

PATENT LAW'S PARSIMONY PRINCIPLE

Alan Devlin[†]

TABLE OF CONTENTS

I.	INTRODUCTION	1694
II.	THE CASE FOR PARSIMONIOUS PATENT RIGHTS	1701
	A. THE PATENT SYSTEM'S CHARGE: SPURRING INNOVATION	1701
	B. PROMOTING A PARSIMONIOUS APPROACH TO PATENT POLICY	1709
III.	PATENT LAW'S SILENT EMBRACE OF THE PARSIMONY PRINCIPLE	1715
	A. PATENTABLE SUBJECT MATTER	1715
	B. THE NATURE OF A PATENTEE'S PROPERTY RIGHT	1722
	C. MONOPOLY LEVERAGE AND RELATED LIMITS ON PATENT VALUE	1727
	D. DOCTRINE OF EQUIVALENTS	1732
	E. EXPERIMENTAL USE—AN UNJUSTIFIED EXCEPTION?.....	1734
IV.	THE PARSIMONY PRINCIPLE AS A GUIDE TO PATENT POLICY	1736
	A. EMPLOYING THE PARSIMONY PRINCIPLE TO INFORM CONTEMPORARY DEBATE	1737
	1. <i>Exploring the Limits of Patentable Processes—Computer Software and Business Methods</i>	1737
	2. <i>Optimal Damages in the Event of Infringement</i>	1743
	B. AN IMPORTANT CAVEAT: AVOIDING EX POST DILUTION OF PROPERTY RIGHTS.....	1746
V.	CONCLUSION	1747

© 2011 Alan Devlin.

[†] Law Clerk to the Hon. Amy J. St. Eve, U.S. District Court for the Northern District of Illinois; University College Dublin, B.B.L. (Int'l), 2004; University of Chicago, LL.M., 2005; University of Chicago, J.S.D., 2006; Stanford Law School, J.D., 2007. The author would like to express his particular gratitude to Steven Horowitz.

I. INTRODUCTION

The patent system is charged with a deceptively difficult task: maximizing social welfare by spurring innovation through the provision of optimal rewards.¹ To create perfect incentives, patent law would have to tailor inventor-specific property rights so that every innovator would receive minimally sufficient exclusivity to encourage desirable investment in R&D and subsequent commercialization.² Were it able and willing to employ such a system, society would reap the greatest possible welfare by maximizing innovation while minimizing loss to allocative efficiency. This method for promoting innovation, which seeks narrowly to tailor property rights to the incentive characteristics of each inventor, is surely optimal.³

But how could one ever follow this course in practice? The “useful arts,” though subject to continuing interpretive debate, comprise products and processes in such disparate fields of innovation as pharmaceuticals, biotechnology, computer software, medical diagnostic techniques, and business methods.⁴ Like any group of individuals, inventors are characterized by divergent motivational influences. They are an idiosyncratic lot who will respond in an asymmetric fashion to any one set of incentives established by an intellectual-property regime. Those implementing the patent system would need perfect access to information about each inventor’s reservation return—the expected return below which each inventor would decline to innovate. Quite obviously, such information is elusive. Indeed, it is testament to the difficulty of aligning incentives with the traits of individual inventors that patent law has largely spurned any suggestion that it attempt to do so.⁵ For the most part, the patent system operates on a “one-size-fits-all” basis.⁶ Yet, to the extent the current patent system creates a blanket set of rules that

1. See U.S. CONST. art. I, § 8, cl. 8; *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 330–31 (1945); *Biotechnology Indus. Org. v. District of Columbia*, 505 F.3d 1343, 1346 (Fed. Cir. 2007).

2. See Robert P. Merges & Richard R. Nelson, *On the Complex Economics of Patent Scope*, 90 COLUM. L. REV. 839, 876–79 (1990).

3. See WILLIAM M. LANDES & RICHARD A. POSNER, *THE ECONOMIC STRUCTURE OF INTELLECTUAL PROPERTY LAW* 297–300 (2003).

4. See ROGER E. SCHECHTER & JOHN R. THOMAS, *PRINCIPLES OF PATENT LAW* 23–60 (2004).

5. Patent law has displayed some flexibility with respect to readily apparent, industry-specific characteristics. Although the current doctrine purports to apply rules with horizontal uniformity, the manner in which rules have actually been applied occasionally differs, sometimes significantly, depending on the industrial context.

6. Natasha N. Aljalian, *The Role of Patent Scope in Biopharmaceutical Patents*, 11 B.U. J. SCI. & TECH. L. 1, 18 (2005); Rebecca S. Eisenberg, *The Role of the FDA in Innovation Policy*, 13 MICH. TELECOMM. & TECH. L. REV. 345, 364 (2007).

apply in comparable fashion across numerous different industries, the current system almost inevitably over-incentivizes innovation in some contexts and under-incentivizes it in others.⁷ Such an outcome is undesirable. As economists typically regard dynamic-efficiency gains as a greater source of long-run social welfare than incremental gains in static efficiency, the prospect of under-rewarding inventors is unsettling.⁸ This is particularly so in capital-intensive, risky fields of innovation, such as the pharmaceutical industry, where desirable levels of R&D depend critically on a sufficient expected return.⁹ In fields characterized by rapid, incremental, “follow-on” innovation, such as computer software, the prospect of excessive rewards may be of greater concern because it may operate to frustrate cumulative innovation.¹⁰ Unfortunately, because we lack sufficient information to adjudge the incentive preferences of different inventors, it is likely unavoidable that some such over- and under-compensation will continue to occur.

There is an apparent solution to this quagmire. Since the law cannot mold property rights to fit the incentive characteristics of every industry and of every inventor lying therein, the only conclusive solution is simply to maximize incentives to invent. To do this, one must appeal to the famous Blackstonian conception of property as “that sole and despotic dominion which one man claims and exercises over the external things of the world, in total exclusion of the right of any other individual in the universe.”¹¹ Only by granting patentees an unqualified right to exclude, thus enabling them to appropriate the full social value of their inventions, can society be sure that it will not mistakenly under-incentivize valuable innovation. Many have

7. See Michael W. Carroll, *One For All: The Problem of Uniformity Cost in Intellectual Property Law*, 55 AM. U. L. REV. 845 *passim* (2006); Alan O. Sykes, *TRIPs, Pharmaceuticals, Developing Countries, and the Doha “Solution,”* 3 CHI. J. INT’L L. 47, 57 (2002).

8. See Thomas O. Barnett, Remark, *Maximizing Welfare Through Technological Innovation*, 15 GEO. MASON L. REV. 1191, 1194–96 (2008); Joseph E. Brodley, *The Economic Goals of Antitrust: Efficiency, Consumer Welfare, and Technological Progress*, 62 N.Y.U. L. REV. 1020, 1026 (1987) (explaining that dynamic efficiency is by far the most important form of efficiency); Jedediah Purdy, *People As Resources: Recruitment and Reciprocity in the Freedom-Promoting Approach to Property*, 56 DUKE L.J. 1047, 1051 n.4 (2007) (noting that “[d]ynamic efficiency works perfectly only with perfect internalization of all benefits and costs attending the exercise of one’s property rights”).

9. See DAN L. BURK & MARK A. LEMLEY, *THE PATENT CRISIS AND HOW THE COURTS CAN SOLVE IT* 38–40 (2009).

10. See *id.* at 38–40, 156–58.

11. See 2 WILLIAM BLACKSTONE, *COMMENTARIES ON THE LAWS OF ENGLAND* 2 (Univ. of Chi. Press 1979) (1765).

articulated this view, which may be characterized as the maximalist perspective.¹²

Despite its ostensible attraction, the maximalist approach is fundamentally flawed. The most obvious frailty lies in an axiomatic fact: it is impossible to create property rules that enable owners to prevent externalities.¹³ This is especially so with respect to information goods, which are typically characterized as non-excludable.¹⁴ The law is therefore incapable of enabling inventors to capture the full value of their inventions, for some free-riding will always take place. Moreover, patentees would need to engage in perfect price discrimination, which is evidently impossible.¹⁵ But even if the law enjoyed the capacity to award inventors Blackstonian property rights, there are several reasons why it should decline to bestow them.

First, tracing problems would give rise to preclusive transaction costs.¹⁶ Given the cumulative nature of innovation, almost every increment in knowledge implicates the contributions of myriad inventors.¹⁷ If the law granted each such inventor a right to enjoin the use of whatever information he added, the search and negotiation costs required to advance technology would quickly become preclusive.¹⁸ Second, were a maximalist regime successfully implemented in pure form, society's members would be indifferent to the fact of innovation, for each would be charged his or her

12. See Rebecca S. Eisenberg, *Patents and the Progress of Science: Exclusive Rights and Experimental Use*, 56 U. CHI. L. REV. 1017, 1025–26 (1989) (addressing the concept of expansive patent rights); Einer Elhauge, *Do Patent Holdup and Royalty Stacking Lead to Systematically Excessive Royalties?*, 4 J. COMPETITION L. & ECON. 535, 541 (2008) (arguing that if patentees are denied the ability to extract the full social value of their inventions, they will devote suboptimal resources to the innovative process); Dennis Michaels, *Bioprospecting Agreements: Forging a Comprehensive Strategy for Managing Genetic Resources on Public Lands*, 22 ENVIRONS ENVTL. L. & POL'Y J. 3, 64 (1999); see also Nuno Pires de Carvalho, *The Primary Function of Patents*, 2001 U. ILL. J.L. TECH. & POL'Y 25, 30 (opining that “the [patent] reward should be tantamount to the invention’s worth”); Vincent P. Tassinari, *Patent Compensation Under 35 U.S.C. § 284*, 5 J. INTELL. PROP. L. 59, 154 (1997) (opining that the “American public has a right to expect that its inventors [receive] the full value of their invention[s] in the marketplace”).

13. See Mark A. Lemley, *Property, Intellectual Property, and Free Riding*, 83 TEX. L. REV. 1031, 1065 (2005).

14. See Kristen Osenga, *Information May Want to Be Free, But Information Products Do Not: Protecting and Facilitating Transactions in Information Products*, 30 CARDOZO L. REV. 2099, 2141 (2009).

15. See Norman Siebrasse, *A Property Rights Theory of the Limits of Copyright*, 51 U. TORONTO L.J. 1, 40 n.94 (2001); Oliver E. Williamson, *Economies as an Antitrust Defense Revisited*, 125 U. PA. L. REV. 699, 720 (1977).

16. See LANDES & POSNER, *supra* note 3, at 214.

17. See *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 427 (2007).

18. *Cf. id.*

reservation price for availing of it. Third, the utilitarian case for a frugal approach is compelling. Every additional dollar awarded to an innovator beyond what was necessary to spur her to invent and commercialize her invention is a dollar wasted.¹⁹ Such a system would result in windfalls that provide no larger gain and, indeed, bear a cost. Fourth, innovation requires not only ex ante incentives in terms of prospective reward, but it also depends intimately on the availability of contemporary know-how. Complete proprietization of information reduces access to technological information, thus diminishing the scientific knowledge available for follow-on innovation.²⁰

Patent law has clearly declined to grant inventors the full social value of their technological contributions.²¹ This is unsurprising, but, as a more realistic alternative, should the law err on the side of generous overcompensation? In other words, perhaps the law would rightly eschew a dogmatic interpretation of the maximalist approach, but would resolve to interpret ambiguities in favor of significantly over-rewarding inventors. This would be a more reasonable approach to decision-making under conditions of uncertainty. Decision theory, which is the branch of microeconomics that deals with choice in the presence of indeterminacy, often suggests that policymakers should favor Type II errors (false negatives) over Type I errors (false positives).²² Such an approach would find greater harm from a mistaken denial of intellectual-property protection to a deserving inventor than an erroneous patent award to an unworthy innovator. Therefore, one might expect an informed IP system to reflect this bias and maximize inventor compensation to the extent permitted by the statutory framework put in place by Congress. This Article refers to such a policy as the “qualified-maximalist” approach.

19. See David S. Abrams, *Did TRIPS Spur Innovation? An Analysis of Patent Duration and Incentives to Innovate*, 157 U. PA. L. REV. 1613, 1615 (2009).

20. See, e.g., C. Scott Hemphill, *Paying for Delay: Pharmaceutical Patent Settlement as a Regulatory Design Problem*, 81 N.Y.U. L. REV. 1553 (2006) (discussing the importance of follow-on innovation to patent policy).

21. See *infra* Part III. Time-limited monopoly is the most obvious example of this determination. See Samson Vermont, *A New Way to Determine Obviousness: Applying the Pioneer Doctrine to 35 U.S.C. § 103(a)*, 29 AIPLA Q.J. 375, 400 (2001). Limits on patentees' ability to contract with potential rivals and licensees for greater protection of their IP and denying patentees an automatic right to injunctive relief provide further examples. Thus, it is clear that a literal interpretation of the maximalist approach is not welcomed by the contemporary patent system.

22. See Melvin Aron Eisenberg, *Bad Arguments in Corporate Law*, 78 GEO. L.J. 1551, 1553 (1990) (“Wrongly considering that a theory is incorrect is known as a Type I error. Wrongly considering that a theory is correct is known as a Type II error.”).

Were the law presently to reflect this policy, we would expect to detect its presence within the current doctrine. Such a system would presumably entitle patentees to injunctive relief in all cases of proven infringement of a valid patent. There would also be no limitation on the patenting of processes beyond the traditional requirements of novelty, utility, nonobviousness, and statutory bars. Patent-holders would enjoy the benefit of an expansive doctrine of equivalents, which would serve to capture subsequent inventions that encapsulate the nature of patentees' innovation, but not their claims. Patentees would have the right to contract with licensees to prevent them from challenging the validity of licensed patents, to require royalties beyond the life of the patents, to bundle or otherwise to tie the pertinent technology to non-patented goods, and to dictate price terms by which licensees must abide in selling the goods incorporating the patented technology.

Yet we do not see any of these things.²³ Patent law has therefore discarded a qualified-maximalist path in its jurisprudence. Instead, this Article contends that a parsimony principle guides the patent system: the law attempts to cabin patentees' compensation and to prevent windfalls. It declines to achieve this goal in a formalistic manner through the adoption of categorical rules, as recent developments make clear.²⁴ Instead, the law adopts an incremental approach to resolving policy issues that emerge over time. Adopting all evidence that may be available, current patent doctrine imposes meaningful and evolving limits on patentees' exclusive rights. In doing so, the law appears to accept at least some risk of Type I errors in certain settings. The Article concludes that the parsimony principle possesses significant power in explaining the current makeup of patent law, and thus offers a helpful framework within which to resolve contemporary challenges facing the patent system.

Despite this, the qualified-maximalist approach may be detectable in at least one regard: the apparent reality of leading innovators' seemingly massive overcompensation. The phenomenon is most obvious in the realm of copyright: leading artists, both in film and music, command returns that dwarf those of similarly talented individuals who lack sufficient fortune to make it to the very top.²⁵ These two industries are prime examples of winner-

23. See *infra* Part III.

24. See, e.g., *Bilski v. Kappos*, 130 S. Ct. 3218, 3222 (2010) (declining to adopt a rigid test for determining the contours of patentable subject matter).

25. See LANDES & POSNER, *supra* note 3, at 49–50. The closest analogy to the patent field appears to be the pharmaceutical industry, where leading companies regularly make astronomic profits. However, the ostensible fact of overcompensation may mask complex, capital-intensive, and inherently risk-filled innovation structures.

takes-all markets, which grant vast rewards to the few chart-toppers and relatively meager profits to all others, including those who are close seconds.²⁶ The windfalls enjoyed by market-topping singers and actors come at considerable social cost. Driven by the prospect of dizzying financial fortune, prospective stars flock to these industries in excessive numbers.²⁷ Moreover, the windfall awarded leading artists accentuates deadweight loss, as these excessive dollars drive a greater wedge between the marginal cost of producing and disseminating art and the ultimate cost paid by the consumer.²⁸ As a result, leading artists' excessive returns price some consumers out of the market.

Overcompensation consistent with the qualified quasi-maximalist approach also appears to be present in the patent context. Commentators often single out pioneer-drug manufacturers for enjoying excessive financial rewards,²⁹ though the pharmaceutical industry is not the only possible example. It may well be the case that certain (even many) inventors of business methods and computer software receive greater returns from the patent system than would be required to spur their innovative efforts in the first place.³⁰ This is suggested by the rancorous debate as to whether innovation in these fields is properly subject to patent protection at all, given the widespread, though not uncontested, view that adequate incentives exist to develop these technologies that are independent of the patent system.³¹ It is also evidenced by the fact that innovation proceeded in fine fashion in these fields before widespread patenting of these types of inventions was made possible by the Federal Circuit's decision in *State Street Bank & Trust Co. v. Signature Financial Group, Inc.*³² in 1998.

26. *See id.*

27. This is a fundamental result of uncontroversial economic theory.

28. *See* DENNIS W. CARLTON & JEFFREY M. PERLOFF, *MODERN INDUSTRIAL ORGANIZATION* 95–96 (4th ed. 2005).

29. *See* Jessica L. Greenbaum, *TRIPS and Public Health: Solutions for Ensuring Global Access to Essential AIDS Medication in the Wake of the Paragraph 6 Waiver*, 25 J. CONTEMP. HEALTH L. & POL'Y 142, 152 (2008).

30. *See* Peter S. Menell, *A Method for Reforming the Patent System*, 13 MICH. TELECOMM. & TECH. L. REV. 487, 497, 506 (2007); Hans A. von Spakovsky et al., *The Limited Patenting of Computer Software: A Proposed Statutory Approach*, 16 CUMB. L. REV. 27, 44–45 (1986).

31. *See, e.g., In re Bilski*, 545 F.3d 943, 1005 (Fed. Cir. 2008) (en banc) (Mayer, J., dissenting), *aff'd but criticized*, *Bilski v. Kappos*, 130 S.Ct. 3218 (2010); Arti K. Rai, John R. Allison & Bhaven N. Sampat, *University Software Ownership and Litigation: A First Examination*, 87 N.C. L. REV. 1519, 1521 (2009).

32. 149 F.3d 1368, 1373 (Fed. Cir. 1998) (adopting the principle that a process need only produce a useful, concrete, and tangible result to be patentable); *see also* John R. Allison & Emerson H. Tiller, *The Business Method Patent Myth*, 18 BERKELEY TECH. L.J. 987, 991 &

Certain patentees receive far greater pecuniary rewards than would have been required for them to produce those particular inventions *ex ante*. Does this suggest that the patent system adopts a qualified-maximalist approach? The answer is no because the windfall enjoyed by certain artists is highly distinguishable from the seemingly exorbitant returns commanded by patentees in certain industries. The distinction lies in the fact of cross-subsidization.³³ Industrial innovation, most obviously in the pharmaceutical sector, is characterized by large-scale R&D over a large number of diversified projects.³⁴ Companies operating in this environment rely on large profits from successful endeavors to cover losses from unfruitful ones.³⁵ To create a solid platform for ongoing innovation, these profits thus need to be of an order of magnitude greater than the cost of developing and commercializing the successful inventions.³⁶ It has been estimated that only one out of 10,000 research endeavors into potentially viable drugs will ultimately result in a marketable product.³⁷ Thus, far from indicating the adoption of a qualified-maximalist principle, hugely profitable patents are entirely consistent with a parsimonious approach.

Of course, this is not to suggest that contemporary doctrine is optimally tailored or that the IP system does not over-reward patentees in some industries. As this Article concludes, room for improvement does exist in the current patent regime and the necessary means for attaining such gains are fully supported by patent law's parsimony principle. This holds true even if that principle has not yet achieved unqualified or flawless application.

Although patent law has generally flouted a maximalist or quasi-maximalist approach to spurring innovation, the patent system has instead followed a parsimonious path in constructing a system of incentives for spurring innovation.³⁸ Questions of patentable subject matter, which have forever vexed the courts, strongly implicate this principle, as do the doctrine of equivalents, proper remedies in the event of infringement, the misuse doctrine, and other aspects of patent policy. The parsimony principle bears

n.10 (2003) (illustrating the dramatic rise in business-method patent claims in the wake of *State Street Bank*).

33. See Brian J. Dunne, *Compatibility Requirements, Systems Competition, and Copyright*, 39 U. TOL. L. REV. 813, 822 n.52 (2008).

34. See *id.*

35. See *id.*

36. Only 30% of FDA-approved drugs recoup their R&D costs. See Christopher L. Lockwood, Comment, *Biotechnology Industry Organization v. District of Columbia: A Preemptive Strike Against State Price Restrictions on Prescription Pharmaceuticals*, 19 ALB. L.J. SCI. & TECH. 143, 148 (2009).

37. *Id.*

38. See *infra* Part II.

great explanatory power in elucidating the current makeup of the law. For instance, it explains the convoluted series of U.S. Supreme Court decisions governing the sphere of patentable subject matter.³⁹ Yet, the principle also yields normative value in resolving pressing issues that presently afflict the patent system. This Article explains that patent law's parsimony principle is a desirable lodestar, indicates how the law has largely evolved in a manner consistent with this principle, and offers some thoughts on how this approach can help guide the courts, Congress, and the PTO through the anticipated turbulent times ahead. The Article also points to a number of caveats, however, that suggest that dogmatic adherence to the parsimonious approach would be improper in all cases.

II. THE CASE FOR PARSIMONIOUS PATENT RIGHTS

A. THE PATENT SYSTEM'S CHARGE: SPURRING INNOVATION

Patent law is charged with propelling the U.S. economy forward by fostering a vigorous and robust process of innovation,⁴⁰ which is no simple task. Invention, innovation, technological advancement, and similar synonyms all capture the idea of scientific progress, but such progress takes place in wholly dissimilar fashions across a bewildering array of industries.⁴¹ The incentives that drive innovation in one context may be quite different from those relevant to others.⁴² Of course, the almighty dollar is a leading incentive across industries generally, but the relative weight to be attached to purely pecuniary rewards will differ, as will the amount required to spur optimal levels of R&D. Moreover, the task of spurring technological progress is complicated by the fact of industrial evolution itself. Scientific development continues to blaze ahead, which is no doubt a testament to the intellectual-property regime already in place.⁴³ Many of the industrial contexts within which innovation now takes place, however, could not have been

39. See *Diamond v. Chakrabarty*, 447 U.S. 303 (1980); *Parker v. Flook*, 437 U.S. 584 (1978); *Gottschalk v. Benson*, 409 U.S. 63 (1972).

40. This mandate emanates from the U.S. Constitution, which grants Congress the power to "promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries." U.S. CONST. art. I, § 8, cl. 8.

41. See Dan L. Burk & Mark A. Lemley, *Policy Levers in Patent Law*, 89 VA. L. REV. 1575, 1581–89 (2003).

42. See Dotan Oliar & Christopher Sprigman, *There's No Free Laugh (Anymore): The Emergence of Intellectual Property Norms and the Transformation of Stand-Up Comedy*, 94 VA. L. REV. 1787, 1840 (2008).

43. See Patrick Doody, *The Patent System Is Not Broken*, 18 INTEL. PROP. & TECH. L.J. 10, 13 *passim* (2006).

within the Framers' contemplation at the time the U.S. Constitution was adopted.⁴⁴ Nor were many crucial areas of innovation foreseeable by Congress at the passage of the 1952 Patent Act.⁴⁵ That piece of legislation remains Congress's latest, all-encompassing attempt to fulfill its constitutional prerogative of advancing science and the useful arts.⁴⁶ The Act does so by creating ownership rights in the fruit of innovation.

Yet those rights were crafted with more traditional industries in mind. The specified bundle of rights associated with a patent grant may have been designed for sectors that require significant monetary outlays for innovation and that produce goods implicating only a limited number of patented products or processes.⁴⁷ It is possible that exclusive rights crafted for innovation in pharmaceutical, mechanical, or other capital-heavy industries may be well suited to those contexts, yet find incongruous application to new-economy fields founded on computer software or information technology.⁴⁸ The latter fields give rise to myriad, overlapping patent rights. It is not unusual, for instance, for a semiconductor chip to implicate thousands of patents.⁴⁹ Even a single patentee's obstinate refusal to license can enjoin commercialization of a product that implicates his technology only in a peripheral manner.⁵⁰ If a court declines to award injunctive relief, conscious infringement of a patent will give rise to treble-damages liability.⁵¹ Computer-software patents have been accused of asphyxiating follow-on research, which frustrates the enthusiastic efforts of individual programmers who seek to build on prior knowledge.⁵² Across a number of high-technology sectors, huge numbers of overlapping patent rights, which give rise to ubiquitous blocking scenarios, bear the potential to turn the patent regime on

44. See *Bilski v. Kappos*, 130 S. Ct. 3218, 3227–28 (2010).

45. See *id.*

46. 35 U.S.C. § 1 (2006).

47. See Daniel R. Cahoy & Leland Glenna, *Private Ordering and Public Energy Innovation Policy*, 36 FLA. ST. U. L. REV. 415, 447 n.167 (2009); Graeme B. Dinwoodie & Rochelle C. Dreyfus, *Diversifying Without Discriminating: Complying with the Mandates of the TRIPS Agreement*, 13 MICH. TELECOMM. & TECH. L. REV. 445, 445–46 (2007).

48. See, e.g., JAMES BESSEN & MICHAEL J. MEURER, *PATENT FAILURE: HOW JUDGES, BUREAUCRATS, AND LAWYERS PUT INNOVATORS AT RISK* 27 (2008).

49. Deborah Platt Majoras, *A Government Perspective on IP and Antitrust Law*, 38 RUTGERS L.J. 493, 497 (2007).

50. For this reason, companies in patent-laden industries typically prefer weaker patent rights. See Jay P. Kesan & Andres A. Gallo, *The Political Economy of the Patent System*, 87 N.C. L. REV. 1341, 1352–53 (2009).

51. *In re Seagate Tech., LLC*, 497 F.3d 1360, 1368 n.3 (Fed. Cir. 2007) (en banc).

52. See James Ernstmeier, Note, *Does Strict Territoriality Toll the End of Software Patents?*, 89 B.U. L. REV. 1267, 1276–77 (2009); Stephen McJohn, *Scary Patents*, 7 NW. J. TECH. & INTELL. PROP. 343, 367 (2009).

its head by braking, rather than driving, innovation.⁵³ Presumably, such a phenomenon was not within the foresight of Congress in 1952.⁵⁴ Yet many inventors in the new economy remain in need of pecuniary compensation, so some exclusive rights or alternative incentives systems (such as prizes or rewards) are surely necessary.

So what form should the exclusive rights associated with a patent take? To the uninitiated, this might appear to be an odd question. After all, property rights conferred on inventors should presumably be akin to ownership rights in more traditional contexts of realty and personalty.⁵⁵ Owners of such items largely have free reign to dictate the ends to which their property can be employed.⁵⁶ For example, the owner of a piece of land has a virtually unqualified right to control its use.⁵⁷ Anyone wishing to employ the property to his benefit must bargain for permission from the landowner, as the exclusivity inherent in a property right allows owners to extract the social value that flows from the land's use. Such rights are justified, in spite of the social costs they impose by denying third-party access, because they align private owners' incentives with the social optimum.⁵⁸ They do so by encouraging owners to devote capital to improvement and to consume resources in a responsible fashion. In the absence of property rights, third parties would appropriate the benefits of the improver's private efforts, thus eviscerating any incentive for the latter to undertake similar efforts in the future. Similarly, economics teaches that un-owned, scarce resources will be over-consumed—a phenomenon typically referred to as the tragedy of the commons.⁵⁹

The benefits of ownership in technology are similar, albeit not identical. Without a right to exclude others from availing of their novel technological insights, inventors may decline to devote the necessary capital to uncover like

53. Carl Shapiro, *Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard Setting*, in 1 INNOVATION POLICY AND THE ECONOMY 119, 121 (Adam B. Jaffe et al. eds., 2001).

54. See David B. Conrad, *Mining the Patent Thicket: The Supreme Court's Rejection of the Automatic Injunction Rule in eBay v. MercExchange*, 26 REV. LITIG. 119, 143–44 (2007).

55. For a discussion of the possible value of treating patents as giving rise to strong property rights, see F. Scott Kieff, *Property Rights and Property Rules for Commercializing Inventions*, 85 MINN. L. REV. 697, 703 (2001); R. Polk Wagner, *Information Wants to Be Free: Intellectual Property and the Mythologies of Control*, 103 COLUM. L. REV. 995, 997 (2003).

56. See, e.g., *Allred v. Harris*, 14 Cal. App. 4th 1386, 1390 (1993).

57. See Richard R.W. Brooks, *The Relative Burden of Determining Property Rules and Liability Rules: Broken Elevators in the Cathedral*, 97 NW. U. L. REV. 267, 313–14 (2002).

58. See STEVEN SHAVELL, FOUNDATIONS OF ECONOMIC ANALYSIS OF LAW 11–22 (2004).

59. See Garrett Hardin, *The Tragedy of the Commons*, 162 SCI. 1243, 1244–45 (1968).

insights in the future.⁶⁰ The free-rider problem is no less endemic in the intellectual realm than it is in the physical. Indeed, it is apt to be considerably worse, given the widely accepted fact that knowledge goods are more easily appropriated than tangible ones.⁶¹ Thus, at least in principle, there is no obvious reason why property rights should be any different in the technological sphere of patent law than they are in more traditional contexts. As Judge Easterbrook has explained, “[p]atents give a right to exclude, just as the law of trespass does with real property.”⁶² Yet, unlike the tragedy of the commons, information is a public good, such that it is not vulnerable to overconsumption once an inventor has garnered a sufficient return to justify the initial research and investment.

But is it really the case, as the Patent Act suggests, that patents should provide their owners similar rights as those enjoyed by owners of traditional property?⁶³ Does a powerful right to exclude that allows a qualifying inventor to extract all, or much, of his discovery’s social value best conform with the constitutional objective of promoting technology? There are certainly some who think so.⁶⁴ Viewed from the maximalist perspective, patent law should enable innovators to prevent any third party from gratuitously benefiting from their inventions.

However, there are strong reasons to reject this approach. Anyone who attempted to implement such a guiding principle would be engaging in a fool’s errand not only because the costs of such an approach would surely outweigh the gains, but also because any such efforts would be in vain. It is simply not possible to construct property rights that allow owners to internalize all beneficial uses of their discovery.⁶⁵ Moreover, traditional

60. See Ariel Porat, *Private Production of Public Goods: Liability for Unrequested Benefits*, 108 MICH. L. REV. 189, 224 n.101 (2009).

61. See Clarisa Long, *Patent Signals*, 69 U. CHI. L. REV. 625, 631–32 (2002).

62. Frank H. Easterbrook, *Intellectual Property Is Still Property*, 13 HARV. J.L. & PUB. POLY 108, 109 (1990).

63. 35 U.S.C. § 261 (2006) (“[P]atents shall have the attributes of personal property.”).

64. But see Adam Mossoff, *Exclusion and Exclusive Use in Patent Law*, 22 HARV. J.L. & TECH. 321, 323–26 (2009) (explaining that the traditional exclusion concept of the patent system is inadequate).

65. The first obstacle is an obvious one: to extract all social value from an invention, the inventor’s rights would have to be perpetual. Yet a system of ever-lasting property rights over a valuable invention would give rise to preclusive transaction and tracing costs. We might overcome this objection by observing that inventors with sufficiently high discount rates will care only about returns that they can derive in the short or medium run. Presumably, not all inventors will care about the value of IP that lasts beyond their deaths. But even in those situations it is impossible to prevent some externalities. Just as passersby benefit from the aesthetic quality of an improved house—a gain that the homeowners

principles of ownership cover realty and personalty, whose attributes can be vastly different than those of information goods.⁶⁶ This Article thus argues that bestowing inventors with *full* control over the disposition of their technologies is folly. The award of exclusive rights over knowledge carries social costs that increase in proportion with the elasticity of demand for that information.⁶⁷ Where such elasticity is high, increases in price beyond the marginal cost will result in sharp decreases in demand and hence output. This result clearly has serious social welfare losses. By granting innovators an absolute ability to exclude others, not only will monopoly prices proliferate, but downstream uses of the relevant technology for follow-on innovation will also be hindered. Real-life complaints of such effects abound in certain sectors, most notably in the field of computer software.⁶⁸ Expanding ownership rights in information can be expected to increase social welfare for a time, but it would also be anticipated that further proliferation of property rights eventually will choke access to knowledge, hinder the commercialization of products that implicate numerous technologies, over-reward initial inventors, and transfer wealth from consumers in an unjustified manner.

A maximalist approach to patent policy is therefore impractical and imprudent, given the overwhelming social costs involved in widespread overcompensation.⁶⁹ Excessively broad property rights over information may

cannot charge for—so too do inventors lack means to prevent third parties from benefiting in some indirect way from discoveries that they unearth.

66. For the author's extended thoughts on the relationship between tangible and intellectual property, see generally Alan Devlin, *Indeterminism and the Property-Patent Equation*, 28 YALE L. & POL'Y REV. 61 (2009).

67. See David W. Opperbeck, *Patent Damages Reform and the Shape of Patent Law*, 89 B.U. L. REV. 127, 131, 175–76 (2009).

68. See, e.g., Carl Shapiro, *Patent System Reform: Economic Analysis and Critique*, 19 BERKELEY TECH. L.J. 1017, 1018 (2004).

69. Contrary to what some might initially believe, there is such a thing as excessive innovation. Money devoted to R&D in future technology can, and in some instances will, generate a greater marginal gain for society by being devoted instead to alternative ends. Windfall profits for inventors—unless necessary to subsidize a broader platform of innovation—create serious distortions. The best-known example is the “gold-rush” phenomenon associated with winner-takes-all markets. The prospect of windfall gains acts as a powerful magnet, attracting more competition than is warranted from a societal viewpoint. Some innovators will eschew safer, and more socially valuable, investment opportunities to obtain a shot at the artificial reward at the end of such an innovation rainbow. Moreover, a maximalist patent system will, by definition, be of further reach than one tailored to the specific characteristics of the relevant industry or inventor. The further spread of property rights in the information field creates search and negotiation costs on the part of consumers, intermediaries, and downstream innovators that would not otherwise exist. And beyond these more nuanced concerns lies the obvious objection that consumers of patented

create windfall profits for some, but generally would leave society with wholly disproportionate losses.⁷⁰ Thus, property rights must be expanded with caution. The catch of course is that, without some reward, supply is apt to diminish or even to disappear, so it is no solution to jettison property rights in information altogether, though some radically-minded scholars have advocated this view.⁷¹

Instead, aggregate welfare can be maximized by ascertaining the optimal trade-off between, on one hand, the relative costs and benefits of free access to information for consumption and follow-on innovation, and, on the other hand, ownership rights that guarantee successful inventors a meaningful pecuniary return. The optimum level of protection occurs where the incremental social gain from a marginal increase in exclusivity equals the concomitant increase in social costs.⁷² As is often the case in economics, however, it is easier to state the solution generally than it is to propose and implement a plan with any reasonable precision. And unfortunately, policymakers are bereft of much of the information that they would need to tailor property rights in this optimal manner. It is an unremarkable fact that people are motivated by a host of idiosyncratic factors that span a vast spectrum. Spurring innovation thus presents huge conceptual and practical challenges.

It is therefore fascinating to consider how patent law has attempted to fulfill its constitutional mandate of promoting the useful arts.⁷³ Economic theory tells us that each inventor's reward should be tailor-made.⁷⁴ For instance, under an economic theory, the academic whose research yields profound insights into a new area of technological endeavors should not receive property rights in his discoveries if the prospect of tenure or prestige in the academic community offers sufficient compensation and if the university does not rely on pecuniary returns from the patented inventions of its faculty to fund the institution. Similarly, an inventor who solves a technical problem for her own benefit should be barred from claiming a

technology are required to pay more money than was necessary to reward the relevant inventors. Wealth transfers might in themselves be viewed as objectionable, but the artificially enhanced prices associated with a maximalist patent regime reduce consumption because most consumers' demand curves are downward-sloping. This translates into deadweight loss and a perpetual elimination of aggregate social wealth.

70. See Eisenberg, *supra* note 12, at 1026–28.

71. See generally Mark D. Janis, *Patent Abolitionism*, 17 BERKELEY TECH. L.J. 899 (2002) (discussing the history of patent abolitionism).

72. See LANDES & POSNER, *supra* note 3, at 66.

73. See U.S. CONST. art. I, § 8, cl. 8.

74. See LANDES & POSNER, *supra* note 3, at 300.

patent over her solution. The same should hold true for those who innovate primarily out of the joy that the process brings them. Some people love writing books; others adore painting; others still derive immense satisfaction from developing and improving software. From the technical standpoint of economics, none of these individuals should be eligible for property protection, at least insofar as they would continue innovating without pecuniary subsidization from the IP system.⁷⁵ But those inventors who face serious R&D and commercialization costs require strong exclusive rights if they are to engage in innovation. The pharmaceutical and biotechnology industries constitute obvious examples.⁷⁶

Even this very brief foray into the world of innovation reveals that no single standard or rule can spur all desirable creativity and invention. Rewards that are sufficient to some may be wholly inadequate to others, but compensation that is acceptable to all inventors will inevitably over-reward many. Those responsible for formulating patent doctrines are thus faced with a quagmire. They know that different inventors will react to a single body of incentives in disparate ways, but they do not possess sufficient information about each inventor to tailor innovator-specific property rights. Or, to be more precise, such information is not available at acceptable cost. Indeed, because it is so difficult to determine why particular inventors innovate, patent law has typically declined to incorporate inventor- or even industry-specific principles into its doctrine.⁷⁷ Instead, the patent laws generally operate on a “one-size-fits-all” basis, attempting to spur optimal levels of innovation through the provision of largely uniform reward structures.⁷⁸ As a result, it is uncontested that patent law currently operates in an imperfect

75. The only complicating factor concerns commercialization. To transform a conceptualized invention into marketable products requires considerable investment, particularly when the products cannot be disseminated digitally. Inventors who innovate for the joy of invention should be awarded patent protection when such ownership rights are necessary to spur commercialization. *See* Kieff, *supra* note 55.

76. *See* Benjamin N. Roin, *Unpatentable Drugs and the Standards of Patentability*, 87 TEX. L. REV. 503, 511 (2009).

77. *See* Michael W. Carroll, *One for All: The Problem of Uniformity Cost in Intellectual Property Law*, 55 AM. U. L. REV. 845 (2006) (exploring the one-size-fits-all nature of much of the U.S. patent system). *But see* BURK & LEMLEY, *supra* note 9 (exploring certain ways in which the courts have applied ostensibly identical patent rules in different ways depending upon the industry at issue).

78. *See, e.g.,* Rebecca S. Eisenberg, *Patents, Product Exclusivity, and Information Dissemination: How Law Directs Biopharmaceutical Research and Development*, 72 FORDHAM L. REV. 477, 486 (2003) (“Our patent laws are one-size-fits-all, applying essentially the same rules to biopharmaceutical research that apply to automotive engineering, information technology, semiconductors, and rocket science. But the needs of these fields for patent protection differ.”).

manner, at least insofar as when its efficacy is measured by its ability to spur optimal levels of innovation.⁷⁹

Despite this melancholy observation, it does not follow that patent law's one-size-fits-all approach is undesirable from a policy perspective. Tailoring rules to context-specific scenarios necessarily involves a cost because courts have to make case-by-case determinations. That cost is, of course, eliminated by the adoption of uniform rules. Such uniformity is warranted when the cost of attempting to convey accurate rewards exceeds the benefit that such specificity would bestow. Given the limited access to information enjoyed by policymakers, the cost of accurately crafting inventor-specific rewards would be high indeed.⁸⁰

There is therefore at least some basis for believing that patent law's relatively uniform approach is justified. The question thus arises of what particular set of rules will act as the optimal heuristic, and we are thus prompted to enter the domain of error analysis. When called upon to craft rules in an indeterminate environment, one must inquire into the relative costs of erring on one side rather than the other. In the criminal context, for instance, it is widely accepted that mistaken guilty verdicts are more serious than erroneous judgments of innocence.⁸¹ In the patent field, one question of

79. See Dinwoodie & Dreyfus, *supra* note 47, at 446 (questioning whether patent law's "one-size-fits-all" approach can survive).

80. Some industry-specific modifications in doctrine are both cost-justified and compelled by a parsimonious approach. Accord Eric E. Johnson, *Calibrating Patent Lifetimes*, 22 SANTA CLARA COMPUTER & HIGH TECH. L.J. 269, 269, 285–89 (2006). The fact remains, however, that sufficient information to tailor rewards precisely to individual inventors' incentive characteristics remains unavailable. Nevertheless, to the extent that more efficient heuristics can be derived from observable differences in various industries' innovation profiles, they should obviously be employed. For example, one can safely observe that significant rewards are required to cover the level of capital required for R&D in the pharmaceutical sector. Yet one can also point to the fact that computer software is copyright-protectable and that innovators in this field will receive some reward even in the absence of patent protection. Therefore, a parsimonious approach to patent doctrine would counsel broader exclusive rights in the pharmaceutical rather than the computer-software industry. This discussion is expanded upon below. See *infra* Part IV.

81. Judge Harlan explains:

In a criminal case . . . we do not view the social disutility of convicting an innocent man as equivalent to the disutility of acquitting someone who is guilty. . . .

. . . .
 . . . [T]he requirement of proof beyond a reasonable doubt in a criminal case [is] bottomed on a fundamental value determination of our society that it is far worse to convict an innocent man than to let a guilty man go free.

In re Winship, 397 U.S. 358, 372 (1970) (Harlan, J., concurring).

significance might be whether overcompensation or under-compensation is worthy of greater concern. Were policymakers forced to operate in an environment of complete uncertainty—that is, if they were denied any ability to ascribe probabilities to various outcomes—the answer to this question would be determinative. If excessive levels of innovation are preferable to insufficient levels of such activity, we should then simply maximize innovation.

This path finds its definition in the “maximalist” approach to patent policy, which this Article has already rejected for the multitude of reasons.⁸² Nevertheless, were we to provide inventors with an unqualified ability to exclude others from benefiting from their discoveries, they would be able to appropriate the full social value of their inventions. When subject to the incentives associated with such rewards, inventors would decline to innovate only if the cost of invention and commercialization exceeded the social value created by the ensuing technology. Thus, a maximalist regime ensures that all socially desirable breakthrough (as opposed to cumulative) innovation takes place.⁸³ For this reason, some commentators tout the benefit of a patent system that would bestow inventors with the greatest possible value that can be tied to their innovation.⁸⁴

B. PROMOTING A PARSIMONIOUS APPROACH TO PATENT POLICY

This Article declines to follow the maximalist ideal because policymakers are blessed with more than zero information about the innovative process. We need not eliminate all Type I errors in innovation (under-compensation) by accepting swathes of Type II errors (overcompensation). It is surely the case that allowing inventors to extract the entire social value of their inventions will exceed the optimal level of protection in most cases. Thus, patent law can achieve superior outcomes by eschewing wild biases in favor

82. See *supra* Part I.

83. See W. KIP VISCUSI ET AL., *ECONOMICS OF REGULATION AND ANTITRUST* 92, app. (1992) (“If the inventor cannot expect to appropriate all of the economic value of his invention, he will under-invest in inventive activity.”); David E. Adelman & Kirsten H. Engel, *Reorienting State Climate Change Policies to Induce Technological Change*, 50 ARIZ. L. REV. 835, 849 (2008); Gideon Parchomovsky & Peter Siegelman, *Towards an Integrated Theory of Intellectual Property*, 88 VA. L. REV. 1455, 1459 (2002); Jaideep Venkatesan, *Compulsory Licensing of Nonpracticing Patentees After eBay v. MercExchange*, 14 VA. J.L. & TECH. 26 (2009) (suggesting that it might be proper to allow patentees to derive the “full value” of their inventions in some settings). *But see* Ian Ayres & Paul Klemperer, *Limiting Patentees’ Market Power Without Reducing Innovation Incentives: The Perverse Benefits of Uncertainty and Non-Injunctive Remedies*, 97 MICH. L. REV. 985, 987 *passim* (1999) (challenging the maximalist view); Louis Kaplow, *The Patent-Antitrust Intersection: A Reappraisal*, 97 HARV. L. REV. 1813, 1828 (1984).

84. See sources cited *supra* note 83.

of under- or over-rewarding inventors and instead attempting to approximate more nuanced rules. It can do so by reference to the unique and visible characteristics of different industries—characteristics that enable patent law to mollify or magnify its reward regime depending on the context at hand.⁸⁵ Of course, patent law’s one-size-fits-all structure places significant restrictions on this ability, but it is widely accepted that the patent system has a number of “policy levers” that the courts can, and have, manipulated to society’s advantage.⁸⁶

Abandoning the pure maximalist approach, both on pragmatic and normative grounds, we should ask how strong patent rights ought to be in light of the framework adopted by Congress. Put differently, if patent law rightly rejects a maximalist lodestar, what guiding principle is left in its stead? Precisely tailoring of property rights’ breadth and duration to individual inventors’ incentive characteristics is wholly unrealistic, so some sort of guide is required. A number of possibilities emerge. One avenue is to reject the pure maximalist approach, which seeks to eliminate any Type I error, and instead to err on the side of significant overprotection in cases of uncertainty. This path, coined the “quasi-maximalist” approach by this Article, would grant patentees generous property rights. More specifically, the quasi-maximalist approach would recognize (both on normative and positive grounds) the limits on patentee compensation established by Congress, such as constraints on duration and breadth. But it would give full force to the rights espoused by the legislature, granting qualified inventors as much protection as would be consistent with the statutory language. Although some limited instances of under-compensation would occur, given that inventors would be denied property rights that would enable them to enjoin *all* valuable uses of their technologies, such powerful patents would ensure the presence of powerful ex ante incentives. In such a regime, Type II errors would surely swamp Type I. Even when debate erupts as to whether patents in a particular field are producing a “tragedy of the anticommons” by hindering innovation more than the grant of excessive rewards would spur it,⁸⁷ one adhering to this approach would strongly resist tempering patentees’ exclusive rights, for patentees would be entitled to derive as much profit as would realistically be possible through their IP rights. Injunctions would thus

85. Such context-specific determinations are not cost-prohibitive in all cases.

86. See Burk & Lemley, *supra* note 41 *passim*.

87. See, e.g., Giovanni Dosi et al., *Knowledge, Competition and Innovation: Is Strong IPR Protection Really Needed for More and Better Innovations?*, 13 MICH. TELECOMM. & TECH. L. REV. 471, 477, 480 (2007); Michael A. Heller & Rebecca S. Eisenberg, *Can Patents Deter Innovation? The Anticommons in Biomedical Research*, 280 SCI. 698, 698–99 (1998).

be expected to routinely issue in the event of proven infringement, patentable subject matter would encompass all new and useful processes, and patentees would be free to enter into any contractual arrangements with licensees that they wish, subject only to antitrust constraints.

This approach may be fairly tied to the “property rights movement,” which seeks to import principles of property law into the intellectual realm and bestow inventors with unlimited rights to exclude.⁸⁸ Although such commentators believe that inventors of valuable technologies deserve to be richly rewarded, they nevertheless recognize that limits on patentees’ exclusive rights are warranted in certain circumstances.⁸⁹ Nor would they contest the principle of patents being time-limited, but they might however believe that patents in certain industries should be of greater duration.⁹⁰

A further alternative is the reverse of the maximalist approach, which is known as the abolitionist approach to patent law. From this perspective, the cost of the patent system so clearly exceeds the perceived benefits that the entire system should be withdrawn.⁹¹ Some people do advocate this extreme view.⁹² For them, the IP system’s restriction on individual freedom is so objectionable that patents should be eliminated.⁹³ They posit the mantra that “information just wants to be free” and believe that altruistic influences, social recognition, and the innate joy of inventing provide sufficient incentives to innovate.⁹⁴ For abolitionists, presumably reduced levels of capital investment in R&D are worthy of concern, but constitute the necessary price of a larger good in the form of individual liberty.⁹⁵

Despite the impassioned arguments some have leveled against the IP regime, it is difficult to take the abolitionist case seriously, at least insofar as it purports to apply to investment-heavy research sectors like the

88. See generally Peter S. Menell, *The Property Rights Movement’s Embrace of Intellectual Property: True Love or Doomed Relationship?*, 34 *ECOLOGY L.Q.* 713 (2007) (discussing the durability of the property rights movement’s embrace of intellectual property).

89. For instance, Professor Richard Epstein, who is regarded by some commentators as a leading proponent of the property rights movement, has acknowledged that limited circumstances exist in which patentees should be denied injunctive relief in the event of infringement. See, e.g., Richard Epstein, *The Property Rights Movement and Intellectual Property: A Response to Peter Menell*, 31 *REGULATION* 58, 59 (2008).

90. The pharmaceutical industry is the prime candidate in this regard.

91. See, e.g., MICHELE BOLDRIN & DAVID K. LEVINE, *AGAINST INTELLECTUAL MONOPOLY* (2008); N. STEPHAN KINSELLA, *AGAINST INTELLECTUAL PROPERTY* 19 (2008).

92. See Janis, *supra* note 71.

93. See *id.*

94. See Thomas O. Barnett, *Interoperability Between Antitrust and Intellectual Property*, 14 *GEO. MASON L. REV.* 859, 865 (2007).

95. For a discussion on the abolitionist perspective, see Janis, *supra* note 71.

pharmaceutical industry.⁹⁶ The pace and sheer scale of U.S. innovation remain the envy of the world.⁹⁷ The demonstrable success of the new U.S. economy—an economy founded in large part on a platform of strong IP rights—is testament to the power of patent law in inducing scientific progress. In light of this historic and ongoing success, and absent compelling empirical or theoretical evidence to the contrary, it would be massively irresponsible to jettison the system that has laid the foundation for such valuable technological innovation.⁹⁸

Although the current IP regime is of course not without its flaws, isolated failures in the patent system are nevertheless not inconsistent with that system performing an overall good. Put differently, the demonstrable net success of the patent laws does not establish that the contemporary system is optimally tailored. It could be that the patent system operates with great effectiveness in R&D-investment-heavy industries, which produce products based on a limited number of patent rights.⁹⁹ But it may also be that new areas of commercial innovation that give rise to innumerable blocking patents owned by numerous entities are less well-suited to traditional patent principles. Denying IP protection to entire swathes of such industries is worthy of skepticism, but, on the basis of current knowledge, it is still empirically unclear whether certain, limited instances of patent protection create net social losses. In lieu of a dogmatic rejection of the benefits of IP generally, the more responsible solution may lie in incremental adjustment.

96. A more reasonable variant of this account would advocate for the removal of patent rights only from certain suspect sectors, such as with business methods and computer software.

97. For a discussion on America's position as the world's most innovative economy in light of the 2008–2009 credit crisis, see *Innovation in America: A Gathering Storm?*, ECONOMIST, Nov. 22, 2008, at 84. *But see* David Goldman, *Recession's Latest Victim: U.S. Innovation*, CNNMONEY.COM, (Dec. 11, 2009), http://money.cnn.com/2009/12/11/news/economy/patent_filings/ (discussing the phenomenon of slowed U.S. innovation and patent filing in light of the 2009 recession).

98. This holds true even in contested industries, such as computer software, where high levels of innovation belie the existence of an IP system that impedes innovation to such a significant degree that it should be removed entirely. *See* Andrew Beckerman-Rodau, *The Supreme Court Engages in Judicial Activism in Interpreting the Patent Law in eBay, Inc. v. MercExchange, L.L.C.*, 10 TUL. J. TECH. & INTELL. PROP. 165, 172 (2007).

99. Of course, it may also be the case that even the pharmaceutical industry, dependent as it is on strong patent rights, may presently be garnering greater profits than necessary to spur innovation. *See Winds of Change: Merck's Woes Illuminate the Shifts Taking Place in the Drugs Industry*, ECONOMIST, Dec. 13, 2008, at 89 (referring to a study that suggested that a 20% drop in drug prices for Medicare purchases would only reduce leading companies' profits by 5% and inferring that no threat to the pharmaceutical industry would exist as long as it continues to innovate).

This brings us to the parsimonious path, which this Article finds the most compelling approach to patent law. Like the quasi-maximalist perspective on patent jurisprudence, it acknowledges that the optimal outcome would be to match incentives precisely to rewards, but similarly recognizes that pragmatic considerations foreclose such an outcome. It may instead be characterized by reference to displaying a qualified bias in favor of constrained compensation in close cases.

As defined by this Article, the parsimony principle instructs that policymakers and courts should not be entirely agnostic in their perceived abilities to judge the unique incentive characteristics of various industries, as the principle teaches that patentee compensation can and should differ depending on the relevant industrial setting. Where evidence exists that inventors in certain fields require less potent patent rights to induce them to invest in desirable levels of R&D, those rights should be diluted in an appropriate fashion. The problem, of course, is that the relevant evidence will rarely be irrefutable, as problems associated with new technologies, and hence new incentive structures, are likely to build incrementally and remain contestable for some time. But as industry concerns grow and become more vocal—as has been the case in the information-technology and business-method settings—the PTO and the courts should avail of patent law's policy levers incrementally to constrain net (as opposed to necessarily individual) compensation. Perhaps the best way to implement such policies is to adjust the nonobviousness and novelty bars to limit the proprietary scope of patented technologies in fields of concern. Such a parsimonious approach to patent policy would see subtle, evolving limitations on patentees' exclusive reach, which may be characterized by minimalist alterations to patent rights in reaction to perceived evidence. Ultimately, the principle would attempt to significantly constrain inventors' pecuniary return and, in so doing, minimize windfalls while still maintaining adequate incentives to invent. By operating in such a fashion, policymakers would naturally demonstrate more faith in their abilities to craft responsible rules of asymmetric effect than would those who adhere to a quasi-maximalist approach. This Article contends, however, that sufficient information is available to mold industry-specific patent rights that would better approximate the theoretical optimum level of protection.

Of course, the preceding categories are subjectively malleable and could conceivably overlap, particularly at the border of the quasi-maximalist and parsimonious approaches to patent policy. But these two categories can be distinguished on the basis of degree and innate bias in the event of qualified uncertainty. The parsimonious path may be defined in part by a greater proclivity for Type I errors than the quasi-maximalist approach would have.

It may also be further defined by an ongoing attempt to cabin rights in appropriate settings as further evidence becomes available.

Can we inject further specificity into the definition of the parsimony principle? As the boundaries of the principle become more clear-cut, it will lend itself increasingly well to more useful applications. In addition to the preceding exploration, it may be helpful to clarify that the parsimony principle is not an approach that seeks to err on the side of under-compensation in cases of uncertainty. The principle, defined in this manner, would be problematic for several reasons, with the most prominent problem being that the law does not demonstrate such a bias. Protection in patent law remains very generous, particularly in comparison to copyright law. Moreover, accepting a large proportion of Type I errors would be a dangerous policy, given the greater benefits of dynamic over static efficiency.¹⁰⁰ So defined, this parsimony principle would be normatively undesirable and would also provide a poor positive explanation of the current patent system. Instead, for those who believe that patent law, despite its many historical and self-evident successes, may have overstepped its bounds, the parsimonious path offers a responsible course by which to limit perceived instances of patentee overcompensation.

Of course, it is the indeterminate nature of innovation, and the elusive point of optimal protection, which denies us the benefit of perfect clarity. Were we confidently able to define an optimal principle that would cause patent doctrine to approach the optimal outcome, we would have solved the problem of indeterminism, but no heuristic devised on the basis of seriously incomplete information could reasonably aspire to such an end. The more modest ambition of this Article is to point to a broad theme of cabined exclusivity that produces lower levels of patentee compensation than would result from granting inventors the full panoply of benefits that could plausibly be derived from the statutory framework put in place by Congress in 1952. Instead of seeing a conscious bias in favor of significant overcompensation, we can observe a more nuanced system that attempts to impose meaningful, though responsible, limitations on patentees' exclusive rights. This degradation of patentees' rights takes place in an incremental fashion, as further information becomes available to policymakers. As the environment within which patent law operates becomes more information-rich, by virtue of the large-scale natural experiment of which the intellectual-property system is a part, we can expect the parsimony path to lead incrementally, yet inexorably, closer to the social optimum.

100. See Barnett, *supra* note 8, at 1194.

Before considering how the parsimony principle can be employed to inform modern debate, particularly on the role of patentable subject matter and calculating damages, this Article explains a somewhat surprising result: patent law has silently embraced the parsimony principle in its substantive doctrine.¹⁰¹ The law has subtly evolved in a manner that seeks to limit patentees' exclusive reach to a level that is unlikely to result in significant overcompensation.¹⁰² The following Part espouses a novel interpretation of the patent system. In doing so, it concludes that the parsimony principle yields great instructive power in explaining the current constitution of the law.

III. PATENT LAW'S SILENT EMBRACE OF THE PARSIMONY PRINCIPLE

A. PATENTABLE SUBJECT MATTER

It might seem odd to begin a discussion of patent law's subtle adoption of the parsimony principle by appealing to a topic that some might read to support an opposing view. Until very recently, the tale of patentable subject matter has been of near-unqualified expansion.¹⁰³ Historically, a host of restrictions on patent eligibility existed, but computer software, business methods, immoral inventions, gene sequences, and biological material have all been deemed patent-ineligible at one point or another.¹⁰⁴ Yet in a series of facilitative rulings, the Supreme Court and Federal Circuit opened up virtually all areas of innovative activity to patent protection, save those that are inescapably abstract or are discovered in lieu of being invented, with the latter restriction resulting from the perennial ban on patenting preexisting natural phenomena.¹⁰⁵ The high Court's famous remark that "anything under the sun that is made by man" is patent-eligible aptly summarizes the law's evolving reach.¹⁰⁶

101. *See infra* Part III.

102. *See infra* Part III.

103. *See* SCHECHTER & THOMAS, *supra* note 4, at 58–60.

104. *See* Gottschalk v. Benson, 409 U.S. 63, 71–72 (1972) (computer software); Hotel Sec. Checking Co. v. Lorraine Co., 160 F. 467, 469 (2d Cir. 1908) (business methods); Lowell v. Lewis, 15 F. Cas. 1018, 1019 (C.C.D. Mass. 1817) (immoral inventions); Nicholas M. Zovko, Comment, *Nanotechnology and the Experimental Use Defense to Patent Infringement*, 37 MCGEORGE L. REV. 129, 152 (2006) (biotechnology).

105. *See* Diamond v. Diehr, 450 U.S. 175, 177 (1981) (computer software); Diamond v. Chakrabarty, 447 U.S. 303, 305 (1980) (oil-eating bacteria); State St. Bank & Trust v. Signature Fin. Grp., 149 F.3d 1368, 1370 (Fed. Cir. 1998) (business methods); Utility Examination Guidelines, 66 Fed. Reg. 1092, 1093 (Jan. 5, 2001) (genes).

106. *Chakrabarty*, 447 U.S. at 309.

In light of the patent system's wide-reaching application, what does the question of patentable subject matter teach about the law's purported adoption of a parsimony principle? First, its expansive reach across fields of innovative activity is not at all inconsistent with a parsimonious approach since the parsimony principle would rather cabin the breadth and duration of exclusive rights to remedy possible overprotection than withdraw entirely from fields where such overprotection is arguably present. Innovation is an activity of huge societal import, which emanates from more than traditional contexts alone. Biotechnology, computer software, gene sequencing, medical diagnostic methods, and other fields of research bear the potential to yield vast contributions to social welfare. While theory suggests that a patent thicket can detract from scientific progress in certain of these fields,¹⁰⁷ there is no convincing evidence that indicates that innovation would continue apace in these fields in the absence of any property rights. This being the case, patent law's wide reach would generally seem to be commendable.¹⁰⁸

Second, gaps in patentable subject matter say important things about the perceived need for property rights to spur innovation.¹⁰⁹ It must be borne in mind that denying inventors in specified fields any prospect of patent protection is something of a nuclear option. A parsimonious approach would seek to curtail exclusive rights to prevent windfalls, but would generally not deny some right of ownership. Such outright denials can often, though not invariably, bear an excessive risk of eviscerating incentives to invent. Yet, as the Court has emphatically stressed, its statement that "anything under the sun that is made by man" is patentable "is not to suggest that § 101 has no limits or that it embraces every discovery. The law of nature, physical phenomena, and abstract ideas have been held not patentable."¹¹⁰ As it turns out, these foundational limitations on patent-eligible subject matter can only

107. See, e.g., BURK & LEMLEY, *supra* note 9, at 89–90 (detailing the possible patent-thicket problem in information-technology industries); Karl Bergman & Gregory Graff, *The Global Stem Cell Patent Landscape*, 25 NATURE BIOTECHNOLOGY 419, 422 (2007) ("The characteristics of the stem cell patent landscape are consistent with conditions that could give rise to a patent thicket."); Arti K. Rai & Rebecca S. Eisenberg, *Bayh-Dole Reform and the Progress of Biomedicine*, 66 LAW & CONTEMP. PROBS. 289, 297 (2003) ("Concern about an anti-commons . . . is quite pressing in contemporary biomedical research that draws upon many prior discoveries made by different scientists in universities and private firms.").

108. The question of whether computer software and business methods are appropriately subject to patent protection is one of the most divisive contemporary issues in patent law. It is also one that is fundamentally implicated by this Article's focus on the parsimony principle.

109. Alternatively, it may say something about society's interest in not promoting innovation in all possible fields of endeavor.

110. *Chakrabarty*, 447 U.S. at 309.

be satisfactorily explained by reference to patent law's parsimony principle. These fields of discovery bear unique potential for overcompensation, given their upstream nature and the concomitant proclivity for ubiquitous downstream application.

Yet these restrictions on patentable subject matter have never been explained in such terms by the judiciary. Instead, the courts have spoken in somewhat conclusory terms, focusing instead on the three atextual non-patentable categories identified above—abstract ideas, laws of nature, and natural phenomena. In 1852, the Court provided its definitive exposition that “a principle is not patentable. A principle, in the abstract, is a fundamental truth; an original cause; a motive; these cannot be patented.”¹¹¹ In 1944, the Second Circuit echoed this view, noting that “epoch-making ‘discoveries’ or ‘mere’ general scientific ‘laws,’ without more, cannot be patented.”¹¹² The exclusion of fundamental principles has largely been explained on the ground that they naturally exist in nature and therefore cannot be “invented.”¹¹³ The Supreme Court has concluded that such principles are “part of the storehouse of knowledge of all men” and therefore cannot be appropriated by any single entity.¹¹⁴

This account of why laws of nature are non-patentable is quite unconvincing.¹¹⁵ A storehouse of knowledge only exists when human toil and ingenuity reveal fundamental rules of physics that may have been extraordinarily elusive for an extended period of time. The Court has reiterated time and again that Einstein's $e=mc^2$ could not have been patented.¹¹⁶ Note that this and other breakthrough scientific discoveries easily surmount the conditions of novelty, nonobviousness, and utility. Until the moment of discovery, such laws of nature have escaped human understanding for our entire history, despite enduring efforts to understand the universe within which we reside. One can hardly call the nonobviousness or novelty of such discoveries into question. Ground-breaking scientific discoveries of the kind that define the late nineteenth and twentieth centuries have given rise to unprecedented levels of technological innovation. Science continues to develop at an extraordinary rate and social welfare benefits

111. *Le Roy v. Tatham*, 55 U.S. 156, 175 (1852).

112. *Katz v. Horni Signal Mfg. Corp.*, 145 F.2d 961, 961 (2d Cir. 1944).

113. *See, e.g., Ex parte Lundgren*, No. 2003-2088, 2004 WL 3561262, at *14 (B.P.A.I. Sept. 28, 2005).

114. *Funk Bros. Seed Co. v. Kalo Inoculant Co.*, 333 U.S. 127, 130 (1948).

115. *See, e.g., Ariel Simon, Reimventing Discovery: Patent Law's Characterizations of and Interventions Upon Science*, 157 U. PA. L. REV. 2175, 2180 (2009).

116. *See, e.g., Diamond v. Chakrabarty*, 447 U.S. 303, 309 (1980).

accordingly.¹¹⁷ Much, if not all, of this progress can be tied to the discovery of fundamental principles. Therefore, no one can credibly challenge the utility of such discoveries.

If patent law is founded on the principle of incentivizing socially desirable innovation, then the preclusion of fundamental principles is a profound incongruity. The gains from their discovery can be extraordinary, and they can be confoundingly difficult to unearth. Given that vast rates of intellectual and pecuniary capital may be required to successfully discover rules of nature that bear great potential value for society, the utilitarian case for patent protection would appear to be strong. It is no answer to proclaim that such principles belong to all mankind. Presumably, the Court views abstract discoveries with consternation because of their broad field of use, unencumbered by limitations to specific applications, threatens to hinder all subsequent applications of those basic scientific discoveries. The transaction costs involved in licensing fundamental principles to myriad users may be large, but to reject patent protection on this basis is to do so solely on the ground that the excluded discoveries are unusually valuable. It is easy to forget that transaction costs are what translate into a monetary reward for the deserving inventor (or discoverer). It is thus not satisfactory to draw a distinction, as the Court has attempted to do, between “invention” and “discovery.”¹¹⁸ The U.S. Constitution explicitly envisions the patent eligibility of both.¹¹⁹

There is a strong normative justification for limitations on patent law’s reach, though it is not one that has been adopted by the Court. By denying patent protection to those who unearth fundamental principles, but granting patent eligibility to those who can apply those principles to articulated and limited ends, the patent system effectively cabins the potential for overprotection. Complete ownership of a fundamental principle will result in exclusive rights of exceptionally broad reach and, hence, extraordinarily high profitability. It is likely that the returns associated with such an expansive property right would result in a windfall for the discoverer. Here, the distinction between the quasi-maximalist and parsimonious approaches is evident. Bestowing a person who uncovers an abstract principle of great value with a property right over all of its conceivable applications would

117. See Harold T. Shapiro, *Stopping Science: Human Cloning—Should It Be Stopped?*, 9 HEALTH MATRIX 303, 307 (1999).

118. See *In re Alappat*, 33 F.3d 1526, 1582 (Fed. Cir. 1994) (Rader, J., concurring); see also Troy L. Gwartney, Note, *Harmonizing the Exclusionary Rights of Patents with Compulsory Licensing*, 50 WM. & MARY L. REV. 1395, 1398 n.5 (2009).

119. U.S. CONST. art. I, § 8, cl. 8.

result in the discoverer recouping a large degree of the principle's social value, but it would not allow her to derive greater value than is inherent in her discovery. However, the return she garnered would most likely exceed what would have been necessary to spur her research efforts. Adopting this perspective, patent law's parsimony principle limits inventors' exclusivity to a degree that is likely to provide a sufficient return, but is unlikely to result in wholly disproportionate profits.¹²⁰

In short, fundamental principles that bear the potential for ubiquitous application are perhaps uniquely poised to provide those who control them with profits far greater than necessary to induce their discovery, but allowing people to patent particular applications of those principles ensures that sufficient returns are possible for commercialization. The result—inventors enjoying a sphere of exclusivity over specific applications of principles rather than over all applications of such principles—is a balanced and sensible approach to managing incentives.

Thus, the law's traditional exclusion of fundamental principles from patentable subject matter suggests a parsimonious approach. A related feature of the patentable subject-matter doctrine concerns the Court's departure from the Patent Act's instruction that "any new and useful process" is patent-eligible.¹²¹ The judiciary has resisted giving force to this command, believing that some processes are too open-ended for patent protection.¹²² Here, the parsimonious approach is similarly evident, though the courts have struggled mightily to find a harmonious limiting principle. One need merely review the tortured reasoning of *Gottschalk, Flook, Diamond*, and most recently *Bilski* to appreciate how the Court has been unable to articulate a satisfactory curb on process patenting.¹²³

The judiciary's struggle with untethered processes is very much related to its rejection of fundamental principles as a class of patent-eligible subject matter. It is a basic aspect of patent law that a claim "cannot be construed so broadly to cover every conceivable way or means to perform" that

120. See *Lab. Corp. of Am. Holdings v. Metabolite Labs, Inc.*, 584 U.S. 124, 126–27 (2006) (Breyer, J., dissenting).

121. See, e.g., Dotan Oliar, *The (Constitutional) Convention of IP: A New Reading*, 57 UCLA L. REV. 421, 456 (2009) ("Congress could clarify that section 101, which says that 'whoever . . . discovers any new and useful . . . composition of matter . . . may obtain a patent,' means what a plain reading suggests—that is, that one may patent a newly discovered natural element, for example—rather than what the Supreme Court interpreted it to mean—namely, that the natural product doctrine bars such protection.").

122. See, e.g., *id.*

123. See John A. Burtis, Comment, *Towards a Rational Jurisprudence of Computer-Related Patentability in Light of In re Alappat*, 79 MINN. L. REV. 1129, 1137 (1995).

function.¹²⁴ Similarly, use of a means-plus-function limitation serves as an important curb against potential over-rewarding.¹²⁵ The theory that justifies these limitations is identical to that which counsels the preclusion of fundamental principles from patent protection: the means-plus-function limitation acts as an important curb on patentees' ability to gain exclusive rights over a broader range of conduct than is appropriate to their respective inventions. Were patentees entitled to claim their inventions through the means-plus-function method, without having those claims limited by the patent document's specification,¹²⁶ they would be able to preempt vast swathes of activity. Similarly, all-encompassing method claims would grant such patentees far greater rewards than would be warranted by the circumstances attendant on their R&D efforts. The law's exclusion of such claims constitutes a resounding endorsement of its embrace of parsimonious ideals.

A final word on the question of patentable subject matter relates to the nonobviousness condition.¹²⁷ Technically, this requirement is separate from the general question of what areas of innovation are eligible for patent protection, but the issues are sufficiently related to warrant discussing these two patentability hurdles together. Whether a parsimonious or quasi-maximalist bias should color determinations under § 103 is an important one. Nonobviousness, which has been aptly characterized as "the ultimate condition of patentability,"¹²⁸ serves a crucial role in siphoning undeserving inventions out of patent eligibility. Obvious increments in knowledge, even if novel and useful, are in all likelihood inevitable. Therefore, from a utilitarian

124. *Mas-Hamilton Grp. v. LaGard, Inc.*, 156 F.3d 1206, 1214 (Fed. Cir. 1998).

125. A related exception to the rule that a patent's reach is based on the substance of its claims lies in 35 U.S.C. § 112, ¶ 6, which allows patentees to engage in means-plus-function claiming, pursuant to which they outline the steps and consequences involved in a process without detailing the underlying structure in the claim itself. However, such otherwise untethered claims are construed in light of the specification, lest the claimed invention be overbroad and grant the owner an excessive return. *See Kemco Sales, Inc. v. Control Papers Co.*, 208 F.3d 1352, 1361–62 (Fed. Cir. 2000). But placing the controversial phenomenon of means-plus-function claiming aside, which tends to eviscerate the purpose of claiming and simply grants patentees what they invented instead of what they claim, claims are essentially self-contained. It is perhaps noteworthy that the incongruity between means-plus-function claiming and the traditional manner of detailing the boundaries of one's invention has caused some critics to call for the former's elimination. If this were put into effect, the U.S. patent system's procedure for establishing the legal reach of one's invention would be rendered considerably more harmonious.

126. *See Kemco Sales*, 208 F.3d at 1361–62.

127. 35 U.S.C. § 103 (2006).

128. *See* Robert P. Merges, *Commercial Success and Patent Standards: Economic Perspectives on Innovation*, 76 CALIF. L. REV. 803, 812 (1988) (quoting NONOBVIOUSNESS—THE ULTIMATE CONDITION OF PATENTABILITY: PAPERS COMPILED IN COMMEMORATION OF THE SILVER ANNIVERSARY OF 35 U.S.C. 103 (John F. Witherspoon ed., 1980)).

standpoint awarding patents for such inventions creates monopoly distortions with little countervailing benefit. Specifically, the nonobviousness condition plays a crucial role in limiting overcompensation.¹²⁹ The problem is that obviousness determinations are notoriously difficult at the margin and are vulnerable to hindsight bias,¹³⁰ as it may be that many elegant solutions to intractable problems seem straightforward after the fact. This phenomenon threatens to deprive deserving inventors of patent eligibility, which would result in under-compensation and an undesirable diminution in ex ante incentives.¹³¹

Judicial exposition of general principles for making § 103 determinations may be somewhat helpful, though they are inevitably limited in their efficacy because such determinations are necessarily context- and fact-specific. The more interesting question is whether the PTO and courts should make nonobviousness assessments with a proclivity for Type I or II errors. The answer would seem to depend on the industrial context in which the non-obviousness determination is being made. Given that some evidence exists that patents in certain areas of innovation—most notably business methods, computer software, and medical diagnostic techniques—may be over-rewarding inventors,¹³² § 103 demarcations must be made discriminately in those settings. Where the obviousness bar for patentability becomes too readily surmountable, a host of patents over inevitable inventions will cast a windfall upon their owners and choke downstream innovation through unwarranted search and negotiation costs, as well as cause potential hold-out problems.¹³³ The dubious quality of many business-method patents, remarked upon with some concern by Justice Kennedy in *eBay*, emanated from lax nonobviousness analyses.¹³⁴ The failure largely resulted from a combination of little prior art, given the lack of historical patentability of

129. *See id.* at 820–26.

130. *See* Gregory N. Mandel, *Patently Non-Obvious: Empirical Demonstration that the Hindsight Bias Renders Patent Decisions Irrational*, 67 OHIO ST. L.J. 1391 (2006).

131. It should be remembered that those incentives are already implicated by the uncertainty inherent in ex post determinations, like non-obvious assessments, which threaten to deprive inventors of rewards after investment in R&D has already taken place.

132. *See, e.g.*, sources cited *supra* note 107.

133. *See* Merges & Nelson, *supra* note 2, at 865–66 (explaining that the hold-up problem is apt to be more acute where the invention underlying the original, as opposed to the improvement, patent is less significant); Roin, *supra* note 76, at 532–36. Of course, the nonobviousness condition loses much of its normative legitimacy when applied to capital-intensive research endeavors, such as pharmaceuticals, where even obvious inventions may not be inevitable absent IP protection or an alternative reward structure. *See id.* at 532–36.

134. *See* *eBay, Inc. v. MercExchange, L.L.C.*, 547 U.S. 388, 396–97 (2006) (Kennedy, J., concurring).

business methods, and the lack of business expertise on the part of PTO examiners.¹³⁵ The Supreme Court's recent decision in *KSR*, which raised the hurdle for nonobviousness determinations, should apply with particular vigor to the fields of innovation within which the patent system's presence is being most criticized.¹³⁶ There, the parsimonious principle should find its strongest application.

In contrast, fields in which patents are the undisputable foundation of ongoing innovation, such as in the pharmaceutical industry, should receive more lax nonobviousness assessments. In such cases, the cost of development has invariably been enormous and the social gain to society from commercialization is similarly large. Denying patent protection on a technical ground in such a context is difficult to justify on normative grounds.¹³⁷ Here, the parsimonious approach should be applied in a more cautious manner.

It is telling indeed that the patent system has already begun to move in this direction.¹³⁸ The Federal Circuit has displayed a readiness to apply obviousness determinations with particular vigor in certain fields, including computer software.¹³⁹ Yet it has simultaneously alleviated inventors in other industries, notably biotechnology and pharmaceuticals, from complying with a stringent nonobviousness requirement.¹⁴⁰ This phenomenon, though hard to ground in the statute, is a strong signal of the parsimony principle's presence.

B. THE NATURE OF A PATENTEE'S PROPERTY RIGHT

The general conditions of patentability discussed above demonstrate a strong endorsement of the view that patent law has charted a parsimonious path. This Section considers an aspect of the law that explicitly implicates patentees' ability to earn rewards in excess of what was necessary to induce them to invent and commercialize their discoveries. Specifically, it addresses the nature of the property rights the patent system bestows on qualifying

135. See John R. Allison & Starling D. Hunter, *On the Feasibility of Improving Patent Quality One Technology at a Time: The Case of Business Method Patents*, 21 BERKELEY TECH. L.J. 729, 732–33 (2006); Julie E. Cohen, *Reverse Engineering and the Rise of the Electronic Vigilantism: Intellectual Property Implications of "Lock-Out" Technologies*, 68 S. CAL. L. REV. 1091, 1178 (1995).

136. *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398 (2007).

137. See Benjamin Roin, *Unpatentable Drugs and the Standards of Patentability*, 87 TEX. L. REV. 503 (2009).

138. See generally Dan L. Burk & Mark A. Lemley, *Is Patent Law Technology-Specific?*, 17 BERKELEY TECH. L.J. 1155 (2002).

139. See *id.* at 1167.

140. See Burk & Lemley, *supra* note 41, at 1677.

inventors. In doing so, it explores the extent to which the characteristics of that right translate into optimal rewards.

The property rights created by the patent system are unique in an important respect. The Seventh Circuit defined property as “a mixture of rights to use and to exclude others from using.”¹⁴¹ But patents grant only the latter power—they do not convey on their owners an affirmative right to practice their inventions.¹⁴² This feature of the patent system, which gives rise to the phenomenon of “blocking patents,”¹⁴³ has both attractive and potentially troubling qualities.¹⁴⁴ The absence of an unqualified ability to use one’s invention enhances the return of prior inventors, whose patented technology implicates later innovation. By granting those earlier patentees a right to enjoin follow-on invention, the law bolsters the value of their IP.¹⁴⁵ This might appear to be an exception to the parsimonious approach, which is generally reflected in patent law and perhaps would—if applied in strong form in this instance—grant improvers a right to practice their new and useful inventions without having to negotiate for permission.

But, of course, the law may be wise not to bestow improvers with an affirmative right to practice their inventions. The parsimonious approach only works if patent law operates to cabin patentees’ exclusive rights, *without* reducing them below the necessary level to induce innovation.¹⁴⁶ Were patents to reflect traditional principles of property law and allow their owners to practice their inventions—in the same way that a property owner generally need not bargain for permission to use her own land as she sees fit—there would be a serious risk of under-compensation in at least some industries. This is most likely to be the case in certain high-tech industries where cumulative innovation is rapid and where, as a corollary, any one increment

141. *Chi. Prof'l Sports Ltd. P'ship v. Nat'l Basketball Ass'n*, 961 F.2d 667, 670 (7th Cir. 1992).

142. See Sina Muscati, *Terminator Technology: Protection of Patents or a Threat to the Patent System?*, 45 IDEA 477, 507–08 (2005).

143. Blocking patents arise when incremental improvements over a patented product or process, not sufficiently extraordinary to trigger the application of the reverse doctrine of equivalents, are themselves patented. In such cases, the improver cannot practice the relevant technology without permission from the original patentee. See Timothy R. Holbrook, *Equivalency and Patent Law's Possession Paradox*, 23 HARV. J.L. & TECH. 1, 12 (2009).

144. See Robert Merges, *Intellectual Property Rights and Bargaining Breakdown: The Case of Blocking Patents*, 62 TENN. L. REV. 75 (1994); see also Maureen A. O'Rourke, *Toward a Doctrine of Fair Use in Patent Law*, 100 COLUM. L. REV. 1177, 1204 (2000).

145. See Robert Merges, *A Brief Note on Blocking Patents and Reverse Equivalents: Biotechnology as an Example*, 73 J. PAT. & TRADEMARK OFF. SOC'Y 878, 878–79 (1991).

146. As emphasized above, the parsimony principle does not counsel a bias in favor of under-compensation.

in technology will likely be defunct in a short amount of time. The problem would be most serious in situations where a single instance of major innovation precedes a series of rapid, but modest, advancements. Those later improvements would receive patent protection¹⁴⁷ and, due to their superiority, would deprive the inventor who made the underlying breakthrough of a reward. This scenario is a real danger, given the commonly accepted fact that innovation tends to be “lumpy,” rather than smooth and continuous.¹⁴⁸ Sudden technological advancements often follow on the heels of a paradigm-altering discovery.¹⁴⁹ Society needs to incentivize such breakthrough inventions more than to reward those ensuing minor improvements that build on a rapid advance in the art.¹⁵⁰ Thus, the lack of an absolute right to use a patented product or process can be thought of as a means to ensure optimal innovation that would otherwise be compromised by free-riding.

The absence of a right to practice one’s invention, however, may be problematic in some circumstances. In particular, such an absence threatens to over-reward inventors of technologies that represent merely a modest improvement over the prior art, but which nevertheless capture commercialized products. Where a patentee can stake a credible claim to a piece of a marketable product, it can credibly threaten to enjoin sales.¹⁵¹ This can hold true even if the allegedly infringed patent implicates only a peripheral part of the relevant invention.¹⁵² Because inventors of even

147. 35 U.S.C. § 101 (2006).

148. See Herbert Hovenkamp, *Restraints on Innovation*, 29 CARDOZO L. REV. 247, 257 (2007).

149. In this respect, it is well known that innovation tends not to occur in a continuous, linear fashion, but instead occurs in waves following significant technological breakthroughs. See, e.g., J. Gregory Sidak & David J. Teece, *Dynamic Competition in Antitrust Law*, 5 J. COMPETITION L. & ECON. 581, 604–05 (2009).

150. See Christopher A. Cotropia, *Patent Law Viewed Through an Evidentiary Lens: The “Suggestion Test” as a Rule of Evidence*, 2006 BYU L. REV. 1517, 1525.

151. Such a patentee can also threaten to extract significant damages in the event of ongoing infringement. See Mark A. Lemley, *Ignoring Patents*, 2008 MICH. ST. L. REV. 19, 19–20.

152. The threat to marketers of technology is so significant, and the search and negotiation costs so immense, that patent pools now abound. See, e.g., R. Justin Koscher, *A Patent Pool’s White Knight: Individual Licensing Agreements and the Procompetitive Presumption*, 20 DEPAUL J. ART, TECH. & INTELL. PROP. L. 53 *passim* (2009) (discussing the role of patent pools in markets subject to potential patent-thicket problems). These entities seek to group all necessary patents to commercializing a technology and to license them at agreed rates. But these entities do not always incorporate every patent. Sometimes, this is deliberate, as patentees either elect not to join or strategically withhold notice of their rights until such time as an infringing product is taken to market. In both such situations, patentees can extract a far greater reward than licensees would have been willing to pay *ex ante*.

modest and subsequently improved-upon technologies can exclude commercialization efforts by improvers, the formers' property rights can result in overcompensation.

The above illustrates how asymmetric incentives to innovate complicate the construction of optimal patent rules. The nature of the property right awarded to deserving inventors lies at the very heart of the patent system. Congress, when enacting the initial patent regime, elected to eschew one traditional aspect of property: the right to use what one owns. The concept of property in patent law is therefore distinct, but whether that distinction is desirable depends significantly on context. Given the rapid, cumulative innovation in many industries subject to patent protection, such as biotechnology, computer software, and IT,¹⁵³ initial inventors of foundation technologies may be left seriously under-compensated by subsequent minor improvements that eliminate consumer demand for the original technological feat. There, patent law's right to exclude, but not to use, is entirely consistent with a parsimony principle. Yet, other scenarios may exist in which the patent system's refusal to grant affirmative rights to practice may frustrate follow-on innovation by creating myriad blocking positions that create immense transaction costs and, if negotiations are sequential in nature, give rise to hold-outs.

The patent system cannot undo these harms without also losing or offsetting crucial advantages. There may be a way to temper the nature of patentees' right to exclude, however, in situations where the lack of an affirmative right to practice one's invention threatens to ensnare cumulative innovation. The answer lies in the legal force given patentees' exclusive rights.

Literally, and by reference to traditional property, a patentee's "right to exclude" would seem to reflect a right to injunctive relief, since exclusion, by definition, refers to an act of shutting someone out. When a trespasser walks into a person's home, and when a company sells a product using another entity's patented technology, the exclusive right in both cases should presumably be the same. The owner can expel the unwanted person from her home, while the inventor can force the company to cease selling products that infringe her patent. The mechanism by which the law facilitates this outcome is the injunction. An owner's right to such a remedy in cases of

153. See Peter Lee, *The Evolution of Intellectual Infrastructure*, 83 WASH. L. REV. 39, 93 (2008).

trespass is virtually unqualified.¹⁵⁴ One would perhaps expect that a patent-owner's entitlement to similar relief should be similarly unfettered.

A patentee's ability to obtain injunctive relief is generally important, for only that legal right entitles him to negotiate a favorable license that rewards him in a manner that definitively exceeds his reservation reward.¹⁵⁵ Absent such ability, a patentee will face a serious threat of under-compensation, at least when there is no a priori basis for believing that courts accurately compute damages or assess attorneys' fees in the patentee's favor.¹⁵⁶ Given that the judiciary often lacks reliable means by which to observe patentees' reservation licensing rates, it may indeed be the case that damages run a significant risk of under-compensating inventors.¹⁵⁷ This is most likely to be the case where there is no licensing history for the assessing court to observe.¹⁵⁸ Consistent with the importance of injunctive relief to ensuring adequate compensation, it was long the rule that courts would apply injunctive relief in the event of proven infringement.¹⁵⁹

Yet the ready availability of injunctive relief is by no means necessary to ensure adequate compensation in all cases. Indeed, as explored *supra*, in certain situations a powerful right to exclude may result in a windfall return to inventors whose contributions were paltry. The latter is most aptly represented by the phenomenon of "patent trolls," which in their purest form provide no social value of any kind.¹⁶⁰ Instead of inventing new and

154. Inadvertent encroachment is an exception in some cases. See Olivia Leigh Weeks, Comment, *Much Ado About Mighty Little—North Carolina and the Application of the Relative Hardship Doctrine to Encroachments of Permanent Structures on the Property of Another*, 12 CAMPBELL L. REV. 71 (1989).

155. See, e.g., Ian Ayres & Kristin Madison, *Threatening Inefficient Performance of Injunctions and Contracts*, 148 U. PA. L. REV. 45, 56 (1999).

156. See Tim Carlton, Note, *The Ongoing Royalty: What Remedy Should a Patent-Holder Receive When a Permanent Injunction Is Denied?*, 43 GA. L. REV. 543, 548 (2009) (arguing that the award of reasonable royalty rates by courts under-compensates patentees).

157. See RICHARD A. POSNER, *ECONOMIC ANALYSIS OF LAW* 69 (5th ed. 1998); F. Scott Kieff, *Coordination, Property, and Intellectual Property: An Unconventional Approach to Anticompetitive Effects and Downstream Access*, 56 EMORY L.J. 327, 346–48 (2006); Stephanie Pall, Note, *Willful Patent Infringement: Theoretically Sound? A Proposal to Restore Willful Infringement to its Proper Place Within Patent Law*, 2006 U. ILL. L. REV. 659, 666 (observing that "the original basis for treble damages was not a desire to punish an infringer for increased culpability, but rather a desire to prevent jury under-compensation to the patentee").

158. See Leslie T. Grab, *Equitable Concerns of eBay v. MercExchange: Did the Supreme Court Successfully Balance Patent Protection Against Patent Trolls?*, 8 N.C. J.L. & TECH. 81, 104 (2006).

159. See *MercExchange, L.L.C. v. eBay, Inc.*, 401 F.3d 1323, 1338 (Fed. Cir. 2005), *rev'd*, 547 U.S. 388 (2006).

160. See Robin M. Davis, Note, *Failed Attempts to Dwarf the Patent Trolls: Permanent Injunctions in Patent Infringement Cases Under the Proposed Patent Reform Act of 2005 and eBay v. MercExchange*, 17 CORNELL J.L. & PUB. POL'Y 431, 438–39 (2008).

useful technologies, these non-practicing entities purchase copious amounts of patents (sometimes from bankrupt companies), do not seek to commercialize them, and then sue for infringement when oblivious companies market infringing goods.¹⁶¹ In such situations, there may be good ground for qualifying patentees' general right to injunctive relief.

In perhaps the most convincing indication that the parsimony principle influences patent law, the Supreme Court in 2006 did just that. In the landmark decision *eBay*—a case involving a non-practicing entity—the Court refused to bestow patentees with a presumptive right to injunctive relief in the event of established infringement.¹⁶² Instead, in order to prevail, the party seeking an injunction would have to satisfy the traditional factors (irreparable injury, inadequacy of remedies at law, balance of hardships favoring party seeking injunction, and public interest) that inform courts' decisions to grant equitable relief.¹⁶³ Despite commentators vilifying the decision for dealing a fatal blow to inventors' incentives to invent by jettisoning a property rule,¹⁶⁴ the case is better viewed through the lens of patent law's parsimony principle. In cases where infringement took place in full notice of the patentee's rights, where the patent constitutes a major, rather than a peripheral, aspect of the infringing product, where the patentee was actively marketing its technology, or in other compelling cases, injunctive relief is near-certain to be forthcoming. But in those cases where such relief is apt to over-reward patentees, such as where they are both non-practicing and non-licensing, where strategic hold-out is demonstrably present, or where the patent thicket is dense and an innocent infringer, despite its demonstrable best efforts, courts are now likely to be more cautious before awarding injunctive relief.¹⁶⁵ This recent development in the law constitutes a resounding endorsement of a parsimonious approach to patent policy.

C. MONOPOLY LEVERAGE AND RELATED LIMITS ON PATENT VALUE

A patent's worth lies not only in the technological merit of the invention it claims, but also in the legal means by which a patentee can realize the value of the invention. There is a fundamental distinction between patents and

161. See Opderbeck, *supra* note 67, at 130 n.12.

162. *eBay, Inc. v. MercExchange, L.L.C.*, 547 U.S. 388 (2006).

163. *Id.* at 391.

164. See Richard A. Epstein, *Richard A. Epstein: Court Soft on Property Rights*, FIN. TIMES (May 16, 2006 6:14 PM), <http://www.ft.com/cms/s/2/6a9ade66-e4ef-11da-80de-0000779e2340.html> (last visited Nov. 30, 2010); Brief of Various Law & Economics Professors as Amici Curiae in Support of Respondent, *eBay, Inc. v. MercExchange, L.L.C.*, 547 U.S. 388 (2006) (No. 05-130), 2006 WL 639164.

165. See, e.g., Venkatesan, *supra* note 83.

other forms of ownership rights—the former are uniquely insecure. Courts invalidate patents at high rates, in approximately 50% of cases according to some empirical studies.¹⁶⁶ This afflicts the incentive structure weighing on companies' decisions to invest capital in R&D. Probabilistic rights to exclude reduce the expected return from innovation, complicate the commercialization process by undermining post-invention investment, and have an especially negative effect on risk-averse inventors.

Observing the reality that many contemporary patents are little more than lottery tickets with better odds, one might correctly conclude the “bad patent” problem requires remedial action.¹⁶⁷ A crucial issue concerns the source from which enhanced patent certainty should appropriately emanate. If it results from heightened prosecution standards, which reduce the incidence of erroneous grant rates, then more secure patent rights are an unquestionable boon for society. While efforts are being made to achieve higher levels of performance at the PTO, ultimate success remains elusive. Nevertheless, increased patent certainty need not emanate from the PTO alone. Private contract between patentees and certain third parties can also increase patent certainty. The question whether patentees should be able to appropriate additional benefits for themselves is controversial.

In an unconstrained legal environment, patentees may be able significantly to enhance the certainty of their property rights.¹⁶⁸ Patents could purchase such security in a number of ways. First, many patentees derive much of their income from licensing fees.¹⁶⁹ By negotiating a suitable contractual provision, they could prevent licensees from challenging the validity or reach of their licensed patents. Similarly, patentees could negotiate a provision in such contracts that any subsequent judicial determination to the licensed patent's invalidity or non-infringement would not affect the royalties due. Third, patent holders could pay potential infringers who might challenge their patents in court not to do so. Fourth, patentees could regulate risk by structuring royalty payments over different timelines, including after

166. John R. Allison & Mark A. Lemley, *Empirical Evidence on the Validity of Litigated Patents*, 26 AIPLA Q.J. 185, 205 (1998) (46%); Jean O. Lanjouw & Mark Schankerman, *Protecting Intellectual Property Rights: Are Small Firms Handicapped?*, 47 J.L. & ECON. 45, 59 (2004) (finding trial win rates of “close to 50 percent”); Kimberly A. Moore, *Judges, Juries, and Patent Cases—An Empirical Peek Inside the Black Box*, 99 MICH. L. REV. 365, 385 (2000) (58%).

167. The bad-patent problem refers to the perceived tendency of the PTO to award many patents that would not survive serious scrutiny in court or upon reexamination. See Mark A. Lemley, *Is the Patent Office a Rubber Stamp?*, 58 EMORY L.J. 181, 181–82 (2008).

168. See Alan Devlin, *The Stochastic Relationship Between Patents and Antitrust*, 5 J. COMPETITION L. & ECON. 75, 77 (2009).

169. See Ian Ayres & Gideon Parchomovsky, *Tradable Patent Rights*, 60 STAN. L. REV. 863, 875 (2007) (observing that patentees' return on innovation depends on licensing fees).

expiration. All these concessions would not be free; rather, a patentee would have to give up something of value to induce another to bear the cost of potential invalidity. The amount paid, assuming both parties can reach agreement, will depend on the parties' relative appetite for risk.¹⁷⁰ If a patentee wants to avoid the dire consequences of courts' finding his patent invalid, he can protect himself by paying a licensee or potential infringer a premium to take on that risk instead. Finally, in addition to boosting the reliability of their patent rights through contract, patentees could also enhance their profits through product tying.¹⁷¹

Patents protected by such arrangements would be more valuable than they would be in isolation. Contractual agreements will enhance patentee compensation, without elevating it to the full social value of the invention (for part of that value would be spent on compensating licensees and potential infringers for not challenging the relevant patents). With these contractual agreements, a quasi-maximalist regime would grant patentees considerable freedom of contract. Instead of encountering this reality, however, one instead finds a host of restrictions on contractual freedom, all of which are designed to limit patents' value. Magnifying the effect of these limitations is the patent-misuse doctrine.¹⁷² Once more, the parsimonious approach is evident.

First, courts have abandoned the doctrine of licensee estoppel, which prevented patent licensees from bringing suit to challenge the validity of the patents upon which they were contractually bound to pay royalties.¹⁷³ Were the doctrine still in force, subject of course to contractual agreement, licensees would assume the risk of invalidity. Obviously the licensing patentee must compensate its licensees for taking on such risk. But, if it is willing to pay the requisite price, this conclusively establishes that the patentee derives greater utility from reduced, though secure, royalties than

170. Contracts operate as paradigmatic risk-shifting devices.

171. For the author's discussion of the economics of product tying (which involves conditioning the sale of one product on the purchase of another), see Alan Devlin, *A Neo-Chicago Perspective on the Law of Product Tying*, 44 AM. BUS. L.J. 521 (2007). It should be noted that none of the preceding courses of action necessarily results in patentees deriving greater value than is inherent in their respective technologies. After all, the technological value of any particular patent is set. A patentee cannot realize a greater return than that which is inherent in this ceiling, unless he uses his IP to mask a cartel agreement with owners of rival technology. Assuming that there is no substitute for the patented invention, no agreement with a licensee or potential infringer will affect the innate value of that technology. Instead, the various agreed-to measures merely operate to shift risk according to the parties' relative appetite for it.

172. See *Mercoid Corp. v. Mid-Continent Inv. Co.*, 320 U.S. 661, 666–68 (1944).

173. *Lear v. Adkins*, 395 U.S. 653, 671 (1969).

greater royalties whose recurrence depend on the validity of the underlying patent. In the famous case of *Lear v. Adkins*, the Supreme Court eliminated the doctrine, thus curtailing patentee compensation (which is tied to utility, rather than just pecuniary income).¹⁷⁴

The loss of licensee estoppel limits patentees' freedom to purchase security, but de facto limitations remained on licensees' ability to avail of the rule in *Lear*. For until very recently, licensees generally lacked standing to bring a suit for declaratory judgment of the relevant patent's invalidity.¹⁷⁵ Such entities would have to manufacture a case or controversy by deliberately withholding royalty payments, thereby committing breach of contract. Many licensees were understandably hesitant to take the chance of losing a validity challenge in court and then being liable under contract.¹⁷⁶ This changed with the Court's recent decision in *MedImmune, Inc. v. Genentech, Inc.*,¹⁷⁷ which seriously undermined patentees' ability to derive reliable royalties.¹⁷⁸ In that decision, the Court paved the way for licensees to challenge the validity of their licensed patents without having to withhold royalties.¹⁷⁹

Further restrictions on patentees' ability to derive heightened levels of utility from their inventions exist. "Reverse payments" constitute a particularly potent example of inventors favorably regulating the security of their patents.¹⁸⁰ Pursuant to this phenomenon, pioneer drug manufacturers pay generic entrants not to enter their markets until the expiration of their patents.¹⁸¹ While the Federal Circuit found these arrangements generally to be within the exclusive power of a patent grant, opposition from the antitrust agencies is mounting.¹⁸² It seems likely that Congress will amend the Patent

174. *Id.*

175. *See* *MedImmune, Inc. v. Genentech, Inc.*, 549 U.S. 118, 126–37 (2007) (reversing the Federal Circuit's determination that a patent licensee lacked standing to bring suit unless it first breached its licensing contract).

176. *See* Majoras, *supra* note 49, at 503.

177. 549 U.S. 118 (2007).

178. *See also* Rochelle Cooper Dreyfuss & Lawrence S. Pope, *Detroning Lear? Incentives to Innovate After MedImmune*, 24 BERKELEY TECH. L.J. 971 (2009).

179. *MedImmune*, 549 U.S. at 126–37.

180. *See* C. Scott Hemphill, *Paying for Delay: Pharmaceutical Patent Settlement as a Regulatory Design System*, 81 N.Y.U. L. REV. 1553 (2006) (discussing the phenomenon of reverse payments).

181. Preserve Access to Affordable Generics Act, S. 369, 111th Cong. (2009).

182. *Compare In re Ciprofloxacin Hydrochloride Antitrust Litig.*, 544 F.3d 1323 (Fed. Cir. 2008), *with* Jon Leibowitz, Chairman, Fed. Trade Comm'n, Speech Before the Center for American Progress: Pay-for-Delay Settlements in the Pharmaceutical Industry: How Congress Can Stop Anticompetitive Conduct, Protect Consumers' Wallets, and Help Pay for Health Care Reform (June 23, 2009) (transcript available at <http://www.ftc.gov/speeches/leibowitz/090623payfordelayspeech.pdf>).

Act to outlaw the practice.¹⁸³ Again, such a limitation will necessarily limit inventors' expected return from obtaining a patent, which dilutes the incentive to invent. A maximalist or quasi-maximalist approach to patent doctrine would allow reverse exclusionary payments, which enable patentees to garner compensation that maximizes ex ante incentives. After all, a right to pay a third party not to infringe can be reconciled with the "right to exclude" envisioned by the Patent Act. A quasi-maximalist regime, which would fall heavily on the side of avoiding Type I errors, would give full force to a patentee's exclusive rights. The fact that the law seems likely to outlaw reverse payments sends yet another strong signal that the parsimony principle is guiding the development of patent law.

Finally, the misuse doctrine purports to prohibit patentees from extending their lawful monopolies beyond their inherent intellectual property confines.¹⁸⁴ Obviously, the doctrine is designed to cabin patentee compensation.¹⁸⁵ Courts often apply the misuse doctrine to condemn product tying, where a seller insists that a consumer purchase a non-patented product as a condition of obtaining the patented one.¹⁸⁶ However, this account of bundling and requirements contracts as nefarious devices for leveraging monopoly power is unjustifiable. Product tying rarely operates to extend monopoly power from a tying to a tied market. Rather, its primary function is one of price discrimination.¹⁸⁷ The welfare effects of such a practice are ambiguous under current economic theory, though it is certainly the case that price discrimination enhances a seller's profits.¹⁸⁸ This being the case, the patent misuse doctrine's prohibition of tying serves to limit patentees' rewards, even though the patentees' means for maximizing their

183. See S. 369.

184. See *Mercoird Corp. v. Mid-Continent Inv. Co.*, 320 U.S. 661, 668 (1944).

185. See *id.*

186. The patent misuse doctrine is also employed to prohibit any attempt by patentees to garner royalties beyond the expiration of their patents. However, a patent's value is fixed, so a patentee cannot demand more than that amount in licensing fees. If a patentee insists that a licensee pay post-expiration royalties, it will either have to forego royalties in the early life of the license or receive a smaller royalty per-payment. Neither results in the patentee receiving more value than is inherent in her IP. See *Scheiber v. Dolby Labs., Inc.*, 293 F.3d 1014, 1020 (7th Cir. 2002).

187. See Richard A. Posner, *The Chicago School of Antitrust Analysis*, 127 U. PA. L. REV. 925, 926 (1979).

188. See Daniel A. Crane, *Intellectual Liability*, 88 TEX. L. REV. 253, 284–85 (2009). For the most recent account of the economics of product tying, see Einer Elhauge, *Tying, Bundled Discounts, and the Death of the Single Monopoly Profit Theory*, 123 HARV. L. REV. 397 (2009). For the author's exploration of this area, see Devlin, *supra* note 171, at 523.

return cannot reliably be shown to impose social costs.¹⁸⁹ Again, the parsimony principle would appear to be present.¹⁹⁰

D. DOCTRINE OF EQUIVALENTS

Aptly characterized as the most controversial canon in patent law, the doctrine of equivalents is notable for its inconsistency with the larger patent framework.¹⁹¹ It is a foundational principle of patent law that a patentee is entitled not to what she actually invented, but to the precise contours of what she actually claimed.¹⁹² Courts construe claims with reference to the specification contained in the patent document. Where the claims are clear, however, courts determine the reach of a patent document in a *Markman* hearing, primarily by reference to those claims alone.¹⁹³

The doctrine of equivalents is contentious because it acts as an exception to the rule that a patent's reach is coterminous with its claim limits.¹⁹⁴ According to the courts, “[t]he scope of a patent is not limited to its literal

189. See John P. Conley & Christopher S. Yoo, *Nonrivalry and Price Discrimination in Copyright Economics*, 157 U. PA. L. REV. 1801, 1810 (2009) (observing that banning price discrimination can reduce the production of desirable public goods).

190. As explored above, the parsimony principle does not incorporate a bias in favor of under-rewarding inventors. Rather, it seeks to impose meaningful limitations on patentees' abilities to reap windfall profits, while simultaneously displaying sensitivity to the dangers of depriving inventors of a sufficient return. On this basis, 35 U.S.C. § 271(d)(4)'s instruction that a patentee's refusal to license cannot constitute patent misuse makes eminent sense. As explained *infra* Section IV.B, patentees' profits should generally be cabined by restrictions on patent scope and duration, rather than by attempts to eviscerate their right to exclude. Protecting patent rights through liability rules is generally apt to cause greater harm than good.

191. See Michael J. Meurer & Craig Allen Nard, *Invention, Refinement, and Patent Claim Scope: A New Perspective on the Doctrine of Equivalents*, 93 GEO. L.J. 1947, 1948–49 (2005).

192. Although the system of claiming one's invention might strike the casual observer as somewhat odd, it is in fact a desirable mechanism for demarcating the boundaries of one's exclusive rights. Potential infringers need merely consult the claims to adjudge the propriety of their future courses of action. In short, the tenet of the law that an inventor establishes the boundaries of his invention through his or her patent claims injects some modicum of certainty into a system that is in dire need of it.

193. See *Silicon Graphics, Inc. v. ATI Techs., Inc.*, 607 F.3d 784, 792 (Fed. Cir. 2010) (“A construing court's reliance on the specification must not go so far as to import limitations into claims from examples or embodiments appearing only in a patent's written description . . . unless the specification makes clear that the patentee . . . intends for the claims and the embodiments in the specification to be strictly coextensive.” (quoting *JVW Enters. v. Interact Accessories, Inc.*, 424 F.3d 1324, 1335 (Fed.Cir.2005) (internal quotation marks omitted))).

194. Even in the case of means-plus-function claiming, the “metes and bounds” of the invention arguably emanates from the language of the claims, even if it does so using those claims as a conduit to the specification. See, e.g., *Messerschmidt v. United States*, 29 Fed. Cl. 1, 57 (1993).

terms but instead embraces all equivalents to the claims described.”¹⁹⁵ The doctrine of equivalents operates to magnify a patent’s reach beyond the literal scope of the claims by capturing activity that is substantially equivalent to the patented product or process. Under its most common iteration, the test asks whether the accused product performs substantially the same function in substantially the same way to achieve the same result (the “function-way-result” test).¹⁹⁶

The existence of a generous doctrine of equivalents would pose a significant problem to this Article’s contention that the patent system evolved along a parsimonious path. Yet, the absence of such a doctrine would similarly be in tension with the parsimony principle. A patent’s inability to capture a substantially identical product or process purely on account of linguistic limitations would enable widespread circumvention of patent documents. Importantly, such circumvention would be distinguishable from an “invent around.”¹⁹⁷ An invent around potentially leads to improvement and novel technologies, because it does not carry inherent social gain beyond eliminating monopoly rents.¹⁹⁸ While that effect may seem desirable, and for consumers in the short run surely it would be, the easy bypass of patentees’ reach would result in dangerous levels of under-compensation.

The reach of the doctrine is therefore all-important. An overly expansive doctrine would allow inventors to enjoin whole swathes of activity that, while related to the patented technology, is not coterminous with it. This reach would of course yield a windfall for the patentee, with all the negative results explored in Part II, *supra*. However, eliminating the doctrine altogether would not be prudent. The optimal reach of the doctrine is elusive as a practical matter, but the parsimonious approach would aim to impose meaningful limits on compensation.

In *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, in 2000, the Federal Circuit expanded the doctrine of prosecution history estoppel to prohibit any application of the doctrine of equivalents to an element in a patent claim that

195. *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 535 U.S. 722, 732 (2002).

196. *Graver Tank & Mfg. Co. v. Linde Air Prods. Co.*, 339 U.S. 605, 608 (1950).

197. *See, e.g., WMS Gaming, Inc. v. Int’l Game Tech.*, 184 F.3d 1339, 1355 (Fed. Cir. 1999) (noting that “the patent law encourages competitors to design or invent around existing patents”); *State Indus., Inc. v. A.O. Smith Corp.*, 751 F.2d 1226, 1236 (Fed. Cir. 1985) (“One of the benefits of a patent system is its so-called ‘negative incentive’ to ‘design around’ a competitor’s products, even when they are patented, thus bringing a steady flow of innovations to the marketplace.”).

198. *See State Indus.*, 751 F.2d at 1236.

was previously narrowed in the prosecution process.¹⁹⁹ This was a draconian ruling that ignited a firestorm of protest amongst the patent bar.²⁰⁰ The Supreme Court subsequently vacated the decision; the Court adopted a rebuttable presumption that narrowing a claim before the PTO triggers an estoppel.²⁰¹ But *Festo's* legacy significantly limited the doctrine of equivalent's ability to enhance patentee compensation. According to recent scholarship, the doctrine experienced a largely unnoticed demise.²⁰² This phenomenon surely reflects the parsimonious evolution of patent law.

E. EXPERIMENTAL USE—AN UNJUSTIFIED EXCEPTION?

Patent law's silent embrace of the parsimony principle would appear to be vulnerable to a notable exception. As explored in the preceding pages, patent doctrine supports patentees' right to obtain a lucrative return on valuable inventions, but nevertheless imposes limits on these returns such that inventors cannot obtain rewards equal to the social value of their technological discoveries. These limitations are far from edentulous. Restrictions on the kind of patented innovation, the increasing denial of injunctive relief in the event of infringement, wide-ranging limitations on contractual freedom, and reduced patent scope through diminished use of the doctrine of equivalents—in addition to claiming limitations, combine to deny patentees much of the social gain that accompanies their inventions.²⁰³ We would not associate such constraints with a maximalist or quasi-maximalist regime. The law governing third-party experimental use of a patented invention constitutes a potentially glaring exception.

An experimental use defense against claims of infringement would appear to serve an important function in constraining patentees' exclusive rights. Allowing rivals to experiment freely on a patentee's technology may facilitate invent-around diluting the patent-holder's market power.²⁰⁴ Moreover, a patent regime can foster cumulative innovation by allowing interested entities to unmask the inner workings of patented technologies through experimentation. Yet, the patent system adopted a decidedly non-parsimonious approach to the issue of experimental use. With highly restricted exceptions, there is no right to practice another's patented

199. 234 F.3d 558 (Fed. Cir. 2000) (en banc), *vacated*, 535 U.S. 722 (2002).

200. See John R. Allison & Mark A. Lemley, *The (Unnoticed) Demise of the Doctrine of Equivalents*, 59 STAN. L. REV. 955, 956–57 (2007).

201. *Festo*, 535 U.S. 722.

202. See Allison & Lemley, *supra* note 200.

203. See *supra* Sections II.A–D.

204. See Ted Hagelin, *The Experimental Use Exemption to Patent Infringement: Information on Ice, Competition on Hold*, 58 FLA. L. REV. 483, 533–34 (2006).

invention for experimental purposes. Courts allow experimentation if it is “not solely for amusement, to satisfy idle curiosity, or for strictly philosophical inquiry.”²⁰⁵ In *Madey v. Duke University*, the Federal Circuit went so far as to find that a university’s academic research constituted patent infringement and was not protected by the doctrine.²⁰⁶ The obvious question thus arises: can the current law on experimental use be squared with patent law’s parsimony principle? Perhaps counter-intuitively, the answer is very much in the affirmative.²⁰⁷

To understand why, it is important to appreciate some nuanced aspects of the law on experimentation. First, where the doctrine of experimental use applies, no infringement takes place and the patentee is entitled to zero compensation.²⁰⁸ As this Article suggests, judges should apply the parsimony principle in a minimalist fashion, so that downward adjustments in patentee compensation should occur in incremental steps. Granting rivals free reign to practice their competitor’s patented invention for the purpose of designing around it deprives the patentee of the exclusive rights to which she is literally entitled under the Patent Act.²⁰⁹ Economists recognize that access prices set at zero are rarely desirable, especially in the presence of fixed costs,²¹⁰ Such is the case here. Zero compensation is tantamount to under-compensation. It is not surprising then, that a patent system built on a parsimony principle would decline to adopt an expansive experimental use exemption.

The law’s refusal to countenance a broader experimental use doctrine is further justified on an additional ground. There is an unappreciated de facto experimental use right in the patent system. The cost of litigation coupled with the immense difficulty of detecting unauthorized experimentation results in considerable under-enforcement. Thus, as a practical matter, the ban on experimental use for commercial purposes is relevant for large-scale experimentation by a known rival of a patentee. In such circumstances, the

205. 307 F.3d 1351, 1362 (Fed. Cir. 2002).

206. *Id.*

207. For the author’s larger defense of the current law on experimental use, see Alan Devlin, *Restricting Experimental Use*, 32 HARV. J.L. & PUB. POL’Y 599 (2009).

208. See Sonya J. Bible, *Does the Experimental-Use Defense to Patent Infringement Still Exist?*, 13 SMU SCI. & TECH. L. REV. 17, 30–33 (2009).

209. 35 U.S.C. § 154(a) (2006).

210. See, e.g., William J. Baumol & Daniel G. Swanson, *The New Economy and Ubiquitous Competitive Price Discrimination: Identifying Defensible Criteria of Market Power*, 70 ANTITRUST L.J. 661, 668 (2003).

patentee's normative case for compensation is compelling and a parsimonious interpretation of the law would reasonably deny free access.²¹¹

As noted, the parsimony principle may advocate the cautious cabining of patentee's exclusive rights, lest those rights confer a windfall at the expense of cumulative innovation, consumers, and society generally. The minimalist manner in which judges should impose such limitations suggests that the current law on experimental use is sensible. Were patentees' enforcement efforts both pervasive and effective, such that they could enjoin all experimentation on their inventions, this could result in overcompensation. The maximalist and quasi-maximalist approaches might approve of the current law even in this case, given the zero-access-price issue, but a parsimonious approach would suggest otherwise. In such a setting, a compulsory-access regime at an access price specified by the government would balance patentee compensation with the broader social benefits of enhanced knowledge. Nevertheless, current reality, which is characterized by patentees' limited ability to detect—and to afford to challenge—experimentation, makes the fear of patentee overcompensation on this ground attenuated.

IV. THE PARSIMONY PRINCIPLE AS A GUIDE TO PATENT POLICY

Having both explored contemporary patent doctrine and unearthed a unifying principle that can guide the law, this Article now demonstrates the effects of applying the parsimony principle to current debates in patent jurisprudence. This Part focuses on two areas of particular contemporary importance: the proper limitations to be imposed on the patentability of processes and the optimal manner in which to quantify damages in the event of infringement.²¹² As the following discussion makes clear, the parsimony principle provides a useful framework for analyzing contemporary challenges.

211. The counter-argument would be that this is where an experimental-use exception is most needed, as major rivals are most unlikely to license one another. Such an objection would not be entirely convincing. First, rivals routinely engage in expansive reciprocal cross-licensing of their patent portfolios and enter into patent pools. *See* Davis, *supra* note 160, at 438–39. Second, and more fundamentally, it is precisely in the context of experimentation by a known rival that some pecuniary compensation is most important in providing patentees a sufficient reward. For the author's larger discussion of this point, see Devlin, *supra* note 207.

212. The ensuing discussion is of course normative and for that reason it is important to specify the substance and contours of the parsimony principle. For without the necessary specificity, the Article could offer only general observations as opposed to specific prescriptions. *See supra* Section II.B.

A. EMPLOYING THE PARSIMONY PRINCIPLE TO INFORM
CONTEMPORARY DEBATE

1. *Exploring the Limits of Patentable Processes—Computer Software and
Business Methods*

As patent law transcended its original fields of relevance to encapsulate the new economy, the parsimony principle took on new levels of importance. Today, patent law sweeps broadly. The one-size-fits-all doctrine employed across a wide variety of disparate industries creates asymmetric incentive effects. Patentee overcompensation is a very real threat in some new-economy industries, most notably the computer-software and business-method sectors.²¹³ An ever-increasing number of voices continue to contribute to the already voracious cries for intervention in this field. Foremost among these aired concerns is that earlier acquirers of patent protection are preempting vast swathes of subsequent innovation.²¹⁴ Whether patents are presently impeding innovation in such controversial settings as computer software, business methods, and medical diagnostic techniques is an empirical question. Despite raucous debate, this question remains unanswered. But the ongoing controversy is notable in particular for the nuclear option espoused by critics of the patent system.

Some of these commentators advocate the wholesale elimination of patent protection over computer software, business methods, and medical diagnostic techniques, amongst other fields of innovation.²¹⁵ Absent convincing empirical evidence that the patent system is indeed inflicting serious social costs, a parsimonious approach to innovation policy would react to such calls in an agnostic fashion. While it may indeed be the case that a vast web of preemptive patent rights encumbers follow-on invention, it does not follow that those ownership rights are not spurring crucially important innovation that lays a foundation for future R&D. Were the patent system to withdraw from these fields entirely, it would likely solve one problem only to create another.

The worst story painted by the evidence so far is that individual and small-firm innovation is being hindered by the proliferation of patents owned by a limited number of large companies.²¹⁶ Thus, if innovation is being

213. See *supra* sources cited and text accompanying note 107.

214. See Charles Babcock, *Stanford Law Professor Raps Patents as Barrier to Innovation*, INFORMATIONWEEK (Apr. 7, 2005), <http://www.informationweek.com/news/software/showArticle.jhtml?articleID=160502321>.

215. See Janis, *supra* note 71.

216. Large companies with expansive patent portfolios are more likely to have formal cross-licensing arrangements in place with one another. Such arrangements eliminate

stifled, it would seem to be with respect to a limited population of inventors. Of course, this is not to downplay the crucial role in innovation played by individuals and modest-scale enterprises. But if the overall rate of innovation is of concern, rather than the distribution of innovative activity, then the anecdotal evidence of patent law's nefarious effect on overall technological progress in the IT sector is not yet compelling.²¹⁷ This being so, a broad withdrawal of patent protection for computer software and methods of conducting business may be of questionable prudence.

Instead, if there is reasonable basis for believing that patent rights in the IT sector are currently too broad or numerous,²¹⁸ the law might benefit by looking to the subtle role played by the parsimony principle elsewhere. As a general matter, this principle suggests further limitations to the breadth and duration of exclusionary rights so as to contain the danger of overreaching, and hence overcompensation. The principle also operates at the margin by shaving degrees of exclusivity, and hence profitability, from patent rights rather than resorting to drastic options. Modest increments in policy-setting are desirable, for they limit the potential harm of erroneous decision-making. If, as at least some evidence suggests, computer-software and business-method patents currently provide original inventors too much control over the subsequent development of technology, then the answer might lie in modest adjustments in patent law's policy levers.²¹⁹

In particular, the courts might display some willingness to employ the reverse doctrine of equivalents with greater regularity in the IT sphere.²²⁰ At present, the doctrine has very limited practical significance, which is defensible in industries where patents are clearly crucial for ongoing innovation and where patent thickets are less problematic.²²¹ But in the field

blocking positions. Yet, individuals and companies with more modest portfolios may not be privy to such agreements, thus further encumbering their research and commercialization efforts.

217. See Ronald J. Mann, *Do Patents Facilitate Financing in the Software Industry?*, 83 TEX. L. REV. 961, 1004–09 (2005).

218. See, e.g., Daralyn J. Durie & Mark A. Lemley, *A Structured Approach to Calculating Reasonable Royalties*, 14 LEWIS & CLARK L. REV. 627, 640 (2010).

219. See John F. Duffy, *Rules and Standards on the Forefront of Patentability*, 51 WM. & MARY L. REV. 609, 622–23 (2009).

220. The reverse doctrine of equivalents serves to free a sufficiently large leap forward in the prior art from the claims of an earlier patent that would otherwise block use of the new technology. See *Graver Tank & Mfg. Co. v. Linde Air Prods. Co.*, 339 U.S. 605, 608–09 (1950).

221. See *Roche Palo Alto L.L.C. v. Apotex, Inc.*, 531 F.3d 1372, 1378 (Fed. Cir. 2008) (“The reverse doctrine of equivalents is rarely applied, and this court has never affirmed a finding of non-infringement under the reverse doctrine of equivalents.”).

of computer software and business methods, perhaps the judiciary should see significant improvements on patented prior art as being sufficiently creditable to warrant being viewed as a break from prior technology. This would require the courts to distinguish between mundane or limited advances in technology from truly significant leaps that advance the art to a new level. Perhaps an appropriate, though very rough, metric for applying the reverse doctrine of equivalents in fields of potential overcompensation would be where a technological advancement renders the asserted patent's technology commercially defunct. Of course, this would only be a partial solution. Courts would need to implement this doctrine cautiously. This is because an overextension of the reverse doctrine of equivalents would risk under-rewarding initial inventors by denying them exclusive rights over subsequent discoveries.

Having noted such concerns, this Article proceeds to address the computer-software and business-method debates in greater detail. In adopting innovation policy, it is important to tie the incentive characteristics of inventors in particular industries to the nature of the reward that society may grant them. This Article explains the controversial nature of patenting innovation in these two particular fields on several grounds.

First, originalists object to patent protection in these spheres because they are not reminiscent of traditional spheres of innovation.²²² For such commentators, Congress designed the patent system to reward inventors in industrial settings involving scientific progress, not mere methods of conducting one's business or algorithms that instruct computers to perform a particular task.²²³ These objections are not especially compelling. The patent system should be concerned with promoting the invention of new, useful, and non-obvious products and processes. That such desirable output might emanate from contexts outside the contemplation of Congress in 1952 is not surprising, for it is the inevitable consequence of a highly innovative economy.

Second, unusual incentives to invent might exist independent of the patent system with respect to these two contentious areas of innovation. These separate incentives are highly relevant to any policymaker attempting to formulate patent policy on the basis of a parsimony principle. One wishing to cabin patentee compensation to a level not grossly exceeding his reservation return must know what return an inventor would enjoy were all

222. See John R. Thomas, *The Patenting of the Liberal Professions*, 40 B.C. L. REV. 1139, 1141 (1999).

223. See Francisc Marius Keeley-Domokos, Note, *State Street Bank & Trust Co. v. Signature Financial Group, Inc.*, 14 BERKELEY TECH. L.J. 153, 167–69 (1999).

patent protection denied to him. In some settings, the lack of such a reward would eliminate innovative activity. No company will devote billions of dollars' research to potential drug research for altruistic purposes.²²⁴ But computer software and business methods are highly dissimilar. The former is already subject to copyright protection, given that it is an original work of authorship that is fixed in a tangible form of expression.²²⁵ It is likely the case that this form of IP protection will suffice for some inventors. As for business methods, depending on the nature of the particular innovation, it might be the case that the cost-reduction or consumer-demand-enhancing virtue of a novel method of conducting business will in itself spur their creation. In both these cases, further protection under the patent system will by definition result in windfall profits.²²⁶

If this were the full story of innovation in these two fields, then we could safely advocate for the elimination of patent protection within them. But like so many things in life and law, this issue is far from straightforward. With respect to software, there are rather dramatic differences between the protections afforded an inventor by the patent and copyright regimes, respectively. There is no fair-use exception in the former field of IP, nor is there a "clean room" exemption for inventors who independently discover a previously patented technology.²²⁷ Although copyright law grants protection of far greater duration, the preventive powers afforded qualifying inventors is considerably weaker.²²⁸ Given these vast differences, copyright protection is surely appropriate for some inventors of software, yet insufficient for others.²²⁹ In short, some inventors of new and useful software will receive

224. It has been estimated that the average cost of developing a successful drug is approximately \$800 million. *See* INT'L FED'N OF PHARM. MFRS. & ASS'NS, A REVIEW OF EXISTING DATA EXCLUSIVITY LEGISLATION IN SELECTED COUNTRIES (4th rev. ed. 2005), available at http://www.ifpma.org/documents/NR2306/DataExclusivity_JAN05_revised.doc.

225. *See* *Computer Assocs. Int'l v. Altai*, 982 F.2d 693, 703–04 (2d Cir. 1992).

226. A further contributing factor to the widespread criticism of these processes is their notoriety for being erroneously granted. In other words, the technical requirements of patentability were being applied in a subpar fashion by the PTO, due in large part to the lack of prior art by which to judge obviousness and novelty. *See* Burk & Lemley, *supra* note 138, at 1169 n.59.

227. *See* Lemley, *supra* note 151, at 33.

228. The lack of an independent invention defense may be particularly relevant in the computer-software industry, where instances of clean-room invention are likely to abound. Copyright protection alone may deny original inventors an adequate return. Of course, it bears noting that this same phenomenon warrants less-strong patent rights in the computer-software industry, for otherwise downstream cumulative research may be unduly hindered.

229. *See* Michael Chapin, Note, *Sharing the Interoperability Ball on the Software Patent Playground*, 14 B.U. J. SCI. & TECH. L. 220, 228 (2008).

inadequate returns absent patent protection. The parsimonious approach to patent jurisprudence would not therefore support a large-scale withdrawal of patent protection in the field of software.

Similarly, with respect to business methods, some such forms of innovation may be forthcoming absent patent protection, but not all. In a prior work, the author explored various forms of innovation and concluded that a particular subset of business methods—namely those that are self-consuming—should not be patent-eligible.²³⁰ This is because free-market pressures to reduce cost and increase consumer demand act as independently sufficient incentives to invent in-house processes. Commercialization costs for such inventions are limited and the social costs of patenting them are apt to be significant, given their prime candidacy to act as mechanisms for raising rivals' costs.²³¹ Yet, it is unlikely that all forms of conducting business create such innate utility to their inventors that they would be invented absent patent eligibility. Some inventors may devote resources to formulating valuable business methods with an eye toward licensing the relevant processes to interested third parties. Thus, the parsimony principle would not seem to counsel an absence of patent protection in this field.

That the parsimony principle does not command such an outcome in the computer-software and business-method contexts does not mean that these fields' unique proclivity for self-creation is irrelevant. Quite to the contrary, it is highly probable that patent law needs less potent exclusionary rights to trigger socially desirable levels of innovation in these contexts than in other, less controversial areas of patentable discovery. A parsimonious approach would therefore counsel more demanding patentability prerequisites and reduced levels of exclusivity in these fields.

Controversy around computer-software and business-method patents has raged for some time, most particularly since the Federal Circuit's 1998 decision in *State Street Bank*.²³² That decision paved the way for patentability of processes that bore "a useful, concrete, and tangible result."²³³ *State Street* opened the door for the patentability of computer programs and business

230. See Alan Devlin & Neel Sukhatme, *Self-Realizing Inventions and the Utilitarian Foundation of Patent Law*, 51 WM. & MARY L. REV. 897 (2009).

231. The infamous Amazon "one-click" patent is an obvious example. See Method and System for Placing a Purchase Order via a Communications Network, U.S. Patent No. 5,960,411 (filed Sept. 12, 1997).

232. *State St. Bank v. Signature Fin. Grp.*, 149 F.3d 1368 (Fed. Cir. 1998), *abrogated by In re Bilski*, 545 F.3d 943 (Fed. Cir. 2008), *rev'd*, *Bilski v. Kappos*, 130 S. Ct. 3218 (2010).

233. *Id.* at 1373.

methods on an unprecedented scale.²³⁴ The proper treatment of business methods and computer software was once again in the spotlight due to the Federal Circuit and Supreme Court's respective decisions in *Bilski*.²³⁵ The Federal Circuit jettisoned the test it enunciated in *State Street* and instead adopted a "machine-or-transformation" test for the patentability of methods.²³⁶ The relevance of the Federal Circuit's espoused machine-or-transformation test for this Article's purposes lies in the negative impact it would have had on the patentability of business methods and computer software. Even putting aside crucial questions about the application of the machine-or-transformation test—and in particular what degree of connection to a computer would suffice to say that a business method or algorithm is "tied to a particular machine"—it became apparent that the Federal Circuit's decision seriously restricted the reach of patentable subject matter.²³⁷ With the exception of internally consumed business methods, which courts ought not to regard as being within the sphere of patentability, the Federal Circuit's decision in *Bilski* can be criticized for sweeping too broadly. As the preceding discussion indicates, the parsimony principle would rather cabin excess through incremental adjustment in doctrine rather than entirely withdraw the benefits created by the patent system's allotment of private ownership in innovation.

The Supreme Court's decision to grant *certiorari* in *Bilski* created a maelstrom of attention. The Court was inundated with an excess of sixty amicus curiae briefs, which took a range of different positions.²³⁸ Many saw the case as the perfect opportunity for the Court to signal the death knell of business methods and computer software as proper subjects of patent law.²³⁹ They were to be disappointed. Instead of formally excluding particular forms of innovation, such as business methods, from patent protection, the Court saw fit to first return to principles.²⁴⁰ Justice Kennedy, writing for the

234. See, e.g., Matthew E. Fink, Note, *Patenting Business Methods in Europe: What Lies Ahead?*, 79 IND. L.J. 299, 301 (2004).

235. *In re Bilski*, 545 F.3d 943 (Fed. Cir. 2008), *aff'd*, *Bilski v. Kappos*, 130 S. Ct. 3218 (2010).

236. *Id.* at 959.

237. See Christopher A. Brown, *Developments in Intellectual Property Law*, 43 IND. L. REV. 837, 837 (2010).

238. See *Merit Briefs for November Supreme Court Cases, Term 2009–2010 (ABA Division for Public Education)*, A.B.A., <http://www.abanet.org/publiced/preview/briefs/nov09.shtml> (last visited Dec. 13, 2009).

239. One can verify this by a casual look at some of the amicus briefs filed with the Supreme Court in the case. See also Christopher A. Cotropia & James Gibson, *The Upside of Intellectual Property's Downside*, 57 UCLA L. REV. 921, 943 (2010).

240. *Bilski v. Kappos*, 130 S. Ct. 3218, 3226–27 (2010).

majority, noted the value of the machine-or-transformation test, but rejected the contention that that particular test is the exclusive means to identify the contours of patentable subject matter.²⁴¹ Instead, it reoriented the question of unpatentable subject matter to its traditional foundation, notably “the exceptions for laws of nature, physical phenomena, and abstract ideas.”²⁴² Applying those principles, the Court had little difficulty finding the relevant invention to be nothing more than an impermissible patenting of an abstract idea.²⁴³

The Court’s approach is broadly in line with the parsimony principle. The only limitation that was not imposed involved self-realizing inventions in the form of self-consumed business methods. This, of course, is a field of invention that bears an unacceptable propensity for wide-ranging exclusive reach. As explained in Section III.A, *supra*, such processes will almost inevitably over-reward inventors and violate the parsimony principle.

Nevertheless, the Court’s decision to eschew categorical line-drawing need not be problematic if courts vigorously enforce the novelty, non-obviousness, and utility conditions of patentability to ensure that any given invention goes beyond “the results of ordinary innovation [which] are not the subject of exclusive rights under the patent laws.”²⁴⁴ Thus, judges should apply the non-obviousness requirement with unusual vigor and the reverse doctrine of equivalents should find new teeth in the computer-software and business-method contexts. These changes would grant deserving inventors their due reward. It would fulfill the constitutional mandate of promoting the useful arts, whilst denying patent protection to inventors of mundane or trivial technological improvements, who would otherwise create social cost by contributing to a potential patent thicket or by frustrating cumulative research.

2. *Optimal Damages in the Event of Infringement*

Contemporary efforts at patent reform focus on the question of damages. Even beyond the threshold question of whether patentees should be entitled to an injunction or mere monetary relief, there is considerable debate as to whether courts are awarding excessive or inadequate pecuniary awards in the event of established infringement.²⁴⁵ The current methodology

241. *Id.* at 3227.

242. *Id.* at 3226.

243. *Id.* at 3231.

244. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 427 (2007).

245. *See, e.g.,* Lemley, *supra* note 151, at 20; Opderbeck, *supra* note 67, at 137–50.

for calculating damages lies in the “entire market value rule.”²⁴⁶ That approach essentially provides that, if a patented technology lies at the heart of an invention, then courts will award royalties based on sales of the entire product. The entire market rule has been quite controversial.²⁴⁷ Infringers accuse the approach of giving rise to excessive rewards, but patentees further malign the doctrine for short-changing them in the event of infringement. The issue of damages may well be the single most divisive issue weighing on patent law today.

One’s view on reforming damages calculations depends in large part on one’s industrial background. Those in communication and computer industries decry the cost of litigation to which they are routinely subject.²⁴⁸ As observed *supra*, products in such sectors often implicate hundreds, even thousands, of patents, so awarding any one patentee an inordinate reward for infringement threatens to impose significant burdens on innocent infringers.²⁴⁹ To companies operating in these industries, the solution lies in “apportionment,” which would tie the amount of damages awarded to the relative contribution of the infringed patent’s technology.²⁵⁰ They favor such an approach because they believe that courts and juries misapprehend the entire-market rule, and that misapprehension results in infringing entities of a product’s small component being nevertheless treated as if the relevant patent lies at the heart of the commercial enterprise.²⁵¹ The Patent Reform Act of 2009 contemplated such an approach to calculating damages.²⁵²

Not surprisingly, apportionment is fiercely opposed by industries in which commercialized products do not implicate a wide variety of patented technologies.²⁵³ In many such sectors, including the biotechnology industry, a

246. See *Imonex Servs., Inc. v. W.H. Munzprufer Dietmar Trenner GmbH*, 408 F.3d 1374, 1379 (Fed. Cir. 2005).

247. See, e.g., Mark A. Lemley, *Distinguishing Lost Profits from Reasonable Royalties*, 51 WM. & MARY L. REV. 655, 656 (2009). See generally Brian J. Love, Note, *Patentee Overcompensation and the Entire Market Value Rule*, 60 STAN. L. REV. 263 (2007).

248. See Jerome H. Reichman, *Intellectual Property in the Twenty-First Century: Will the Developing Countries Lead or Follow?*, 46 HOUS. L. REV. 1115, 1121–22 (2009).

249. See Lemley, *supra* note 151, at 20 (noting that current rules “permit excessive recoveries” in patent cases); Michael Meehan, *Increasing Certainty and Harnessing Private Information in the U.S. Patent System: A Proposal for Reform*, 2010 STAN. TECH. L. REV. 1, 9 (observing that, “in the computer and software industries, there can be thousands of patents on a single product”).

250. See Lemley, *supra* note 247, at 661–69.

251. *Id.*

252. Patent Reform Act of 2009, S. 515, 111th Cong. (2009).

253. See Opderbeck, *supra* note 67, at 136.

company may establish a product on merely a single patent, or a few more.²⁵⁴ Here, the prospect for patentees' windfall is significantly reduced, for the presence of merely a limited number of patents presumably increases the expected technological contribution of each one. In such cases, the entire market value rule would seem to make sense.

The parsimony principle, far from dictating the innate superiority of one unwavering view on apportionment over another, suggests that both camps have it partially right. There is little question that juries are more likely to overcompensate, through a damages award derived from overall sales of a commercialized product, patent owners of software or IT technology than companies that own rights in pharmaceutical formulae or biotechnology. In the former setting, courts obviously should not require infringers of peripheral components to pay royalties based on entire sales, unless the courts discount the royalty rate to a level that reflects the fringe nature of the infringed technology. In the latter context, patentees ought to be entitled to a far larger proportional return.

In this regard, there is much to commend in the Federal Circuit's 2009 decision in *Lucent Technologies, Inc. v. Gateway, Inc.*, which rejected a 358 million dollar award against Microsoft.²⁵⁵ There, the jury awarded Lucent an 8% royalty on the entire market value of Microsoft's Outlook software, even though the patented method was but one of "hundreds, if not thousands" of features in the challenge product.²⁵⁶ The court properly concluded that it was "inconceivable" that "the use of one small feature, the date-picker, constitutes a substantial portion of the value of Outlook."²⁵⁷ If district courts make discerning judgments about the centrality of the patented technology to the infringing product, then the prospect of over-reward should not be of great concern. This is particularly so if courts endeavor to employ an appropriately reduced royalty rate, the dilution of which should reflect the extent to which the commercialized product includes technology other than the patented one at issue.

Ultimately, cost-justified asymmetric treatment lies at the heart of sound policy, for parsimonious treatment is difficult to achieve otherwise. There is no problem with a universal standard, as long as that standard is subject to

254. See Kevin W. McCabe, *The January 1999 Review of Article 27 of the TRIPS Agreement: Diverging Views of Developed and Developing Countries Toward the Patentability of Biotechnology*, 6 J. INTELL. PROP. L. 41, 55 (1999) ("[B]iotechnology is highly patent sensitive, in that a single patent can dominate a marketed product.").

255. 580 F.3d 1301 (Fed. Cir. 2009).

256. *Id.* at 1332.

257. *Id.*

flexible application, with sensitivity to the unique characteristics of the situation at hand. In that regard, one should not be overly concerned with the choice between the entire market rule and an apportionment alternative, as long as courts can be trusted to recognize the idiosyncrasies attendant upon each individual case.²⁵⁸

B. AN IMPORTANT CAVEAT: AVOIDING EX POST DILUTION OF PROPERTY RIGHTS

This Article contends that a pervasive theme runs through the patent system. Specifically, the patent doctrine evolved in a manner that demonstrably limits inventors' rewards, thereby diminishing the prospect of gross overcompensation.²⁵⁹ The influence of the parsimony principle on patent law is far-reaching, spanning from denying patent protection for abstract inventions, to limited rights for injunctive relief, and to limits on contractual freedom. Such constraints on windfall returns are normatively justified for a variety of compelling reasons, which are recounted at length in Section II.A.

Yet it is appropriate to end on a cautionary note. It would be easy to read the preceding pages as advocating for the widespread dilution of patentee's property rights. However, such a broad reading would be mistaken. An important distinction exists between limiting inventors' compensation through an appropriate tailoring of patent eligibility, patent duration, and patent breadth, on the one hand, and ex post dilution of property rights, on the other. The latter fear is realized most directly by limitations on patentees' exclusive rights. Although the Article advocates the withholding of injunctive relief in certain cases—most notably those involving patent trolls and in certain peripheral infringement scenarios—courts should generally regard patentees' right to exclude as sacrosanct, especially where infringers had notice of the relevant patent. If courts begin denying injunctions on a more regular basis—that is, in situations not countenanced by the exceptions discussed above—patentees will increasingly be subject to liability rules.

Such an outcome would be problematic for a variety of reasons. Strong property rights lend themselves well to efficient contractual agreement, save in cases where transaction costs become prohibitive.²⁶⁰ They do so by forcing

258. As the following discussion makes clear, however, the relative virtues of apportionment and of the entire market rule do not alter the fact that injunctive relief should generally be the preferred option.

259. See *supra* Part III.

260. See D. Bruce Johnsen, *Myths About Mutual Fund Fees: Economic Insights on Jones v. Harris*, 35 J. CORP. L. 561, 610 (2010).

those wishing to avail of an owned resource to bargain for permission up front, before they devote possibly forgone capital if the owner later denies access. Liability rules, in contrast, can encourage prospective licensees to infringe today and worry about paying tomorrow.²⁶¹ In addition to threatening to under-compensate inventors, they create costly ex post judicial disputes over “reasonable” damages.²⁶² Ultimately, the optimal choice between property and liability rules is the subject of extended scholarly analysis and is beyond the scope of this Article.²⁶³ Suffice it to say that significant gains accompany treating patents as giving rise to property rules, with exceptions to this approach limited to instances where the parsimony principle and related policy deem such exceptions warranted.

V. CONCLUSION

The study of patent law is fascinating for many reasons. Of these reasons, the most engrossing is how the law formulates policy in the impenetrably complex world of innovation. Inducing inventors to devote their human and pecuniary capital to the task of innovation is an exercise optimally conducted with sensitivity to the vastly asymmetric incentive characteristics of different inventors. Unfortunately, there is much that we do not know. We remain significantly ignorant about innovation, the macro-forces that weigh upon it, and the idiosyncratic influences that propel it at the individual level.²⁶⁴ Most of all, we lack crucial empirical data on the relationship between enhanced patent rights and industry-specific rates of innovation. While we certainly know that patents constitute the sine qua non for certain industries, notably pharmaceuticals,²⁶⁵ we still do not know whether contemporary patent rights are penurious or excessively generous.

261. Perhaps counter-intuitively, this feature of liability rules may have some virtue in the case of unused patents. See Julie S. Turner, Comment, *The Nonmanufacturing Patent Owner: Toward a Theory of Efficient Infringement*, 86 CALIF. L. REV. 179, 204 (1998).

262. See Robert P. Merges, *Contracting into Liability Rules: Intellectual Property Rights and Collective Rights Organizations*, 84 CALIF. L. REV. 1293, 1317 (1996).

263. For the classic treatment of this subject, see generally Guido Calabresi & A. Douglas Melamed, *Property Rules, Liability Rules, and Inalienability: One View of the Cathedral*, 85 HARV. L. REV. 1089, 1111–15 (1972).

264. Cf. Richard S. Whitt & Stephen J. Schultze, *The New Emergent Economics of Innovation and Growth, and What It Means for Communications Policy*, 7 J. TELECOMM. & HIGH TECH. L. 217, 267 (2009) (“Innovation is a much-admired concept, yet in many ways still rather mysterious and elusive.”).

265. Individual pharmaceutical companies are hugely dependent on the patents they possess, as the looming expiration of many valuable patents in 2011 evidences. See Vijay Vaitheeswaran, *Generically Challenged*, THE ECONOMIST – THE WORLD IN 2010, Nov. 21,

Although the optimal contours of patent law remain elusive, it does not follow that policymakers are condemned to ignorance. In particular, the tools of economics provide a rich source of theoretical guidance. By virtue of that discipline's teachings, we know that the public goods nature of information threatens its underproduction absent a reward structure. But the award of property rights creates monopoly distortions, the negative impact of which rises in parallel with the value of the owned resource. In addition, exclusive rights of greater breadth and duration tighten access to information and increase the expense of commercialization. Combining the theoretical predictions that stronger IP rights create more poignant incentives to invent, but simultaneously result in greater social costs, there exists an optimal balance. Specifically, rewards should be tailored in such a way that the marginal gain in innovation from enhanced exclusivity precisely equals the cost to society from the increased right to exclude. Economics can define this point theoretically, but cannot identify it in practice.

This concept might be left awash in a sea of doubt, but for some further knowledge. Specifically, it is almost certainly the case that complete propertization of information, encapsulated by the maximalist ideal, would widely miss the mark. Inventors of valuable technologies will rarely require the full social value of their inventions to induce them to invent, and a uniform oligarchical regime would radically overcompensate the rest. Nor is the abolitionist approach likely to be an acceptable enablement to the optimal trade-off between exclusion and free access. We can reject this perspective because its adoption is not supported by the currently ascertained data. We are not entirely bereft of empirical evidence, for the U.S. knowledge economy stands as a towering edifice with the power of the patent regime at its foundation. Abandoning the framework for the basis of such success would be policy of the most reckless kind.

We are thus left with some important conclusions about the general nature of innovation policy, but with limited information about the precise rules that should be formulated between the extreme alternatives of maximalism and abolitionism. Given the pervasive level of uncertainty currently residing at the margins of U.S. patent law, policymakers must choose between erring on the side of significant overcompensation and imposing meaningful limitations on patentees' returns. Although both approaches would display sensitivity to the social cost of departing from the optimal level of patent protection, the quasi-maximalist path would rather

2009, at 130 (discussing the impending patent cliff facing the pharmaceutical industry in 2011).

countenance a partial windfall situation. It would accept tales of industry-specific overcompensation as being preferable to complaints of inadequate returns. Under a quasi-maximalist system, we would see doctrine crafted in such a way as to give patentees broad control over the disposition of their inventions. One would expect to seldom encounter restrictions on patentable subject matter, contractual freedom on the part of patentees to secure their rights, a generous doctrine of equivalents and, most of all, an automatic entitlement to injunctive relief in the event of established infringement. Yet, one observes none of these things.

Instead, this Article finds a near-unqualified theme in patent doctrine toward a parsimonious solution to the information quandary faced by policymakers. Of the major tenets of patent law that weigh on the prospect of patentee overcompensation, virtually all display sensitivity to this threat. Discoveries that courts and the PTO view as excessively “abstract” are ineligible for patent protection—a result explained by the fact that open-ended processes, untethered to specific applications, will foreclose vast areas of activity and will likely yield a windfall on the inventor. Similarly justifiable restrictions exist on an inventor’s ability to claim her invention. The Federal Circuit cabined the reach of the doctrine of equivalents. Serious restrictions exist on patentees’ contractual rights, which if exercised freely, would serve dramatically to enhance the value of the relevant IP rights. And in light of *eBay*, injunctive relief is by no means readily forthcoming in all cases of infringement. Without ever saying so explicitly, the patent doctrine evidently evolved along a parsimonious path.

This is not to say that the current patent system under-compensates inventors. Indeed, many respected commentators continue to worry that patents are overly generous and that the proliferation of patent rights threaten to stifle future innovation.²⁶⁶ Nevertheless, the patent system has undergone a significant effort to cabin the prospect of serious overcompensation. To the extent that the limitations imposed on the patent doctrine reduced the incidence and severity of windfall returns on inventors below what would prevail under maximalist and quasi-maximalist regimes, the gains thereby attained are commendable. This holds true even if current rewards are excessive in light of the theoretical, though empirically unidentifiable, optimum. Whether policymakers should attempt to weaken patentee compensation further, either by restricting the field of patentable subject matter or reducing the breadth or duration of awarded patent rights,

266. See Richard A. Posner, *Pharmaceutical Patents*, BECKER-POSNER BLOG (Dec. 12, 2004), <http://www.becker-posner-blog.com/2004/12/pharmaceutical-patents--posner.html>.

is a difficult question to answer. This Article argues that any further downward adjustments should be made in incremental steps rather than through more extreme measures. Absent further evidence mandating such a course of action, the complete withdrawal of patent protection from the computer software, business methods, and other controversial fields seems excessive. A better step would be to find ways to limit the force of patents awarded in such sectors and to heighten the standard required for obtaining patent protection in those industries. In particular, the reverse doctrine of equivalents should enjoy new-found force and courts should apply the non-obviousness condition with particular vigor. Should evolution in the law proceed along such lines, it would be fully consistent with the teachings of patent law's parsimony principle.