86. 299 F. Supp. at 207.

87. *Id*.

failed to recognize that, to a firm investing in R&D, trade secret protection influences the expected benefits corresponding to one series of probabilistic outcomes of the innovative process; meanwhile, patent protection determines the expected benefits corresponding to a different series of probabilistic outcomes. If either series of expected benefits is diminished, the overall expected return to innovation—and, therefore, the level of sunk investment in innovative activity—will decline.

Another decision in *Conmar*'s lineage that fails to distinguish *ex ante* incentives to invest in innovation from *ex post* outcomes of the innovation process is *Gallowhur Chemical Corp. v. Schwerdle,*[88] a 1955 case in which two former employees of the innovator were alleged to have appropriated secret processes related to the solubility of phenyl mercuric acetate. The New Jersey state court framed the issue as "whether one who has learned and preserved the trade secret in confidence . . . shall be denied the same status as the rest of the public after the inventor has voluntarily removed the secret by applying for and obtaining letters patent thereon or by otherwise revealing the secret himself."[89] The court distinguished *Shellmar* on the ground that, unlike the present case, it presented an act of misappropriation that "clearly predated disclosure by patent issuance."[90] The court explicitly rejected any property basis for trade secret law, observing that "in the *Shellmar* case itself the relief was granted not to protect a property right but to penalize inequitable conduct."[91]

Such judicial reasoning also fails to distinguish between competitor welfare and consumer welfare, a distinction that is well recognized in antitrust law. For example, Judge Richard Posner has stated: "Competition is the allocation of resources in which economic welfare (consumer welfare, to oversimplify slightly) is maximized; it is not rivalry per se, or a particular form of rivalry, or some minimum number of competitors."[92] In a 1983 antitrust decision, he similarly wrote that "[t]he policy of competition is designed for the ultimate benefits of consumers rather than of individual competitors, and a consumer has no interest in the preservation of a fixed number of competitors greater than the number required to assure his being able to buy at the competitive price."[93] *Gallowhur*, which predated by two decades the

88.   37 N.J. Super. 385, 117 A.2d 416 (Super. Ct. Ch. Div. 1955).
89.   37 N.J. Super. at 398, 117 A.2d at 423-24.
90.   37 N.J. Super. at 400, 117 A.2d at 424.
91.   37 N.J. Super. at 398, 117 A.2d at 423.
92.   Roland Mach. Co. v. Dresser Indus., 749 F.2d 380, 395 (7th Cir. 1984) (Posner, J.) (citing Product Liab. Ins. Agency, Inc. v. Crum & Forster Ins. Cos., 682 F.2d 660, 663-65 (7th Cir. 1982) (Posner, J.)).
93.   Marrese v. American Academy of Orthopaedic Surgeons, 706 F.2d 1488, 1497 (7th Cir. 1983) (Posner, J.) (citing Products Liability Ins. Agency v. Crum & Forster Insurance Cos., 682 F.2d 660, 663-64 (7th Cir. 1982) (Posner, J.); University Life Ins. Co. of America *v.* Unimarc Ltd., 699 F.2d 846, 853 (7th Cir. 1983) (Posner, J.)).

economic restatement of antitrust law by the federal courts, is devoid of such
reasoning or mooring in consumer welfare maximization. By focusing
exclusively on commercial morality as the objective of trade secret law,
Gallowhur in effect ignored that trade secret remedies influence the incentive
to make sunk investment in innovative activity, which in turn has enormous
benefits in terms of consumer welfare: "Assuming, as the facts here plainly
show, that defendants respected plaintiffs' secret . . . though plaintiffs had
themselves revealed it to the public; and assuming also, as is entirely
possible, that plaintiffs' patents would upon judicial test be found to be
invalid, would the law then be furthering the attainment of higher standards
of commercial morality by permitting plaintiffs to enjoy a monopoly for
which there was no legal or other sanction?"[94] The negative answer that the
court obviously intimated by its rhetorical question rests on a misconception
about the economics of innovation. The court failed to recognize that the
thief received a head start over legitimate competitors that was equal in
duration to the distance between time t_2 and time t_1 in Figure 1.
Consequently, the marginal effect of *Gallowhur* is to reduce the returns to
legitimate reverse engineering. The court also exaggerated the benefits to the
innovator from being able to enjoin the former employees: the competition
from imitators who lawfully had gained access to the innovator's formerly
secret information would suffice to constrain the innovator's exploitation of
its tenuous "monopoly." In other words, the court ignored that supply
substitutability would be high once the innovator's secret had entered the
public domain.

   After *Kewanee* and after the economic transformation of antitrust
jurisprudence on "monopoly," this error of economic reasoning is all the
more embarrassing because the courts committing it have done so ostensibly
in the name of protecting consumers. In *Hayes-Albion v. Kuberski*, the
Michigan Supreme Court in 1985 vacated a perpetual injunction against
former employees who had misappropriated the innovator's trade secrets
relating to the production of silicone rubber products used in hot stamp
decorating.[95] Sounding more like *Masland* than *Kewanee*, the court declined
to recognize a property right in trade secrets, holding instead that the
innovator's right to relief is based on the fiduciary relationship between the
employer and employee.[96] By limiting the injunction's duration "until such
time as defendants can demonstrate that plaintiff's knowledge has become
common knowledge," the court said it was protecting the "right of customers
to choose their suppliers," which the court believed ought not to be restricted

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94.   37 N.J. Super. at 402, 117 A.2d at 425.
95.   421 Mich. 170, 190 (Mich. 1985).
96.   *Id*. at 190.

by the dispute between innovator and trade secret thief.[97] Implicitly, however, the court's characterization of the policy objective as being the protection of consumers' "right to choose their suppliers" necessarily subordinates (or simply ignores) the objective of encouraging risky sunk-cost investment in innovation by protecting the opportunity for innovators to earn quasi rents.

B. *The Equilibrium under* Winston Research

Under *Winston Research*, the trade secret thief may freely use the trade secret at time t_3. The court enjoins the thief's use of the misappropriated secret only for as long as it would take an imitator to bring a product to market after lawfully learning the secret. Stated differently, the trade secret thief implicitly acquires knowledge of the trade secret at time t_1 at a royalty rate of zero, and he acquires the right to exploit the (former) secret commercially at time t_3, again at a royalty rate of zero. This time frame assumes that a court would conclude that the trade secret thief could legitimately develop the trade secret as quickly as the first legitimate imitator could (that is, by time t_3). It might be unrealistic to suppose that the thief would be as swift as the most expeditious imitator, rather than the median imitator. But it is probably even more unrealistic to suppose that a court would delay the trade secret thief's entry significantly past time t_3, given the rapid diffusion of information at that time to the n-1 other legitimate imitators poised to enter the market.

Winston Research rejects the polar rules of *Shellmar* and *Conmar* in favor of issuing an injunction of limited duration. Although this self-described "head start" rule[98] may be appealing because it offers a compromise between divergent legal rules, it gives courts, without any useful guidance, the difficult task of trying to determine after the fact how long it would have taken a trade secret thief independently to have discovered something he already knows.[99]

In *Winston Research*, Minnesota Mining & Manufacturing (3M) developed an improved precision tape recorder after four years of R&D. When 3M began developing a production prototype, key personnel on the

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97.   *Id.* Similarly, in Miles, Inc. v. Cookson America, Inc., Civ. Action No. 12,310, 1994 Del. Ch. LEXIS 221 (Del. Ch. Nov. 7, 1994), the Delaware Court of Chancery, citing *Hayes-Albion*, limited injunctive relief sought by a manufacturer on the ground that "[i]nnocent third parties (such as customers), to the extent possible, should be left unaffected" by legal disputes between innovators and trade secret thieves. *Id*. at *58.

98.   *Winston Research*, 350 F.2d at 142.

99.   The leading commentary endorsing the *Winston Research* approach ignores this problem. *See* Michael Barclay, Note, *Trade Secrets: How Long Should An Injunction Last?,* 26 UCLA L. REV. 203, 217-30 (1978); *cf.* ARROW, *supra* note 67, at 623 ("The difficulties of even ex post calculations of rate of return are formidable though possibly not insuperable.").

project left 3M and joined Winston Research, which fourteen months later completed a machine with the same technical characteristics as 3M's. The federal district court enjoined Winston Research and the former 3M employees from using or disclosing the design specification for 3M's tape recorder for two years. The court reasoned that 3M's trade secrets "would shortly be fully disclosed, through no fault of Winston, as a result of public announcements, demonstrations, and sales and deliveries of [3M] machines."[100]

The Ninth Circuit affirmed the two-year injunction, reasoning that a perpetual injunction "would subvert the public's interest in allowing technical employees to make full use of their knowledge and skill and in fostering research and development."[101] The court amplified this concern earlier in its opinion:

> [R]estrictions upon the use and disclosure of . . . information [acquired in the course of a terminated employment relationship] limit the employee's employment opportunities, tie him to a particular employer, and weaken his bargaining power with that employer. Such restrictions interfere with the employee's movement to the job in which he may most effectively use his skills. They inhibit an employee from either setting up his own business or from adding his strength to a competitor of his employer, and thus they diminish potential competition. Such restrictions impede the dissemination of ideas and skills throughout industry. The burdens that they impose upon the employee and society increase in proportion to the significance of the employee's accomplishments, and the degree of his specialization.[102]

At the same time, however, the court conceded that "denial of any injunction at all would leave the faithless employee unpunished where, as here, no damages were awarded; and he and his new employer would retain the

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100. 350 F.2d at 141.

101. *Id*. at 142.

102. *Id*. at 137-38. Other courts have adopted approaches similar to *Winston Research*'s "head start" rule. *See, e.g.,* Sigma Chem. Co. v. Harris, 794 F.2d 371, 375 (8th Cir. 1986) ("extending the injunction beyond the time needed for independent development would give the employer a windfall protection and would subvert the public interest in fostering competition and in allowing employees to make full use of their knowledge and ability") (internal quotations omitted); Anaconda Co. v. Metric Tool & Die Co., 485 F. Supp. 410, 431 (E.D. Pa. 1980) (entering an injunction for sixteen months against Metric, which had misappropriated trade secrets relating to the manufacture of telephone cord armor, holding that a perpetual injunction would put Metric "out of business for all time, everywhere. This clearly is not necessary to make plaintiffs whole . . . .") (citing Schulenberg v. Signatrol, Inc., 33 Ill.2d 379, 212 N.E.2d 865, 869 (1965)); Hayes-Albion v. Kuberski, 421 Mich. 170, 189 (Mich. 1985) ("The overbreadth of the [perpetual] injunction effectively prevents defendants from earning a living in the field in which they have expertise."). *See also* Valco Cincinnati, Inc. v. N & D Machining Serv., 24 Ohio St. 3d 41, 492 N.E.2d 814, 820 (1986) (upholding a perpetual injunction against trade secret thieves on grounds that the circumstances were sufficiently egregious to warrant punitive sanctions, but noting nevertheless that the thieves were "not foreclosed from doing business generally within this commercial field").

benefit of a head start over legitimate competitors who did not have access to the trade secrets until they were publicly disclosed."[103]

On economic grounds, *Winston Research* is superior to *Conmar* in the sense that it recognized the competitive consequences of the thief's head start and acknowledged that a tradeoff exists between encouraging innovation and preserving the mobility of specialized human capital. The court concluded that the best method for balancing these conflicting interests was a limited injunction: "By enjoining use of the trade secret for the approximate period it would require a legitimate [3M] competitor to develop a successful machine after public disclosure of the secret information, the district court denied the employees any advantage from their faithlessness, placed [3M] in the position it would have occupied if the breach of confidence had not occurred prior to the public disclosure, and imposed the minimum restraint consistent with the realization of these objectives upon the utilization of the employees' skills."[104]

The Ninth Circuit acknowledged but refused to consider in *Winston Research* the policy concern that unless courts "protect . . . confidential but unpatented matter from disclosure," "private investment in such activities will be inhibited and progress will be slowed, with consequent loss to both employers and public."[105] In other words, the court clearly understood the safety-net argument that would underlie the Supreme Court's decision nine years later in *Kewanee*. The Ninth Circuit noted that "patent laws, it is argued, do not afford adequate protection because excessive time is required to process a patent application, and because a high standard of invention must be met to obtain a patent, or at least to sustain a patent once issued."[106] However, in the absence of the guidance that the Supreme Court subsequently provided in *Kewanee*, the Ninth Circuit was compelled to rule that the Court's 1946 decision in *Sears, Roebuck & Co. v. Stiffel Co.*[107] "precludes judicial recognition of a legally protectible interest in the secrecy of industrial information as such, as distinguished from an interest in the integrity of confidential employer-employee relationships."[108] In a footnote

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103. *Id*. at 142. The court elaborated on this concern earlier in its opinion: "[R]estrictions upon an employee's disclosure of information which was developed as a result of the employer's initiative and investment, and which was entrusted to the employee in confidence, are necessary to the maintenance of decent standards of morality in the business community. Unless protection is given against unauthorized disclosure of confidential business information by employees, employee-employer relationships will be demoralized; employers will be compelled to limit communication among employees with a consequent loss in efficiency; and business . . . espionage, deceit, and fraud among employers will be encouraged." *Id*. at 138.

104. *Id*. at 142.

105. *Id*. at 138.

106. *Id*

107. 376 U.S. 225 (1946).

108. 350 F.2d at 138.

elaborating on federal preemption under *Sears*, the court cited Comment b of section 757 of the original Restatement of Torts and concluded that "state law protecting trade secrets cannot be based 'on a policy of rewarding or otherwise encouraging the development of secret processes or devices.'"[109]

Had the Ninth Circuit heard *Winston Research* after the Supreme Court decided *Kewanee* in 1974—and, arguably, if *Winston Research* had been heard as early as 1969, after the Court decided *Lear, Inc. v. Adkins*[110]—the *Sears* preemption argument would have been untenable. The Ninth Circuit then would have had to consider explicitly the additional policy of protecting innovations of doubtful or unknown patentability so as to preserve *ex ante* the incentive to make sunk investments in the creation of new information. Of course, even in the absence of explicit and legitimate consideration of this factor, the Ninth Circuit nonetheless issued a two-year injunction in *Winston Research*. After *Kewanee*, therefore, it is likely that, if faced again with the same facts as in *Winston Research*, the Ninth Circuit would enjoin the trade secret thief for longer than two years, though not necessarily in perpetuity, as *Shellmar* would.

Schulenberg v. Signatrol, Inc.,[111] decided the same year as *Winston Research*, illustrates the difficulty of deterring trade secret theft through an injunction of limited duration. Schulenberg's former employees used illicit copies of the blueprints for his unpatented electric flasher to manufacture and sell a competing product. The flasher was relatively unsophisticated, but the blueprints nonetheless contained information regarding measurements, tolerances, and the quality of material that could not "ordinarily be discovered . . . without expensive and time-consuming analyses."[112] The trial court granted a perpetual injunction against the former employees' use of the blueprints, and the appellate court affirmed the judgment.[113]

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109. *Id.* at 138 n.2 (quoting RESTATEMENT OF TORTS § 757, cmt. b (1939)). Leading to this conclusion was the following preemption rationale: "The federal patent statutes require full disclosure of the invention as a condition to the grant of monopoly so that at the end of the period of monopoly the development may be freely available to all. Thus, the federal patent statutes would seem to reflect a congressional determination that any individual or social interests which may be served by secrecy are outweighed by those served by full disclosure. And it would seem to follow, under the rationale of *Sears, Roebuck & Co. v. Stiffel Co.*, that state law providing protection for trade secrets cannot be applied to serve a premise that the balance of interests favors secrecy." *Id.*

110. 395 U.S. 653 (1969). The Court concluded in *Lear* that it "should not now attempt to define in even a limited way the extent, if any, to which the States may properly act to enforce the contractual rights of inventors of unpatented secret ideas." *Id.* at 675. *See also* Paul Goldstein, *The Competitive Mandate: From* Sears *to* Lear, 59 CALIF. L. REV. 873 (1971).

111. 33 Ill. 2d 379, 212 N.E.2d 865 (1965), *cert. denied*, 388 U.S. 959 (1966).

112. 33 Ill. 2d at 386, 212 N.E.2d at 869.

113. 50 Ill. App. 2d 402, 412, 200 N.E.2d 615, 620 (4th Dist. 1964). The appellate court concluded: "We see no good purpose in condoning defendants' conduct by lifting the injunction. If defendants are now out of business they can only blame themselves. They were not born that way but got that way on their own." *Id.*

The Illinois Supreme Court, however, held that the injunction against Schulenberg's former employees "should have been limited in duration to the period of time reasonably required for defendants to legally produce . . . copies" by reverse engineering.[114] The court reasoned that a perpetual injunction would "not restrict its application as to time or geographical area," thereby putting the former employees "out of business for all time, everywhere."[115] This result was "clearly . . . not necessary to make plaintiffs whole," because other competitors already could copy Schulenberg's product lawfully by reverse engineering.[116] The court concluded that, because the former employees themselves lawfully could have reverse engineered Schulenberg's device in the same manner that his other competitors were free to do, it would be "difficult to justify" enjoining the former employees "for a period of time longer than that required to duplicate the product by lawful means."[117]

Unlike the Ninth Circuit in *Winston Research*, the Illinois Supreme Court in *Schulenberg* found that *Sears* and the U.S. Supreme Court's 1964 decision in *Compco Corp. v. Day-Brite Lighting, Inc.*[118] were "inapposite" when the innovator's unpatentable product designs were copied not through the lawful means of reverse engineering but through "industrial espionage by employees who plan to organize a competing company."[119] Thus, *Schulenberg* stands in odd contrast to *Winston Research*. Constrained by *Sears*, the Ninth Circuit in *Winston Research* suggested that the ability to distinguish *Sears* would allow consideration of the safety-net argument, which in turn would imply a longer injunction than the two-year injunction issued by the trial court. On the other hand, the Illinois Supreme Court in *Schulenberg* distinguished *Sears*—but then shortened the injunction from one running in perpetuity to one limited in duration.

Schulenberg is flawed because it fails to penalize the trade secret thief. It merely returns the thief to the status quo ante. The former employee still may produce a competing product, having only incurred the time lag (and postponed any investment) necessary for reverse engineering. The thief still

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114. 33 Ill. 2d at 388, 212 N.E.2d at 870. The court said that although "[t]he record contains no indication of the time so required, . . . such fact should be readily ascertainable since a Minnesota firm apparently did legally copy plaintiffs' product." 33 Ill. 2d at 388, 212 N.E.2d at 869-70. The court cited no authority for its modification of the injunction.

115. 33 Ill. 2d at 388, 212 N.E.2d at 869.

116. *Id*.

117. *Id.*

118. 376 U.S. 234 (1964).

119. 33 Ill. 2d at 386, 212 N.E.2d at 868-69. The court cited with approval Servo Corp. of Am. v. General Elec. Co., 337 F.2d 716 (4th Cir. 1964), *cert. denied*, 383 U.S. 934 (1966), in which the Fourth Circuit distinguished *Sears* and held that "one [may] not take advantage of a confidential relationship and pirate another's trade secrets without responding in damages—even though the finished product was unpatentable and could be copied by legal means." 33 Ill. 2d at 386, 212 N.E.2d at 869.

retains the valuable option implicit in the misappropriation of the trade secret. Given the trial-and-error nature of R&D, it is likely that at least some of the innovator's efforts ended in failure before arriving at a successful design or process. As a result of his misappropriation, however, the trade secret thief already knows which designs and processes are successful, and therefore he can avoid the expense of pursuing those failed research avenues. If the product does not have a short product life cycle—as Schulenberg's flasher evidently did not—a ready market will await the trade secret thief when the injunction expires. Unless accompanied by an award of punitive damages, the limited injunction in *Schulenberg* does not leave the former employee any worse off for having misappropriated his employer's trade secrets. Therefore, the injunction rule will fail to deter similar acts of misappropriation even when the probability of detection is certain—let alone when detection is uncertain.

Another case in the *Winston Research* family, *Bryan v. Kershaw*,[120] illustrates how courts have struggled to determine whether an injunction of some specified limited duration is superior to a perpetual injunction. In *Bryan*, the former chief engineer of R&D for Kershaw designed for his new employer a railroad track undercutter that was functionally identical to the undercutter that Kershaw was able to manufacture and market only after 4,000 to 5,000 man-hours of development.[121] The district court issued and the Fifth Circuit affirmed a limited injunction barring the former employee and his new employer from "duplicating, using or selling their undercutter" for a period of time "found necessary to remove the competitive advantage gained through the illegally used trade secrets."[122] The injunction, which extended until September 21, 1966, lasted at most thirty-three months. The Fifth Circuit's opinion does not state when the district court's decree took effect, but it does state that the former employee did not join his new employer until after "early 1964."[123]

The Fifth Circuit heard *Bryan* because it was a diversity case. But neither the Fifth Circuit nor the Texas cases that it cited as authority indicated why the trade secret injunction had to be limited rather than perpetual in duration. With respect to the injunction against the former employee, the court held that "where an employee has in confidence gained information concerning a machine incorporating trade secrets and has divulged or attempts to divulge the same after the device has become public by some other means, the Texas law labels such conduct a breach of confidence and will enjoin the reaping of benefits there from."[124] Yet nothing distinguishes this holding from

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120. 366 F.2d 497 (5th Cir. 1966), *cert. denied*, 386 U.S. 959 (1967).
121. 366 F.2d at 498.
122. *Id*. at 499.
123. *Id*. at 498.
124. *Id*. at 500.

Shellmar. To the contrary, in each of the three Texas cases that the Fifth Circuit cited to support its holding,[125] the Texas court *perpetually* enjoined the trade secret thief. In one case, *Hyde Corp. v. Huffines*, the Texas Supreme Court strongly leaned toward the *Shellmar* approach by observing that when an innovator in a trade secret case "makes out a case for injunctive relief, the duty devolves upon the opposing party to show by competent evidence that an order of less duration than a permanent order will afford the injured party adequate protection."[126] In short, the Fifth Circuit's decision in *Bryan* does not provide any compelling rationale for why *Winston Research* is superior to *Shellmar*.

C. *The Equilibrium under* Shellmar

Under *Shellmar*, the trade secret thief is enjoined from time t_2 through time t_4 and beyond. The *Shellmar* rule arose when a trade secret thief sought to have modified an equitable decree perpetually enjoining him from making, using, or selling a wrapping material for food products, and from using or revealing the processes or machinery for making the wrap. The thief argued that the innovator's "right of secrecy was extinguished by the disclosures of the patents" subsequently issued for the wrapping inventions and that "equity will not continue injunctive relief to protect a right of secrecy which no longer exists."[127] The Seventh Circuit rejected this argument and affirmed the perpetual injunction.

The Seventh Circuit's decision is most striking because it explicitly recognizes a property right in trade secrets, even though it believed that the equity jurisdiction to protect trade secrets "is founded upon trust and confidence."[128] The court said: "Whether the subject-matter is patentable or not, if the designer discovers and keeps secret a process of manufacture, though he will not have an exclusive right to it as against the public, after he shall have published it, or against those who in good faith acquire knowledge of it, yet he has a property right, which a court of chancery will protect against one who in bad faith and breach of confidence undertakes to apply it

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125. Atlas Bradford Co. v. Tuboscope Co., 378 S.W.2d 147 (Tex. Civ. App. 1954); Hyde Corp. v. Huffines, 158 Tex. 566, 314 S.W.2d 763 (1958); K&G Oil Tool & Serv. Co. v. G&G Fishing Tool Serv., 158 Tex. 594, 314 S.W.2d 782 (1958).

126. 158 Tex. at 585, 314 S.W.2d at 776. The Texas Supreme Court further said that the trade secret thief "has not raised an alternative contention that an injunction, if issued, should be of limited duration, such as two or three years after the issuance of patent, rather than being perpetual in nature." *Id.* Thus, the court concluded, "[n]o proper predicate by alternative pleadings and supporting evidence was laid for limiting the effect of the injunction to a certain period of time after the issuance of the patent." *Id.*

127. *Shellmar,* 87 F.2d at 105.

128. *Id.* at 107 (quoting Allen-Qualley Co. v. Shellmar Prods. Co., 31 F.2d 293, 296 (N.D. Ill. 1929)). The Seventh Circuit in *Shellmar* did cite *Masland*, 87 F.2d at 108, but not for the proposition that trade secrets do not constitute property.

to his own use."[129] In support of this reasoning, the court employed the legal fiction that the thief, "by its inequitable conduct had taken itself outside the pale of the general public to which disclosure of that patent was made."[130] Despite this emphasis, the property element of trade secrets seemed more important to the Seventh Circuit's rationale than confidentiality. The Seventh Circuit also hinted at the safety-net function of trade secret law. Quoting the district court's opinion approvingly, the Seventh Circuit emphasized the complementarity between property rights in patents and property rights in trade secrets: "The difference between secret processes and patents is that the owner of patent had a monopoly against all the world, while the owner of a secret process has no right 'except against those who have contracted, expressly or by implication, not to disclose the secret, or who have obtained it by unfair means.'"[131] Therefore, unlike *Conmar*, *Shellmar* rested on a property-rights view of trade secret law that comported, thirty-eight years later, with *Kewanee* and its objective of encouraging the efficient allocation of resources for innovation.

Although courts now routinely pay lip service to *Kewanee*'s holding that trade secret law seeks to encourage innovation, they appear reluctant to embrace the full implications of their doing so. The older view of trade secret law—that it provides a remedy for breach of a confidential relationship—still leads some courts to view perpetual injunctions, like the one upheld by *Shellmar*, as punitive in nature, without considering the possibility of post-trial bargaining between the innovator and the trade secret thief.

Real option analysis would imply a rule somewhere between *Winston Research* and *Shellmar*. In other words, an injunction whose duration was calculated to reflect the option value of involuntary exchange would be longer than what *Winston Research* would imply and shorter than what *Shellmar* would imply. The transactions costs to litigants of making the precise calculation would be substantial, and the weighing of the relevance evidence associated with that calculation conceivably could exceed the competence of a trial court and, far more conceivably, the competence of a civil jury. It is therefore useful to ask whether a proxy rule exists.

In this regard, it is critical to recognize that even a perpetual injunction against a trade secret thief probably will not have the practical effect of precluding his use of the trade secret. More likely, the grant of a perpetual injunction merely will enable the innovator to enter post-trial licensing negotiations with the thief with greater relative bargaining power than if the

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129. 87 F.2d at 107 (quoting 31 F.2d at 296).

130. *Id*.

131. *Id*. at 107 (quoting 31 F.2d at 296 (quoting Tower Mfg. Co. v. Monsanto Chem. Works, 20 F.2d 386, 387 (S.D.N.Y. 1927))). In *Monsanto*, 20 F.2d at 387, Judge Augustus Hand (brother of Judge Learned Hand) said that, regarding misappropriation of trade secrets, he saw "much similarity . . . between a secret process and a patent."

court instead had ordered compulsory licensing of the proprietary information (or, worse, compulsory licensing at a court-ordered royalty rate). Put differently, a perpetual injunction is analogous to granting the innovator a patent for his trade secret that is enforceable only against the trade secret thief. Of course, *Conmar* represents the extreme case of compulsory licensing at a price equal to the court's lump sum damage award for the thief's unauthorized use from time t_1 to t_2, and nothing more.[132]

The polarity of *Conmar* and *Shellmar*—with *Winston Research* somewhere in between—illustrates the Coase Theorem. When the transactions costs of negotiation are low, these disparate rules have differing effects on the distribution of wealth between the innovator and the trade secret thief. But these disparate rules do not have differing short-run effects on the allocation of resources by altering the extent to which valuable information is disseminated for use.[133] At the litigation stage—when the innovator's foregoing expenditures on R&D all are sunk costs, and thus are irrelevant to his actions on the margin—all three rules will produce the identical allocation of resources. All three will result in the trade secret thief being able to use the trade secret, only at different prices.[134]

However, it is not correct that all three rules will, in a dynamic sense, create identical incentives to make sunk investments to *create* valuable information. As predicted by the Coase Theorem, the three injunction rules will produce the same resource allocation outcome *at a given snapshot in time*. For present purposes, the relevant snapshot is the length of the current cycle of Schumpeterian rivalry—the period from t_o to t_4 in Figure 1. Across time, as producers and consumers move from one Schumpeterian cycle of innovation and competition to another, the Coasean neutrality of resource allocation under the three injunction rules will disappear. Just as industries subjected to compulsory patent licensing resort to secrecy rather than rely on

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132. *Cf.* Paul Goldstein, *Preempted State Doctrines, Involuntary Transfers and Compulsory Licenses: Testing the Limits of Copyright*, 24 UCLA L. REV. 1107, 1128 (1977) ("In a sense, compulsory licenses are as old as equity's discretion to withhold injunctions when issuance of the decree would harm the defendant disproportionately to the plaintiff's benefit. By allowing defendants in these cases to continue their invasion of property rights upon payment of damages, courts substitute their estimate of appropriate compensation for the figure that the parties would have arrived at privately.").

133. *See* Ronald H. Coase, *The Problem of Social Cost*, 3 J.L. & ECON. 1 (1960); *see also* Guido Calabresi & A. Douglas Melamed, *Property Rules, Liability Rules, and Inalienability: One View of the Cathedral*, 85 HARV. L. REV. 1089 (1972).

134. This analysis assumes that the transactions costs of post-trial negotiations are not so high as to invalidate the Coase Theorem. This assumption is uncontroversial in the theoretical literature. *See, e.g.*, Mark Schankerman & Suzanne Scotchmer, *Damages and Injunctions in Protecting Intellectual Property*, 32 RAND J. ECON. 199, 201-02 (2001) (assumes "frictionless bargaining" between patent owner and patent infringer).

continued patenting,[135] so also one would expect that innovators protected only by *Conmar* or *Winston Research* would show a greater reluctance over time to disseminate information even to contractually bound employees or third parties than would innovators protected by *Shellmar*.

Apart from the option value of involuntary exchange, the probability of detecting trade secret theft also influences the appropriate duration of an injunction. An injunction for a misappropriated process secret differs from an injunction for a misappropriated design secret in the way that legal protection of the trade secret relates to *Kewanee*'s objective of rewarding investment in innovative activity. Process secrets probably are easier to protect than are product design secrets, simply because the innovator can physically guard a secret process in his factory. In contrast, a product design is vulnerable to reverse engineering as soon as it is marketed. If the product is highly specialized and requires elaborate point-of-sale demonstration or a continuing customer-service relationship (as would a mainframe computer or an Internet router, for example), the innovator or his distributor may be able to screen purchasers and refuse to sell to any whose primary motive appears to be to reverse engineer the product.[136] Similarly, the innovator might impose a lease-only requirement, or condition a lease or warranty on the requirement that only authorized personnel may service the product. But these protective measures have their shortcomings and, in any case, quickly become prohibitively costly for a product that is widely marketed. Certainly, this is the case for mass-market consumer products as well.[137]

Although process secrets are probably easier to protect than are product secrets, their misappropriation (once it has occurred) is harder to detect. A misappropriated design ultimately manifests itself in a recognizable copy of the innovator's product. But a misappropriated process is not necessarily disclosed by the thief's marketing of a competing product. Furthermore, although the thief may be less creative than the innovator, he may be more skillful at concealing a valuable process, whether original or stolen. In light of these concerns, a second piece of economic intuition underlies the justification for a court's issuance of a perpetual injunction: the duration of a limited injunction (calculated as in *Winston Research*) must be divided by the *ex ante* probability that the innovator will ever detect the misappropriation.[138] If this adjustment for the probability of detection is not

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135. *See* FREDERIC M. SCHERER, THE ECONOMIC EFFECTS OF COMPULSORY PATENT LICENSING 64-67 (1977).

136. *See, e.g.,* Bryan v. Kershaw, 366 F.2d 497, 499 (5th Cir. 1966), *cert. denied*, 386 U.S. 959 (1967) (trade secret thief tried unsuccessfully to purchase product from innovator before hiring innovator's chief engineer).

137. *Cf.* J. Gregory Sidak, *Debunking Predatory Innovation*, 83 COLUM. L. REV. 1121, 1137-38 (1983) (discussing the high transactions costs of monitoring consumer's use of product).

138. *Cf.* Edmund W. Kitch, *The Law and Economics of Rights in Valuable Information*, 9 J. LEGAL STUD. 683, 693 (1980).

made, the cost to the trade-secret thief of a limited injunction would be insufficient to deter misappropriation. A perpetual term for the injunction is a rough approximation of this optimal duration. The perpetual term does not confer any windfall on the innovator. At any significant discount rate, the present value of licensing fees that the innovator could derive from the trade secret thief for use of the process during the perpetual term would not differ substantially from the present value of the royalty stream during the statutory patent term. Particularly in an industry in which substantial technological change occurs more rapidly than the duration of a patent, the value of a perpetual injunction against the thief would be roughly equivalent to the value of a patent license covering the same proprietary information. Neither form of intellectual property protection would have any practical value for the innovator after t_4 in Figure 1. Instead, the value of both would be truncated by the Schumpeterian cycle of competition.

It would be erroneous, however, to conclude that, because the theft of a secret product design is more likely to be detected than the theft of a secret process, an injunction for the misappropriation of a design should be of limited rather than perpetual duration. This conclusion would presuppose that process secrets and product secrets have equivalent effects on the innovator's ability to earn quasi rent and economic rent. They do not. Misappropriation of a process secret erodes the innovator's upward pricing flexibility by increasing the elasticity of supply of rival firms, but it does not directly reduce consumer demand for the innovator's own product. On the other hand, the misappropriation of a product design enables the thief immediately to market a consumer substitute, thereby flattening the innovator's residual demand curve and reducing its upward pricing flexibility.[139] One would expect the theft of secret product designs to be more damaging to incentives to make sunk investment in innovation than the theft of secret processes, for the innovator's loss in upward pricing flexibility probably would be greater from the increase in demand substitutability than from an increase in producer substitutability.

An exception to this argument would arise when the misappropriation of constituent processes is so pervasive that the trade secret thief in effect has stolen the know-how to the innovator's entire business. The result in this case should be the same as for the theft of design blueprints: The thief's manufacture of a competing product must be enjoined perpetually. If the trade secret thief still considers it profitable to manufacture a copied product, he can negotiate with the innovator for a license. *Head Ski Co. v. Kam Ski*

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139. In the extreme case, a product design secret that confers upward pricing flexibility on its owner without affecting producer substitutability at all evokes concerns more reminiscent of trademark and state unfair competition laws than of the need to reward innovation that the Supreme Court emphasized in *Kewanee*.

Co. exemplifies this situation.[140] Two former employees who had helped Head develop a composite wood and metal ski began manufacturing a competing ski using secret processes and apparently also some secret designs learned while working for Head. A special master concluded that Kam avoided "years of experimenting" by using Head's "major manufacturing processes."[141] Although the master also concluded that the former employees had legitimately developed certain improved designs on their own,[142] he nonetheless recommended that the court enjoin the former employees "altgether from the manufacture of adhesively bonded metal skis."[143] The district court agreed with the master that "[a] broad injunction appears to be necessary to protect plaintiff from unlawful use of its trade secrets by defendants."[144] The court found it particularly relevant that "[o]ther ski manufacturers, in this country and in Europe, have endeavored to produce a metal ski which could compete successfully with Head's, but have failed to do so despite their knowledge and experience."[145] Unlike these many unsuccessful competitors, Head's former employees "were able to do so immediately, because of the knowledge they had gained during their employment" at Head's plant.[146] Even though these former employees had made significant design innovations of their own after leaving Head, the court concluded that their mere existence as a business entity resulted from the totality of processes and designs misappropriated from Head:

> This is not a case where a technician having confidential knowledge of a restricted process reveals it to a competitor of the owner of the process. In such a case the court might properly enjoin the use of the process involved, and not the manufacture of the product . . . . In the instant case, however, defendants' entire operation has been built upon plaintiff's techniques, methods, materials and design. In such a case, an injunction against the manufacture of the product is appropriate.[147]

The court considered the less restrictive alternative of listing the specific processes that the former employees would be perpetually enjoined from using, but it rejected this approach on the grounds that it would be "impracticable if not impossible to enumerate all the secrets learned by defendants while working for plaintiff, some of which have already been used by defendant, and some of which may be used by them in the future."[148]

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140. 158 F. Supp. 919 (D.C. Md. 1958).
141. *Id.* at 922.
142. *Id.* at 923.
143. *Id*. at 924.
144. *Id.*
145. *Id.* at 923.
146. *Id.* at 923-24.
147. *Id*. at 924 (citation omitted).
148. *Id.* Consequently, the court perpetually enjoined the former employees from manufacturing "adhesively bonded metal, wood and plastic skis" and from "advising any person,

Some opinions ordering perpetual injunctions exhibit an awkward synthesis of both the commercial morality and property rationales for trade secret law. One such case is the 1986 decision in *Valco Cincinnati, Inc. v. N & D Machining Service, Inc*, in which the former employees were found to have misappropriated information relating to the manufacture of industrial glue application equipment.[149] The Ohio Supreme Court cited *Masland* in support of the proposition that "trade secret laws are not those of property but the equitable principles of good faith applicable to confidential relationships."[150] The innovator is protected not because of a property right in the trade secret, but because of a confidential relationship with the potential trade secret thief.[151] Yet, the court also cited *Kewanee* to support the proposition that "trade secret policies in Ohio are to maintain standards of commercial ethics and the encouragement of invention, as well as the protection of the substantial investment of employers in their proprietary information."[152] Evidently the court failed to see the contradiction in applying a body of trade secret law between the innovator and the trade secret thief that was supposedly not based upon property law to protect investments in proprietary information.

The court observed that Ohio courts had issued punitive perpetual injunctions when the misappropriation was egregious.[153] The case before it, reasoned the court, was one such instance when a punitive perpetual injunction was appropriate. Still, the court seemed oddly concerned that the former employees not be punished too much, noting that they were "not foreclosed [by the perpetual injunction] from doing business generally within this commercial field."[154] The court recognized the need to balance protection of the innovator's interest against the employee's right to earn a livelihood.[155] The court said that a distinction may exist "between knowledge and skill that is general in the trade as a whole and 'secret' knowledge which is acquired particularly and specifically from the employer."[156] Yet, the court remained inconclusive regarding which side of the balance of interest is to be favored. Given such vacillation, it is hard to say whether Ohio trade secret law is intended to protect primarily confidential relationships or investments

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firm, or corporation as to the manufacture or design or laminated skis of this nature." *Id.* However, the perpetual injunction did allow the former employees to "proceed with their efforts . . . to secure a patent on the design features which the master found had been independently conceived by defendants." *Id.*

149. 492 N.E.2d 814 (Ohio 1986).

150. *Id*. at 817.

129. *Id.* at 818.

152. *Id.* at 820.

153. *Id*.

154. *Id*.

155. *Id.* at 818.

156. *Id.*

in proprietary information. If the latter, why justify a perpetual injunction as appropriate punishment for wrongdoing rather than as the optimal means to restore correct incentives for innovation? Such a confusing synthesis of *Kewanee* and *Masland* is unlikely to promote either commercial ethics or sunk investment in innovation in a consistent manner.

Another curious example of legal-rule synthesis is *Boeing Co. v. Sierracin Corp.*,[157] in which the Washington Supreme Court, applying the *Conmar*-style default rule in Washington's version of the UTSA, upheld a perpetual injunction on a rationale similar to that of *Winston Research*. A jury found that Sierracin had misappropriated trade secrets relating to the design of Boeing's replacement cockpit windows, and the trial court entered a permanent injunction against him. Sierracin appealed, arguing that the injunction was "perpetual and punitive."[158] The Washington Supreme Court rejected the argument and upheld the injunction. The court reasoned that Sierracin should not be allowed to profit from wrongful conduct.[159] The court further observed, in response to the argument that the injunction was perpetual, that the default *Conmar* rule in Washington's version of the UTSA "specifically allow[ed] Sierracin to apply to the superior court to have the injunction lifted when Boeing's trade secrets cease to exist."[160] Unlike *Conmar*, however, the *Sierracin* court recognized that one purpose of trade secret law is to protect an innovator's investments, for it observed that Boeing had invested $16 million in designing the windows.[161] Furthermore, the Washington Supreme Court appeared satisfied that the trial court reasonably doubted that Sierracin could ever have reverse engineered the design, thus using a *Winston Research* rationale.[162] Consequently, the Washington Supreme Court upheld an injunction that was effectively perpetual in duration. Yet, the question remains whether the court's rationale was based on the protection of the innovator's investment or on the fact that reverse engineering by Sierracin seemed unlikely.[163]

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157. 738 P.2d.665 (Wash. 1987).

158. *Id*. at 681.

159. *Id.*

160. *Id*. at 682.

161. *Id*. at 670.

162. *Id*. at 675.

163. In contrast, in Kamin v. Kuhnau, 232 Or. 139, 374 P.2d 912 (1962), the Oregon Supreme Court, following *Shellmar*, enjoined the manufacture and sale of garbage truck bodies that incorporated ideas and inventions acquired by Kuhnau during a confidential relationship with the innovator, Kamin. Even though the facts established that the thief could have developed the innovator's design by reverse engineering, that competitors substantially had done so even before the thief had begun business, and that the thief's product differed from the innovator's in some respects, the court upheld a decree that perpetually enjoined the thief from making and selling any product incorporating the innovator's "ideas and inventions." 232 Or. at 143, 145, 149, 374 P.2d at 915, 917.

The analytical confusion in decisions such as *Sierracin* and *Valco* suggests how courts in other states that have adopted the UTSA might attempt to justify a longer injunction than the *Conmar* default rule would indicate. These future cases will have greater coherence if they base their analysis on the option value inherent in trade secret theft.

VII.   CONCLUSION

The trade secret thief enjoys the valuable opportunity to "wait and see" whether investing in product development related to the secret is justified. He also knows in advance that certain lines of R&D are unlikely to be fruitful, and thus he can avoid the sunk cost of investing in drilling those dry holes. The three conflicting rules for calculating the duration of injunctions for the misappropriation of trade secrets create different incentives not only for sunk investment in innovative activity, but also for the misappropriation of trade secrets. In addition, for each of the three conflicting rules, the nature and magnitude of these incentives differ as between process secrets and design secrets.

Serious inefficiencies attend Judge Learned Hand's *Conmar* rule, which bars an injunction against a trade secret thief after public disclosure of the information. The *Winston Research* rule limits the duration of the injunction to the length of time that it would have taken the trade secret thief to reverse engineer the secret design or process. This approach fails to recognize the full value of the real option that the thief received when he misappropriated the trade secret. Courts could refine the *Winston Research* approach by explicitly considering the option value of involuntary exchange. In other words, the more valuable the option, the longer would be the injunction. In practice, however, such a calculation would be difficult for litigants to produce and courts to evaluate. Clearly, the duration of the injunction would be longer than under the current *Winston Research* approach. Introducing explicit consideration of the probability of detection would further extend the injunction term.

Recognizing that the issuance of the injunction will be followed by Coasean bargaining between the innovator and the thief, and recognizing further that the duration of the injunction will affect the relative bargaining power of the two parties but not the likelihood that they will undertake such negotiations, it would be more efficient for courts simply to apply the *Shellmar* rule of granting a perpetual injunction against the trade secret thief. Of the three injunction rules, *Shellmar* most closely reflects the value of the real option inherent in trade secret misappropriation. In this respect, *Shellmar* is most consistent with the objective, enunciated by the Supreme Court in *Kewanee,* of preserving incentives to make sunk investments for the creation of valuable information.