

SECRET INVENTIONS

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I. INTRODUCTION

In 1953, Norm Larsen, a self-taught chemist and founder of the Rocket Chemical Company, was attempting to develop a chemical that would fortify metal against rust. On his fortieth attempt, he created a chemical that displaced the standing water that slowly corrodes metal. He named his invention “Water Displacement, Fortieth Attempt.” Larsen immediately commercialized his invention, selling it to the U.S. government to protect the outer skin of the Atlas missile from rust and corrosion. Five years after Larsen developed his chemical product he began offering it to the American consumer.¹ Water Displacement, Fortieth Attempt was a resounding commercial success due to the product’s affordability and wide range of common household uses. Today, over eighty percent of American households own Larsen’s product, now known as WD-40.

Larsen never patented WD-40. Instead, Larsen’s company, the Rocket Chemical Company (later renamed the WD-40 Company) relied on trade secrecy to protect its intellectual property.² Although other companies have since created water-displacement chemicals that are similar, if not identical,

1. U.S. Patent No. 6,315,152 (filed Nov. 13, 2001) (retelling the Norm Larsen story as background for a patent application for a tube storage device).

2. Douglas Martin, *John S. Barry, Main Force Behind WD-40, Dies at 84*, N.Y. TIMES, July 22, 2009, at B12.

to the chemical Larsen created, WD-40 continues to enjoy commercial success across the world.³

The success story of the unpatented WD-40 formula runs counter to traditional conceptualizations of patent law's role in promoting innovation. Patents are often conceptualized as a means of luring secret inventions out of the dark, shadowy cave of trade secrecy, and into the bright, public sunlight of the patent system.⁴ Courts tend to characterize the preference for patents over trade secrets as a matter of sound public policy, but this understanding is both incomplete and under-theorized.⁵

Reliance upon trade secrecy, it is thought, leaves the know-how surrounding valuable inventions in the hands of a select few. The traditional quid pro quo view of the patent system imagines the patent grant as the carrot used to entice inventors to reveal their valuable secrets to the public. Secrecy, as conceptualized by the traditional patent quid pro quo viewpoint, is antithetical to the purposes animating the patent system.⁶

The rhetoric used by courts to describe the patent system as discouraging secrecy pervades certain patent doctrines as well. Various patent doctrines attempt to persuade inventors to forego secrecy by favoring patentees over trade secret holders in various potential disputes. For example, a first inventor who relies on trade secrecy risks losing the right to practice her own invention if a subsequent inventor chooses to patent the invention.⁷ Other legal doctrines close the proverbial doors of the patent office to inventors

3. Gwendolyn Bounds, *Boss Talk: No More Squeaking By—WD-40 CEO Garry Ridge Repackages a Core Product*, WALL ST. J., May 23, 2006, at B1 (claiming that the WD-40 company sells over one million cans per week).

4. *See generally* Kewanee Oil Co. v. Bicron Corp., 416 U.S. 470 (1974) (describing the patent “quid pro quo” which seeks to encourage inventors to reveal their discoveries via the patent system).

5. *See, e.g.*, Carl Shapiro, *Prior User Rights*, 96 AM. ECON. REV., no. 2, 2006, at 92, 95 (“The effects of encouraging inventors to adopt trade secret versus patent protection are not well understood. Further work is needed to compare the . . . costs that result from inducing some inventors to seek trade secret rather than patent protection.”).

6. Gordon L. Doerfer, *The Limits of Trade Secret Law Imposed by Federal Patent and Antitrust Supremacy*, 80 HARV. L. REV. 1432, 1441 (1967); Mark A. Lemley, *The Surprising Virtues of Treating Trade Secrets as IP Rights*, 61 STAN. L. REV. 311, 314 (2008) (“[T]he law operates in various ways to encourage inventors to choose patent over trade secret protection where both are possible.”); Jason Mazzone & Matthew Moore, *The Secret Life of Patents*, 48 WASHBURN L.J. 33, 35 (2008) (“Federal law . . . expresses a clear preference for the inventor who discloses an invention to the public and obtains a patent over the inventor who keeps the invention a secret.”); Shapiro, *supra* note 5, at 95 (“[T]he current patent system rewards applicants who are most aggressive in seeking patents over those who simply use their own inventions internally as trade secrets.”).

7. *See, e.g.*, Gillman v. Stern, 114 F.2d 28, 30 (2d Cir. 1940).

who file for a patent more than one year after commercialization.⁸ These doctrines are designed to convince inventors to seek patent protection for their inventions at an early stage in the inventive process, rather than to continue working in secret.

Despite the traditional distaste for secrecy displayed by patent law, secrecy offers several underappreciated benefits. First, secret inventions reduce the administrative and judicial burdens associated with patenting. The U.S. Patent & Trademark Office (PTO) cannot keep up with the over 500,000 patent applications filed each year.⁹ Similarly, patent litigation has become an enormously expensive and time-consuming affair, resulting in the creation of an entirely new circuit court of appeals to handle patent appeals.¹⁰ Reliance upon trade secrecy does not involve the expensive administrative and judicial procedures that patent protection entails.

Second, the use of trade secrets does not reduce competition for innovation, as the use of patents does. Unlike a patented invention, a secret invention does not limit competitors from independently discovering or reverse engineering the invention. The unfettered competition that trade secrecy permits attracts competitors to the most successful and profitable inventive spaces. Patents, on the other hand, can discourage inventors from entering into well-researched areas. While the increased competition for innovation may result in duplicative research, the social benefits that come from innovative competition may outweigh the costs of duplication, particularly when research costs are small.¹¹

Trade secrecy's competitive benefits extend to the realm of commercialization and development as well. Trade secret exclusivity has an uncertain duration. The potential loss of exclusivity can motivate inventors to rapidly commercialize, develop, and improve their invention. Patentees, on the other hand, may not be as diligent in commercializing due to the patent's relative security from competitors.¹²

Lastly, the availability of secrecy can increase the ex ante incentive to invent in certain cases. Some inventions (such as inventive manufacturing

8. 35 U.S.C. § 102(b), (g) (2007).

9. U.S. Patent & Trademark Office, U.S. Dep't of Commerce, *U.S. Patent Statistics, Calendar Years 1963–2010* (Mar. 2011), http://www.uspto.gov/web/offices/ac/ido/oeip/taf/us_stat.pdf [hereinafter PTO, *U.S. Patent Statistics*] (recording 520,277 U.S. patent applications filed in 2010).

10. See Rochelle Cooper Dreyfuss, *The Federal Circuit: A Case Study in Specialized Courts*, 64 N.Y.U. L. REV. 1, 6 (1989) (stating that the Federal Circuit was created partially as a result of the caseload crisis at the federal courts).

11. See *infra* Part III.

12. Ted Sichelman, *Commercializing Patents*, 62 STAN. L. REV. 341, 358 (2010).

and chemical methods) are more valuable to their inventors as secrets than those inventions would be as patents. This increased value is due to the avoided costs of patenting (the cost of obtaining and enforcing patent rights) as well as the potential private benefits of secrecy (primarily the potential duration of exclusivity and the ability to conceal their invention from competitors). Secrecy can thus increase an invention's private value as compared to the same invention if patented; increased private value increases the ex ante incentives to create.¹³

In light of the social benefits of secret inventions, this Article argues that trade secrets and patents should be viewed not as opposing systems of invention protection, but rather as complementary tools for policy makers. Along those lines, the Article constructs a framework for determining when policy makers should prefer patents to secrets, and vice versa. The framework is modeled upon the patent reward theory, which explains the existence of the patent system as a means of overcoming the public goods problem of economics. By employing the reward theory model and introducing the concept of differing inventive value for patented and secret inventions, the framework suggests situations in which an inventor's protection preference differs from society's preference.

The framework concludes that policy makers ought not to discourage secrecy, as the law currently does. Because secrecy is a market inefficiency that (at times) permits inventors to amortize their investment costs, there is no risk of reduced innovation when inventors choose trade secret protection: inventor choice of protection scheme is the best means of eliminating the free rider problem. Furthermore, in light of the societal costs of patenting, the law should actually encourage secrecy over patenting in certain circumstances. By encouraging secrecy in certain cases, policy makers can better balance the innovation incentives of the patent system.

This Article proposes two categories of doctrinal changes in light of the constructed framework. First, the Article urges the elimination of patent doctrines that discourage the use of secrecy. The adoption of prior user rights is recommended, along with changes to the standards used in patent priority disputes. Second, this Article begins to examine potential ways in which the law can actively encourage the use of secrecy. A potential limitation of patent subject matter is examined. Additionally, this Article

13. See Mark A. Lemley, *Property, Intellectual Property, and Free Riding*, 83 TEX. L. REV. 1031, 1054 (2005) [hereinafter Lemley, *Free Riding*] ("In a private market economy, individuals will not generally invest in invention or creation unless the expected return from doing so exceeds the cost of doing so—that is, unless they can reasonably expect to make a profit from the endeavor.").

proposes the creation of a secret invention registry. The registry would encourage the use of secrecy by lowering the private cost of enforcing trade secret rights.

II. PATENT LAW AND SECRECY

Innovators encounter a diverse array of legal means to appropriate their innovations.¹⁴ Patents, copyrights, trademarks, and trade secrets offer different legal protection mechanisms for different types of inventions, works, or commercial marks. Some innovations can only be protected by one form of intellectual property.¹⁵ The Nike “swoosh,” for example, is protectable only as a trademark. An artistic work, such as *Gone with the Wind*, is protected under copyright law but cannot be patented.¹⁶ Some innovative subject matter falls within the ambit of multiple protection regimes. For example, software can often be protected with a utility patent, a copyright, or both. Ornamental designs, such as designer candle holders, can be patented (by a design patent), copyrighted, and/or trademarked.¹⁷

While the overlap between copyright and patent at times permits two forms of protection, there is one intellectual property overlap that requires an

14. Of course, intellectual property protection is not required when innovation occurs. Alternatively, an innovator may decide to forgo legal protection for her invention and instead disclose her innovation to the public free of charge. Such disclosure may occur for numerous reasons, including enhanced professional reputation, conformity to common industry or community norms, or because of lack of earning potential associated with the innovation. The social and private benefits of voluntary disclosure are outside the scope of this article. For more on open disclosure's benefits for peer production, see generally Yochai Benkler, *Coase's Penguin, or Linux and the Nature of the Firm*, 112 YALE L.J. 369 (2002) (arguing that open source production models are superior to hierarchical models of production because of open source's more efficient acquisition and processing of human capital availability).

15. This assumes that trade secrets are considered intellectual property, a proposition that has received substantial attention and criticism. For more on trade secrecy's place in the intellectual property universe, see generally Lemley, *supra* note 6 (arguing that trade secrets should be considered forms of intellectual property); Michael Risch, *Why Do We Have Trade Secrets?*, 11 MARQ. INTELL. PROP. L. REV. 1 (2007) (arguing that trade secrets are not intellectual property because the justification for trade secret law is not based on incentives to invent).

16. Although there are now patent applications for movie plot lines pending at the PTO, the Supreme Court's recent decision in *Bilski v. Kappos* likely dooms those applications as unpatentable “abstract ideas.” *Bilski v. Kappos*, 130 S. Ct. 3218 (2010) (holding a method of hedging risk unpatentable as an abstract idea).

17. U.S. PATENT & TRADEMARK OFFICE, U.S. DEP'T OF COMMERCE, MANUAL OF PATENT EXAMINING PROCEDURE (MPEP) § 1512.I (8th ed. Rev. 8, July 2010) (“There is an area of overlap between copyright and design patent statutes where the author/inventor can secure both a copyright and a design patent.”).

innovator to choose between protection schemes: that of trade secret and patent law.¹⁸ An innovator who chooses to patent cannot simultaneously enjoy trade secrecy because the patent application reveals her secret to the world.¹⁹ Similarly, the choice to maintain an invention as a long-term secret precludes patenting that invention.²⁰ Thus, since the law precludes inventors from receiving simultaneous patent and trade secret protection, an inventor must select the regime that provides the best protection for the particularities of her invention.²¹

A. PATENTS AND TRADE SECRETS: LEGAL DIFFERENCES

An invention is eligible for patenting at the moment it is “reduced to practice” or when an inventor produces descriptions of the invention that enable a skilled artisan to practice the invention.²² “Reduction to practice” can occur in one of two ways: constructive (which occurs upon filing a patent application) or actual.²³ Actual reduction to practice requires that an invention work for its intended purpose.²⁴ When an invention is ready for patenting, an inventor can choose to patent or to continue working in secret. The window for patenting ends one year after the innovation has been commercialized or used publicly.²⁵

18. *Compare* *Kewanee Oil Co. v. Bicron Corp.*, 416 U.S. 470, 487–88 (1974) (discussing selection of patenting or secrecy), *with In re Yardley*, 493 F.2d 1389, 1395–96 (C.C.P.A. 1974) (holding that the constitutional provision distinguishing copyrights and patents does not “require[] an election” of one form of protection over the other).

19. There is a delay between the filing of a patent application and the publication thereof during which an invention may be considered both patented and secret. Secrecy in this case expires upon publication, which typically occurs eighteen months after filing. 35 U.S.C. § 122(a)–(b)(1)(A) (2006).

20. *Id.* § 102(b) (2006).

21. It should be noted that the choice presented so far is somewhat stylized. The literature reveals that the choice between patent and secrecy is often not an all-or-nothing choice. *See* Karl F. Jorda, *Patent and Trade Secret Complementariness: An Unsuspected Synergy*, 48 WASHBURN L.J. 1, 31 (2009). Inventors often will employ a hybrid strategy in protecting their invention in which they patent some aspects of their invention and maintain other aspects as trade secrets. This strategy provides some of the benefits of both protection schemes. For instance, patent infringement suits are available as a remedy, yet the risk of free riding from the patent document itself is reduced due to the presence of the trade secret. Part IV, *infra*, deals with this hybrid strategy in more detail.

22. *Pfaff v. Wells Elecs., Inc.*, 525 U.S. 55, 67 (1998).

23. *Hybritech Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1376 (Fed. Cir. 1986).

24. *Id.*

25. 35 U.S.C. § 102(b). Similarly, an invention is ineligible for patent protection one year after the invention appears in a qualifying publication.

In making the patent/trade secret election, inventors must consider the different scope and strength of protection offered by the two regimes.²⁶ The legal protection offered by a patent differs from that offered by trade secrecy in four fundamental ways. First, a trade secret has a potentially limitless lifespan, while a patent is constitutionally time-limited. The Constitution requires that patents be granted “for a limited term.”²⁷ Currently, the right to exclude that a patent provides can extend for up to twenty years. Trade secrets, on the other hand, allow inventors to exclude others for as long as secrecy continues.

The most famous example of trade secrecy’s duration is the formula for Coca-Cola syrup. The Coca-Cola Company protects the formula for Coke as a trade secret, and it has been doing so for over a century.²⁸ Had the company instead chosen to patent the formula it would have been forced to disclose the secret to the world and been unable to exclude others from copying that formula over the past eighty years.²⁹

However, the potentially limitless life of a trade secret comes with a risk. The second fundamental difference between patent and trade secret protection is that a secret invention has a narrower exclusionary scope. A patent permits a patentee to exclude any unauthorized use of the invention, even if the invention was independently developed.³⁰ A trade secret, on the other hand, only provides a legal remedy against misappropriation of the secret.³¹ Secret inventions risk discovery through independent invention or

26. This Article is concerned only with those innovations that are potentially patentable. Trade secret law’s subject matter is more inclusive than patent law. A trade secret can encompass information that is neither new nor non-obvious and is therefore ineligible for patent protection. *See, e.g.*, Risch, *supra* note 15, at 11, 12 (citing 35 U.S.C. §§ 101–103 (2000)). Similarly, unoriginal information—such as names and phone numbers—can be protected as a trade secret but is not eligible for patent protection. *Id.* at 12. This Article is concerned with only the subset of potential trade secrets that would also be eligible for patent protection.

27. U.S. CONST. art. I, § 8, cl. 8.

28. *See Coca-Cola Bottling Co. v. Coca-Cola Co.*, 107 F.R.D. 288 (D. Del. 1985) (mentioning that the trade secret 7X formula was kept in bank vault that could only be accessed by a board resolution).

29. Other famous culinary trade secrets include Colonel Sanders’ original recipe for fried chicken and McDonald’s original special sauce. Many of these trade secrets would not be eligible for patent or copyright protection because recipes are ineligible for any sort of intellectual property protection. *See, e.g.*, Emily Cunningham, *Protecting Cuisine Under the Rubric of Intellectual Property Law: Should the Law Play a Bigger Role in the Kitchen?*, 9 J. HIGH TECH. L. 21 (2009) (noting that any intellectual property protection for methods of food preparation is unlikely to be used, although patent law is arguably available).

30. *See, e.g.*, Samson Vermont, *Independent Invention as a Defense to Patent Infringement*, 105 MICH. L. REV. 475, 480 (2006) (arguing for an independent inventor defense in patent law).

31. *Id.*

reverse engineering.³² Thus, if one were to independently stumble upon the secret Coke formula, or if one were to reverse engineer the formula via chemical testing, nothing prevents the discoverer from commercializing that formula.

The third fundamental difference in the protection regimes is that a secret invention requires no legal formalities to obtain exclusionary rights.³³ Filing for a patent involves a lengthy, expensive process. Patent attorneys draft stylized legal documents that are required to describe the metes and bounds of the patent, disclose the invention in a way that permits a “person skilled in the art to make and use the invention without undue experimentation,”³⁴ and demonstrate that the invention is novel, non-obvious, and useful.³⁵ The attorney then files the document with the U.S. Patent and Trademark Office. The initial filings are often rejected, necessitating amendments to the original filings in the form of a continuation, further filings demonstrating the patentability of the invention, or other negotiations with the patent office.³⁶ This cycle can continue ad infinitum. Patents cost upwards of \$10,000 to file and are expensive to maintain.³⁷

Trade secrets, on the other hand, require no formal registration with the government.³⁸ Instead, trade secret protection requires owners to invest in “reasonable measures” to keep the secret.³⁹ Thus, secret inventions require a measure of self-help in order to exclude. By choosing secrecy, inventors avoid the cost of obtaining a patent and the risky, costly business of patent enforcement. Patent litigation is an extremely costly undertaking and requires patent holders to monitor competitors for infringement, which can be quite costly and difficult depending on the visibility of the invention.⁴⁰ However, trade secrets carry their own set of costs: negotiations and relationships must

32. UNIF. TRADE SECRETS ACT § 1 cmts. 1–2 (amended 1985).

33. *Id.* § 1 (listing the requirements for a trade secret).

34. *See In re Wands*, 858 F.2d 731, 735 (Fed. Cir. 1988).

35. 35 U.S.C. §§ 101–103.

36. *See* CRAIG A. NARD, *THE LAW OF PATENTS*, 41–42 (2d ed. 2011) (explaining the typical process of obtaining patent rights).

37. Mark A. Lemley, *Rational Ignorance at the Patent Office*, 95 NW. U. L. REV. 1495, 1498–1500 (2001) (estimating 2001 costs).

38. *See* UNIF. TRADE SECRET ACT § 1 (listing the requirements for a trade secret).

39. *See* ROGER M. MILGRIM, *MILGRIM ON TRADE SECRETS* §§ 1.03–.04 (1996).

40. Upwards of \$7 billion was spent on legal fees surrounding patent litigation and patent prosecution in 2001. Lemley, *supra* note 37, at 1498–1503.

be closely monitored and controlled through non-disclosure agreements, employee confidentiality agreements, and physical protection.⁴¹

Lastly, and perhaps most importantly for innovation policy, trade secrets differ from patented inventions in the amount of disclosure that is legally required (or permitted) to protect an invention. A secret, by its nature, cannot be broadly disclosed. Once a trade secret is widely known, it no longer qualifies for legal protection.⁴² Conversely, a patented invention must be fully disclosed to the public. The patent document itself must “enable” a skilled artisan to practice the invention.⁴³

Oftentimes an inventor will desire disclosure, either through a patent or a published article. But at other times an inventor may wish to keep her invention secret, either to maximize profit, minimize competition, or to conduct further research and development before choosing whether to disclose. However, such secrecy is not always feasible.⁴⁴ Often, disclosure of an invention is tied to commercialization. For example, an improved pop-top soda can is effectively disclosed once on the market; secrecy of the commercialized product is virtually impossible.

Secrecy is often used by inventors as a means of appropriating an invention.⁴⁵ In fact, in certain circumstances it is preferred to patenting because it is a more effective means of securing profits from an innovative idea.⁴⁶ Numerous surveys demonstrate that inventors in fields in which secrecy is feasible view secrecy as the more effective method of appropriating their inventions. For example, using historical data from the Crystal Palace World's Fair, Petra Moser has shown that in fields where secrecy is feasible,

41. See, e.g., Elizabeth Rowe, *When Trade Secrets Become Shackles: Fairness and the Inevitable Disclosure Doctrine*, 7 TULANE J. TECH. & INTEL. PROP. 167, 201–03 (2005).

42. See MILGRIM, *supra* note 39, § 1.05.

43. 35 U.S.C. § 112. In *Ariad v. Lilly*, the Federal Circuit held that Section 112 requires that a patentee both teach one skilled in the art the manner of practicing the invention (enablement) and demonstrate that the inventor possesses the claimed invention (written description). *Ariad Pharm., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1344 (Fed. Cir. 2010).

44. See Timothy R. Holbrook, *Possession in Patent Law*, 59 SMU L. REV. 123, 133–34 (2006).

45. See Anthony Arundel & Isabelle Kabla, *What Percentage of Inventions Are Patented? Empirical Estimates of European Firms*, 27 RES. POL'Y 127 (1998); Wesley Cohen et al., *Protecting Their Intellectual Assets: Appropriability Conditions and Why U.S. Manufacturing Firms Patent (or Not)* 17 (Nat'l Bureau of Econ. Research, Working Paper No. 7552, 2000) (estimating the patent propensity rate to be 54% for product innovations and 27% for process innovations based on a survey of 1,478 R&D labs in the United States).

46. See Cohen et al., *supra* note 45, at 17; Richard C. Levin et al., *Appropriating Returns from Industrial R&D*, 3 BROOKINGS PAPERS ON ECON. ACTIVITY 783, 795 (1987) (reporting results from a survey of high-level R&D executives finding that secrecy was “considered more effective than patents in protecting processes”).

inventors typically rely on trade secret protection.⁴⁷ However, over time, as reverse engineering becomes less costly, inventors increasingly turn to patent protection.⁴⁸

Thus the difference in protection preference is largely attributable to the feasibility of secrecy. Such feasibility differs among invention types and inventive industries. Based on a 1994 survey of research labs at 1,478 U.S. manufacturing companies, Wesley Cohen et al. found that a wide range of industries considered secrecy to be the most effective method of appropriating the value of an invention. Those industries included food, textiles, paper, petroleum, all chemical industries, rubber, plastics, mineral products, metals, machine tools, electrical equipment, motors, generators, semiconductors, and navigation instruments.⁴⁹ Furthermore, secrecy was “clearly the most effective” method of securing an invention for process innovators, while patents were less effective for process than for product innovations.⁵⁰ A considerable number of similar surveys confirm Cohen et al.’s results.⁵¹

For example, the 2008 Berkeley Patent Survey found that certain industries (primarily the software, internet, manufacturing, and chemical processing industries) perceive patenting to be among the least important means of capturing a competitive advantage.⁵² This stratification of value across industry and innovation type indicates that secrecy is more valuable in industries in which it is available (including software, manufacturing, chemicals) and certain invention types that are less revealing (methods and processes) while patents provide more private value for other industries (pharmaceuticals, consumer products) and invention types (product innovations).

47. Petra Moser, Innovation Without Patents—Evidence from World Fairs (July 16, 2010) (unpublished manuscript), <http://www.ssrn.com/abstract=930241>.

48. *Id.*

49. Cohen et al., *supra* note 45, at 10 n.21.

50. *Id.* at 10.

51. *See, e.g.*, Stuart J.H. Graham et al., *High Technology Entrepreneurs and the Patent System: Results of the 2008 Berkeley Patent Survey*, 24 BERKELEY TECH. L.J. 1255 (2009); Levin et al., *supra* note 46, at 799 (finding that secrecy was preferred to patenting in the process innovation industry, whereas patents were more valuable to product innovators).

52. *See* Graham et al., *supra* note 51, at 1285–87. The other strategies in the Berkeley Patent Survey were secrecy, first-mover advantage, copyrights, trademarks, reverse engineering, and complementary assets. *Id.* at 1289.

B. DISCOURAGING SECRECY

With few exceptions, the existence of the United States patent system is justified on utilitarian grounds.⁵³ The patent system's goal of stimulating innovation is manifested in the U.S. Constitution's articulation of Congress's power to "promote the Progress of Science and the useful Arts by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries."⁵⁴ The reward theory is the predominant theoretical explanation for how the patent system promotes the progress of the useful arts.

Reward theorists justify the patent system as a means of inducing the creation and disclosure of new and useful inventions. Without the supranormal profits obtainable with a patent, the theory predicts that many inventions would remain undiscovered or shrouded in secret.⁵⁵ Reward theory has thus been characterized by courts as a quid pro quo between society and the inventor. In exchange for society's offer of patent protection, the inventor must disclose her invention to the public. These dual incentives acting upon an inventor—the incentive to invest and the incentive to disclose—form the basis for the reward theory. The goal is that in exchange for a twenty-year period of exclusivity, inventors will be incentivized to create new and useful inventions and then reveal those innovations to the public. This Section briefly discusses the quid pro quo view of the patent system and the rhetoric employed by the courts to discourage secrecy. Then, moving beyond the legal rhetoric, this Section describes how patent doctrine discourages inventors from relying on trade secrecy.

1. *The Rhetorical Distaste for Secrecy*

Because it requires disclosure, patent law precludes simultaneous protection of an invention as both a patent and a trade secret. Beyond the structural rejection of secrecy, patent law has traditionally been conceptualized by courts as a means of prying secret inventions from their

53. See, e.g., Lemley, *supra* note 6, at 329; Katherine J. Strandburg, *Experimental Use and the Patent Bargain*, 2004 WIS. L. REV. 81, 90–91 (2004). Non-utilitarian theories proffered for the existence of the patent system include those grounded in moral rights. See, e.g., Lawrence C. Becker, *Deserving To Own Intellectual Property*, 68 CHI.-KENT L. REV. 609, 619–29 (1993) (evaluating the patent system through a desert-for-labor argument).

54. U.S. CONST. art. I, § 8, cl. 8.

55. Mark A. Lemley, *The Economics of Improvement in Intellectual Property Law*, 75 TEX. L. REV. 989, 993–1000 (1997); Sichelman, *supra* note 12, at 358.

inventors and disclosing those inventions to the public.⁵⁶ The patent quid pro quo has provided courts with a rhetorical narrative to account for the existence of the patent system.⁵⁷

The traditional view envisions the possibility of a patent as the carrot that is offered to inventors operating in secret.⁵⁸ Viewed from this perspective, the patent system's primary goal is to offer a reward that will incentivize inventors to disclose their secrets to the public. The price that the public pays for the revelation of secret inventions is the property-like exclusive rights of patent protection. The bargain is viewed as beneficial to society because society pays for secrets by giving up what it otherwise would not possess—a description of the invention and the right to eventually practice that invention once the patent expires.⁵⁹

The rhetoric surrounding the quid pro quo generally emphasizes the social benefits of patent disclosure.⁶⁰ On this view, secret inventions are unlikely to be revealed or disclosed unless a reward (in the form of a patent) is offered to possessors of such inventions.⁶¹ For this rhetorical conceptualization to make sense, one must assume that inventions benefit society more as revealed patents than as concealed trade secrets. This view is understandable: society obviously benefits from having valuable knowledge disclosed. However, the assumption that patents are always preferable to secrets fails to account for the societal costs that accompany the patent grant.

Perhaps the best example of the degree to which the rhetoric of the patent quid pro quo has influenced the courts' view of the value of secrecy is in the 1974 case *Kewanee Oil Co. v. Bicron Corp.*⁶² In *Kewanee*, the Supreme Court analyzed whether state trade secret law (Ohio law in this case) was preempted by the operation of federal patent law.⁶³ *Kewanee Oil Co.* had developed, after significant investment, “many processes, procedures, and

56. See generally *Mason v. Hepburn*, 13 App. D.C. 86, 96 (D.C. Cir. 1898) (stating that the patent law's concealment doctrine is designed to favor patentees over trade secret holders).

57. *Id.*

58. See Benjamin Roin, Note, *The Disclosure Function of the Patent System (or Lack Thereof)*, 118 HARV. L. REV. 2007, 2010 (2005).

59. See, e.g., *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 535 U.S. 722, 736 (2002) (“[P]atent rights are given in exchange for disclosing the invention to the public.”); *W.L. Gore & Assocs. v. Garlock, Inc.*, 721 F.2d 1540, 1550 (Fed. Cir. 1983) (“Early public disclosure is a linchpin of the patent system.”).

60. See Roin, *supra* note 58, at 2012.

61. *Kewanee Oil Co. v. Bicron Corp.*, 416 U.S. 470, 487–88 (1974).

62. *Id.*

63. *Id.* at 472.

manufacturing techniques” in the growth of crystals.⁶⁴ One such technique enabled the company to grow a seventeen-inch crystal that proved useful for the detection of ionizing radiation, which the company maintained as a trade secret.⁶⁵ Kewanee sued some of its former employees for misappropriation of that trade secret.⁶⁶ In reversing the Sixth Circuit Court of Appeals, the Supreme Court held that the federal patent system did not preempt the states’ ability to protect trade secrets.⁶⁷

With respect to secret inventions, the Court viewed the patent system as specifically designed to draw trade secrets into the public sphere. “[T]he federal interest in disclosure is at its peak” with patentable secret inventions, the Court concluded.⁶⁸ In fact, the Court stated that “[t]he interest of the public is that the bargain of 17 years of exclusive use in return for disclosure be accepted.”⁶⁹ Thus, the Court, without citation or much evaluation, elevated the patent quid pro quo to a status beyond a mere bargain or contract. In the Court’s view, the Patent Act operates in large part as a secrecy disclosing mechanism. This expansive view of the traditional patent bargain favors disclosure of secrets without regard to the justification for preferring patents. Indeed, the Court immediately follows its description of the patent quid pro quo with a statement that denies, albeit in dicta, secrecy’s ability to coexist with patent law: “If a State, through a system of protection, were to cause a substantial risk that holders of patentable inventions would not seek patents, but rather would rely on the state protection, we would be compelled to hold that such a system could not constitutionally continue to exist.”⁷⁰ In sum, the Court understood the quid pro quo view of the patent system as potentially in conflict with the practice of trade secrecy.

Kewanee held that trade secrecy was not preempted by the patent system because it did not pose a reasonable risk of deterring the filing of patent applications for reasons which have been roundly criticized by commentators.⁷¹ But the view that the patent system is designed to reduce

64. *Id.* at 473.

65. *Id.*

66. *Id.*

67. *Id.* at 474.

68. *Id.* at 489. Indeed, Katherine Strandburg has shown that it is this class of inventions (those that are (1) eligible for patent protection, (2) more valuable to their owners as trade secrets, and (3) promise profits greater than their development costs), and this class only, that even concern the patent quid pro quo. Strandburg, *supra* note 53, at 110–11.

69. *Kewanee*, 416 U.S. at 489.

70. *Id.*

71. *Id.* at 474, 490–91. For a strong critique of the *Kewanee* Court’s reasoning on this point, see Sharon K. Sandeen, *Kewanee Revisited: Returning to First Principles of Intellectual*

the number of secret inventions is a view that courts have embraced, both before and after *Kewanee*.⁷²

The traditional view of the patent bargain emphasizes patents as preferable to secrets. Trade secrets are seen as potential targets of the patent system, rather than as a potentially complementary form of intellectual property. The rhetorical heft of the patent quid pro quo tends to cloud the tradeoffs inherent in patent protection. Furthermore, reliance on this view of the patent quid pro quo *may* obscure any potential benefits that might inure to the public by encouraging secrecy. A more complete theoretical understanding of the costs and benefits of secrecy should be employed when attempting to craft the proper incentives for innovation policy.

To be sure, some courts and a majority of patent scholars have framed the quid pro quo as a choice rather than as a policy lever. Scholars recognize that the patent system benefits society not merely because of the increased disclosure that results from patenting, but also (and primarily) because of the incentive to invent that the patent system creates.⁷³ Any disclosure benefit from patenting, on this view, is secondary to the benefit of increased amounts of innovation that result from the patent bargain. This view, widely adopted by commentators, has been the minority viewpoint for courts.

2. *The Doctrinal Distaste for Secrecy*

The conceptual distaste for secrecy in patent jurisprudence is also reflected in patent doctrine. Carl Shapiro noted that “the current patent system rewards applicants who are most aggressive in seeking patents over

Property Law To Determine the Issue of Federal Preemption, 12 MARQ. INTELL. PROP. L. REV. 299, 345–47 (2008).

72. See, e.g., *Russo v. Ballard Med. Prods.*, 550 F.3d 1004, 1012 (10th Cir. 2008) (“Federal law expresses a strong interest in seeing that patentable innovations do not stay bottled up in secret but are instead shared with the public in order to promote social progress. This interest is most obviously embodied in patent law’s bargain of providing inventors with many years of monopoly rents in return for the public’s opportunity to use and enjoy their ideas.”); *Mason v. Hepburn*, 13 App. D.C. 86, 96 (D.C. Cir. 1898) (“The true ground of the [concealment] doctrine, we apprehend, lies in the policy and spirit of the patent laws and in the nature of the equity that arises in favor of him who gives the public the benefit of the knowledge of his invention, who expends his time, labor, and money in discovering, perfecting, and patenting, in perfect good faith, that which he and all others have been led to believe has never been discovered, by reason of the indifference, supineness, or wilful act of one who may, in fact, have discovered it long before.”); see also Brief for the United States as Amicus Curiae at 13, *Kewanee Oil Co. v. Bicron Corp.*, 416 U.S. 470 (1974) (No. 73-187), 1974 WL 185610, at *13 (“Since election by inventors to rely on trade secret law reduces disclosure by diverting inventions away from the patent system, technological progress is slowed, contrary to the goal of federal patent policy.”).

73. Roin, *supra* note 58, at 2012.

those who simply use their own inventions internally as trade secrets.”⁷⁴ Patent law encourages inventors to patent secret inventions in three ways. First, statutory bars to patentability require the prompt filing of a patent application.⁷⁵ Failure to file within the time period allotted by statute will result in the loss of rights in the invention. Second, during patent priority disputes (interferences), a first inventor can lose the rights in her invention if she is found to have “abandoned, concealed, or suppressed” the invention.⁷⁶ These priority rules favor an inventor who does not employ secrecy, even if that inventor was second in time. Third, a first inventor who chooses to maintain her invention as a secret can be liable for infringement to a second inventor who decides to patent.⁷⁷ The relative lack of “prior user rights” for secret inventors is unique to the American patent system.⁷⁸

a) Statutory Bars to Patentability

An inventor loses all rights to patent an invention if she does not file a patent application within one year of the invention being “in public use or on sale” in the United States.⁷⁹ Courts have set a very low standard for what constitutes public use. The Federal Circuit has declared that public use includes “any use of that invention by a person other than the inventor who is under no limitation, restriction or obligation of secrecy to the inventor.”⁸⁰ Under this standard, public use can encompass some unrevealed uses of an invention.⁸¹ The use of an invention in secret—if connected to commercial exploitation of the invention—may be considered public use by the courts and the PTO.⁸² Public use cases largely turn on factual issues, and courts often focus their inquiry in an evaluation of the purposes of the public use bar.⁸³ Among these purposes is the encouragement of prompt patent filing.⁸⁴

74. Shapiro, *supra* note 5, at 95; *see also* Margo A. Bagley, *The Need for Speed (and Grace): Issues in a First-Inventor-To-File World*, 23 BERKELEY TECH. L.J. 1035, 1049 (2008) (discussing the U.S. first-to-invent system’s “default preference” for patents over trade secrets).

75. 35 U.S.C. § 102(b) (2006).

76. § 102(g).

77. *See infra* Section II.B.2.c.

78. For information on exceptions to this general rule, *see infra* note 96.

79. § 102(b).

80. *In re Smith*, 714 F.2d 1127, 1134 (Fed. Cir. 1983).

81. MPEP, *supra* note 17, § 2133.03(a).II.A.1; *see also* *Egbert v. Lippmann*, 104 U.S. 333, 336 (1882) (stating that public use may occur “even though the use and knowledge of the use may be confined to one person”).

82. MPEP, *supra* note 17, § 2133.03(a).II.A.1; *see also* *TP Labs, Inc. v. Prof1 Positioners, Inc.*, 724 F.2d 965, 972 (Fed. Cir. 1983) (noting that secret but commercial use of an invention could constitute “public use” under the statute).

83. *See, e.g., Egbert*, 104 U.S. at 338 (holding that a corset patent was invalid because of the public-use bar); *Motionless Keyboard Co. v. Microsoft Corp.*, 486 F.3d 1376, 1385 (Fed.

Courts have also lowered the threshold requirements for what constitutes “on sale.” In *Pfaff v. Wells Electronics, Inc.*, the Supreme Court affirmed a decision that the on-sale bar had been triggered by an offer to sell, even though the invention was not reduced to practice at the time of the offer.⁸⁵ Thus, a sale of an as-yet-unreduced-to-practice invention can begin the one-year time period in which an inventor has to patent an invention.⁸⁶ For inventive methods, the sale of a product tied to the inventive method may trigger the on-sale bar even if the method remains concealed.⁸⁷ The on-sale and public use bars encourage inventors to file for patents at an early stage of an invention’s development. *Pfaff*’s holding discourages inventors from maintaining inventions as trade secrets while conducting initial commercial activities because the time period for filing a patent begins once an offer for sale has been made.

b) Patent Priority Rules

When two inventors apply for a patent on the same invention, a complex set of priority rules governs who will receive the patent. Priority is determined at the filing stage in a proceeding called an interference. A similar set of rules governs whether a prior invention is considered prior art in determining validity at trial. Under American law, the first inventor to file is presumed to be the first to invent.⁸⁸ But that presumption is rebuttable upon a showing that another inventor actually reduced the invention to practice prior to the earliest filing date,⁸⁹ with several caveats, one of which is described immediately below.⁹⁰

Although the American system generally rewards the first inventor, a second inventor can receive patent protection over a first inventor if she can demonstrate that the first inventor “abandoned, suppressed, or concealed” the invention at any time after the second inventor successfully created the

Cir. 2007) (reversing a finding of invalidity due to the trial court’s misapplication of the concept of public use).

84. See, e.g., Nancy S. Paik, *Implied Professional Obligation of Confidentiality Sufficient To Overcome Public Use Defense to a Claim of Patent Infringement?* Bernhardt v. Collezione—*The Federal Circuit Court of Appeals’ Surprising Recent Announcement on the Public Use Bar*, 4 CHI.-KENT J. INTELL. PROP. 332, 333–34 (2005).

85. 525 U.S. 55 (1998).

86. *Id.*

87. See *In re Caveney*, 761 F.2d 671, 675–76 (Fed. Cir. 1985) (stating that sale of the product of a secret method triggers the on-sale bar).

88. See, e.g., Charles L. Gholz, *First To File or First To Invent?*, 82 J. PAT. & TRADEMARK OFF. SOC’Y 891 (2000).

89. 1 DONALD S. CHISUM, CHISUM ON PATENTS § 10.03[1][C][1] (2006).

90. See *infra* Section II.B.2.c.

invention.⁹¹ All three statutory terms reflect a single concept of an inventor who fails to patent an invention or commercialize it, or both.⁹² For the PTO to consider an invention concealed, it need only be shown that an inventor did not take active steps to make an invention publicly known. Courts have interpreted concealment to mean that within a reasonable amount of time, no steps have been taken by the inventor to make the invention publicly known.⁹³ Public knowledge may occur through a patent application, a public announcement, or public use.⁹⁴ Not only can an inventor who both invented and filed for a patent first lose all rights to her invention, she also may not be able to use her prior invention to invalidate the second inventor's patent.⁹⁵

c) Prior User Rights

The third aspect of the patent system that discourages secrecy is U.S. patent law's general lack of prior user rights. Unlike trade secret holders in a majority of countries,⁹⁶ U.S. inventors do not generally possess prior user rights in their inventions.⁹⁷ That is, a first inventor that practices her invention in secret cannot use her prior use and invention as a defense

91. 35 U.S.C. § 102(g) (2006).

92. *See* 1 CHISUM, *supra* note 89, § 10.08[1].

93. *Correge v. Murphy*, 705 F.2d 1326, 1330 (Fed. Cir. 1983).

94. *Id.*

95. *In re Suska*, 589 F.2d 527, 529 (C.C.P.A. 1979) ("The result of applying the suppression and concealment doctrine is that the inventor who did not conceal (but was the 'De facto' last inventor) is treated legally as the first to invent, while the 'De facto' first inventor who suppressed or concealed is treated as a later inventor."). This surprising result affects both who is entitled to the patent and whether a first invention constitutes prior art and invalidates another's later-issued patent. *Id.* *But see* *Dunlop v. Ram*, 524 F.2d 33 (7th Cir. 1975) (holding that "secret" use of a machine or process is "public" if the details of the machine or process are ascertainable by inspection or analysis of the product that is sold or publicly displayed). Robert Merges explains the difference in the case law by focusing on the inventor's actions rather than the nature of the invention. When inventors intentionally conceal (as opposed to merely possess non-revealing technology) courts tend to consider the invention suppressed. ROBERT P. MERGES, *PATENT LAW & POLICY* 461 (4th ed. 2007).

96. *The Patent Prior User Rights Act and the Patent Reexamination Reform Act: Hearing on S. 2272 and S. 2341 Before the Subcomm. on Patents, Copyrights and Trademarks of the S. Comm. on the Judiciary*, 103d Cong. 24 (1994) (statement of Roger S. Smith, President, Intellectual Property Owners, and Assistant General Counsel for Intellectual Property Affairs, IBM) (noting that prior user rights are "common" in foreign countries and that a WIPO study found that the "vast majority" have such rights).

97. A prominent exception to the lack of prior user rights in the United States was adopted by Congress in 1999. 35 U.S.C. § 273 (2006). The 1999 "safe-harbor" was granted to protect companies with business method trade secrets that feared a rush of patenting after the Federal Circuit's decision in *State Street Bank & Trust Co. v. Signature Financial Group, Inc.*, 149 F.3d 1368 (Fed. Cir. 1998). Robert C. Haldiman, *Prior User Rights for Business Method Patents*, 20 ST. LOUIS U. PUB. L. REV. 245, 246 (2001).

against a subsequent patentee.⁹⁸ For example, consider the case of Inventor 1 inventing an improved method of manufacturing widgets. If she chooses to maintain her invention as a secret, she loses her right to patent that invention one year after she sells the invention or puts it into public use.⁹⁹ Those priority rules limit Inventor 1's ability to claim exclusive rights in her invention after certain activities occur.

The lack of prior user rights, however, does more than merely limit Inventor 1's ability to patent her invention; it potentially limits her ability to practice her own invention. If Inventor 2 discovers and patents the method of manufacturing widgets, she can sue Inventor 1 for infringement.¹⁰⁰ Inventor 1's earlier invention and use is not a valid defense to patent infringement. Therefore the possibility of infringement liability hangs over the head of a first inventor if she chooses to practice her invention in secret.¹⁰¹ The threat of infringement liability to a subsequent inventor can be a powerful deterrent against keeping an invention secret.¹⁰²

III. EXAMINING SECRECY

Patent law's doctrinal discouragement of secrecy attempts to influence inventors at the margins to patent rather than maintain trade secrets. Courts routinely reference the patent quid pro quo without examination of the theoretical relationship between patents and trade secrets.¹⁰³ Reliance upon the accepted wisdom of patents as preferable to secrets obscures the benefits that secrecy might provide. This Part fills the theoretical lacuna of the patent/trade secret trade-off from a societal perspective. In doing so, it examines the potential benefits and drawbacks of secrecy when compared to patenting.

98. See JAMES BESSEN & MICHAEL J. MEURER, *PATENT FAILURE: HOW JUDGES, BUREAUCRATS, AND LAWYERS PUT INNOVATORS AT RISK* 32–34 (2008).

99. See *supra* Section II.B.2.a.

100. This assumes, of course, that Inventor 2 did not misappropriate the invention. If so, Inventor 1 may have a claim for misappropriation.

101. See, e.g., *Gillman v. Stern*, 114 F.2d 28, 30 (2d Cir. 1940).

102. See Vincenzo Denicolò & Luigi A. Franzoni, *Patents, Secrets, and the First Inventor Defense*, 13 J. ECON. MGMT. & STRATEGY 517, 518–19 (2004).

103. See, e.g., *Bonito Boats, Inc. v. Thunder Craft Boats, Inc.*, 489 U.S. 141, 148 (1989) (“Thus, from the outset, federal patent law has been about the difficult business ‘of drawing a line between the things which are worth to the public the embarrassment of an exclusive patent, and those which are not.’”) (quoting 13 THE WRITINGS OF THOMAS JEFFERSON 335 (definitive ed. 1907)); *United States v. Dubilier Condenser Corp.*, 289 U.S. 178, 186–87 (1933) (“Thus a monopoly takes something from the people. An inventor deprives the public of nothing which it enjoyed before his discovery, but gives something of value to the community by adding to the sum of human knowledge.”).

This Part proceeds in three Sections. Section III.A examines the theoretical economic justification for patenting (and intellectual property more generally) and the relationship that justification has with secrecy. It concludes that the economic concern motivating the patent system—the public goods market failure—is inapplicable when secrecy is an available appropriation means. Thus, as a theoretical matter, the economic justification for conferring patent protection on secrecy-appropriable inventions is lacking. Section III.B considers the traditional support offered by courts and theorists for discouraging secrecy, namely the benefits of disclosure and coordination. In doing so, this Section examines the ability of trade secrecy to perform the same beneficial functions often attributed to the patent system. Lastly, Section III.C describes the overlooked potential benefits of secrecy.

A. SECRET INVENTIONS AND PUBLIC GOODS

Unlike real property, intellectual property law (and patent law more specifically) is concerned with intangible assets. Unlike land, which can be depleted by overuse, information can be reused infinitely with no depletion to the resource. Thus, economists often refer to information as a pure “public good.”¹⁰⁴ Public goods are those goods which are nonexcludable (cannot easily be excluded from others’ use) and nonrivalrous (consumption by one person does not deplete the resource). Information is analogized to a public good because it can be easily copied (nonexcludable) and used by an infinite number of individuals (nonrival).¹⁰⁵

Lighthouses are the classic example of a public good.¹⁰⁶ The light from the lighthouse is essentially nonrivalrous: the use of the light by one ship does not diminish the value of the light to another ship. The light is also nonexcludable: a lighthouse owner cannot easily exclude users from using the lighthouse’s services—those that refuse to pay for a lighthouse’s guidance (free riders) enjoy the same benefits as those that pay. Thus, the nonexcludability of the light drives the price down to a point where a

104. See Kenneth J. Arrow, *Economic Welfare and the Allocation of Resources for Invention, in THE RATE AND DIRECTION OF INVENTIVE ACTIVITY: ECONOMIC AND SOCIAL FACTORS* 609, 614–16 (Nat’l Bureau of Econ. Research ed., 1962).

105. *Id.*; Mark A. Lemley, *Ex Ante Versus Ex Post Justifications for Intellectual Property*, 71 U. CHI. L. REV. 129 (2004) (“Ideas are public goods: they can be copied freely and used by anyone who is aware of them without depriving others of their use.”); Lemley, *Free Riding*, *supra* note 13, at 1050–51.

106. Christopher Yoo, *Copyright and Public Good Economics: A Misunderstood Relationship*, 155 U. PA. L. REV. 635, 644 & n.25 (2007).

lighthouse owner cannot profitably provide the good, even though there is demand.

The economic literature predicts that public goods such as lighthouses and innovative information will be under-produced in an unregulated market because of the difficulty, if not impossibility, of capturing the positive externalities of such goods.¹⁰⁷ For example, because she cannot capture the social benefit that her light creates, a lighthouse owner will operate her lighthouse at less than the socially optimal level. Analogizing lighthouses to information predicts the same result: inventive information will be suboptimally produced because competitors will be able to copy the information at low cost and drive the market for innovative products towards marginal cost. Rational inventors will not invest heavily in producing new knowledge when they know that they will be unable to recoup their investment costs.

The economic justification for the patent system depends upon the public goods rationale¹⁰⁸: because inventions are nonexcludable, new inventions will be suboptimally produced absent patent protection. Economists see the patent system as a means of transforming nonexcludable public goods (inventive ideas) into private goods (patented inventions).¹⁰⁹ Thus, the innovation market failure is overcome with the promise of supranormal profits via the excludability offered by a patent.¹¹⁰

However, the public goods analogy fails to justify granting patents when secrecy is available. There are two reasons for this imperfect fit. First, inventions that are appropriable as trade secrets do not suffer from the excludability problems associated with pure public goods; such inventions are excludable via secrecy itself.¹¹¹ Inventions that can be appropriated as trade secrets do not, by definition, require non-market incentives—such as the

107. See A.C. PIGOU, *THE ECONOMICS OF WELFARE* 331 (4th ed. 1938) (describing how externalities can result in suboptimal production of goods); see also Francis M. Bator, *The Anatomy of Market Failure*, 72 Q.J. ECON. 351, 370 (1958) (describing market failures based upon nonappropriability).

108. See, e.g., Holbrook, *supra* note 44, at 132; Lemley, *Free Riding*, *supra* note 13, at 1053 (“[T]he basic economic justification for intellectual property law comes from . . . the risk that creators will not make enough money in a market economy to cover their costs.”).

109. See Arnold Plant, *The Economic Theory Concerning Patents for Inventions*, reprinted in *SELECTED ECONOMIC ESSAYS AND ADDRESSES* 36 (Inst. of Econ. Affairs ed., 1974).

110. Lemley, *supra* note 55, at 993–1000 (stating the traditional economic argument for the patent system’s ability to overcome the public goods market failure).

111. See Lemley, *Free Riding*, *supra* note 13, at 1057 (“Economic theory offers no justification for rewarding creators anything beyond what is necessary to recover their average total costs.”).

patent system—to attract investment *ex ante*.¹¹² An inventor can amortize her investment via secrecy rather than the patent system. This is true precisely because secret inventions enjoy the natural market inefficiency of secrecy. That is, because the information contained in a secret invention is not widely known, holders of such knowledge can often obtain greater profits than would be possible if the information were public.

Mark Lemley argues that the presence of market imperfections, such as secrecy, does not change the public good nature of information.¹¹³ I take no quarrel with that position. However, to the extent that patent theory is concerned with overcoming free riding, the question is not whether information is a public good, but rather whether the problems that public goods create (nonexcludability in this case) can be overcome. When secrecy is selected by an inventor to protect an innovation, we can presume the absence of a public goods market failure. In fact, by rewarding innovators the market is operating as desired. The choice to maintain an invention as a trade secret indicates an inventor's belief that her up-front research costs can be recouped outside of the patent system. In such a case, secrecy circumvents the public goods problem without resorting to patenting.

Certainly, there are cases in which inventions will be under-produced in the absence of the patent system's legally-sanctioned excludability. In some instances, the patent system may be the only means of profitably excluding free riders. But the patent system is not always necessary to foster innovation. Indeed, in many industries, secrecy provides greater incentives to invent, as evidenced by innovator's preference for secrecy.¹¹⁴

The second reason that the public goods analogy is inapplicable for cases in which secrecy is feasible is that patents are often a poor means of creating excludability in those cases. Even if we accept the public goods rationale, the patent system must demonstrate that it can overcome the problems associated with public goods, primarily nonexcludability.

However, unlike with real property, detection of infringement of intellectual property boundaries requires knowledge that is often unobtainable to a trade secret holder. Just as secrecy is a market inefficiency

112. F. M. SCHERER, INDUSTRIAL MARKET STRUCTURE AND ECONOMIC PERFORMANCE 444–45 (2d ed. 1980) (noting that natural market imperfections reduce the need for intellectual property protection).

113. Lemley, *Free Riding*, *supra* note 13, at 1052 n.87.

114. In a 1994 survey, secrecy was considered the most effective method of appropriability in a wide, diverse range of industries, including food, textiles, paper, petroleum, all chemical industries, rubber, plastics, mineral products, metals, machine tools, electrical equipment, motors, generators, semiconductors, and navigation instruments. Cohen et al., *supra* note 45, at 10 n.21.

that inventors can leverage to their benefit, it can be a detriment in detecting infringement. Whenever secrecy enables an inventor to hide her inventions from the public, secrecy is also likely to prevent the inventor from detecting infringing use of her invention.¹¹⁵ If maintaining an invention in secret is realistic, competitors may feel that the risk of being caught infringing a patented invention is negligible. Patents provide little solace for the owner of such an invention. Patent law requires full disclosure but does not guarantee full compliance by competitors. If detection of infringement is difficult or impossible, the patentee has little ability to enforce her rights. Thus, patents are likely to be a poor means of excludability when inventions are truly maintainable as trade secrets.

As shown, inventions that can be carried out profitably in secret do not justify legal interventions into the marketplace to overcome the public goods problem.¹¹⁶ Because secret inventions are excludable, they do not suffer from the problems associated with public goods. Because of the natural excludability provided by secrecy, utilitarian patent theorists should refuse patents in cases in which secrecy is a viable option for inventors.¹¹⁷

The lack of justification for granting patents when secrecy is available might not be problematic if patents were costless. If patents were costless, society might be agnostic to the use of and justification for patents. However, patents are not costless. They result in deadweight losses to consumers because patent holders can charge supranormal rates for patented inventions to the extent that the patent offers the ability to exclude competitors.¹¹⁸ Ideally, these losses are justified by the value of the innovation that is incentivized by the patent reward. However, in cases where the patent system is not required to encourage research into an invention, such as when secrecy is a viable option, the patent system does not

115. A. Samuel Oddi, *Un-unified Economic Theories of Patents—The Not-Quite-Holy Grail*, 71 NOTRE DAME L. REV. 267, 285 n.126 (1996) (citing Robert P. Merges, *Rent Control in the Patent Districts: Observations on the Grady-Alexander Thesis*, 78 VA. L. REV. 359, 376–77 (1992)) (noting that trade secret protection is preferable to patent protection for processes because it is difficult to detect infringement of a process).

116. See SCHERER, *supra* note 112, at 444–46 (noting that natural market imperfections such as imitation lags, first-mover advantage, and nonpatent barriers reduce the economic need for patent protection).

117. See WILLIAM M. LANDES & RICHARD A. POSNER, *THE ECONOMIC STRUCTURE OF INTELLECTUAL PROPERTY LAW* 379 (2003) (stating that intellectual property rights should be granted only when “making intellectual property rights excludable creates value”).

118. Peter S. Menell & Suzanne Scotchmer, *Intellectual Property Law*, in 2 HANDBOOK OF LAW AND ECONOMICS 1473 (A. Mitchell Polinsky & Steven Shavell eds., 2007).

encourage innovation, it merely rewards it.¹¹⁹ To the extent that the patent system is unnecessary to promote innovation, analysis of the benefits and drawbacks of permitting patenting must be examined in order to determine the most socially beneficial means of encouraging innovation.

B. TRADITIONAL JUSTIFICATIONS FOR DISCOURAGING THE USE OF
SECRECY

1. *Disclosure*

Courts have consistently cited the second incentive of patent law's reward theory—the disclosure incentive—as the principal benefit that the public receives from the patent system.¹²⁰ Legal theorists have similarly emphasized the harm resulting from reduced disclosure when inventions are maintained as secrets.¹²¹ Indeed, disclosure and its accompanying benefits are fundamental to traditional notions of the patent *quid pro quo*. Katherine Strandburg has noted that when secret inventions are lured into the patent system the only benefit to the public is the resulting disclosure.¹²² Furthermore, fears regarding the increased use of trade secrecy have centered around the harm to the public of decreased disclosure.¹²³ In sum, it is presumed that patents are better at promoting innovation than secrets due to patent law's disclosure doctrine.

However, there are three reasons to suspect that the effectiveness of patent disclosure in encouraging innovation is somewhat limited. First, patents generally do a poor job of promoting innovation through teaching. Patents do not perform much of a teaching function because of some paradoxical elements of patent law that discourage would-be innovators from

119. Strandburg, *supra* note 53, at 111 (finding that the reward theory cannot justify granting patents for inventions that can profitably be maintained in secret).

120. *See, e.g.*, *Kewanee Oil Co. v. Bicron Corp.*, 416 U.S. 470, 481, 489 (1974); *Pfaff v. Wells Elecs., Inc.*, 525 U.S. 55, 63 (1998) (stating that the patent system should be thought of as “a carefully crafted bargain that encourages both the creation and the public disclosure of new and useful advances in technology, in return for an exclusive monopoly for a limited period of time”). For a more thorough discussion of the courts' treatment of the disclosure requirement, see Roin, *supra* note 58, at 2011–13.

121. *See* F. SCOTT KIEFF ET AL., *PRINCIPLES OF PATENT LAW* 68 (4th ed. 2008) (describing the basis of patent law's incentive to disclose and stating that “secrecy would deprive the public of the new knowledge”).

122. Strandburg, *supra* note 53, at 111.

123. *See* Brief of Respondents, *Kewanee Oil Co. v. Bicron Corp.*, 416 U.S. 470 (1974) (No. 73-187), 1973 WL 172412; Brief of Amicus Curiae National Patent Council, Inc. for Itself and Representing National Small Business Association, Inc., *Kewanee Oil Co. v. Bicron Corp.*, 416 U.S. 470 (1974) (No. 73-187), 1973 WL 173805; Doerfer, *supra* note 6, at 1441.

consulting patents for technical knowledge. Second, disclosure requirements are often insufficient to promote disclosure that would enable follow-on innovation. Patentees in some industries are able to obtain patent protection while retaining essential know-how. Thus, some inventors are able to patent an invention while still maintaining enough of the invention in secret to prevent valuable knowledge from being transferred to the public. Third, concerns about the loss of public disclosure that would result from increased use of trade secrecy may be overblown. Trade secret law permits a limited form of disclosure that may replicate many of the beneficial effects of patent disclosure.

a) The Ineffective Teaching Function of Patent Disclosure

The courts' view of the patent quid pro quo often focuses on the innovation benefits that result from disclosing secret inventions.¹²⁴ The portrayal of disclosure as an innovation-promoting mechanism is not without theoretical support. If disclosure disseminates information that encourages follow-on innovation, then the social cost of the patent grant may be less than the social benefit of the follow-on innovation.¹²⁵ While patents exclude others from producing products that are covered by the patent's claims, perhaps the disclosure of the invention to the public will teach others the novel method or product and encourage improvements or tangential innovations that would not have occurred without the lesson contained within the patent. As an added benefit, after patent expiration the disclosed invention enters the public domain, free for all to use. In contrast, entrance into the public domain does not occur automatically with trade secrecy.

But, there are reasons to doubt the extent of the patent system's ability to teach follow-on innovators. Much of the doubt in the literature concerning patent law's teaching ability stems from aspects of the patent system that discourage innovators from consulting patents. Timothy Holbrook pointed to four aspects of the patent system that undermine the disclosure function of patents: the limited experimental use exception, the risk of willful infringement faced by those that do examine prior patents, the eighteen-month delay for publication of patent applications, and the moribund reverse doctrine of equivalents.¹²⁶ Holbrook concluded that "[n]ot only are the disclosure obligations inconsistent with the theoretical justifications of patent

124. For more on potential reasons for courts' and scholars' differing explanations for the patent system, see Roin, *supra* note 58, at 2012 (speculating on the reasons for courts' preference for the disclosure rationale).

125. Holbrook, *supra* note 44, at 134 n.56.

126. *Id.* at 139–45.

law, but the current structure of the patent system undermines the ability of patents to actually perform this function.”¹²⁷

The Federal Circuit effectively eliminated any experimental use exception for practicing an invention by follow-on innovators.¹²⁸ Follow-on innovators can read a patent, but they cannot make or use the patent in order to study the invention’s properties or the manner in which it functions.¹²⁹ Without such a right, the ability of a patent to teach anything is severely limited. Furthermore, innovators who examine patents risk triggering a duty to investigate infringement and liability for willful infringement with accompanying treble damages.¹³⁰ Lastly, patent applications are not published for at least eighteen months, which reduces their value as teaching aids to follow-on innovators.¹³¹ Many industries have such rapid innovation rates that eighteen-month-old innovations are relegated to the history books. Other commentators concur in Holbrook’s findings that the patent system’s disclosure ability is overstated.¹³²

Jeanne Fromer has argued that disclosure promotes the progress of science and the useful arts not only in economic terms—that is, by conferring information to society that can be used for future innovations—but also by democratizing the process of innovation.¹³³ Fromer argued that disclosure levels the scientific playing field by permitting all interested parties to operate with the same basic information. According to Fromer, numerous

127. *Id.* at 146.

128. *See* *Madey v. Duke Univ.*, 307 F.3d 1351, 1362–63 (Fed. Cir. 2002); Holbrook, *supra* note 44, at 140.

129. *Madey*, 307 F.3d at 1362–63.

130. *See In re Seagate Tech.*, 497 F.3d 1360, 1366–71 (Fed. Cir. 2007) (en banc); Mark A. Lemley & Ragesh K. Tangri, *Ending Patent Law’s Willfulness Game*, 18 BERKELEY TECH. L.J. 1085, 1090 (2003).

131. Patent applicants filing only in the United States can opt out of the eighteen-month publication requirement. 35 U.S.C. § 122(b)(2)(B) (2006). A 2002 study suggests that eleven percent of U.S. applications are not published at eighteen months. NAT’L RESEARCH COUNCIL, *A PATENT SYSTEM FOR THE 21ST CENTURY* 64 (2004).

132. *See* Doerfer, *supra* note 6, at 1444 (observing, wryly, that “the method in which the [patent] statute is administered seems to be quite compatible with the nondisclosure aims of trade secret law”); Roin, *supra* note 58, at 2027–28; Strandburg, *supra* note 53, at 113–18. Doerfer also notes that patent law’s claim to promote disclosure is undermined by the secret nature of patent applications. Doerfer, *supra* note 6, at 1445. Since Doerfer’s article, most patent applications are now published after eighteen months. While this change clearly reflects a desire for more disclosure, a system that truly valued disclosure over all other considerations would publish applications at filing.

133. Jeanne C. Fromer, *Patent Disclosure*, 94 IOWA L. REV. 539, 551 (2009).

minds are more capable of effecting technological progress than centralized control.¹³⁴

While justifying the theoretical basis for disclosure as a democratizing discovery, Fromer agrees with Holbrook that patents do not, in general, fulfill their teaching role.¹³⁵ She points to evidence that most inventors spend little to no time reading others' patents.¹³⁶ This lack of relevance for technologists may stem from fear of willful infringement,¹³⁷ the inability to comprehend the legal jargon of a patent document,¹³⁸ or the lack of meaningful information that patents convey.¹³⁹ Patentees themselves tend not to consult others' patents,¹⁴⁰ and they learn of the patents that are eventually cited in their own applications only after invention.¹⁴¹ Furthermore, inventors rank patents last among sources of inspiration for their inventions.¹⁴²

Part of the explanation for innovators' apparent disinterest in patent documents is that patents are a poor medium for communicating technical information.¹⁴³ Although patent specifications are meant to be written for those skilled in the art, most scientists and engineers find patents to be repetitive and often incomprehensible.¹⁴⁴ Rules of claim construction

134. *Id.*

135. *Id.* at 560–62 (“[T]he evidence tends to show that potential inventors are not turning to patent disclosures to inspire their research.”).

136. *Id.* at 560.

137. Lemley, *supra* note 37, at 1510 n.63.

138. Robert Barr, Speech at the Federal Trade Commission and Department of Justice Antitrust Division Roundtable on Competition, Economic, and Business Perspectives on Substantive Patent Law Issues: Non-Obviousness and Other Patentability Criteria 79–80 (Oct. 30, 2002), available at <http://www.ftc.gov/opp/intellect/021030trans.pdf>.

139. Doerfer, *supra* note 6, at 1444 (noting the Patent Office's “reluctance to require detailed specifications”).

140. See Adam B. Jaffe, *The Meaning of Patent Citations*, in ADAM B. JAFFE & MANUEL TRAJTENBERG, PATENTS, CITATIONS, AND INNOVATIONS: A WINDOW ON THE KNOWLEDGE ECONOMY 389–90 & fig.5 (2002) (finding that less than 20% of patentees “learn about” the patents eventually cited in their applications before working on their inventions).

141. *Id.*

142. Behind “awareness of a commercial or technological opportunity, word of mouth, personal interactions, viewing a presentation or demonstration, joint work with others, and technical literature.” Fromer, *supra* note 133, at 562; accord James Bessen, *Patents and the Diffusion of Technical Information*, 86 ECON. LETTERS 121, 122 (2005); Asish Arora, Marco Ceccagnoli & Wesley M. Cohen, *R&D and the Patent Premium* 17 (Nat'l Bureau of Econ. Research, Working Paper No. 9431, 2003), available at <http://www.nber.org/papers/w9431> (finding no measurable impact on information flows resulting from patent disclosure).

143. See Sean B. Seymore, *The Teaching Function of Patents*, 85 NOTRE DAME L. REV. 621, 633–41 (2010) (describing how the widespread use of “patentese” reduces the teaching function of patents); see also Roin, *supra* note 58, at 2025.

144. Fromer, *supra* note 133, at 560–62; Roin, *supra* note 58, at 2025.

encourage patent attorneys to draft their specifications broadly so as not to have the narrowness of their disclosure read into their claims.¹⁴⁵

Patentees can avoid fully disclosing their inventions via a number of methods. First, inventors can delay publication of their patent application until their patent issues. Patent applications are usually published eighteen months after they are filed, but if a patentee agrees to file for patent protection only in the United States, publication is delayed until issuance.¹⁴⁶ Patent applications typically take much longer than eighteen months to issue as patents; thus innovators in industries with product cycles that are shorter than the period of patent pendency can delay disclosure until after their innovation is obsolete.¹⁴⁷

Second, patentees in certain industries can disclose enough information to obtain a patent but less than enough to reveal how that innovation is practiced. This is especially common in the software, computer hardware, and business innovation industries.¹⁴⁸ This practice permits innovators to patent the central innovation of their invention yet retain certain trade secret know-how or show-how that is required to effectively practice the invention.¹⁴⁹ Although the Federal Circuit requires patent applications to “provide a disclosure sufficient to enable one skilled in the art to carry out the invention,”¹⁵⁰ oftentimes a follow-on innovator must enter into a license agreement with a patentee to obtain the knowledge withheld from the patent application. Without that information, it is often difficult and costly to practice (and thus improve upon) an invention.¹⁵¹ Thus, any claim that disclosure, by itself, provides a benefit to the public greater than the cost of a patent grant is weakened.¹⁵² If follow-on innovators must obtain information directly from patentees in order to practice a patented invention, then that

145. Roin, *supra* note 58, at 2026 (citing claim drafting advice encouraging practitioners to describe as many variations as possible).

146. 35 U.S.C. § 122(b)(2)(B) (2006).

147. *See* Roin, *supra* note 58, at 2024 (finding that innovators in industries with short product cycles are more likely to withhold disclosure until issuance).

148. *Id.* at 2024 n.102 (citing FED. TRADE COMM’N, TO PROMOTE INNOVATION: THE PROPER BALANCE OF COMPETITION AND PATENT LAW AND POLICY ch. 3, at 33 (2003), available at <http://www.ftc.gov/os/2003/10/innovationrpt.pdf>).

149. *See* Jorda, *supra* note 21, at 31; Gregory J. Maier, *Software Protection—Integrating Patent, Copyright and Trade Secret Law*, 69 J. PAT. & TRADEMARK OFF. SOC’Y 151, 163–65 (1987) (noting that software developers can obtain patent rights while not disclosing source code).

150. *Amgen, Inc. v. Chugai Pharm. Co.*, 927 F.2d 1200, 1213 (Fed. Cir. 1991).

151. *See* Roin, *supra* note 58, at 2025 (noting that “[m]any patented inventions cannot be recreated” from the information contained in the patent; without that information licensing or reverse engineering is required to practice an invention).

152. *Id.* at 2025 (stating that the practice of not disclosing key know-how in a patent “calls into question the extent to which patent disclosures can produce R&D spillovers”).

patent disclosure has provided, at most, a means of locating the information necessary to perform further research.

All of this is not to suggest that patent disclosure is without value. Even if the teaching function of patents is limited, there are occasions in which the disclosure of an invention can lead to innovation that is not measurable by the impact of the patent document alone. For instance, the existence of patent protection may permit the scientific publication of ground-breaking research that otherwise would have remained concealed.¹⁵³ That is, even if patents do not adequately disclose information, they may enable scientists to disclose research via other means that better serve follow-on innovators.

But while such instances of valuable disclosure undoubtedly exist, they do not, standing alone, justify the discouragement of secrecy. There are other types of secret information, outside of patentable subject matter, that would promote innovation if disclosed, such as business survey information, customer data, laboratory data, etc.¹⁵⁴ Society refuses to pay for this information precisely because there is no reason to do so—it will be produced privately to the extent it is valuable. The public does not demand a complete democratization of competition. Indeed, competition relies on companies retaining certain tangible or intangible advantages over their competitors. Typically policy makers rely upon market mechanisms and scientific norms to determine what information is valuable enough for private individuals to invest in its creation.

b) Trade Secret Disclosure

Trade secrecy does not enjoy a system of mandated public disclosure, as patent law does. Indeed, public disclosure of a secret destroys the legal protection of trade secret law. However, commentators have noted that trade secret law encourages disclosure, although of a more targeted nature than patent disclosure.¹⁵⁵ The Court in *Kewanee* relied on trade secrecy's limited

153. *See id.* at 2027 (“Even given the current structural limitations, however, the patent system still serves a limited disclosure function by allowing inventors to discuss and publicize their research freely.”).

154. *See, e.g.*, Henry J. Silberberg & Eric G. Lardiere, *Eroding Protection of Customer Lists and Customer Information Under the Uniform Trade Secrets Act*, 42 BUS. LAW. 487, 487 (1987) (noting that unpatentable customer information is among many businesses’ “most precious” trade secrets).

155. Lemley, *supra* note 6, at 314 (“[F]or certain types of inventions we may actually get more useful ‘disclosure’ at less cost from trade secret than from patent law.”); Sandeen, *supra* note 71, at 344 (noting that while the qualitative and quantitative scope of disclosure is different with trade secrets and patents, “it is true that trade secret law helps to facilitate the sharing of secret information between those with a need to know”).

promotion of disclosure in finding no preemption of trade secret laws.¹⁵⁶ By protecting against misappropriation, trade secrecy reduces the cost of protecting secrets and permits innovators to market their ideas, as long as owners engage in a minimum level of protection.¹⁵⁷ Thus, trade secrecy exhibits some elements of disclosure that patent law encourages.¹⁵⁸ Of course, patent holders can engage in the same targeted disclosure as trade secret holders, and with less risk of loss of protection. But it is likely that many of the benefits to future innovation that come from patent disclosure can also exist in the more limited world of trade secret disclosure.

Indeed, given the scope of trade secret protection, inventors who maintain inventions as trade secrets likely have more incentive to efficiently disclose their inventions to the proper individuals. As described more fully in Section III.C, *infra*, trade secrecy encourages competition because the exclusivity of trade secrecy can end at any time. Thus, unlike patents, which have a certain duration, trade secret owners likely feel time pressure to maximize the value of an innovation. Thus trade secrets may lead to earlier—albeit more limited—disclosure than patents.

The idea that targeted, limited, inventor-initiated disclosure is more beneficial than patent disclosure for promoting innovation is open to debate. However, given the limited value of broad-based patent disclosure, it is likely that the innovative benefits resulting from trade secret's targeted disclosure at least approach the innovative value of patent disclosure.

2. *Coordination of Commercialization and Research*

The prospect theory, a second major strain of patent theory, concerns itself with efficiently allocating scarce research dollars. Edward Kitch suggested that the patent system places the patent holder “in a position to coordinate the search for technological and market enhancement of the patent[],” thus “increas[ing] the efficiency with which investment in innovation can be managed.”¹⁵⁹ Kitch viewed the patent holder as having the power to coordinate future investment in the prospect because “no one is likely to make significant investments in searching for ways to increase the

156. *Kewanee Oil Co. v. Bicron Corp.*, 416 U.S. 470, 485–86 (1974) (describing a disclosure function in trade secret law).

157. Additionally, trade secret law permits the disclosure of secrets “in connection . . . with information that is relevant to public health or safety, or to the commission of a crime or tort, or other matters of substantial concern.” RESTATEMENT (THIRD) OF UNFAIR COMPETITION § 40 illus. 1(c) (1993).

158. See Sandeen, *supra* note 71, at 344.

159. Edmund Kitch, *The Nature and Function of the Patent System*, 20 J.L. & ECON. 265, 276 (1977).

commercial value of a patent unless he has made previous arrangements with the owner of the patent” to share in the profits of that effort.¹⁶⁰

A patent system focused on coordinating downstream research activity, like that envisioned by prospect theorists, would likely benefit from the disclosure of secret inventions: increased openness would lead to increased coordination. However, the prospect theory presupposes that patents lead to coordination of research and that markets for innovation coordination operate efficiently. Both of these assumptions are contentious. First, as demonstrated in Section III.B.1.a, *supra*, patent documents do not do a good job of facilitating research or commercialization coordination. Scientists rarely consult patent documents.¹⁶¹ The sheer number of patents issued every year (over 200,000 in 2010) makes it impossible for an innovator to stay current with all of the issued patents in a particular field.¹⁶² Owners of trade secrets are just as likely as patent holders to seek out those that can best commercialize and market an innovation, perhaps more so.¹⁶³ Patent protection and disclosure may have the perverse effect of placating the drive of patentees from seeking out commercialization partners; they can simply rely on the patent for protection against competition or independent invention.

Numerous scholars have cast doubt on the assumption that pioneering inventors will efficiently market their patented technology. Rebecca Eisenberg noted that the likelihood of efficient licensing is lowest when “subsequent researchers want to use prior inventions to make further progress in the same field in competition with the patent holder.”¹⁶⁴ Robert Merges explained that bargaining breakdowns occur between holders of blocking patents as a result of mistaken assumptions and irrational choices.¹⁶⁵

As a corollary to the prospect theory’s emphasis on coordination of research and development of an invention, the theory also emphasizes the

160. *Id.*

161. Fromer, *supra* note 133, at 560–62. Fromer also notes that the Intellectual Property Owners Association Survey likely overestimates the number of technologists who consult patents prior to invention by lumping together the research stage of invention with latter stages of invention. *Id.* at 561 n.104.

162. See PTO, *U.S. Patent Statistics*, *supra* note 9.

163. See generally Sichelman, *supra* note 12 (arguing that the dominant theories of patent law do not incentivize commercialization of patented inventions).

164. Rebecca S. Eisenberg, *Patents and the Progress of Science: Exclusive Rights and Experimental Use*, 56 U. CHI. L. REV. 1017, 1072–73 (1989).

165. Robert P. Merges, *Intellectual Property Rights and Bargaining Breakdown: The Case of Blocking Patents*, 62 TENN. L. REV. 75, 89 (1994).

elimination, or at least reduction, of duplicative research.¹⁶⁶ Kitch noted that “a patent system enables firms to signal each other, thus reducing the amount of duplicative investment in innovation.”¹⁶⁷ In Kitch’s view, patents put “the patent owner in a position to coordinate the search for technological and market enhancements of the patent’s value so that duplicative investments are not made and so that information is exchanged among the searchers.”¹⁶⁸

Secrecy, to Kitch, does not permit other researchers to determine the efficient level of search.¹⁶⁹ Indeed, Kitch viewed the fact that “technological information can be used without signaling that fact to another”¹⁷⁰ as a problem that the patent system intends to solve. Other firms are unlikely to know of the success of the original inventors and thus cannot redirect their research accordingly. As Kitch acknowledged, under a trade secrecy regime “the competitive firm might never learn of a new product until it is marketed.”¹⁷¹

However, duplicative research can provide social benefits. First, multiple firms inventing in the same area can result in distinct and improved innovations.¹⁷² Firms that are initially engaged in pursuing the same goal often end up inventing different means of achieving that goal. Society benefits from having varied innovative products. Furthermore, multiple inventive efforts can result in new uses for the same product. In the area of biochemistry, for instance, multiple firms investigating a similar chemical compound can develop different uses for the compound. This also leads to competition and lower prices for consumers.

Duplication of research and commercialization efforts is often indistinguishable from competition.¹⁷³ Competition entails duplication of

166. Many reward theorists take a skeptical view to limiting independent invention because competition is also reduced. *See* Lemley, *supra* note 6, at 336 n.103. Duplication of research and commercialization efforts is often indistinguishable from competition. *See* Vermont, *supra* note 30, at 495. Competition entails duplication of costs by competing firms (an inefficient cost), but it also results in increased production and lowered costs for consumers (a social benefit). *Id.* Rivalry among firms to develop and create new inventions is seen by many reward theorists as deserving of encouragement from the law. *See* Robert P. Merges & Richard R. Nelson, *On the Complex Economics of Patent Scope*, 90 COLUM. L. REV. 839, 908 (1988). While rivalry creates inefficient duplication of effort and resources among competitors, it also tends to generate rapid technological progress. *Id.*

167. Kitch, *supra* note 159, at 278.

168. *Id.* at 276.

169. *Id.* at 278.

170. *Id.* at 276.

171. *Id.* at 278.

172. *See* Lemley, *supra* note 6, at 336 n.103.

173. *See* Vermont, *supra* note 30, at 495.

costs by competing firms (an inefficient cost), but also results in increased production and lowered costs for consumers (a social benefit).¹⁷⁴ Rivalry among firms to create and develop new inventions is seen by many reward theorists as deserving of encouragement from the law.¹⁷⁵ While rivalry creates duplication of effort and resources among competitors, it also tends to generate rapid technological progress.¹⁷⁶

A final potential benefit of invention races is that duplicative research may actually encourage disclosure. John Duffy has a different take on secrecy's effect on duplicative research than Kitch. Duffy asserts that secrecy is much more difficult to maintain in the initial stages of research than Kitch suggests.¹⁷⁷ He claims that in the initial stages of research, firms may be incentivized to communicate their results with competitors rather than maintain them in secret.¹⁷⁸ Thus, to the extent that research secrecy is difficult to maintain, duplicative research and secrecy can, in some instances, lead to increased disclosure among competitors.

C. THE OVERLOOKED BENEFITS OF SECRECY

1. *Increased Competition*

The innovative benefits of trade secrecy have often been overlooked by courts and commentators.¹⁷⁹ Perhaps the primary benefit of secrecy is that of increased competition for innovative ideas. Robert Merges and Richard Nelson stated that “multiple and competitive sources of invention are socially preferable to a structure where there is only one or a few sources. Public policy, including patent law, ought to encourage inventive rivalry, and not hinder it.”¹⁸⁰ Patents grant inventors control over the positive externalities associated with their invention, as well as control over future improvements and new uses of their invention. Granting such broad rights

174. *Id.*

175. *See* Merges & Nelson, *supra* note 166, at 908 (arguing that for industries involving cumulative technologies, public policy ought to encourage a “rivalrous structure” rather than a “race to invent” structure in order to “generate rapid technological progress”).

176. *Id.*

177. John F. Duffy, *Rethinking the Prospect Theory of Patents*, 71 U. CHI. L. REV. 439, 497–98 (2004).

178. *Id.*

179. *See* Vincent Chiappetta, *Myth, Chameleon, or Intellectual Property Olympian? A Normative Framework Supporting Trade Secret Law*, 8 GEO. MASON L. REV. 69, 88–90 (1999) (arguing that trade secret law does not encourage innovation); Risch, *supra* note 15, at 26–27 (arguing that “creating incentives to innovate is a very minor justification for trade secret law”).

180. *See* Merges & Nelson, *supra* note 166, at 908.

to future innovation reduces competition and, in some cases, may reduce innovation generally.¹⁸¹

The monopoly control of a patent may reduce the incentive to improve upon the patented technology. Indeed, while patents in some cases induce invention, they may retard the commercialization and improvement of that invention.¹⁸² Trade secret holders, on the other hand, do not control the future excludability of their innovation. If someone independently replicates a secret invention, the value of the invention to the original inventor plummets since the exclusive use of the invention is now gone. Similarly, reverse engineering of an invention destroys trade secret excludability.

There is substantial debate in the literature about whether monopoly power or competition provides stronger incentives to improve upon an invention.¹⁸³ However, it appears that many industries rely on competition to spur innovation.¹⁸⁴ It is possible that the security offered by a patent may deaden the incentive to improve the invention, whereas the incentive to improve upon a trade secret is enhanced by the indeterminate length of exclusivity.¹⁸⁵ The fear of independent invention and reverse engineering may motivate trade secret holders to commercialize and improve their invention before someone else comes up with the same idea.

John Duffy argues that patents better promote improvements than trade secrets. Duffy proposed that the patent system functions as a type of Demsetzian auction, in which the winner is the innovator who promises to let the patent expire earliest.¹⁸⁶ Duffy's version of the prospect theory accentuates and directs competition by encouraging early discovery. According to Duffy, the patent system does not discourage competition; it encourages competition at an extremely early stage in the innovative process. Duffy views the ability to obtain blocking patents as a check on a patentee's

181. See, e.g., PIGOU, *supra* note 107.

182. See generally Sichelman, *supra* note 12 (arguing that the dominant theories of patent law do not incentivize commercialization of patented inventions).

183. For differing viewpoints, compare JOSEPH A. SCHUMPETER, CAPITALISM, SOCIALISM, AND DEMOCRACY 100–03 (Harpers & Row 3d ed. 1962) (1942) (arguing in favor of monopolies) with Merges & Nelson, *supra* note 166 (arguing for competition).

184. See, e.g., Mark A. Lemley & Lawrence Lessig, *The End of End-to-End: Preserving the Architecture of the Internet in the Broadband Era*, 48 UCLA L. REV. 925, 960–62 (2001) (arguing the internet industry relies upon competition); Howard Shelanski, *Competition and Deployment of New Technology in U.S. Telecommunications*, 2000 U. CHI. LEGAL F. 85 (arguing that the telecommunications industry relies upon competition to spur innovation).

185. See Lemley, *Free Riding*, *supra* note 13, at 1060 (arguing that patents “may simply give less incentive to improve on first-generation technology than competition for the rights to improvements”).

186. Duffy, *supra* note 177, at 445.

monopoly power. He argues that “[c]ompetition to obtain, and to maintain, a monopoly position can be harnessed to constrain the monopolist and to increase social welfare.”¹⁸⁷

However, Duffy’s view that blocking patents act to encourage competition relies upon secrecy. In Duffy’s view, the real competition occurs *before* a patent is granted, in the period when two competitors are competing for patent rights. In cases in which secrecy is not a viable appropriability mechanism, Duffy is undoubtedly correct that patents encourage competition and innovation. But in the case in which secrecy is available, it is not clear that the patent encourages more competition than secrecy offers organically: it likely does in some cases and does not in others. Those cases in which it does not are likely to be the cases in which secrecy provides more private value than patenting.

Duffy’s second argument—that the existence of blocking patents encourages patentees to improve and develop their inventions¹⁸⁸—rests on certain assumptions. First, that licensing markets for blocking patents are strong and functioning. As demonstrated in Section III.B.2, *supra*, such markets do not appear to be robust.

The second assumption underlying the argument that blocking patents encourage commercialization is that follow-on innovators are not discouraged by the existence of a foundational patent to such a degree as to take their research dollars elsewhere. Knowledge of an existing foundational patent has been shown to discourage follow-on researchers.¹⁸⁹ Even if unknown at the time research began, such a foundational patent reduces the profits available to a researcher since she must share her profits with the original patentee whose work was unknown (and therefore unhelpful) to the follow-on development. Mark Lemley also noted that the inherent uncertainty of patent boundaries may chill further improvement by leaving

187. *Id.* at 490.

188. *Id.* at 489–90.

189. *See, e.g.*, Mark F. Grady & Jay I. Alexander, *Patent Law and Rent Dissipation*, 78 VA. L. REV. 305, 316–21 (1992) (using rent dissipation theory to explain instances in which courts grant broad rights to discourage follow-on innovations); Michael A. Heller & Rebecca S. Eisenberg, *Can Patents Deter Innovation? The Anticommons in Biomedical Research*, 280 SCIENCE 698 (1998) (describing potential downstream product development as an effect of widespread patenting in the biomedical sector); Lemley, *supra* note 55, at 997–98 (noting that “efficient creation of new works requires access to and use of old works”); Merges & Nelson, *supra* note 166, at 843–44 (surveying historical examples in various industries to assess the effect of patent scope on follow-on innovation).

innovators in a patented space unclear whether they are running afoul of the law.¹⁹⁰

Trade secrets, on the other hand, do not diminish the incentive for competitors to attempt to innovate. If the competitor is successful, she will enjoy the rights to practice the invention with no fear of an infringement suit or forced license arrangement. Trade secrecy thus leverages competition to promote commercialization and improved innovation.

2. *Reduced Administrative Burden*

The second area in which secrecy can prove more beneficial to society than patenting is in the reduced costs that secrecy imposes on administrative agencies. The PTO is now inundated with over 500,000 patent applications each year.¹⁹¹ This is in addition to the current backlog of over 700,000 patent applications waiting to be examined.¹⁹² The enormous number of applications means that each application is examined for only eighteen hours on average.¹⁹³ The inability to properly examine patent applications results in the grant of numerous invalid patents each year. Critics have not missed the opportunity to mock the PTO for the dubious patents that it issues each year.¹⁹⁴

Secrets have no administrative regime, and reliance on trade secrecy to protect an invention removes the PTO from the equation. Furthermore, patent applications are not cheap: they cost on average \$10,000 to \$30,000.¹⁹⁵ With secrets, the money saved by not filing a patent application can be invested towards future innovation. Thus, patent applications exact a sort of innovation tax that trade secrecy avoids.

Perhaps even more staggering than the administrative cost of the patent system is the cost of enforcing patent rights. Patent litigation costs upwards of \$15 billion per year to patentees and accused infringers.¹⁹⁶ An average

190. Lemley, *Free Riding*, *supra* note 13, at 1061; Mark A. Lemley & Dan L. Burk, *Quantum Patent Mechanics*, 9 LEWIS & CLARK L. REV. 29, 52–56 (2005).

191. See PTO, *U.S. Patent Statistics*, *supra* note 9.

192. U.S. Patent & Trademark Office, U.S. Dep't of Commerce, *Patent Inventory Statistics—FY09* (2010), <http://www.uspto.gov/patents/stats/appbacklog.jsp> (reporting a backlog of 718,835 patent applications).

193. Lemley, *supra* note 37, at 1496 n.3.

194. Simson Garfinkel, *Patently Absurd*, WIRED, July 1994, at 104; James Gleick, *Patently Absurd*, N.Y. TIMES MAG., Mar. 12, 2000, at 44; Lawrence Lessig, *The Problem with Patents*, THE INDUSTRY STANDARD, Apr. 23, 1999, available at <http://www.lessig.org/content/standard/0,1902,4296,00.html>.

195. Lemley, *supra* note 37, at 1498–99 (estimating 2001 costs).

196. BESSEN & MEURER, *supra* note 98, at 139, fig.6.5. Note that Bessen and Meurer's numbers are likely understated. *Id.* at 140–41.

patent case costs upwards of \$5 million.¹⁹⁷ The public strain from patent enforcement is quite tangible as well. Judicial resources are strained with the complexity and time consumption of patent cases. The burden of patent appeals was so great that in 1982 Congress created a new circuit court, the Court of Appeals for the Federal Circuit, to handle those appeals.¹⁹⁸ Enforcing trade secrets is a much more affordable process. Trade secret cases average around one-third the cost of a similar-sized patent case.¹⁹⁹

Lastly, trade secrets eliminate the rent-seeking behavior that patents often attract. The large value associated with the exclusive rights in certain technologies has resulted in a booming secondary market for the exclusivity rights of patents. While the merits of the secondary market being used purely for litigation are hotly debated,²⁰⁰ there is ample evidence that abuses of the patent system are widespread. The so-called “troll” phenomenon, in which parties acquire patents simply to use them as weapons in extracting licensing fees from established companies has received ample attention in the literature.²⁰¹ Patent trolls have been analogized to a large innovation tax imposed privately on certain industries.²⁰² Trade secrets do not provide the same opportunities for rent-seeking. Because trade secrets do not permit exclusion of independent inventors, they do not provide any rent targets.

3. *Incentive Value*

The first two categories of secrecy’s potential benefits are familiar to patent scholars. They are the benefits that accrue by avoiding the costs of patenting. In essence, reduced administrative costs and increased competition accrue simply by avoiding the drawbacks associated with patenting. However,

197. A trade secret litigation case in which damages are over \$25 million costs around \$1–2 million to litigate. WOLF, GREENFIELD & SACKS, P.C., Q&A: INTELLECTUAL PROPERTY LITIGATION 10 (2009), http://www.wolfgreenfield.com/files/litigation_copy_1.pdf. A patent case with similar damages costs \$5 million on average. *Id.* at 5.

198. *See* Dreyfuss, *supra* note 10, at 6.

199. *See* Lemley, *supra* note 6, at 331 n.81 (citing AM. INTELLECTUAL PROP. LAW ASS’N, REPORT OF THE ECONOMIC SURVEY 2007, at 25–26 (2007)).

200. *See, e.g.*, Spencer Hosié, *Patent Trolls and the New Tort Reform: A Practitioner’s Perspective*, 4 I/S: J.L. & POL’Y FOR INFO. SOC’Y 75 (2008) (arguing in support of secondary patent markets); James F. McDonough III, *The Myth of the Patent Troll: An Alternative View of the Function of Patent Dealers in an Idea Economy*, 56 EMORY L.J. 189, 190 (2006) (same).

201. *See, e.g.*, Mark A. Lemley & Carl Shapiro, *Patent Holdup and Royalty Stacking*, 85 TEX. L. REV. 1991, 1993 (2007) (describing holdup and royalty stacking burdens that trolls impose on manufacturers). *But see* John M. Golden, “Patent Trolls” and Patent Remedies, 85 TEX. L. REV. 2111, 2116 (2007) (questioning conclusions of Lemley and Shapiro).

202. *See* Gerard N. Magliocca, *Blackberries and Barnyards: Patent Trolls and the Perils of Innovation*, 82 NOTRE DAME L. REV. 1809, 1810 & n.7 (2007) (noting the common claim of trolls serving as a tax on innovation).

secrecy's benefits are more than simply the residual benefits of foregoing patent protection. In certain cases, secrecy can encourage innovation where patenting cannot.

To understand the incentive to invent function of secrecy, we first must establish that secret inventions and patented inventions often have distinct values to their owners.²⁰³ For example, a new drug effective against migraines is likely to be much more valuable to its owner as a patent than as a secret. As a patent, the owner can exclude non-licensed manufacturers from reproducing the drug and therefore charge higher prices. As a trade secret, the drug would be subject to reverse engineering, which would likely reveal the drug's formulation. Public knowledge of this formulation would allow others to copy and sell the drug at a lower price.

Conversely, an innovative process of manufacturing that same drug, involving heating certain compounds to specific temperatures before combination, may be more valuable as a secret than as a patent. As a trade secret, the owner will not have to pay for a patent application, nor will she have to monitor competitors to ensure noninfringement. If she has manufacturing capabilities, she can keep the secret confidential from all but the employees that work at her factory. As a patent, on the other hand, she is forced to disclose the invention to all (including her competitors) and may not be able to detect infringement if one of those competitors infringes her invented process.

Seen in this light, it is quite apparent that secrecy can encourage innovation. That is, the private value of a trade secret, S , can be greater than the private value of a patent, P . When $S > P$, economic theory predicts that secrecy will provide greater incentives to invent than patenting.²⁰⁴ Of course, this assumes that inventors can know *ex ante* the value of their future invention. While an inventor can obviously not know such information with exactitude, it seems likely that the relative values of the two protection regimes is possible at the point of deciding between patent or trade secret.²⁰⁵ Indeed, economic theories of patenting depend upon such an assumption.²⁰⁶

Empirical evidence suggests that when secrecy is feasible, trade secrecy provides greater incentives to innovate than patenting. Petra Moser, in

203. See Denicolò & Franzoni, *supra* note 102, at 519 (noting that inventors select the protection that affords them the greatest scope of protection).

204. See, e.g., Vermont, *supra* note 30, at 489 (explaining the relationship between private incentives to innovate and the social costs of patenting).

205. See *id.* at 478 ("An inventor will not pursue an invention unless her expected revenue exceeds her expected costs of invention.").

206. Lemley, *Free Riding*, *supra* note 13, at 1054.

examining data from the nineteenth- and twentieth-century world fairs, concludes that only a fraction of innovations (about twelve to fifteen percent) were patented.²⁰⁷ She found that patent rates vary by industry and that variation is predicated upon the ability to protect one's innovation through secrecy.²⁰⁸ For innovations in industries that are able to maintain secrecy, patent rates are lower than the average (around five percent). In industries in which secrecy is less available, the rates are much higher (around fifty percent).²⁰⁹

Intriguingly, Moser discovered that as reverse engineering methods in an industry improved, patenting rates increased. Patenting rates in the chemical industry, which had been as low as five percent between 1851 and 1876, increased to nearly twenty percent between 1893 and 1915 as reverse engineering became more cost-effective.²¹⁰ At the same time, other industries in which secrecy was ineffective (such as machine manufacturing) maintained consistently high rates of patenting.²¹¹ Moser's findings indicate that inventors can determine, with some efficiency, the protection regime that will maximize the private value of an invention.

The fact that secrecy can provide stronger incentives to invent than patenting in certain cases is based on the tension within the reward theory between disclosure and incentives to invent.²¹² The tension between disclosure and investment incentives is greatest when the disclosure itself harms the private value of the invention. As in the case of the secret pharmaceutical process, disclosure reduces an inventor's ability to exclude because detection ability is inversely correlated to the ability to maintain the invention in secret.²¹³ The ability to rely on secrecy permits inventors whose inventions are more valuable when undisclosed to maximize the value of their invention.

In addition to secrecy's incentive function, secrecy can help balance distortions in innovative investment that patent rights may encourage. Scholars have long been concerned that the rents available from patent

207. Petra Moser, *Why Don't Inventors Patent?* 3 (Nat'l Bureau of Econ. Research, Working Paper No. 13294, 2007), available at <http://www.nber.org/papers/w13294>.

208. *Id.* at 4.

209. *Id.* at 37 tbl.3.

210. *Id.* at 3.

211. *Id.*

212. Holbrook, *supra* note 44, at 146; Strandburg, *supra* note 53, at 105.

213. OFFICE OF INT'L AFFAIRS, NAT'L RESEARCH COUNCIL, GLOBAL DIMENSIONS OF INTELLECTUAL PROPERTY RIGHTS IN SCIENCE AND TECHNOLOGY 10–12 (Mitchell B. Wallerstein et al. eds., 1993) (noting that infringement detection issues are particularly acute with inventions maintained in secret).

protection would inefficiently redistribute investment effort and dollars.²¹⁴ If the law could force all secret inventions to be disclosed, the investment in those technologies that are non-self-revealing would be reduced. This result is due to patent disclosure reducing the private value of non-self-revealing inventions: just as a system of pure trade secrecy would create special incentives for secret inventions,²¹⁵ a system of full disclosure creates disincentives to invest in such inventions. In this way, the law's disclosure requirement may induce firms to invest in technologies that are more valuable when disclosed (patented inventions) than those that are more valuable when kept as proprietary information (secret inventions). This has negative consequences for society as non-self-revealing technologies with social benefits (i.e., lower costs for goods, reduced environmental impact, etc.) will be under-developed.

IV. TOWARDS A FRAMEWORK FOR SECRECY POLICY

The patent system provides a means for individuals and firms to invest ex ante in innovative activity, while knowing that a means of recouping that investment is potentially available ex post in the form of a patent. Such an incentive is not required to encourage investment for all inventions, however. For some inventions, first-mover advantage, complementary assets, secrecy, or some other market imperfection serves as an alternate means of recouping initial investments. The preceding Part described the societal advantages and disadvantages involved with increased reliance on secrecy. This Part will begin to construct a framework from which policy makers can analyze when to prefer one type of protection scheme, and when intervention is required to encourage inventors to make that choice.

A. CONSTRUCTING THE FRAMEWORK

1. *Private Valuation: Inventor Choice of Protection Regime*

The same invention can have vastly different private values depending upon the mode of protection used to protect that invention. Inventors that

214. See, e.g., JAMES W. HENDERSON, HEALTH ECONOMICS & RESEARCH POLICY 288 (4th ed. 2009) (including the distortion of research incentives among the patent system's potential drawbacks). Of course the patent system can also direct research in socially beneficial directions. See, e.g., PIGOU, *supra* note 107, at 185 (arguing that patents redirect inventive activity into areas of general usefulness). Jonathan Barnett argues that repeat market players may overcome some of these inefficiencies by efficiently balancing the strength of intellectual property rights. Jonathan M. Barnett, *Property as Process: How Innovation Markets Select Innovation Regimes*, 119 YALE L.J. 384, 432–33 (2009).

215. Kitch, *supra* note 159, at 279.

choose to practice an invention in secret have determined that the invention is worth more as a trade secret than as a patent. That is, taking into account the private advantages (including protection from independent invention, signaling effects, etc.) and disadvantages (including disclosure, limited duration, cost, etc.) of a patent, the inventor has decided that she can capture more of the value of her invention through secrecy. Various factors influence this decision. Among the most prominent of these are the potential market life of the invention, the feasibility of secrecy, and the likely use of the invention.²¹⁶

First, inventors must take into account the likely lifespan of the invention. Patents are limited to twenty years, whereas trade secrets are valid as long as the secret is kept. The commercial lifespan consideration typically favors choosing secrecy over patenting for both extremely long commercial life-cycles and extremely short ones. For extremely long product cycles measured in multiple decades, patents are less attractive because they expire after twenty years. If an innovation promises to be valuable for a period of time longer than twenty years, it may behoove the inventor to keep the innovation as a secret.²¹⁷

For extremely short life cycles, patent protection is sometimes impractical because of the delay involved in obtaining a patent. On average a patent takes around five years to issue.²¹⁸ After that delay, an invention's value may be extinguished. In rapidly moving industries, patenting and its accompanying expenses are often not attractive to inventors; the invention's product life-cycle will end before the patent issues. Similarly, the financial returns available from being the first product to market often dwarf any increased returns that a patent could provide.

216. For a more complete view of the decision between patenting and secrecy, see Holly Amjad, *Patent vs. Trade Secret: Look at Costs, Industry, Returns*, BUS. J. KAN. CITY, Feb. 3, 2002, available at <http://www.bizjournals.com/kansascity/stories/2002/02/04/smallb3.html>; Ozzie A. Farres & Stephen T. Schreiner, *Patent or Trade Secret: Which Is Better?*, 124 BANKING L.J. 274 (2007); Daniel C. Munson, *The Patent-Trade Secret Decision: An Industrial Perspective*, 78 J. PAT. & TRADEMARK OFF. SOC'Y 689 (1996); Sharon K. Sandeen, *Checklist for Choosing Between Patent and Trade Secret Protection*, 479 PLI/PAT 725 (1997).

217. Eisenberg, *supra* note 164, at 1029.

218. The exact average pendency is impossible to know, but Hal Wegner estimates a sixty month pendency. Hal Wegner, *Overall Patent Pendency* (March 5, 2010) (unpublished manuscript) (on file with author). The official government estimate is a more respectable, albeit less realistic twenty-four months. See U.S. PATENT & TRADEMARK OFFICE, U.S. DEPT OF COMMERCE, *PERFORMANCE AND ACCOUNTABILITY REPORT: FISCAL YEAR 2000*, at 38 (2000), available at <http://www.uspto.gov/about/stratplan/ar/2000/00goals.pdf> (latest available official statistics state average pendency for patent application is 25.0 months). See generally 35 U.S.C. § 154(b)(1)(B) (2006) (statutory guarantee that patents issue no more than three years after filing).

Second, inventors must analyze the feasibility of maintaining an invention in secret. Secrecy is possible only with a limited set of inventions. Inventions that are easily discerned via reverse engineering, or that are likely to be developed independently, are ideal candidates for patent protection.²¹⁹ Consumer products are very difficult to maintain in secret. Widespread distribution limits an inventor's ability to meaningfully control the downstream use of a product and prevent competitors from reverse engineering it.²²⁰ Indeed, an entire "teardown" industry has sprung up that permits cost-effective reverse engineering of even the most sophisticated consumer products, such as iPhones.²²¹ Products that are generally available to competitors are unlikely to remain secret for long because once an invention is sold or marketed, it is easily replicated.²²²

The concealment of a trade secret can be threatened from within as well as from reverse engineers without. Unscrupulous employees, former business partners, and hackers all pose risks for inventors attempting to maintain secrets.²²³ Because trade secrets must be closely guarded, the cost of protecting them can be very high. Innovators must weigh the cost of maintaining the secret when they decide whether or not to patent.²²⁴ Physical security measures, employee agreements, and cyber-security can all be costly means of protecting an invention; a cost that may be greater than the cost of obtaining legal protection through the patent system.

Patents, on the other hand, require disclosure. Not only does a patent describe the manner of practicing an invention, it alerts competitors to the invention's existence.²²⁵ Competitors alerted to a patented method are free to "design around" the invention and bring competing products or processes to

219. See Moser, *supra* note 207, at 1.

220. Andrew Beckerman-Rodau, *The Choice Between Patent Protection and Trade Secret Protection: A Legal and Business Decision*, 84 J. PAT. & TRADEMARK OFF. SOC'Y 371, 386 (2002).

221. *The Lowdown on Teardowns*, THE ECONOMIST, Jan. 21, 2010, at 62, 63.

222. The rise of a sophisticated reverse-engineering regime has led some commentators to claim that it is now virtually impossible to maintain inventions in secret. See Mazzone & Moore, *supra* note 6, at 35; see also Holbrook, *supra* note 44, at 134 (stating that the set of non-self-disclosing inventions is "small"). This argument, however, tends to focus on inventions that are contained within commercially available consumer products. While it is true that certain inventions, particularly products, are often impossible to conceal once they are sold, other types of inventions, such as chemical and industrial processes, are not disclosed to the public when the final product is sold. Many processes are not revealed in the products that they create; the very existence of the process may be undetectable.

223. This is not a new phenomenon. See Victor M. Harding, *Trade Secrets and the Mobile Employee*, 22 BUS. LAW. 395 (1967).

224. Beckerman-Rodau, *supra* note 220, at 382.

225. *Id.* at 384.

the market.²²⁶ In contrast, if the invention is maintained as a secret, competitors may not know of the existence of the invention, let alone the manner of practicing the invention for themselves.

However, disclosure of an invention can be desirable to certain inventors. A patented invention can signal to competitors that a particular area of technology has been cornered. This may discourage other companies from investing in the same invention because the patent prevents any future developments in that space.²²⁷ Similarly, Clarisa Long theorized that patents are often used as a signal of innovative activity at a firm.²²⁸ Under Long's theory, firms may desire the disclosure of a patent because it enables them to attract investment from investors who rely upon patents as a signal of innovative strength.

Disclosure is also desirable when an inventor wants to widely market, sell, or license her innovation. The patent system's ability to overcome Arrow's paradox—one will not pay for an invention that isn't disclosed—has long been heralded by commentators.²²⁹ Disclosure of trade secrets, while permitted, is more costly and limited than with patents.²³⁰ Secrecy is impractical when exploitation of the invention requires impersonal communication to a large number of firms.²³¹

Inventions that are easily maintained in secret are also likely to be infringed in secret.²³² Thus, the ability to maintain an invention in secret has two important roles in determining the proper means of appropriation: it allows an inventor to enjoy a competitive advantage for a potentially limitless time period, and it reduces the value of a patent on that invention because the cost of detecting infringement is increased.

Lastly, in deciding upon invention protection, inventors must take into account the likely use of any new invention. As detailed above, inventions embodied in consumer products are often poor candidates for secrecy. If the business model for an innovation calls for widespread licensing, rather than in-house use, patent protection may make more sense than secrecy.²³³ On the

226. For more on the ability to design around, see S. Glazier, *Inventing Around Your Competitors' Patents*, MANAGING INTELL. PROP., July/August 1995, at 10.

227. This idea has been explored thoroughly in the literature on the prospect theory of patent law. See generally Duffy, *supra* note 177, at 476; Kitch, *supra* note 159, at 267–71.

228. Clarisa Long, *Patent Signals*, 69 U. CHI. L. REV. 625, 627–28 (2002).

229. Arrow, *supra* note 104, at 614–16; Eisenberg, *supra* note 164, at 1029.

230. Lemley, *supra* note 6, at 314.

231. WARD S. BOWMAN JR., PATENT AND ANTITRUST LAW 13 (1973).

232. Oddi, *supra* note 115, at 285 n.126 (stating that because process patent infringement is difficult to detect, processes are ideal candidates for trade secret protection).

233. Beckerman-Rodau, *supra* note 220, at 403.

other hand, products and processes which are to be used in the internal workings of a company are much more likely to have value as secrets.

2. *Comparing Private and Public Preference*

While the factors involved in any individual inventor's decision of whether to patent are quite complex, in general we can say that inventors will choose secrecy when the expected return from secrecy exceeds the expected return from patenting. If we define S as the value of a trade secret and P as the value of a patented invention, we expect inventors to choose secrecy when $S > P$. S represents the value to the inventor of the invention as a secret, taking into account the risks and costs of secrecy as detailed above. In other words, S equals the increased profit one can expect from using the invention if kept secret forever reduced by some function accounting for the potential discovery of the secret. P , on the other hand, represents the increased profit to be expected over the twenty-year life of the patent (including any licensing royalties), minus enforcement costs and patent fees.

Let us introduce a third variable, R , which represents the cost of researching, developing, and commercializing the invention. R represents the revenue that must be generated by the invention to allow the inventor to recoup her upfront costs. Generally, when the expected return from either secrecy or patenting exceeds R , the invention will be produced; conversely, when S and P are both less than R , the invention will not be produced. That is, when $R > P$ or S , a potential inventor will not expend the necessary effort to produce the invention because she will not recoup her upfront research costs. Four scenarios in which theory predicts that inventive effort will be expended deserve our attention. I label those scenarios Public Goods, Reverse Public Goods, Valuable Secret, and Valuable Patent. The scenarios are analyzed in more detail in Section IV.B, *infra*.

B. FRAMEWORK SUMMARY

The chart below summarizes the secrecy framework described in this section:

Scenario	Private Valuation	Inventor Preference	Societal Preference
Public Goods	$P > R > S$	Patent	Patent
Reverse Public Goods	$S > R > P$	Trade Secret	Trade Secret
Valuable Secret	$S > P > R$	Trade Secret	Trade Secret
Valuable Patent	$P > S > R$	Patent	Trade Secret

The framework revolves around two primary assumptions. First, private inventors will choose the intellectual property protection that offers the

greatest private value. Thus, if at the moment of selection, trade secrecy appears to offer the greater private reward, an inventor will choose to maintain her invention in secret. Conversely, if patent protection appears to offer the greatest private reward, patenting will be selected as the appropriation mechanism.

Second, societal preference is premised upon an innovation regime that primarily encourages innovation and secondarily reduces social costs. Thus, society prefers the appropriation regime that incentivizes creation of innovative devices and methods. When innovation is incentivized under both patent and trade secrecy, society prefers to offer the protection regime that carries the lowest social burden. For reasons described herein, I conclude that trade secrecy carries lower social costs than patenting.

The framework suggests that policy makers ought to be more concerned with encouraging the use of secrecy, rather than discouraging it. Policy makers need not concern themselves with influencing decisions in the scenarios in which inventor preference coincides with public preference.²³⁴ Contrary to contemporary understanding, secrecy does not need to be discouraged by patent law. In fact, the one case where the socially optimal selection differs from the expected inventor selection suggests the need for a policy that creates incentive to keep an invention as a trade secret.

Thus, secrecy policy should be motivated by two primary concerns. First, the use of trade secrecy need not be discouraged. The public goods scenario is the only situation in which secrecy is not the socially preferred method of protection. Because of the existence of the patent system, inventors will seek patents on such inventions without any intervention from policy makers. Second, in a small set of cases—when $P > S > R$ —secrecy should be encouraged. The following section outlines ways in which the two policy objectives suggested by the secrecy framework might be employed.

1. *The Public Goods Scenario*

The reward theory's incentive to invent is generally concerned with the public goods market failure.²³⁵ The public goods scenario occurs when the expected return from secrecy is less than the cost of development and the expected return from patenting exceeds development costs, or $P > R > S$. In this case, we would not expect innovation to occur without the patent

234. Trusting individuals in valuation decisions instead of courts is the primary justification scholars have offered for injunctive relief in patent cases. See ROBERT P. MERGES ET AL., *INTELLECTUAL PROPERTY IN THE NEW TECHNOLOGICAL AGE* 297–99 (3d ed. 2003).

235. See e.g., Holbrook, *supra* note 44, at 132; Lemley, *Free Riding*, *supra* note 13, at 1053.

system. Secrecy alone is insufficient to induce investment because the inventor will not be able to recoup her initial investment. The promise of a patent, however, is sufficient to induce investment. This scenario is the only one of the four that involves the production problems associated with public goods.

The public goods scenario occurs quite frequently. This scenario likely describes the majority of patented product inventions, which tend to be difficult to conceal and therefore easily copied. For example, Chester Carlson's invention of the Xerox machine required large investments in the then novel field of imaging technology.²³⁶ Had Carlson maintained his invention as a trade secret, it would have been possible for a competitor to reverse engineer the xerography process once the machines were sold publicly. A copyist could have offered a lower priced alternative since she would have avoided the research costs incurred by Carlson. Of course, he avoided the free riding problem by obtaining a number of patents covering his technology.²³⁷ Patenting enabled him to exclude others from practicing his invention and thus charge supranormal prices in order to recoup investment costs.²³⁸

The public goods scenario is the primary economic justification for the existence of the patent system.²³⁹ This scenario describes the classic economic win-win: inventors benefit by being able to recoup investment costs and the public benefits by receiving new technologies that are disclosed for public consumption.

In this scenario, inventor preference is aligned with societal preference. When secrecy does not provide sufficient means of recouping investment, rational inventors will choose to patent their inventions. Society prefers patenting in the public goods scenario because reliance upon secrecy results in reduced investment in and production of innovation. Thus, the mere existence of the patent system will encourage investment in and disclosure of novel innovations. There is no justification for discouraging secrecy in this case because rational inventors will independently make the socially optimal choice—patenting.

236. *See generally* DAVID OWEN, COPIES IN SECONDS: CHESTER CARLSON AND THE BIRTH OF THE XEROX MACHINE (2004) (describing the large investments made in the invention of the Xerox machine).

237. *Id.* at 141 (noting that Carlson received forty total patents on xerography).

238. *See id.* at 288–89 (describing the potential competitors “lining up to sue” over Carlson's patent misuse).

239. *See, e.g.,* Holbrook, *supra* note 44, at 132.

2. *The Reverse Public Goods Scenario*

Certain inventions, particularly process inventions, are significantly more valuable to inventors as secrets than the same invention would be if patented. At times, the protection offered by secrecy can provide a means of appropriating an invention and recouping the invention's investment costs while the same invention, if disclosed as a patent, would not provide an inventor with sufficient incentive to innovate. I name this scenario the "reverse public goods scenario." In the reverse public goods scenario, mandated disclosure (if possible) would lead to the underproduction of certain inventions, namely those inventions in which infringement detection would be difficult and therefore trade secrecy more valuable.²⁴⁰ Infringement detection is difficult for some of the same reasons that secrecy is appealing: the marketed product or service does not reveal the underlying technology. The reverse public goods scenario is defined as $S > R > P$.

In the reverse public goods case, as in the classic economic case of public goods, free riders would drive down the cost of an invention, reducing the ability of the innovator to recoup costs.²⁴¹ However, in this case it is the disclosure of the invention, not reverse engineering, that provides the free riding opportunity.

Chemical manufacturing methods are an example of the reverse public goods scenario. These methods are often undetectable to a potential reverse engineer.²⁴² Thus, if the innovator of a new type of process chooses to patent, competitors could use the process in secret with little fear of detection and subsequent infringement suits. Because of the difficulty in detecting infringement, companies tend to maintain such processes as secrets rather than disclose them through the patent office. If these inventions were somehow forcibly disclosed, inventors would choose to invest less in those technologies where private value is undermined by disclosure, resulting in less innovation and ultimately less disclosure.

The reverse public goods scenario does not occur under current law because of the appropriability that secrecy provides. Thus, because inventors are not forced to patent (and disclose) their inventions, they are free to maintain inventions as trade secrets and rational actors will do precisely that. Society has a preference for these inventions remaining as secrets for precisely the same reasons that patenting is preferred in the public goods

240. PIGOU, *supra* note 107, at 185.

241. *See, e.g.*, Holbrook, *supra* note 44, at 132; Lemley, *Free Riding*, *supra* note 13, at 1053.

242. Lemley, *supra* note 6, at 339 (noting that chemical processes are not transparent to the world).

scenario: in a world of full disclosure, certain inventions would be suboptimally produced, thereby reducing overall innovation. Again, this scenario does not present a justification for discouraging secrecy. In fact secrecy is the socially optimal choice in this scenario. Fortunately, rational inventors will make that choice as well.

3. *The Valuable Secret Scenario*

A third scenario presents a more difficult case in determining whether to incentivize trade secrets or patents. There are cases in which both patenting and secrecy promise returns greater than investment costs. In some of those cases the expected returns from a trade secret exceed the expected returns from a patent, or $S > P > R$. Patent doctrines designed to discourage secrecy are primarily concerned with this scenario.²⁴³ Here, the patent system provides enough of an expected return to encourage innovation, just not as large of a return as secrecy. Secrecy will be the preferred method of appropriation for rational inventors in this scenario. Traditional treatments of this scenario have tended to prefer patenting, as described in Section IV.A, *supra*.

The *Kewanee* case is an example of the valuable trade secret scenario. The valuable innovation involved in Harshaw Chemical's 17-inch radiation-detecting crystal was the process used in manufacturing and growing the crystal.²⁴⁴ Harshaw likely would have been able to profit from its invention if patented because discovering a 17-inch crystal in radiation-detection products would likely constitute *prima facie* evidence of infringement, assuming no other methods of growing such crystals were known. However, for reasons which are unclear from the published opinion, Harshaw's leadership felt that maintaining the method of crystal growth as a trade secret would provide more private value for the company. This may be because the market for such crystals was relatively small, detection of the use of such crystals would be prohibitively expensive, or for some other reason.

Maximizing public value in this case is more complicated than in the previous two scenarios because the primary concern of the patent system—stimulating innovation—is not a concern: both the patent system and trade secrecy promise a return on innovative investment. In this Section, I suggest that secrecy is socially optimal in the valuable secrets scenario. Secrets exhibit numerous benefits over patents in this scenario. First, reliance on trade

243. See Eisenberg, *supra* note 164, at 1072 (stating that the quid pro quo only concerns this scenario).

244. *Kewanee Oil Co. v. Bicron Corp.*, 416 U.S. 470, 473 (1974). Harshaw spent over \$1 million in developing its crystal. *Id.*

secrecy reduces the administrative costs of innovation. Second, secrecy encourages competition in both innovation and commercialization. Third, secrecy provides a natural market mechanism of inducing inventive activity. Fourth, the use of trade secrecy when available leads to increased incentives to invent in the future. Furthermore, deadweight losses from secrecy will attract competitors whereas patents will discourage competition. The unencumbered ability to innovate in innovative areas that are protected as trade secrets encourages competitors to reduce the deadweight losses in circumstances in which those losses are excessive.

Trade secrecy avoids some of the costs associated with patenting, namely administrative costs and the costs to future innovators of navigating patent entitlements.²⁴⁵ Trade secrecy often involves some sort of disclosure.²⁴⁶ However, the deadweight losses from a secret invention in this scenario are likely to be higher than those from patenting. Deadweight losses refer to the losses that result from certain consumers who would purchase the invention at the marginal price being priced out of the market due to the exclusionary power of the producer.²⁴⁷ Because higher private value signals the ability to charge higher prices, we should expect secrecy to result in greater deadweight losses than patenting in this scenario.²⁴⁸

However, the societal advantages of trade secrets over patents may overcome the greater deadweight losses on the margins. For those cases in which deadweight losses are much greater for secrets than patents, the large relative private value of the secret invention is unlikely to be overcome by small policy tweaks. Encouraging such privately valuable inventions to be patented would likely require eliminating secrecy completely in such cases, an obvious impossibility. Additionally, it should be noted that because trade secrecy does not restrict competition, we should expect market forces to counteract somewhat any deadweight losses that arise from secrecy. Whereas patents create deadweight losses and restrict competitors from attempting to lower those losses, trade secrecy likely attracts competitors due to the lack of competitive restrictions.

Furthermore, there is little economic justification for granting patents in this scenario, let alone preferring them to trade secrets. Patent law is designed

245. See Vermont, *supra* note 30, at 490–92 (classifying the costs associated with granting patents as monopoly losses, rent dissipation, and miscellaneous costs).

246. See Sandeen, *supra* note 71, at 344.

247. See, e.g., WILLIAM NORDHAUS, INVENTION, GROWTH AND WELFARE: A THEORETICAL TREATMENT OF TECHNOLOGICAL CHANGE (1969) (recognizing that the creation of intellectual property rights in innovation will lead to deadweight loss as a result of monopoly pricing).

248. See Denicolò & Franzoni, *supra* note 102, at 530–34.

to overcome a particular market failure—free riding on information.²⁴⁹ The valuable secret scenario does not present such a market failure.

In addition to secrecy's incentive and competitive benefits, permitting inventors to select secrecy in this case has innovative benefits. Economists have developed economic models that demonstrate that overall investment is reduced when patent strength is increased for inventions in which secrecy is a viable option. Illoong Kwon showed that when the patent propensity (the ratio of innovations for which patent protection is sought) is less than one, "strengthening patent protection always *decreases* research investment."²⁵⁰ This result holds for both models involving single innovations²⁵¹ as well as cumulative innovations.²⁵² Kwon's models support the theoretical model of this Article and also have an intuitive explanation. As patent protection becomes stronger, firms will increasingly prefer patents even when ex ante expected profits would be greater under a secrecy regime because they will have a "strong incentive to apply for patents in order to exclude the other firms from the product market."²⁵³ Thus, widespread patenting in an industry incentivizes inventors to increasingly rely on patent protection, thereby reducing the value of those inventions that can be maintained in secret. The reduced value in turn reduces the ex ante incentive to invest in innovation.

4. *The Valuable Patent Scenario*

The final scenario describes situations in which both patenting and trade secrecy provide sufficient incentives to innovate, but a patented invention has more private value than a secret. In other words, when $P > S > R$. There are a number of real-life scenarios in which secrecy alone is sufficient to propel an innovator to create, but patenting provides a higher potential return on the initial investment.

Many patented inventions likely fall within this scenario. For instance, several methods of financial investing would be appropriable as either trade secrets or as patents.²⁵⁴ For years such financial methods were largely

249. See, e.g., Holbrook, *supra* note 44, at 132; Lemley, *Free Riding*, *supra* note 13, at 1053.

250. Illoong Kwon, Patent Portfolio Races and Secrecy 3 (2009) (unpublished manuscript), <http://www.albany.edu/~ik325357/Research/Portfolio.pdf>.

251. Illoong Kwon, Secrecy and the Fallacy of Patent Protection 2–3 (2010) (unpublished manuscript), <http://www.albany.edu/~ik325357/Research/Fallacy.pdf>.

252. *Id.*

253. Kwon, *supra* note 250, at 23.

254. See, e.g., John R. Allison & Emerson H. Tiller, *The Business Method Patent Myth*, 18 BERKELEY TECH. L.J. 987, 1015 (2003) (noting that the change to business method patentability has led to worries that methods maintained as trade secrets would now be patented).

maintained as trade secrets; companies that developed superior methods were rewarded when their investments earned higher profits than those of their competitors.²⁵⁵ After *State Street Bank & Trust Co. v. Signature Financial Group, Inc.* established the patentability of such methods, many financial institutions began patenting some of their inventive method innovations that would have been maintained as secrets prior to *State Street*.²⁵⁶ In other words, some financial innovations promised more private value for their creators as patents than as secrets. Much of this added value likely came from a patent's ability to exclude competitors from practicing the invention. There is little reason, however, to think that these methods were insufficiently incentivized prior to *State Street*. Rather, once offered the choice, the institutions felt that patenting held greater promise for earning profit than did trade secrecy.²⁵⁷

However, the social value of financial institutions rushing to patent methods that a decade earlier would have been maintained in secret is likely negative: patenting in this scenario involves greater deadweight losses,²⁵⁸ higher administrative costs,²⁵⁹ and potentially decreased incentives to commercialize.²⁶⁰ All of these costs come with no increase in innovation, because secrecy alone would have provided (and once did provide) sufficient incentives to create.

Secrecy, on the other hand, provides the same innovation at a lower cost to society. Furthermore, it enables competition in innovation to flourish, likely resulting in improved products and better incentives to commercialize quickly. Indeed, prior to *State Street*, there was no shortage of inventive financial methods. Competition among rivals ensured that new and innovative financial methods would continue to be developed. Companies protected their investment in such methods through a variety of methods such as marketing, first-mover advantage, and secrecy. The introduction of wide-spread patenting into the field has created uncertainty as to rights clearance as well as a new competitor, the so-called "patent troll."

255. Kwon, *supra* note 250, at 4.

256. *Id.*; Josh Lerner, *Where Does State Street Lead? A First Look at Finance Patents, 1971 to 2000*, 57 J. FIN. 901, 906–07 (2002) (noting the increasing acceleration of finance patents over time); *see also* *State St. Bank & Trust Co. v. Signature Fin. Group, Inc.*, 149 F.3d 1368 (Fed. Cir. 1998).

257. *See* Lerner, *supra* note 256, at 906–07.

258. F.M. SCHERER & DAVID ROSS, *INDUSTRIAL MARKET STRUCTURE AND ECONOMIC PERFORMANCE* 449–50 (3d ed. 1990) (documenting excess pricing of patented products).

259. Many of the costs that Vermont refers to as "miscellaneous costs." Vermont, *supra* note 30, at 492.

260. *See* Sichelman, *supra* note 12.

Trade secrecy avoids many of the social costs that wide-spread patenting creates. However, rational individuals and companies will continue to choose to patent their inventions in cases where patenting provides more private value than secrecy. Unlike the first three scenarios, public value is maximized by encouraging inventors to choose an intellectual property regime that reduces private value. Thus, encouraging inventors to rely on trade secrecy in the valuable patents scenario should be the focus of policy makers.

Patent doctrine and rhetoric regarding secret inventions has been concerned with discouraging inventors from choosing secrecy. This focus, however, is misplaced. As shown above, when rational inventors prefer trade secrecy (when a trade secret provides more private value), that choice is socially optimal (it provides the largest social value).²⁶¹ Instead of discouraging secrecy, policy makers and courts should adopt policies that encourage secrecy in the limited set of circumstances when $P > S > R$.

5. *Framework Caveats*

The framework is subject to a number of caveats. First, the framework involves rough ex ante estimates of private invention value. These values are difficult to determine ex ante. They involve calculations of the odds of success as well as predictions of market demand—values which are very difficult to predict with precision. However, it is likely that many inventors can make at least some determination of relative future value.²⁶² Indeed, the reward theory generally presumes that inventors can determine the relative value of a potential invention and the cost of creation.²⁶³ The framework constructed in this Article merely adds a third value, S , to the fundamental framework of the reward theory. Inventors who can determine, on some level, expected patented returns likely can make an estimation of expected trade secrecy returns as well.

Another potential drawback to the framework is that the economic rationale underlying the framework (and patent theory generally) assumes perfectly rational actors. While those assumptions have been questioned elsewhere, their support (or lack thereof) is beyond the scope of this

261. The social value of a patented invention, of course, is dependent on the social value derived from the disclosure of that invention. For purposes of this Article, it is assumed that the social value of disclosure, standing alone, is less than the social cost of a patent. If one places more value on the social benefit of patent disclosure, this conclusion may change.

262. Lemley, *Free Riding*, *supra* note 13, at 1064; *see also*, Vermont, *supra* note 30, at 499–500 (assuming inventors can value future invention value relative to research costs in both a world with and a world without an independent invention defense).

263. Vermont, *supra* note 30, at 499–500.

Article.²⁶⁴ Such assumptions of future value and rational actors lie at the heart of patent theory.

Lastly, and perhaps most importantly from a policy perspective, the determinations depend upon one's valuation of patent disclosure. I have detailed the reasons for doubting the societal value of patent disclosure alone in Section III.B.1, *supra*. My view on the limited public value of patent disclosure is not unique.²⁶⁵ However, reasonable minds can, and do, differ on this subject.²⁶⁶ The value one places on patent disclosure may affect the societal value associated with the differing modes of protection. If one believes that patent disclosure, standing alone, has a large societal value, the public value discussion in this Article's valuable patent scenario may be altered. A view of strong patent disclosure value may suggest encouraging patents when patented inventions have a larger private value than a secret invention.

C. EMPLOYING THE FRAMEWORK

Moving towards a more theoretical framework for encouraging the use of secrecy requires certain changes to the doctrines of patent law. Before delving into the changes suggested by this Article's framework, it is important to note the rhetoric employed by courts. In intellectual property law, the choice of rhetoric employed to embody legal concepts has consequences.²⁶⁷ Courts have consistently elevated the patent quid pro quo beyond merely an option for inventors; it has become a de facto social policy. Little effort has been made to theoretically support the discouragement of secrecy and, as detailed above, policy makers should in fact prefer precisely the opposite result in certain cases. Courts would be better served by couching their examination of the patent bargain in language suggesting patents as a means of encouraging innovation rather than eliminating secret inventions.

264. For more on the problem of assuming perfectly rational actors in law, see Robert C. Ellickson, *Bringing Culture and Human Frailty to Rational Actors: A Critique of Classical Law and Economics*, 65 CHI.-KENT L. REV. 23 (1989).

265. See generally Fromer, *supra* note 133 (suggesting ways to improve the disclosure system, while acknowledging the limited current value of disclosure); Holbrook, *supra* note 44 (noting the paradoxical elements of patent doctrine that discourage disclosure).

266. See generally Kitch, *supra* note 159 (arguing for a new theory of patent law based upon the signaling value of patent disclosure).

267. See, e.g., Adam Mossoff, *Who Cares What Thomas Jefferson Thought About Patents? Reevaluating the Patent "Privilege" in Historical Context*, 92 CORNELL L. REV. 953 (2007) (investigating the role of courts referencing Thomas Jefferson's views of patent law).

1. *Reversing the Doctrines Against Secrecy*

Current patent doctrine attempts to influence innovator choice by discouraging secrecy. In a broad sense, one could consider any doctrine that strengthens patent protection to discourage secrecy. For example, if patent duration were to be increased from twenty to forty years, some inventors at the margins would undoubtedly be enticed to consider patenting over trade secrecy. This interplay between patent strength and the appeal of trade secrecy is inevitable and unavoidable. However, there are two groups of doctrines whose sole function is to discourage secrecy. This Section suggests changes to those doctrines that would better align patent doctrine with the policies outlined above.

a) *Prior User Rights*

Prior user rights are rights for first inventors to practice their invention regardless of whether the invention has been subsequently patented by another.²⁶⁸ The lack of prior user rights encourages patenting by placing trade secret holders at risk of losing the right to practice their own invention. Indeed, commentators view the discouragement of trade secrecy as the strongest argument for denying prior user rights.²⁶⁹ For example, some commentators have argued that the law correctly permits a patentee to exclude a first inventor from practicing her invention because such a risk of exclusion will encourage patenting.²⁷⁰

However, as shown above, discouraging secrecy does not have theoretical support as a policy objective. Refusing to grant prior user rights creates a sense of fear among trade secret holders and an inevitable push towards the patent system. Even critics of prior user rights have noted that while prior user rights decrease the incentive to patent, they likely increase the overall incentive to innovate.²⁷¹

268. See, e.g., James R. Barney, *The Prior User Defense: A Reprieve for Trade Secret Owners or a Disaster for Patent Law?*, 82 J. PAT. & TRADEMARK OFF. SOC'Y. 261 (2000) (describing the debate around prior user rights); Lisa M. Brownlee, *Trade Secret Use of Patentable Inventions, Prior User Rights and Patent Law Harmonization: An Analysis and Proposal*, 72 J. PAT. & TRADEMARK OFF. SOC'Y 523 (1990) (detailing the existence of prior user rights in foreign jurisdictions).

269. See Barney, *supra* note 268 (concluding that prior user rights would harm the public in part due to diminished disclosure); Shapiro, *supra* note 5, at 95.

270. Denicolò & Franzoni, *supra* note 102, at 517.

271. *Id.* at 529–30 (finding that in a system with prior user rights, the incentive to innovate is strengthened, although the incentive to patent is reduced).

Carl Shapiro has argued for the establishment of prior user rights.²⁷² He has posited that prior user rights enhance competition, reward innovation, and can partially correct problems caused by patents of questionable validity.²⁷³ While I agree with Shapiro, this Article suggests an additional ground which supports prior user rights: granting prior user rights would more closely harmonize the law with the economic rationale underlying patent theory.

On the other hand, Vincenzo Denicolò and Luigi Franzoni have argued that prior user rights should be denied because society prefers patenting over secrecy in cases in which an inventor would prefer trade secrecy.²⁷⁴ They argue that because greater deadweight losses occur when secrecy provides a greater benefit to the inventor, society should prefer patenting. However, Denicolò and Franzoni admit that denying prior user rights “reduces the incentives to innovate.”²⁷⁵ This is true because discouraging secrecy can decrease overall incentives to invest.

Since 1999, U.S. law has provided for some prior user rights for patents on business methods.²⁷⁶ Congress is considering further legislation that would greatly expand prior user rights.²⁷⁷ The business method exception for prior user rights, while desirable, does not go far enough to align patent doctrine with the reward theory. A better solution would be to grant blanket prior user rights to first inventors. Doing so would place holders of patented inventions and trade secrets on equal footing: patentees would be able to exclude others from using a patented invention, except for those inventors that invented prior to the patent application. Similarly, trade secret holders could operate knowing that later-filed patents would not subject them to infringement liability or the inability to practice their own invention.

b) Priority Rules and the One-Year Statutory Bar to Patentability

A subsequent inventor can obtain patent rights over a first inventor if the second inventor can show that the first inventor “abandoned, suppressed, or concealed” the invention at any time after the second inventor successfully

272. The law’s lack of prior user rights has been criticized by commentators on the grounds of being unfair and for economic reasons. *See* Shapiro, *supra* note 5, at 95 (finding that prior user rights enhance competition, reward innovation with relatively little deadweight loss, and more properly align the private and social incentives of innovation).

273. Shapiro, *supra* note 5, at 93.

274. Denicolò & Franzoni, *supra* note 102, at 530–34.

275. *Id.*

276. 35 U.S.C. § 273 (2006).

277. Patent Reform Act, H.R. 1260, 111th Cong. (2009).

reduced the invention to practice.²⁷⁸ An invention is considered abandoned, suppressed, or concealed if an inventor fails to patent the invention within a reasonable period of time.²⁷⁹ Courts weigh various factors when determining whether a delay in patenting is reasonable, but commercialization activities are not valid reasons for delay.²⁸⁰ Courts have determined that commercialization means any commercial use, including use that is not observable by the public.²⁸¹

The priority rule of Section 102(g) favors inventors who aggressively seek patent protection over those who practice inventions secretly for a time. An inventor who conceals her invention faces the risk of losing the patent rights in her invention to a subsequent patentee and is thus encouraged to patent, even if the information available at the time of selection indicates that secrecy would provide sufficient return on investment.²⁸²

Along with the lack of prior user rights, the priority doctrine is a threat to inventors who practice in secret. Whereas priority rules threaten the potential exclusive rights, the lack of prior user rights threatens the complete ability to practice an invention. The latter threat is potentially more worrisome for both an inventor and from an equity perspective,²⁸³ but under current law the two go hand-in-hand. The loss of a priority battle means that one loses both the right to patent and the ability to practice the invention.

278. 35 U.S.C. § 102(g) (2006).

279. *See* 1 CHISUM, *supra* note 89, § 10.08[1].

280. *Id.*

281. *E.g.*, *Lutzker v. Plet*, 843 F.2d 1364, 1367 (Fed. Cir. 1988) (“[W]hen there is an unreasonable delay between the actual reduction to practice and the filing of a patent application, there is a basis for inferring abandonment, suppression or concealment. . . . The inventor’s activities during the delay period may excuse the delay (e.g., he may have worked during that period to improve or perfect the invention disclosed in the patent application). . . . When, however, the delay is caused by working on refinements and improvements which are not reflected in the final patent application, the delay will not be excused. . . . Further, when the activities which cause the delay go to commercialization of the invention, the delay will not be excused.”).

282. Priority rules also serve to limit an inventor’s ability to extend the exclusivity period of an invention by tacking on a twenty-year patent term just as trade secrecy is expiring. *See Pencoek v. Dialogue*, 27 U.S. (2 Pet.) 1, 19 (1829) (stating that allowing such term extension would “materially retard the progress of science and the useful arts”). One potential way of altering priority rules to both reward first invention and reduce “double-dipping” would be to reduce the patent term by the term of trade secret usage. Additionally, by granting broad prior user rights, a system in which patent priority is lost is less burdensome because patent rights would not restrict an original inventor from practicing her invention.

283. *See Dunlop Holdings, Ltd. v. Ram Golf Corp.*, 524 F.2d 33, 36 n.11 (7th Cir. 1975) (“For it is less serious to hold that the first inventor has forfeited his right to a patent monopoly than it is to hold that he has forfeited any right to use his own invention without the permission of a subsequent inventor.”).

Rather than focus on the public or private nature of an innovation, priority disputes ought to turn on the issue for which they were created: who invented first. First reduction to practice should be the primary concern of priority disputes. Rewarding the first inventor rather than the first non-secret inventor has both an intuitive equitable appeal,²⁸⁴ as well as an economic appeal, as a means of encouraging commercialization of trade secrets. Currently, commercialization activities which delay the filing of a patent may be considered suppression of an invention.²⁸⁵ The law should encourage such commercializing activities by awarding priority to the de facto first inventor.²⁸⁶

2. *Encouraging Secrecy: Potential Steps*

The law does not currently encourage inventors to maintain inventions as trade secrets. As described in this Part, however, economic theory suggests that at least in certain situations, it should. In general, we can assume that inventor choice will mirror the socially optimal choice. However, when a patented invention is more valuable than a trade secret and secrecy promises a sufficient return on investment, society should encourage secrecy. This final Section will begin to describe different ways in which secrecy can be actively encouraged as well as potential drawbacks from employing these changes.

a) Encouraging Secrecy Through Patent Law

When research costs are low, it can be assumed that S and P will both be greater than R . That is, as R approaches zero, both secrecy and patenting provide sufficient return on investment to induce invention. When that is the case, this Article's framework suggests that policy makers should encourage the use of trade secrecy. Often, inventors will prefer patenting in such cases because the risk of independent invention or reverse engineering is very high when research costs are minimal.

James Anton and Dennis Yao demonstrated that inventors of low-cost innovations will often rely on patent protection. They developed models that

284. *See id.*

285. *See In re Caveney*, 761 F.2d 671, 675–76 (Fed. Cir. 1985) (stating that sale of the product of a secret method triggers the on-sale bar).

286. The law regarding priority (and novelty in general) was recently modified via legislation. Leahy-Smith America Invents Act, Pub. L. No. 112-29, sec. 3, §§ 101, 102 (enacted Sept. 16, 2011). Beginning eighteen months after the enactment of the America Invents Act, priority to invention will be judged based upon the filing date of the patent application rather than the date of invention. *Id.* sec. 3(n). The move to a first-to-file system will harmonize U.S. patent law with the rest of the world and alleviate some of the concerns discussed above for applications filed after that date. For inventions filed before March 2013, however, the old priority rules still apply.

demonstrate that innovators will tend to seek patents for smaller, incremental, less valuable developments.²⁸⁷ This behavior can be explained by the fact that these innovations are unlikely to be imitated, thus full disclosure does not harm the innovator.²⁸⁸

Unfortunately, it is difficult to determine *ex ante* which types of inventions require low investment and which do not. Much to the chagrin of economists, patent law does not concern itself with the amount of investment required to produce an innovation. Patent law's obviousness doctrine could potentially provide some help in this area. Further work on the obviousness doctrine's ability to weed out low-cost innovation could prove helpful in implementing the framework proposed in this Article.

Another potential means of encouraging the use of secrecy is to deny patents altogether to inventions that could have been maintained as trade secrets and thus do not require the patent system to encourage their creation. Section 101 of the Patent Act provides a means, albeit a heavy-handed one, of restricting the types of inventions that can be patented.²⁸⁹ Any new and useful process, machine, manufacture, or composition of matter can be patented as long as it meets the other requirements of the Patent Act and does not fall under one of the non-patentable categories created by the Supreme Court, such as abstract ideas.²⁹⁰

David Olson proposed eliminating patent protection for business methods for utilitarian reasons. As Olson notes, the ability to accurately differentiate a specific class of inventions from another is requisite for effective use of Section 101 as a policy lever.²⁹¹ In the case of secret inventions, however, it is unlikely that subject matter categories will differentiate those inventions that could be profitably maintained in secret from those that cannot.

For example, consider one potential manner of distinguishing invention types: products and methods. Inventions appropriable through secrecy tend

287. James J. Anton & Dennis A. Yao, *Little Patents and Big Secrets: Managing Intellectual Property*, 35 RAND J. ECON. 1, 3 (2004).

288. *Id.* at 11–13.

289. See 35 U.S.C. § 101 (2006); David S. Olson, *Taking the Utilitarian Basis for Patent Law Seriously: The Case for Restricting Patentable Subject Matter*, 82 TEMP. L. REV. 181, 184 (2009) (arguing that the subject matter of inventions eligible for patenting “has developed with little explicit consideration of the utilitarian question”).

290. See 35 U.S.C. § 101 (2006). See generally *Bilski v. Kappos*, 130 S. Ct. 3218 (2010) (holding a patent on a method of hedging risk invalid as an “abstract idea”).

291. See Olson, *supra* note 289, at 184.

to be methods or processes and not products.²⁹² Products are, in general, subject to easier reverse engineering than are methods that can be performed in secret. Particular types of methods, such as manufacturing methods, chemical methods, and certain types of software are examples of inventions that are generally appropriable through secrecy.²⁹³ However, the method/product distinction is an imperfect measure of the viability of secrecy. Certain types of method innovations are difficult to appropriate through secrecy; inventors of such methods depend on the patent system in order to obtain a return on their investment in the innovation. The blunt use of Section 101 to eliminate patentability on all, or a specific class, of methods is likely to result in reduced innovation in areas that would be socially beneficial.

b) Encouraging Secrecy Through Trade Secret Law: Secret Invention Registry

Another potential manner of encouraging secrecy involves modifying the existing system of trade secrecy. Trade secret law poses certain difficulties for inventors. Among the drawbacks of trade secret law from an inventor's perspective are the uncertainty of trade secret scope²⁹⁴ and the potential loss of the right to practice one's invention if later patented.²⁹⁵ One potential means of encouraging the use of secrecy is to reduce the uncertainty of those aspects of trade secret law.

As an initial step towards encouraging secrecy, a trade secret registry could be created. A trade secret registry would overcome one of the major drawbacks of litigating the misappropriation of trade secrecy: proving that a secret exists in the first place.²⁹⁶ In general it can be said that proving the existence of a trade secret requires three elements: proof that the subject matter is not generally known, proof that reasonable efforts were taken by the owner to protect the secret, and proof that secrecy confers an economic advantage on the holder.²⁹⁷

292. See Oddi, *supra* note 115, at 285 n.126 (noting that processes are particularly good candidates for trade secret protection); see also Robert P. Merges, *Rent Control in the Patent Districts: Observations on the Grady-Alexander Thesis*, 78 VA. L. REV. 359, 376–77 (1992).

293. See Merges, *supra* note 292.

294. See James Pooley, *The Top Ten Issues in Trade Secret Law*, 70 TEMP. L. REV. 1181, 1181–82 (1997) (stating that the definitional problem of trade secret litigation is one of the most pressing issues of the law).

295. See *supra* Section IV.C.1.a.

296. See, e.g., Pooley, *supra* note 294, at 1181–85 (noting that much litigation centers around whether a secret exists).

297. See MILGRIM, *supra* note 39, §§ 1.03–1.04.

Providing a registry in which trade secret holders can secretly catalogue valuable secrets would assist trade secret holders in demonstrating the first two elements of a trade secret. Registration would assist courts and other decision makers in analyzing the contours of the secret that the owner considered valuable enough to protect. Registration would also provide prima facie evidence of intent to protect a trade secret. One accused of misappropriation could then bring forth proof that either (1) the registered secret was well-known, or (2) the registrant had not demonstrated reasonable efforts to protect her secret. Absent such a showing, courts would assume that the registered secret was a reasonably protected secret invention.

The second benefit of a trade secret registry would be increased protection against independent patenting of the invention. As described in Section IV.C.1, *supra*, inventors who elect to commercialize their inventions in secret risk the loss of two rights: the right to eventually patent the invention and the right to practice the invention.²⁹⁸ Both right losses potentially occur when a second party patents the invention.

The existence of a trade secret registry along with the establishment of legal protection for prior users would assist trade secret users in protecting against these losses. Adopting prior user rights, as urged in Section IV.C.1.a, *supra*, could lead to protracted legal battles about whether an invention was invented by a first inventor prior to patenting by a second. Registration would alleviate some of the difficulties in proving prior use and protect against false allegations of prior use. In fact, prior user rights could be extended only to those inventions that have been registered, including equivalents and obvious extensions.

Creating this registration regime would not be prohibitively expensive because registration does not require the same level of examination as patenting. Furthermore the PTO already has a statutorily authorized registration system. Section 157 of Title 35 authorizes the PTO to establish a statutory invention registration that requires applicants to give up future rights to a patent on the invention after publication of the application.²⁹⁹ The statutory invention registration allows inventors to publish inventions that they do not intend to patent in a manner that precludes others from patenting the invention. The registration is used by inventors who do not desire a patent but want to prevent others from patenting.

Establishing prior user rights may disincline inventors from using the current registration system because they would no longer be at risk of losing

298. *See supra* Section IV.C.1.

299. 35 U.S.C. § 157(a)(3), (b) (2006).

the right to practice to a second inventor patentee. However, they may desire some means of demonstrating their prior use before an infringement action arises. Such non-public registration would not serve as prior art as the current registration does, because submissions would not be made public. However, registration would serve as *prima facie* evidence of prior invention and prior user rights.³⁰⁰

V. CONCLUSION

Patent law has long relied on the perceived wisdom that patenting is preferable to secrecy. This Article turns that logic on its head. Reliance on secrecy can have numerous underappreciated social benefits, including targeted disclosure, more rapid commercialization, and increased incentives to invent. Many of these benefits are the result of the competition-enhancing aspects of trade secrets and the lack of barriers to innovative entry.

The framework developed in this Article leads to two primary policy results. First, the legal system should not discourage the use of trade secrecy; rational inventors will select trade secret protection only in instances when it is also socially optimal without interference from policy makers. To eliminate the disincentives to rely on secrecy that exist in current law, this Article suggests establishing prior user rights and altering the standards for patent priority disputes.

Second, the secrecy framework that this Article has developed suggests that in certain circumstances secrecy should be encouraged. Without intervention from policy makers, patents will be the preferred method of protection more often than is socially desirable. The use of trade secrets should be encouraged when both secrecy and patenting provide sufficient incentives to invent. In such situations, the use of trade secrecy is socially preferable because identical amounts of innovation are produced but with fewer legal restrictions on competition. Furthermore, the fundamental economic concern of patent law's reward theory—free riders—is inapplicable in such cases.

Trade secrets can promote innovation. They do so in a limited set of cases, but they do so without many of the drawbacks associated with patents. Trade secrets have traditionally not been viewed as a means of incentivizing

300. The current publication requirement in the registration system would dissuade trade secret holders from registration. *See* § 157(b), (c). In order to alleviate this, the statute authorizing the invention registration would need to be altered to grant registrants the option of non-publication.

innovation or a means of encouraging inventors to refrain from patenting. Courts and policy makers should, however, view secrecy as a low-cost means of encouraging competition and innovation.