

Working Paper Series

Villanova University Charles Widger School of Law

Year 2005

One for All: The Problem of Uniformity Cost in Intellectual Property Law

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ONE FOR ALL: THE PROBLEM OF UNIFORMITY COST IN INTELLECTUAL PROPERTY LAW

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* Associate Professor of Law, *Villanova University School of Law*. I am grateful to Dan Burk, Brett Frischmann, and Mark Lemley for helpful comments. In addition, I thank the organizers and participants in the Law and Economics of Intellectual Property Speaker Series at the University of Michigan Law School for their very helpful reactions. Finally, for comments on this project at a much earlier stage, I thank the participants in the Third Annual Intellectual Property Scholars' Conference held at Boalt Hall and at the Penn-Wharton-Temple Colloquium. William Freiberg and Edward Topolewski provided superb research assistance. All errors remain mine.

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INTRODUCTION

The law grants patents to inventors and copyrights to authors to encourage investments in technological and cultural innovation. While addressing an appropriability problem faced by innovators, these intellectual property rights create a different problem by supplying rightsholders with powerful weapons against end-users, direct competitors, and follow-on innovators who seek to bring socially beneficial innovations to market. To promote progress, intellectual property law must strike a balance, providing sufficient incentives for innovation without unduly stifling the efforts of follow-on innovators or the liberties of end-users.

In the law, balance usually calls for context sensitivity. However, intellectual property law protects the owner of each patented invention and each copyrighted work of authorship with a largely uniform set of exclusive rights.¹ Historically, this uniformity may have been justified in light of the relative homogeneity of market conditions applicable to protected subject matter.² Technological progress since the creation of intellectual property rights has led to considerable growth in the range of inventions and expressive works

1. There are exceptions and qualifications to the claim that patent and copyright owners, respectively, enjoy uniform rights. Nonetheless, as the discussion in Part II demonstrates, the law does not differentiate the scope or duration of rights granted on the basis of subject matter, level of investment, or any other metric. *Infra* Part II. For purposes of this Article, discussion of “intellectual property” is shorthand for patent and copyright law. Trademark, trade secret, rights of publicity and other rights in information present related but different features that require separate analysis beyond the scope of this Article.

2. See Copyright Act of 1790, ch. 15, 1 Stat. 124 (1790) (current version 17 U.S.C. § 101 (2000)) (extending protection only to “maps, charts, and books”).

to which patent and copyright law apply, respectively.³ In the modern context, it is clear that innovators' needs for intellectual property protection vary substantially across industries and among types of innovation.⁴ Applying a socially costly, uniform solution to problems of differing magnitudes means that the law necessarily imposes *uniformity cost* by underprotecting those who invest, or would invest, in certain costly innovations and overprotecting those with low innovation costs or access to alternative appropriability mechanisms.⁵

Legal scholars recently have begun analyzing the problem of uniformity cost in patent law. Professor Glynn Lunney, Jr. argues that uniformity cost is the key to understanding the economic structure of patent law and that recent doctrinal changes affecting the scope of patents demonstrate this point.⁶ Further raising the prominence of the problem, Professors Dan Burk and Mark Lemley argue that uniformity cost is particularly high in relation to patent law's

3. See, e.g., Dan L. Burk & Mark A. Lemley, *Is Patent Law Technology Specific?*, 17 BERKELEY TECH. L.J. 1155, 1159 (2002) [hereinafter Burk & Lemley, *Technology-Specific?*] ("The 'useful arts' envisioned by the Framers were mechanical inventions useful in a primarily agrarian economy."). Historically, copyright law regulated the publishing business. See also *infra* notes 127-137 and accompanying text (charting expansion of copyrightable subject matter); see also Note, *Exploitative Publishers, Untrustworthy Systems, and the Dream of a Digital Revolution for Artists*, 114 HARV. L. REV. 2438, 2438 (2001) (noting how digital technology has led to a "crisis in copyright").

4. See, e.g., Dan L. Burk & Mark A. Lemley, *Policy Levers in Patent Law*, 89 VA. L. REV. 1575, 1581-83 (2003) [hereinafter Burk & Lemley, *Policy Levers*] (comparing the pharmaceutical industry which requires a large research and development ("R&D") budget to the computer software industry which can operate on a much smaller budget).

5. See, e.g., *id.* at 1584-85 (explaining that patent protection may not benefit inventions which are impossible to imitate). Additionally, while market forces drive patent protection, some inventors may pursue non-economic objectives such as prestige, prizes, and job promotion. *Id.* at 1586. Furthermore, government subsidies for innovation, for example, through the National Science Foundation and the National Institutes of Health, offer an alternative to patent protection. *Id.* at 1586-87.

6. See generally Glynn S. Lunney, Jr., *Patent Law, the Federal Circuit, and the Supreme Court: A Quiet Revolution*, 11 SUP. CT. ECON. REV. 1 (2004) [hereinafter Lunney, *Quiet Revolution*] (discussing uniformity costs in patent protection and arguing that uniformity in patent protection undermines high cost innovation). Professor Lunney's colleague Professor Christopher Cotropia has further extended this line of analysis. See Christopher A. Cotropia, "After-Arising" Technologies and Tailoring Patent Scope, 61 N.Y.U. ANN. SURV. AM. L. 151, 152 (2005) [hereinafter Cotropia, "After-Arising"] (arguing that while after-arising equivalents protection is needed, it should be "tailored to rapidly developing cumulative technology industries"); Christopher A. Cotropia, *Patent Claim Interpretation and Information Costs*, 9 LEWIS & CLARK L. REV. 57, 82-90 (2005) (discussing how minimizing informational costs in claim interpretation promotes a clearer understanding of the boundaries of an invention's patent protection); Christopher A. Cotropia, "Arising Under" Jurisdiction and Uniformity in Patent Law, 9 MICH. TELECOMM. & TECH. L. REV. 253, 286-302 (2003), reprinted in 36 INTELL. PROP. L. REV. 209, 243-59 (2004) (discussing how the U.S. Supreme Court's decision in *Holmes* allows for the development of non-uniform patent law).

application to software and biotechnology, and that these costs can be reduced by differential application of the Patent Act.⁷

Building on this prior work, this Article generalizes the problem to include copyright law and advances an analytical, a descriptive, and a normative claim with respect to the problem of uniformity cost. First, if one accepts the standard economic justification for intellectual property rights, one must accept that exclusive rights must promise some potential power over price to induce innovation. One must also accept that different innovators require different kinds of promises from the law. From this premise follows the underappreciated conclusion that perfectly tailored rights that promise innovators only the expected value required to induce socially desirable innovation would be theoretically optimal⁸ if intellectual property rights were the only policy tool available to promote innovation.

Intellectual property law falls short of this ideal for a host of reasons including uncertainty about innovation, information asymmetries between policymakers and innovators, administrative costs of tailoring, and the political economy of intellectual property policymaking. The law's inability to achieve this ideal imposes uniformity costs on society. While all laws impose some uniformity cost because they are inevitably overinclusive or underinclusive in some respects, uniformity cost matters from a pragmatic perspective when initial entitlement allocations cannot readily be realigned to accord with social commitments to allocative efficiency, distributive justice, and personal autonomy. Part I explains why initial allocations in patent and copyright law are not readily realigned and why, therefore, the problem of uniformity cost in intellectual property law is substantial.

Second, a descriptive account of contemporary patent and copyright law in Part II demonstrates that the problem of uniformity cost is embedded in the standard entitlements granted under each body of law. However, the discussion in Part III demonstrates that two features of these formally uniform rights can function, and do

7. See Dan L. Burk & Mark A. Lemley, *Biotechnology's Uncertainty Principle*, 54 CASE W. RES. L. REV. 691, 695-706 (2004) (discussing the stringent disclosure standards for patents in the biotechnology industry); Burk & Lemley, *Policy Levers*, *supra* note 4, at 1689 (recommending that software patent policy should be reformed with respect to the obviousness doctrine and disclosure requirements on the doctrine of equivalents); Burk & Lemley, *Technology-Specific?*, *supra* note 3, at 1158-85 (discussing heterogeneity in patent law).

8. See *infra* note 55 and accompanying text (qualifying this Article's claim concerning optimality in general and optimality of tailored rights in particular).

function to some extent, to reduce uniformity cost: (1) real options that regulate who acquires, and who keeps, intellectual property rights;⁹ and (2) flexible standards that define rights to promote context-sensitive application of the law.¹⁰ Contemporary law also includes provisions that have been legislatively tailored, and in a separate paper, I analyze the tailoring of intellectual property rights as a strategy for reducing uniformity cost.¹¹

Finally, this Article closes by claiming that the theoretical and descriptive accounts lead to the conclusion that uniformity cost is the central problem that intellectual property law must manage. There are substantial pragmatic arguments that favor uniformity in the current policymaking environment, but as uniformity cost rises with the growing economic importance of, and variation among, information-centric industries, policymakers should strive harder to maximize context-sensitivity in intellectual property law. By making uniformity cost the focus of economic analysis of intellectual property law and by analyzing two important features of entitlement design that can be deployed to reduce uniformity cost, this Article supplies a general framework for analyzing the economic stakes in a range of policy debates in contemporary intellectual property law.

I. THE PROBLEM OF UNIFORMITY COST

Intellectual property rights impose social costs because they interfere with competitive distribution of information goods.¹² From a dynamic perspective, some distortion must be tolerated as the price for having the information created in the first place.¹³ The social costs that matter, then, are not all static deadweight losses, but only the distortions caused by rights that are more or less robust than necessary to have induced investments in innovation that deliver a

9. See *infra* Part III.A (arguing that real options can promote social welfare in some circumstances).

10. See *infra* Part III.B (discussing how flexibility can reduce uniformity costs by customizing protection for different contexts).

11. Michael W. Carroll, *Intellectual Property in the Twenty-First Century* (unpublished draft Apr. 2005) (on file with author).

12. See, e.g., WILLIAM M. LANDES & RICHARD A. POSNER, *THE ECONOMIC STRUCTURE OF INTELLECTUAL PROPERTY LAW* 74-76 (2003) (explaining that copyright protection is needed to offset the costs of others copying inventions but adding that too much protection causes market inefficiencies). The authors explain that the social desirability of patent protection depends on the patentee's fixed costs and how easy it is for competitors to work around the patent, but that the patent system fails to take these two factors into consideration, which in turn, leads to social costs. *Id.* at 297-310.

13. See *id.* (illustrating that a deadweight loss in the market for copies is caused because greater copyright protection increases the price of a copy while decreasing the number of copies sold).

net benefit to society. Uniform intellectual property rights necessarily impose such costs. This Part demonstrates this point by revisiting the standard economic justification for intellectual property rights and then by reorienting this analysis around the problem of uniformity cost.

This reorientation reveals that the theoretically optimal policy, if intellectual property rights were the only feasible response to underproduction of valuable information, would be to fashion perfectly tailored rights rather than to promote perfect price discrimination, as some theorists suggest.¹⁴ While perfect tailoring is just as elusive as perfect price discrimination, the uniformity cost perspective shows that the focus of policy analysis should be on how intellectual property rights can be rendered more context sensitive. Further, this theoretical reorientation emphasizes the role of “law” in the law and economics of intellectual property because even after economic analysis identifies industries or technologies for which uniformity costs are particularly high, legal scholars must assess whether legal institutions can competently address this problem.

A. *Standard Economic Justification for Intellectual Property Rights*

Intellectual property rights are a second-best solution to an “appropriability problem.”¹⁵ The now familiar utilitarian justification for intellectual property law starts with Thomas Jefferson’s observation that information’s “peculiar character . . . is that no one possesses the less, because every other possesses the whole of it [H]e who lights his taper at mine, receives light without darkening me.”¹⁶ For Jefferson, the capacity for information to “freely spread from one to another over the globe” is “benevolently designed by nature.”¹⁷ For the economist, however, given that information is a public good, its “benevolent” design poses a problem.¹⁸ To the extent that pecuniary motivation drives

14. See *id.* at 39-40 (contending that perfect price discrimination is not feasible given the difficulty in obtaining the required information about consumer preferences).

15. See, e.g., Gideon Parchomovsky & R. Polk Wagner, *Patent Portfolios*, 154 U. PA. L. REV. 1, 12-14 (2005) (explaining that since intellectual property are public goods, others would be able to copy inventions without first paying the related research and development costs).

16. Letter from Thomas Jefferson to Isaac McPherson (Aug. 13, 1813), in 3 THE FOUNDERS’ CONSTITUTION 42-43 (Philip B. Kurland & Ralph Lerner eds., 1987).

17. *Id.*

18. See ROBERT COOTER & THOMAS ULEN, LAW AND ECONOMICS 108-09 (3d ed. 2000) (explaining that public goods can be consumed without depletion (non-rivalrous consumption) and can be withheld from nonpaying beneficiaries only at prohibitive cost (non-excludability)); see also Wilfried Ver Eecke, *Public Goods: An*

innovation, we should not expect to see useful information¹⁹ produced unless the producer can recoup his or her investment.²⁰ Producers, acting alone, cannot rely on competitive markets to supply a sufficient return to make the investment in producing such information worthwhile because the distribution of valuable information cannot be controlled in the same ways scarce goods can, given information's non-rival nature.²¹ The government's response has been to grant and to administer rights under patent and copyright law.²² Such rights give the innovator the power to exclude or inhibit direct competition, which yields potential power over price.²³ If demand is sufficient, the innovator can use that power to earn a positive return on investments in innovation.²⁴

Ideal Concept, 28 J. SOCIO-ECONOMICS 46 (1999) (identifying at least thirteen economic problems related to public goods: "(1) decreasing costs in production, (2) externalities, (3) joint supply, (4) nonexclusion, (5) nonrejectability, (6) benefit spillovers, (7) unenforceability of compensation, (8) indivisibility, (9) nonappropriability, . . . (10) nonrivalness, . . . (11) free rider possibility, (12) multiple user good, [and] (13) lumpiness" (citations omitted). Information is imperfectly excludable and its non-rivalrous quality makes it "problematic").

19. The terms "valuable" and "useful" information in this Article refer to information that is costly to produce and that members of our society find to be useful, informative, enriching, or otherwise of value. Such information includes the ideas and expressions or embodiments of those ideas found in, for example, novels, movies, music, methods for manufacturing useful articles (medicines, computers, clothing, etcetera), and computer software.

20. See, e.g., Mark A. Lemley, *The Economics of Improvement in Intellectual Property*, 75 TEX. L. REV. 989, 994 (1997) [hereinafter Lemley, *Economics of Improvement*] ("In a private market economy, individuals will not invest in invention or creation . . . unless they can reasonably expect to make a profit from the endeavor."); Christian Koboldt, *Intellectual Property and Optimal Copyright Protection*, 19 J. CULTURAL ECON. 131, 134-35 (1995) (noting that copyright protection provides incentives for the creation of inventions).

21. See, e.g., CARL SHAPIRO & HAL VARIAN, *INFORMATION RULES: A STRATEGIC GUIDE TO THE NETWORK ECONOMY* 3 (1999) [hereinafter SHAPIRO & VARIAN, *INFORMATION RULES*] (explaining that "[i]nformation is costly to *produce* but cheap to *reproduce*"); F.M. SCHERER & DAVID ROSS, *INDUSTRIAL MARKET STRUCTURE AND ECONOMIC PERFORMANCE* 622 (3d ed. 1990) (arguing that innovators must be given some monopoly power in order to recoup high start-up costs); Mark A. Lemley, *Property, Intellectual Property, and Free Riding*, 83 TEX. L. REV. 1031, 1054-55 (2005) [hereinafter Lemley, *Free Riding*] (contending that the competitive market for information will result in an underproduction of inventions); Ian E. Novos & Michael Waldman, *The Effects of Increased Copyright Protection: An Analytic Approach*, 92 J. POL. ECON. 236, 237 (1984) (illuminating the problem of free riding in the software industry because of software's nonrival nature).

22. See generally *supra* note 2 (discussing the history and evolution of intellectual property law); The Copyright Act, 17 U.S.C. §§ 101-1332 (2000).

23. See LANDES & POSNER, *supra* note 12, at 74-76 (explaining the effect of copyright protection on the price and quantity of copies and on social welfare).

24. See, e.g., *id.*, *supra* note 12, at 76-79 (demonstrating the effect of patent protection on price and profit). While an increase in copyright protection increases residual demand for the product, if the elasticity of residual demand sufficiently declines, equilibrium output may decrease. *Id.* at 79.

While addressing underproduction, intellectual property rights also impose social costs. Professor Lemley nicely summarizes these as follows:

First, intellectual property rights distort markets away from the competitive norm, and therefore create static inefficiencies in the form of deadweight losses. Second, intellectual property rights interfere with the ability of other creators to work, and therefore create dynamic inefficiencies. Third, the prospect of intellectual property rights encourages rent-seeking behavior that is socially wasteful. Fourth, enforcement of intellectual property rights imposes administrative costs. Finally, overinvestment in research and development is itself distortionary.²⁵

B. *The Problem of Uniformity Cost*

Economic analysts generally agree that these social costs must be minimized, and intellectual property rights should be no more robust than necessary to induce the desired level of investment in cultural and technological innovation.²⁶ However, in both the economic and the law and economics literature, the problem of social cost in intellectual property law often is discussed at a very high level of abstraction. The literature surrounding the optimal length of a patent is a typical example. Neoclassical economic models concerning an optimal patent term often hold that optimality is conditional, recognizing that efficiency might dictate varying terms from patent to patent.²⁷ Other analysts make the point more

25. Lemley, *Free Riding*, *supra* note 21, at 1058-59.

26. See, e.g., Lunney, *Quiet Revolution*, *supra* note 6, at 5 (arguing that patent protection should be provided only to the "precise extent[] necessary to secure each individual innovation's *ex ante* expected profitability" and acknowledging that this level will have to account for unsuccessful research efforts); William W. Fisher III, *Property and Contract on the Internet*, 73 CHL-KENT L. REV. 1203, 1249 (1998) (arguing that the goal of copyright law is to "give creators enough entitlements to induce them to produce the works from which we all benefit but no more"). The canonical version of this argument was voiced by Lord Macaulay, who argued that a grant of copyright was a grant of an evil monopoly and that "[f]or the sake of the good we must submit to the evil; but the evil ought not to last a day longer than is necessary for the purpose of securing the good." Thomas Babington Macaulay, Speech in the House of Commons (Feb. 5, 1841), in THE COMPLETE WORKS OF THOMAS BABINGTON MACAULAY 241 (Sully & Kleinteich eds., Houghton, Mifflin & Co. 1900).

Professor John Duffy argues that the mobility of capital makes analysis of the causal connection between rights and investment levels unstable. John F. Duffy, *Intellectual Property Isolationism And The Average Cost Thesis*, 83 TEX. L. REV. 1077, 1078-89 (2005). But see Mark A. Lemley, *What's Different About Intellectual Property?*, 83 TEX. L. REV. 1077, 1102-03 (2005) [hereinafter Lemley, *What's Different?*] (responding that because intellectual property rights distort the market away from competitive equilibrium, entry will not necessarily compete away supracompetitive returns).

27. See *infra* notes 186-188 and accompanying text (discussing economic literature on patent length).

explicitly.²⁸ But these economists offer no suggestion for how variable patent terms might be implemented, and those who contemplate the matter find the administrative difficulties intractable. This literature points out the problem of *uniformity cost* in intellectual property law.²⁹ While economic analysis can help identify situations in which uniformity cost is particularly high, it will require pragmatic legal analysis to identify ways in which the legal system can competently redress the problem.

1. *The problem*

Legal scholars only recently have begun to analyze the social costs of uniform rights as a general problem in intellectual property law. Analyzing U.S. patent law, Professor Lunney has advanced a formal economic model of uniformity cost that assesses the trade-offs between strictly uniform rights, rights tailored to individual innovations, and certain intermediate options.³⁰ At bottom he shows that “[e]ven where an innovative product represents the most valuable use of available resources . . . an optimal uniform scheme of protection will provide protection that will leave some desirable innovative products unprofitable.”³¹

To illustrate the point, imagine four innovations, *A*, *B*, *C*, and *D*. These could be musical compositions, types of business software, biotechnological inventions, or chemical compounds with

28. See *infra* notes 29-31 and accompanying text (discussing recognition of uniformity cost in the literature).

29. See Lunney, *Quiet Revolution*, *supra* note 6, at 5-6 (stating that uniformity costs rise as the gap between the optimal uniform level of protection and the level needed for individual innovation increases). See generally Francesca Cornelli & Mark Schankerman, *Patent Renewals and R&D Incentives*, 30 RAND J. OF ECON. 197, 197 (1999) (“A uniform patent life provides too much R&D incentive to low-productivity firms and too little incentive to high-productivity ones.”).

30. See Lunney, *Quiet Revolution*, *supra* note 6, at 39-56 (illustrating that uniform protection forces regulators to choose between encouraging innovation at the cost of social welfare while an individualized protection scheme requires additional administrative and information costs); see also Cornelli & Schankerman, *supra* note 29, at 197 (arguing that an optimum patent scheme can be achieved through various patent renewal fees); Wendy A. Adams, *Intellectual Property Infringement in Global Networks: The Implication of Protection Ahead of the Curve*, 10 INT’L J.L. & INFO. TECH. 71, 79-80 (2002) (noting that the ideal amount of patent protection requires a complex analysis of a state’s economic and technological capacity).

31. See Lunney, *Quiet Revolution*, *supra* note 6, at 50-51 (arguing that excluding otherwise desirable innovations would be advantageous when the benefits of doing so are outweighed by the costs involved in excluding or extending protection to preexisting innovations); see also Bruce Abramson, *Promoting Innovation in the Software Industry: A First Principles Approach to Intellectual Property Reform*, 8 B.U. J. SCI. & TECH. L. 75, 107 (illustrating that second-generation products may not reach the market if the patent holder of a first-generation product refuses to cooperate with another innovator who holds a block patent on the improvement to the first-generation product).

pharmacological uses. Society places a value of fifty on each of these if it is available for use and is free from any intellectual property rights. Assume that intellectual property rights apply uniformly to all covered forms of information and can be calibrated to yield levels of protection ranging from zero to three. Innovations *B-D* will require a level of protection above zero to be created and distributed, so that *A* alone will be created and distributed at zero, *A* and *B* will be created and distributed at level one, and so on. As protection increases, however, social value decreases because some users are priced out of desired uses for which they would pay more than marginal cost.³² Assume that each increase in the level of protection reduces the social value of each innovation by ten. Sliding the protection lever upward yields the following distribution of social values:

Level of Protection	Innovations Created and Distributed	Total Social Value
0	A	50
1	A, B	80
2	A, B, C	90
3	A, B, C, D	80

A policymaker interested in maximizing social value from intellectual property rights but bound by the uniformity condition would set the level of protection at two, leaving innovation *D* unprofitable even though society places a net positive value of twenty on having it created. Within this highly stylized example, it is easy to see that if the uniformity condition could be relaxed, it would be possible to adjust rights to entice the creation of *A-D* by, for example, eliminating protection for *A* and reducing the scope or duration of rights granted to *B*.

Some empirical data suggest that the social costs of protecting innovations such as *A* are not merely hypothetical. Edwin Mansfield interviewed research and development managers from 100 randomly selected firms to ask what percentage of each firm's inventions would have been developed and brought to market in the absence of patent protection.³³ Although any counterfactual query introduces certain

32. See COOTER & ULEN, *supra* note 18, at 21 (explaining that marginal cost is the cost associated with increasing an additional unit of output or production); *id.* at 300 (illustrating that social costs are the costs imposed on society due to private conduct, such as having accidents).

33. See Edwin Mansfield, *Patents and Innovation: An Empirical Study*, 32 MGMT. SCI. 173 (1986) (exploring how much innovation would decline without patent protection and to what extent firms make use of the patent system). In 1994, Wesley

biases and uncertainties, especially when posed to interested parties, Mansfield's data indicate that: (1) a significant percentage of inventions would have been developed and brought to market without the prospect of patent protection; (2) this effect varies significantly by industry; and (3) the availability of protection resulted in eighty percent of patentable inventions being patented in industries with high patent-dependencies (pharmaceuticals, chemicals, petroleum, machinery, and fabricated metal products) and sixty percent of inventions being patented in less patent-dependent industries (primary metals, electrical equipment, instruments, office equipment, motor vehicles, rubber, and textiles).³⁴ Similar results have been found in the semiconductor manufacturing industry.³⁵

In fact, the problem of uniformity cost is potentially far more significant than the example above suggests. The distribution of rewards from both cultural and technological innovation is highly skew.³⁶ For example, uncertainty about demand or about feasibility leads recording companies, motion picture studios, pharmaceutical companies, and biotechnology research firms to invest millions of

Cohen randomly surveyed R&D lab managers on their methods of protecting patents and received responses from 1,478 labs. Wesley M. Cohen et al., *Protecting Their Intellectual Assets: Appropriability Conditions and Why U.S. Manufacturing Firms Patent (or Not)* 1-4 (Nat'l Bureau of Econ. Research, Working Paper No. 7552, 2000) [hereinafter Cohen et al., *Why U.S. Manufacturing Firms Patent*], available at <http://www.nber.org/papers/w7552>. Of the firms surveyed, most viewed patents as the least important in securing profits on an invention. *Id.* at 1; see also Richard C. Levin et al., *Appropriating the Returns from Industrial Research and Development*, 1987 BROOKINGS PAPERS ON ECON. ACTIVITY 783, 793-99 (surveying R&D managers about the efficacy of patents and finding that respondents rated patents as the least effective method of appropriation and preferred other devices to protect returns on investments).

34. Mansfield, *supra* note 33, at 175-76.

35. See Rosemarie Ham Ziedonis, *Don't Fence Me In: Fragmented Markets for Technology and the Patent Acquisition Strategies of Firms*, 50 MGMT. SCI. 804 (2004) (explaining rise in defensive patenting in semiconductor industry); Bronwyn H. Hall & Rosemarie Ham Ziedonis, *The Patent Paradox Revisited: An Empirical Study of Patenting in the U.S. Semiconductor Industry, 1979-1995*, 32 RAND J. OF ECON. 101, 104-05 (2001) (summarizing findings indicating that patents are ineffective as solutions to appropriability in the industry and increases in patenting explained by other factors).

36. See, e.g., F.M. Scherer, *The Innovation Lottery*, in EXPANDING THE BOUNDARIES OF INTELLECTUAL PROPERTY: INNOVATION POLICY FOR THE KNOWLEDGE SOCIETY 4-7 (Rochelle Cooper Dreyfuss et al., eds. 2001) (collecting data showing that vast majority of profit data was clustered in the range of low profit values but that the distribution also had a long range of high values); F.M. Scherer, Dietmar Harrhoff & Jörg Kukies, *Uncertainty and the Size Distribution of Rewards from Innovation*, 10 J. EVOLUTIONARY ECON. 175, 175-79 (2000) (showing through an empirical study that eighty-one to eighty-five percent of U.S. patents were in the top ten percent value shares).

dollars that will never be recouped in innovation.³⁷ In these industries, profits from chart-topping songs, blockbuster movies, and blockbuster drugs must be sufficient to cover the losses incurred on other investments.³⁸ Consequently, industries such as these demand robust intellectual property rights to maximize the profitability of successful innovations. When these rights apply uniformly, the social costs are magnified.

2. *Uniformity cost typology*

Uniformity costs can be categorized as Type I or Type II. Type I uniformity costs arise when the creators of the same class of subject matter face different magnitudes or types of the appropriability problem. For example, in the absence of copyright, some composers would still create new music whereas others may pursue a different line of work. The public would benefit if copyright applied to only music created by the latter group.³⁹ Instead, under U.S. copyright law all music is protected by the same entitlement.⁴⁰ Even when some copyright incentives are needed, the magnitude of that need varies based on the time, effort, and capital at risk or the incentives may be needed to solve different kinds of problems. With respect to software, for example, open source programmers rely on rights under copyright to prohibit private appropriation of common-pool software whereas many commercial software producers rely on copyright to prohibit unauthorized public appropriation of privately held software.⁴¹ Copyright law, however, treats all software as literary works and supplies the same rights to both groups.⁴²

37. See, e.g., Edwin Mansfield et al., *Social and Private Rates of Return from Industrial Innovations*, 91 Q. J. ECON. 221, 233-34 (1977) (stating that the median private rate of return for the innovations studied was twenty-five percent).

38. See, e.g., Arthur S. DeVany & W. David Walls, *Motion Picture Profit, the Stable Paretian Hypothesis, and the Curse of the Superstar*, 28 J. ECON. DYNAMICS & CONTROL 1035, 1039-40 (2004) (estimating from gross profit data over a thirteen year span that only twenty-two percent of movies made were profitable and of those, thirty-five percent made eighty percent of the total profits earned); Henry Grabowski, *Patents and New Product Development in the Pharmaceutical and Biotechnology Industries* 14 (Working paper 2002), available at <http://www.econ.duke.edu/Papers/Other/Grabowski/Patents.pdf> (last visited Mar. 2, 2006) (finding that "the search for blockbuster drugs is what drives the R&D process in pharmaceuticals" and that "[t]he median new drug does not cover the R&D costs of the average compound").

39. A more thorough welfare analysis would include, among other things, the disaffection costs imposed on unprotected composers from being treated differently than protected composers.

40. See 17 U.S.C. § 102(a)(2) (2000) ("musical works, including any accompanying words"); *id.* § 102(a)(7) ("sound recordings"); *id.* § 106 (enumerating types of available rights).

41. Compare David McGowan, *Legal Implications of Open-Source Software*, 2001 U. ILL. L. REV. 241, 242 (2001) (describing that while the GNU/Linux operating system

Type II uniformity costs also arise out of variable appropriability problems. Even when all creators within an industry or technological field face roughly the same type and magnitude of appropriability problem, the magnitude and type of problem will certainly vary among industries and technological fields.⁴³ Nonetheless, patent law grants the same entitlement to inventors of pharmaceutical drugs and novelty toys, and copyright law grants roughly the same entitlement to, for example, authors of novels and computer programs. This uniformity highlights the imprecision of current intellectual property law.

3. *Qualifying the problem*

Granting uniform entitlements in patent and copyright law necessarily will impose some Type I and Type II costs, and the question for policymakers is how best to reduce these costs. The magnitude of social costs incurred when the government rewards all innovators with the same entitlement depends on the currency used. If the government were to grant a uniform monetary entitlement to all inventors—say a bounty of \$1 million—whether their invention were a life-saving biomedical device or a novelty toy, the social costs of uniformity would be apparent and such a system would be grossly inefficient.

Policymakers have chosen to grant legal rather than monetary entitlements to innovators. Uniform exclusive rights are not immediately problematic because three market-based features of the intellectual property system reduce uniformity cost: demand

is copyrighted, the persons and firms who own the rights use them to further the goals of the open source community, namely that the software “may be freely copied, modified, and distributed, but only if the modifications (derivative works) are distributed on these terms as well”), with Microsoft’s Software Piracy Protection Home Page, <http://www.microsoft.com/piracy> (last visited Mar. 3, 2006) (providing information on piracy including how to report it to Microsoft).

42. See 17 U.S.C. § 101 (2000) (defining literary works as “works, other than audiovisual works, expressed in words, numbers, or other verbal or numerical symbols or indicia, regardless of the nature of the material objects, such as books, periodicals, manuscripts, phonorecords, film, tapes, disks, or cards, in which they are embodied”); see also *Vault Corp. v. Quaid Software Ltd.*, 847 F.2d 255, 259 (5th Cir. 1988) (noting that Congress amended the Copyright Act in 1976 with the intention of including software in the definition of literary works).

43. 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.”); Burk & Lemley, *Policy Levers*, *supra* note 4, at 1584 (“Appropriability is itself an amalgam of a complex set of variables, many of which are themselves industry-specific.”).

elasticity, price discrimination, and Coasean bargaining. The social costs of intellectual property rights arise only when there is demand for protected information. If demand for a novelty toy that would have been invented in the absence of protection is zero, then even though granting uniform patent rights was unnecessary, uniformity cost is zero because no potential buyers have been excluded.⁴⁴ Uniformity costs rise with demand.⁴⁵

Even when these uniformity costs arise, under traditional economic analysis, perfect price discrimination *theoretically* would eliminate the underdistribution of protected information. That is, static deadweight loss would be zero if intellectual property owners were able to fully engage in first-degree price discrimination, such as selling or licensing to each user willing to pay more than marginal cost.⁴⁶ As others have shown, however, even as a matter of theory, perfect price discrimination would not eliminate all social costs of intellectual property rights.⁴⁷ Moreover, even if perfect price discrimination would theoretically avoid reduction in social value, perfect first-degree price discrimination in the intellectual property

44. See Patently Silly, <http://www.patentlysilly.com> (last visited Mar. 3, 2006) (identifying such low-demand inventions). Of course, demand for the invention does not refer to only demand in product markets. Any potential user of information for which a patent owner might make a credible threat must be plotted on the invention's demand curve.

45. Increases in demand for a work also attract free riding competitors so that increases in demand increase both the magnitude of the appropriability problem and the magnitude of social cost. See Glynn S. Lunney, Jr. *Reexamining Copyright's Incentives-Access Paradigm*, 49 VAND. L. REV. 483, 557 (1996) (pointing out that narrowing copyright protection necessarily reduces incentives to innovate along with deadweight loss). Although we should expect rising demand to generate correlated offsetting effects in many cases, when creators of popular works do not require the power over price that patent or copyright promise, uniformity costs rise.

46. See SHAPIRO & VARIAN, INFORMATION RULES, *supra* note 21 at 39; Harold Demsetz, *The Private Production of Public Goods*, 13 J. L. & ECON. 293, 303-04 (1970) (positing that no single price in the market for privately produced public goods can satisfy equilibrium requirements).

47. Economists have become less certain about the theoretical efficiency of perfect price discrimination by natural monopolists or firms engaged in monopolistic competition. See, e.g., V. Bhaskar & Ted To, *Is Perfect Price Discrimination Really Efficient? An Analysis Of Free Entry*, 35 RAND J. OF ECON. 762, 775 (2004); Aaron S. Edlin et al., *Is Perfect Price Discrimination Really Efficient?: Welfare and Existence in General Equilibrium*, 66 ECONOMETRICA 897 (1998) (arguing that the efficiency of price discrimination may be undermined by excessive entry of firms into the market). Moreover, many attempts to modify intellectual property law to enhance opportunities for price discrimination likely are undesirable. See generally Julie E. Cohen, *Copyright and the Perfect Curve*, 53 VAND. L. REV. 1799 (2000); Michael J. Meurer, *Copyright Law and Price Discrimination*, 23 CARDOZO L. REV. 55 (2001) [hereinafter Meurer, *Price Discrimination*]; Brett M. Frischmann, *An Economic Theory Of Infrastructure And Commons Management*, 89 MINN. L. REV. 917, 978-80 (2005) (discussing distortionary effects of promoting price discrimination).

context is a practical impossibility.⁴⁸ The real question is whether policymakers should design intellectual property entitlements to facilitate price discrimination so as to reduce uniformity cost. As Michael Meurer has shown, some forms of price discrimination are socially beneficial and others are socially harmful.⁴⁹ Consequently, even when the law can encourage price discrimination, the problem of uniformity cost reemerges with respect to the need to tailor entitlements to promote only beneficial price discrimination.

Finally, when demand is positive and price discrimination is imperfect, the Coase Theorem asserts that uniformity cost will affect *allocative* efficiency only if reallocation or reapportionment of uniform entitlements by contract is too costly.⁵⁰ Commentators disagree about the general magnitude of transaction costs in intellectual property sales and licensing, but all would agree that the costs are greater than zero.⁵¹ Indeed, most agree that difficulties in valuing patents and copyrights raise transaction costs to the point that allocative efficiency will depend upon the content of intellectual property entitlements.⁵² This is particularly true because the

48. See, e.g., Lemley, *Free Riding*, *supra* note 21, at 1059 n.115; Christopher S. Yoo, *Copyright and Product Differentiation*, 79 N.Y.U. L. REV. 212, 255 (2004) (noting that entry of firms will eventually eliminate all supracompetitive profits); Daniel A. Farber & Brett H. McDonnell, *Why (and How) Fairness Matters at the IP/Antitrust Interface*, 87 MINN. L. REV. 1817, 1867 (2003) (adding that imperfect price discrimination can have negative consequences).

49. See generally Meurer, *Price Discrimination*, *supra* note 47, at 90-94 (arguing that in some circumstances, price discrimination is efficient because it makes producers better off without making consumers worse off but in other circumstances, it is not efficient because while producers are better off, total surplus is reduced); Michael J. Meurer, *Price Discrimination, Personal Use and Piracy: Copyright Protection of Digital Works*, 45 BUFF. L. REV. 845, 869, 894 (1997) (noting that price discrimination allows sellers to generate more revenue but is more likely to induce buyers to band together to share digital goods in order to arbitrage against differential pricing).

50. See Ronald Coase, *The Problem of Social Cost*, 3 J. LAW & ECON. 1, 16 (1960) ("In these conditions [of high transaction costs] the initial delimitation of legal rights does have an effect on the efficiency with which the economic system operates."); see also Cooter & Ulen, *supra* note 18, at 82-87 (explaining that the Coase theorem posits that in the absence of transaction costs, all allocations are efficient because private parties will bargain to internalize externalities). While arguing that policymakers should recognize the effects they have on allocative efficiency when fashioning legal rights for high transaction cost environments, Coase also recognized that distributional justice matters and that "the choice between different social arrangements for the solution of economic problems should be carried out in broader terms than this [maximizing total output] and that the total effect of these arrangements in all spheres of life should be taken into account." Coase, *supra* note 50, at 43.

51. See Robert P. Merges, *Of Property Rules, Coase, and Intellectual Property*, 94 COLUM. L. REV. 2655, 2661 (1994) [hereinafter Merges, *Of Property Rules*] ("Despite a few brave attempts to assume away the obvious, those who have considered the application of the Coase theorem to IPRs have noted the pervasive presence of transaction costs.").

52. See, e.g., Clarisa Long, *Proprietary Rights and Why Initial Allocations Matter*, 49

externalities that justify patent and copyright law differ fundamentally from those that inspired Coase,⁵³ and the law's choice is not between granting an entitlement to party A or to party B but between granting an entitlement to party A or to the public at large, comprised of an unknown and often unknowable proportion of higher and lower-valued users.⁵⁴ Consequently, allocative inefficiency in intellectual property law potentially imposes a far more significant social cost than it does with respect to real property.

Thus, even after demand elasticity, price discrimination, and Coasean bargaining have been accounted for, if the law grants uniform intellectual property rights, society pays too much for numerous innovations that would be created with less robust protection, and the optimal level⁵⁵ of protection must be set lower than is necessary to induce the creation of certain costly but socially desirable innovations.⁵⁶

The uniformity-cost perspective calls for a reorientation in the economic analysis of intellectual property law. Those who argue that perfect price discrimination alone would be a complete solution to

EMORY L.J. 823, 828-29 (2000) (arguing that uncertainty in valuation of patents on basic research tools is likely to block efficient licensing of such tools); Nancy Gallini & Suzanne Scotchmer, *Intellectual Property: When is it the Best Incentive System?*, in 2 INNOVATION POLICY AND THE ECONOMY 67 (Adam Jaffe et al. eds., 2001) ("The optimal design of IP depends importantly on the ease with which rights holders can contract around conflicts in rights."); Lemley, *Economics of Improvement*, *supra* note 20, at 1053 (analyzing components of transaction costs and concluding that "[t]he result of all these factors is that the transaction costs of intellectual property licenses are significant"); James Bessen, *Holdup and Licensing of Cumulative Innovations With Private Information*, 82 ECON. LTRS. 321, 326 (2004) (showing that "[t]he possibility of ex ante licensing does not eliminate the problem of holdup in cumulative innovation").

53. See, e.g., Merges, *Of Property Rules*, *supra* note 51, at 2657-64 (highlighting that it is more difficult to identify the existence and severity of externalities in the context of intellectual property than in physical property); Lemley, *Free Riding*, *supra* note 21, at 1054-55; Lemley, *What's Different?*, *supra* note 26, at 1098-1102 (noting that creating intellectual property rights is more likely to have positive externalities and greater costs than creating real property rights). See generally Mark A. Lemley, *Ex Ante Versus Ex Post Justifications for Intellectual Property*, 71 U. CHI. L. REV. 129 (2004) [hereinafter Lemley, *Ex Ante Versus Ex Post*] (comparing traditional and new justifications for intellectual property rights).

54. See generally Frischmann, *supra* note 47, at 939-80 (discussing a variety of demand-side considerations for information resources).

55. In my view, interpersonal and intrapersonal incommensurability problems make the notion of an optimal level of protection incoherent. Nonetheless, the case for some level of protection is persuasive for at least some forms of information. Those who share my doubts about the utility of optimality analysis should understand "optimal level" to mean the level of protection that democratically-representative policymakers would choose to bring about a desired amount of investment in innovation, recognizing the incommensurable interests that are sacrificed with each change in the level of protection.

56. See Lunney, *Quiet Revolution*, *supra* note 6, at 50-51 (arguing that this conclusion helps explain why products such as business methods and clothing designs are traditionally excluded from patent and trademark protection).

the social costs of intellectual property rights err. In fact, if intellectual property rights were the only available solution to the underproduction problem, the ideal implementation would be perfectly tailored rights⁵⁷—i.e. rights that promised the expected value necessary to induce investment in only socially-desirable innovations.

II. UNIFORMITY AND ITS LIMITS IN U.S. INTELLECTUAL PROPERTY LAW

As is true in most areas of law, intellectual property entitlements fall far short of the theoretically desirable design. This Part describes the current state of patent and copyright law, showing that the entitlements are largely uniform and that recent changes have exacerbated the problem of uniformity cost. Before turning to the specifics of U.S. intellectual property law, a few preliminary remarks concerning the general design of intellectual property rights and the difference between uniform and tailored rights are in order.

Intellectual property rights have three dimensions: subject matter, scope, and duration. The subject matter of intellectual property potentially is all information.⁵⁸ Scope defines the actions that the rightholder may engage in lawfully with respect to protected subject matter, the actions of others for which the rightholder may seek legal redress, and the remedial rules specifying available redress.⁵⁹ Duration is a relevant dimension because the U.S. Constitution requires that federal patent and copyright rights be limited in time.⁶⁰

57. The claim for perfect tailoring is qualified because if policymakers had sufficient information about expected value so as to perfectly tailor rights, a more efficient policy response to underproduction would be to pay innovators directly for the costs of innovation while leaving the costs of distribution to competitive markets. See, e.g., Lemley, *Ex Ante Versus Ex Post*, *supra* note 53, at 135 (2004) (characterizing intellectual property rights as a “necessary evil” and arguing that the default preference in a market economy is to leave distribution to competitive markets). Nonetheless, if the policymaker’s options are restricted to the creation of exclusive rights, perfectly tailored rights are superior to a regime of uniform rights with perfect price discrimination because dynamic inefficiencies would be eliminated as well.

58. See, e.g., Thomas Cottier & Marion Panizzon, *Legal Perspectives on Traditional Knowledge: The Case for Intellectual Property Protection*, 7 J. INT’L ECON. L. 371, 382-84 (2004) (asserting that information that intellectual property protects should be interpreted broadly to include information that can create economic gain, such as traditional knowledge).

59. See, e.g., Wendy J. Gordon, *An Inquiry Into The Merits Of Copyright: The Challenges Of Consistency, Consent, And Encouragement Theory*, 41 STAN. L. REV. 1343, 1356 (1989) (using Hohfeldian entitlement schema to describe scope of rights under copyright).

60. See U.S. CONST. art. I, § 8, cl. 8 (granting Congress power to secure exclusive rights for authors and inventors for “limited Times”).

Intellectual property rights are “uniform” when the subject matter is broadly defined and the scope and duration of rights is the same for all protected subject matter.⁶¹ Rights are “tailored” when scope or duration varies depending either on the classification of the work or invention along industry-specific or technology-specific lines, say, as computer software, or classification of the initial rightholder (e.g., whether the rightholder was a government employee or used public funds to create the protected information).⁶² Rights can be, and have been, tailored along a continuum of abstraction.

In the most abstract sense, all intellectual property law has been tailored because its subject matter does not include all information. Even when the law makes some distinction between protected and public domain information, that distinction could be captured by a single set of intellectual property rights.⁶³ From this perspective, differences in the rights granted by copyright and patent law, respectively, represent a form of tailored protection driven by the relative differences in functionality and expressiveness in patentable and copyrightable subject matter.⁶⁴ For purposes of this Article, the baseline for measuring uniformity will be the now-traditional copyright/patent distinction: Rights are “uniform” if the standard rights under patent or copyright apply and are “tailored” if these rights have been varied for particular subject matter or for particular initial rightholders.

Five sources of law specify the degree of uniformity for U.S. intellectual property rights: (1) the U.S. Constitution,

61. See Lunney, *Quiet Revolution*, *supra* note 6, at 6 (stating that if uniform rights are given over information they must be narrowly tailored “to a particular instance where the incentives available from a market . . . leave a significant gap between an innovative product’s expected desirability, relative to alternative uses of the resources, and its expected profitability”).

62. See, e.g., 17 U.S.C. § 105 (2000) (“Copyright protection under this title is not available for any work of the United States Government, but the United States Government is not precluded from receiving and holding copyrights transferred to it by assignment, bequest, or otherwise.”).

63. During the Renaissance, for example, the scope and duration of royal privileges or letters patent granted to publishers and inventors were quite similar. See, e.g., Michael W. Carroll, *Whose Music Is It Anyway?: How We Came To View Musical Expression As A Form Of Property*, 72 U. CIN. L. REV. 1405, 1407-08 (2004) (surveying historical literature and giving examples in Western history of how music became the subject of proprietary claims).

64. See, e.g., Dennis S. Karjala, *Distinguishing Patent and Copyright Subject Matter*, 35 CONN. L. REV. 439, 524 (2003) (arguing that digital technology creates pressure on the information/function distinction between copyrightable and patentable subject matter); see also Clarisa Long, *Information Costs in Patent and Copyright*, 90 VA. L. REV. 465, 466 (2004) [hereinafter Long, *Information Costs*] (arguing that patent and copyright bundle distinct entitlements because of differing costs of conveying information about the protected subject matter).

(2) international obligations, (3) statutory entitlements, (4) judicial opinions refining the contours of those entitlements, and (5) administrative adjudicatory and regulatory interpretations of those entitlements. The Constitution grants Congress the power to enact patent and copyright laws,⁶⁵ and Congress has provided some form of patent and copyright protection since 1790.⁶⁶ More recently, the United States has committed itself to exercise that constitutional authority subject to copyright-specific and patent-specific multilateral, international agreements administered by the World Intellectual Property Organization (“WIPO”).⁶⁷ Overarching and reinforcing the obligations under WIPO agreements are those the United States has accepted as a party to the Agreement on Trade-Related Aspects of

65. U.S. CONST. art. I, § 8, cl. 8.

66. See Patent Act of 1790, Ch. 7, 1 Stat. 109 (Apr. 10, 1790) (current version at 35 U.S.C. §§ 100-05 (2000)) (detailing the process by which a patent or trademark could be applied for and granted).

67. The copyright-specific agreements to which the United States is a party are: the Berne Convention for the Protection of Literary and Artistic Works, Sept. 9, 1886, 25 U.S.T. 1341, 828 U.N.T.S. 211 (last revised at Paris, July 24, 1971) [hereinafter Berne Convention], the Universal Copyright Convention, Sept. 6, 1952, 6 U.S.T. 2731, 216 U.N.T.S. 132, the WIPO Performances and Phonograms Treaty, Dec. 20, 1996, S. Treaty Doc. No. 105-17, 36 I.L.M. 76 [hereinafter WPPT], and the WIPO Copyright Treaty, Dec. 20, 1996, S. Treaty Doc. No. 105-17, 36 I.L.M. 65 [hereinafter WCT].

The United States also is party to narrower agreements offering tailored protections with respect to specific forms of expression or modes of delivery. See, e.g., the Convention Relating to the Distribution of Programme-Carrying Signals Transmitted by Satellite, May 21, 1974, art. 2(1), 13 I.L.M. 1444 (obligating member states to regulate satellite transmission); The Convention for the Protection of Producers of Phonograms Against Unauthorized Duplication of Their Phonograms, Oct. 29, 1971, art. 2, 25 U.S.T. 309, 866 U.N.T.S. 67 (obligating member states to protect phonogram producers against the making and importation of unauthorized duplications).

The patent-specific agreements to which the United States is a party are: the Paris Convention for the Protection of Industrial Property, Mar. 20, 1883, 21 U.S.T. 1583, 626 U.N.T.S. 305 [hereinafter Paris Convention]; the Patent Cooperation Treaty, June 19, 1970, 28 U.S.T. 7645, 1160 U.N.T.S. 231 [hereinafter PCT]; and the Strasbourg Agreement Concerning the International Patent Classification, Mar. 24, 1971, 26 U.S.T. 1793. The United States also has signed but not ratified the Patent Law Treaty, June 1, 2000, 39 I.L.M. 1047, which entered into force in Member States on April 28, 2005. The United States also is party to agreements specifying tailored procedural requirements. Budapest Treaty on the International Recognition of the Deposit of Microorganisms for the Purposes of Patent Procedure, Apr. 28, 1977, 32 U.S.T. 1241, 1861 U.N.T.S. 361.

The International Court of Justice has jurisdiction to resolve disputes under the principal substantive agreements, the Berne Convention (copyright) and the Paris Convention (patent), but that jurisdiction has yet to be invoked. See GRAEME B. DINWOODIE ET AL., INTERNATIONAL INTELLECTUAL PROPERTY LAW AND POLICY 45 (LexisNexis 2001); Graeme B. Dinwoodie, *International Property Litigation: A Vehicle For Resurgent Comparativist Thought?*, 49 AM. J. COMP. L. 429 (2001) [hereinafter “Int’l IP Litigation”] (stating that the International Court of Justice has jurisdiction to resolve disputes arising under both conventions, but no parties have invoked this jurisdiction to date).

Intellectual Property Rights (“TRIPS”).⁶⁸ The current statutory entitlements reside in the Patent Act of 1952, as amended,⁶⁹ and the Copyright Act of 1976, as amended.⁷⁰ The federal courts have exclusive jurisdiction to enforce these entitlements,⁷¹ with the U.S. Court of Appeals for the Federal Circuit and the United States Supreme Court sharing exclusive appellate jurisdiction over well-pled complaints arising under the Patent Act.⁷² Finally, the United States Patent and Trademark Office (“PTO”) has administrative responsibility for examining and issuing patents pursuant to the Patent Act,⁷³ whereas, the United States Copyright Office issues copyright registrations, subject to minimal examination, and performs other tasks delegated by the Copyright Act.⁷⁴

A. *The Constitutional Framework*

Patent and copyright law find constitutional legitimacy in the grant of power “[t]o promote the progress of science and useful Arts, by securing for limited times to Authors and Inventors the exclusive

68. Agreement on Trade-Related Aspects of Intellectual Property Rights, Apr. 15, 1994, 33 I.L.M. 81 (1994) [hereinafter TRIPS Agreement]. As a matter of substantive law, the TRIPS Agreement primarily incorporates the essential requirements of the Berne Convention for copyrights and the Paris Convention for patents, as revised, but the enforcement mechanism under the TRIPS Agreement is far more effective. The TRIPS Agreement is administered by the TRIPS Council of the World Trade Organization. See Dinwoodie et al., *supra* note 67, at 45-47. Disputes under the TRIPS Agreement are subject to the WTO’s dispute settlement procedure and are subject to review by the WTO’s Appellate Body. *Id.*

These obligations apply only to how member States treat innovators or innovations from other member States. Congress can depart from uniformity without violating these obligations if such departures apply only to works created by United States innovators. See, e.g., 17 U.S.C. § 411 (applying a registration requirement in copyright law only to U.S. works); see also *infra* notes 198-204 and accompanying text (discussing this registration requirement).

69. See Patent Act of 1952, Pub. L. No. 82-593, 66 Stat. 792 (1952) (codified as amended at 35 U.S.C. § 1, et seq. (2000)).

70. See 17 U.S.C. §§ 101-806 (2000).

71. See 28 U.S.C. § 1338(a) (2000) (“The district courts shall have original jurisdiction of any civil action arising under any Act of Congress relating to patents, plant variety protection, copyrights and trademarks. Such jurisdiction shall be exclusive of the courts of the states in patent, plant variety protection and copyright cases.”).

72. See *Holmes Group, Inc. v. Vornado Air Circulation Sys., Inc.*, 535 U.S. 826, 832-33 (2002) (applying well-pleaded complaint rule to “arising under” jurisdiction under 28 U.S.C. §§ 1295(a)(1), 1338).

73. See United States Patent and Trademark Office, *Manual of Patent Examining Procedure*, § 1309 (8th ed. 2001, 4th rev. 2005), available at http://www.uspto.gov/web/offices/pac/mpep/documents/1300_1309.htm#sect1309 (detailing the process by which electronic information submitted for the issuance of a patent is handled and processed).

74. See, e.g., 17 U.S.C. § 104(A)(e)(1)(A)(i) (describing the process by which a notice can be filed with the Copyright Office to enforce a restored copyright).

right to their respective Writings and Discoveries.”⁷⁵ For purposes of this Article, the important question is whether Clause 8 requires or prohibits uniform rights under patent or copyright. In general, the Constitution grants policymakers wide discretion to address the problem of uniformity cost in intellectual property law.

1. *Subject matter*

The Court has inferred constitutional subject matter limitations from Clause 8’s reference to “[a]uthors” and their “[w]ritings” and “[i]nventors” and their “[d]iscoveries.” “[W]ritings” should be understood broadly,⁷⁶ but a creative work that has not been expressed in any tangible form would fail to qualify as copyrightable subject matter.⁷⁷ In addition, from the terms “[a]uthors” and “[w]ritings,” the Court has inferred that copyright requires a modicum of creativity and may not extend to unoriginal writings, such as factual compilations organized in an obvious manner.⁷⁸

With respect to patent law, the Court has asserted, as a matter of statutory interpretation, that laws of nature, natural phenomenon, and abstract ideas are unpatentable.⁷⁹ Whether there is a

75. U.S. Const. art. I, § 8, cl. 8. This Constitutional provision lacks a consensus designation among courts or commentators. For some, it is the “Copyright and Patent Clause.” *Eldred v. Ashcroft*, 537 U.S. 186, 192 (2003). For others it is the “Patent and Copyright Clause.” *Id.* at 214 n.20. Others prefer the more textual “Exclusive Rights Clause.” Lawrence Lessig, *Copyright’s First Amendment*, 48 UCLA L. Rev. 1057, 1068 (2001). Many others refer to it as the “Intellectual Property” Clause. *See, e.g.*, Paul J. Heald & Suzanna Sherry, *Implied Limits on the Legislative Power: The Intellectual Property Clause as an Absolute Constraint on Congress*, 2000 U. Ill. L. Rev. 1119. In the interests of scholarly and judicial consensus, it shall be referred to hereinafter, however inelegantly, as “Clause 8,” since we can all agree that the provision is the eighth clause in Article I. *See Goldstein v. California*, 412 U.S. 546, 562 (1972) (using “Clause 8”).

76. *See Goldstein*, 412 U.S. at 561 (holding that the term writing includes, “any physical rendering of the fruits of creative intellectual or aesthetic labor”); *Burrow-Giles Lithographic v. Saroni*, 111 U.S. 53, 58 (1884) (stating that Clause 8 “Writings” include “all forms of writing, printing, engraving, etching, by which the ideas in the mind of the author are given visible expression”). Potentially, the term “writing” imposes a “minimum size” principle on fixed expression eligible for copyright. *Cf.* Justin Hughes, *Size Matters (or Should) in Copyright Law*, 74 *FORDHAM L. REV.* (2005) (proposing minimum size principle to explain absence of copyright protection for “microworks”).

77. *See United States v. Martignon*, 346 F. Supp. 2d 413, 423-24 (S.D.N.Y. 2004) (stating that unfixed works are not constitutional “writings”); *KISS Catalog v. Passport Int’l Prods., Inc.*, 350 F. Supp. 2d 823, 831 (C.D. Cal. 2004) (“If ‘writings’ continues to exist as a constitutional limit, live performances cannot be within the scope of that term.”).

78. *See Feist Publ’ns, Inc. v. Rural Tel. Serv. Co.*, 499 U.S. 340, 361-63 (1991) (holding that a telephone directory’s information organized without any original characteristics does not meet the Constitutional requirements of copyright).

79. *See, e.g.*, *Diamond v. Diehr*, 450 U.S. 175, 185 (1981) (“A principle, in the abstract, is a fundamental truth; an original cause; a motive; these cannot be

constitutional foundation for this assertion may be tested in future cases.⁸⁰ At least one commentator has suggested a more restrictive reading of Clause 8, asserting that “useful [a]rts” is the relevant subject matter limitation and that it limits the discoveries that patent law can protect to those related to technology, in contradistinction to innovations in the traditional liberal and fine arts.⁸¹ The Court does not seem to be receptive to such arguments, however.

2. *Scope*

The Constitution empowers Congress to “secure” the “exclusive right” to a writing or discovery.⁸² To date, the courts have not had reason to define the limits of Congress’s power to define the scope of an author’s or inventor’s exclusive right, although one Justice has asserted that the text of the Constitution does impose such a limit.⁸³ Presumably the text imposes some nexus requirement between the right granted and the writing or discovery to which the right relates, but the courts have not specified how close this nexus must be. With respect to uniformity, the text might support an argument that the grant of power to secure “the” exclusive right requires that if Congress enacts patent or copyright legislation, it must extend the same right to all inventors or authors, respectively; however, little in the history or structure of Clause 8 supports this reading.

patented, as no one can claim in either of them an exclusive right.” (quoting *Le Roy v. Tatham*, 55 U.S. 156, 175 (1852))).

80. See, e.g., Saul Levmore, *Property’s Uneasy Path and Expanding Future*, 70 U. CHI. L. REV. 181, 193 (2003) (“[W]e should expect sporadic agitation for a property right in a (mere) idea—because the winners are identifiable and the exploitation of the idea will often not identifiably impede on an existing set of easily organized holders of property rights.”); see also Arthur R. Miller, *Common Law Protection for Products of the Mind: An “Idea” Whose Time Has Come*, 119 HARV. L. REV. 703 (2006) (proposing such expansion).

81. See John R. Thomas, *The Patenting of the Liberal Professions*, 40 B.C. L. REV. 1139, 1164 (1999) (arguing that the few materials available suggest that the Framers did not intend to have every created thing be covered by Clause 8).

82. U.S. CONST. art. I, § 1, cl. 8.

83. See *United States v. Line Material Co.*, 333 U.S. 287, 320 (1948) (Douglas, J., concurring):

Congress has much to say as to the pattern of our economic organization. But I am not clear that Congress could expand “the exclusive right” specified in the Constitution into a right of inventors to utilize through a price-fixing combination the production and marketing facilities of competitors to protect their own high costs of production and eliminate or suppress competition. It is not apparent that any such restriction or condition promotes the progress of science and the useful arts.

3. *Duration*

Patents or copyrights may be “secured” only for “limited Times.”⁸⁴ At a minimum, this means that Congress may not make the term of patent or copyright protection perpetual,⁸⁵ the wishes of some legislators notwithstanding.⁸⁶ The Court’s current interpretation of the constitutional limit is that Congress does not violate the “limited Times” constraint by retrospectively extending the terms of subsisting copyrights and patents so long as the extended term has a defined end.⁸⁷ Additionally, the Court has suggested that Congress may not extend protection to protected subject matter for which the limited time of protection has expired,⁸⁸ although lower courts recently have rejected that understanding.⁸⁹

In addition to these explicit subject matter, scope, and duration limits, Clause 8 declares that the purpose of the grant of power is “to promote the progress of Science and useful Arts.”⁹⁰ If this “preamble” imposes a progress limitation on Congress’s power, it could serve as the basis for attacking or promoting uniformity in some circumstances.⁹¹ Although Congress undoubtedly would have wide

84. U.S. CONST. art. I, § 1, cl. 8.

85. *See, e.g., Eldred v. Ashcroft*, 537 U.S. 186, 209 n.16 (2003) (“[T]he Constitution ‘clearly precludes Congress from granting unlimited protection for copyrighted works.’”) (quoting with approval S. REP. NO. 104-315, at 11 (1996)); *United States v. Martignon*, 346 F. Supp. 2d 413, 424 (S.D.N.Y. 2004) (“It is clear that the ‘Limited Times’ restriction in the Copyright Clause prohibits Congress from granting Copyright protection of perpetual duration.”); *KISS Catalog v. Passport Int’l Prods., Inc.*, 350 F. Supp. 2d 823, 833 (C.D. Cal. 2004) (holding that perpetual term violated “limited Times” requirement).

86. *See Eldred*, 537 U.S. at 256 (Breyer, J., dissenting) (“After all, the statute was named after a Member of Congress, who, the legislative history records, ‘wanted the term of copyright protection to last forever.’”) (citation omitted).

87. *See Eldred*, 537 U.S. at 199 (interpreting “limited” to mean “confined within certain bounds,” “restrained,” or “circumscribed” and holding that “a timespan appropriately ‘limited’ as applied to future copyrights does not automatically cease to be ‘limited’ when applied to existing copyrights”).

88. *See Bonito Boats, Inc. v. Thunder Craft Boats, Inc.*, 489 U.S. 141, 146 (1989) (“Congress may not authorize the issuance of patents whose effects are to remove existent knowledge from the public domain, or to restrict free access to materials already available.”) (quoting *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 6 (1966)); *Eldred*, 537 U.S. at 234 (Stevens, J., dissenting) (arguing that the extension of patent protection to items where the patent had expired is unconstitutional).

89. *See Luck’s Music, Inc. v. Gonzales*, 407 F.3d 1262, 1266 (D.C. Cir. 2005) (distinguishing *Graham*); *Golan v. Gonzales*, No. Civ.01-B-1854(BNB), 2005 WL 914754, at *3-4 (D. Colo. Apr. 20, 2005) (appeal filed) (claiming that it is doubtful that the basis for the *Graham* decision could govern copyright cases).

90. U.S. CONST. art. I, § 8, cl. 8.

91. Whether the current Court reads the preamble to be hortatory or mandatory is subject to doubt. *Compare Graham*, 383 U.S. at 5-6 (1966) (treating the preamble as a substantive limit on Congress’s power), *with Eldred*, 537 U.S. at 196 (relying on petitioners’ concession below that circuit precedent precluded argument that progress was a substantive limit while also implicitly treating the progress clause as a limitation on congressional action subject to rational basis review). *See also* Figueroa

discretion to define progress and to determine whether a particular legislative measure promotes it,⁹² at the margins, the progress limitation could support an argument that application of uniform rights to particular subject matter or in a particular case would so clearly impede progress that the rights must be tailored to be constitutional. For example, during the late nineteenth and early twentieth centuries, lower courts held that the “progress” limitation required that copyright law be tailored to exclude protection for immoral subject matter.⁹³

Legislative or judicial departures from uniformity could implicate three other constitutional provisions: the First Amendment,⁹⁴ the Commerce Clause,⁹⁵ and the Takings Clause.⁹⁶ The First Amendment’s broad prohibition on content and viewpoint discrimination in expression is more likely to constrain Congress’s ability to differentiate rights under copyright than patent.⁹⁷ While the Court has expressly acknowledged that the First Amendment imposes

v. United States, 66 Fed. Cl. 139, 152 (Fed. Cl. 2005) (accepting the progress limitation on Congress’s power and holding that diversion of fees from PTO to be necessary and proper to promotion of progress).

92. See *Eldred*, 537 U.S. at 213 (“The justifications we earlier set out for Congress’s enactment of the CTEA . . . provide a rational basis for the conclusion that the CTEA ‘promote[s] the Progress of Science.’”) (internal citation omitted).

93. See *Simonton v. Gordon*, 12 F.2d 116, 124 (D.C.N.Y. 1925) (holding that public policy required denying copyright protection for “blasphemous, seditious, immoral or libelous” subject matter but that the work at issue was not immoral); see also *Broder v. Zeno Mauvais Music Co.*, 88 F. 74, 77-79 (C.C.N.D. Cal. 1898) (holding that song “Dora Dean” with lyrics describing woman as “the hottest thing you’ve ever seen” not entitled to copyright protection because use of “hot” in this context rendered lyrics immoral); *Martinetti v. Maguire*, 16 F. Cas. 920, 922 (C.C. Cal. 1867) (No. 9173) (concluding that, consistent with the progress limitation, Congress had tailored protection to exclude immoral subject matter by defining protected musical compositions as those “suited for public representation”).

94. U.S. CONST. amend. I.

95. U.S. CONST. art. I, § 8, cl. 3 (granting Congress the ability to “regulate Commerce with foreign Nations, and among the several States, and with the Indian Tribes”).

96. U.S. CONST. amend. V (forbidding private property to be taken for public use, without just compensation).

97. With respect to patent law, one could imagine the First Amendment furnishing the basis for a successful challenge to a rejection on the grounds of “moral utility” assuming that the applicant could find a nexus to protected expression either with respect to the invention itself or, perhaps, an expressive interest in having the government recognize the inventor *qua* inventor. In addition, software patents are an area in which the First Amendment may play a role. See generally Dan L. Burk, *Patenting Speech*, 79 TEX. L. REV. 99, 162 (2000) (arguing that First Amendment protections of expressive elements in software patents will pose challenge for patent law and concluding that “[i]n patent law, perhaps new doctrines can be tailored specifically to the problem of patenting speech”). Patent law may also have to confront other claims of expressive harm as well. See generally Timothy R. Holbrook, *Curing Heterosexuality? Moral Signals and the Potential for Expressive Impacts in Patent Law* (working paper), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=702587#PaperDownload.

limits on Congress's power to grant rights under copyright, those limits remain largely undefined because, in the current Court's view, doctrines internal to copyright law supply sufficient limits for the time being.⁹⁸ The First Amendment could require tailoring of copyright's exclusive rights to permit unauthorized uses in certain cases or classes of case.⁹⁹ Alternatively, the First Amendment also could be used to require uniformity.¹⁰⁰

The Commerce Clause and Takings Clause deserve mention but do not warrant extended discussion for present purposes. Whether the Commerce Clause offers Congress an alternative basis to pass legislation that would violate the constraints imposed by Clause 8, such as protection of unoriginal databases, is a question the Court has touched on,¹⁰¹ and is one over which lower courts and commentators have engaged in vigorous debate.¹⁰² If the Commerce

98. See, e.g., *Eldred v. Ashcroft*, 537 U.S. 186, 221 (2003) ("We recognize that the D.C. Circuit spoke too broadly when it declared copyrights 'categorically immune from challenges under the First Amendment.' But when, as in this case, Congress has not altered the traditional contours of copyright protection, further First Amendment scrutiny is unnecessary."). Nonetheless, the power to enjoin speech through a copyright injunction remains potentially problematic. See *SunTrust Bank v. Houghton Mifflin Co.*, 252 F.3d 1165, 1166 (11th Cir. 2001) (dissolving copyright infringement injunction on First Amendment grounds), *vacated and superseded by* 268 F.3d 1257, 1259 (11th Cir. 2001); Mark A. Lemley & Eugene Volokh, *Freedom Of Speech And Injunctions In Intellectual Property Cases*, 48 DUKE L.J. 147 (1998) (arguing that infringement injunctions should be subjected to constitutional scrutiny).

99. See, e.g., MELVILLE, NIMMER ON COPYRIGHT § 1.10[A] (1981) (suggesting potential First Amendment defense to copyright infringement) *as expanded in* 1 MELVILLE B. NIMMER & DAVID NIMMER, NIMMER ON COPYRIGHT § 1.10(D) (2002) (extending potential First Amendment defense to instances in which "vital news elements will be lost unless the exact language can be quoted").

100. Consider, for example, whether Congress constitutionally could withdraw copyright protection from pornographic expression on the theory that the exclusive rights serve as an undesirable public subsidy for this form of expression. See *Martinetti v. Maguire*, 16 F. Cas. 920, 922 (C.C. Cal 1867) (No. 9173) (interpreting grant of copyright protection as form of public subsidy). In recent decades, the lower courts have rejected the contention that an obscenity exception should be read into current copyright law and have suggested that any attempt to so tailor rights under copyright may violate the First Amendment. See *generally* *Mitchell Bros. Film Group v. Cinema Adult Theater*, 604 F.2d 852, 858 (5th Cir. 1979) ("We can only conclude that we must read the facially all-inclusive 1909 copyright statute as containing no explicit or implicit bar to the copyrighting of obscene materials, and as therefore providing for the copyright of all creative works, obscene or non-obscene, that otherwise meet the requirements of the Copyright Act."); *Pillsbury Co. v. Milky Way Prods.*, 1981 WL 1402 *9 n.10 (N.D. Ga. Dec. 24, 1981) (holding no implied obscenity exception to fair use defense).

101. See, e.g., *Dastar Corp. v. Twentieth Century Fox Film Corp.*, 539 U.S. 23, 34 (2003) (suggesting that Congress could not rely on Commerce Clause to impose attribution requirement on public domain information).

102. See *United States v. Moghadam*, 175 F.3d 1269, 1274-77 (11th Cir. 1999) (suggesting Congress may protect unfixed sound recordings under Commerce Clause). *But see* *United States v. Martignon*, 346 F. Supp. 2d 413, 425 (S.D.N.Y. 2004) (appeal filed) ("Congress may not, if the Copyright Clause does not allow for such legislation, enact the law under a separate grant of power, even when that separate

Clause is available, then the wide discretion granted Congress to regulate interstate commerce would further extend the already broad range of tailoring options available under Clause 8.¹⁰³ Conversely, the Takings Clause potentially raises the price of tailored intellectual property legislation. If the federal government, through the legislative or executive branch, violates rights under copyright or patent, it has consented to be sued for damages in the U.S. Court of Federal Claims.¹⁰⁴ Similarly, it seems likely that if the government were to condemn for public use an individual patent or copyright, just compensation would be due under the Takings Clause.¹⁰⁵ A far

grant provides proper authority.”); *KISS Catalog v. Passport Int’l Prods. Inc.*, 350 F. Supp. 2d 823, 833 (C.D. Cal. 2004) (citing *Martignon*, 346 F. Supp. 2d at 425).

Among commentators, compare Thomas B. Nachbar, *Intellectual Property and Constitutional Norms*, 104 COLUM. L. REV. 272 (2004) (arguing that Congress may rely on other Article I enumerated powers to evade constraints imposed by Clause 8), with Yochai Benkler, *Constitutional Bounds of Database Protection: The Role of Judicial Review in the Creation and Definition of Private Rights in Information*, 15 BERKELEY TECH. L.J. 535, 538-39 (2000) (asserting that the Intellectual Property Clause serves as a limit to the extent where Congress can secure exclusive rights in information), Paul J. Heald & Suzanna Sherry, *Implied Limits on the Legislative Power: The Intellectual Property Clause as an Absolute Constraint on Congress*, 2000 U. ILL. L. REV. 1119, 1177 & n.409, Robert Patrick Merges & Glenn Harlan Reynolds, *The Proper Scope of the Copyright and Patent Power*, 37 HARV. J. ON LEGIS. 45, 63-64 (arguing that if Congress could pass legislation under the Commerce Clause that it could not under Clause 8, it would effectively read Clause 8 out of the Constitution), and William Patry, *The Enumerated Powers Doctrine and Intellectual Property: An Imminent Constitutional Collision*, 67 GEO. WASH. L. REV. 359, 361 (1999) (claiming that Congress cannot make an end run around the Constitutional restriction of Clause 8 by passing legislation under another power).

103. See *supra* Part II (discussing in depth the tailoring of intellectual property rights).

104. 28 U.S.C. § 1498. With respect to infringement by states, some commentators argue that the Takings Clause should supply a remedy. See, e.g., Mitchell N. Berman et al., *State Accountability for Violations of Intellectual Property Rights: How to “Fix” Florida Prepaid (And How Not To)*, 79 TEX. L. REV. 1037, 1072 (2001) (stating that state infringements of patents, copyrights, and trademarks are likely compensable takings); Shubha Ghosh, *Toward a Theory of Regulatory Takings for Intellectual Property: The Path Left Open After College Savings v. Florida Prepaid*, 37 SAN DIEGO L. REV. 637 (2000) (arguing that state infringement of intellectual property might be remedied by takings suits); Paul J. Heald & Michael L. Wells, *Remedies for the Misappropriation of Intellectual Property by State and Municipal Governments Before and After Seminole Tribe: The Eleventh Amendment and Other Immunity Doctrines*, 55 WASH. & LEE L. REV. 849, 870-72 (1998) (stating that the intention of the Takings Clause is to limit the government’s ability to force an individual to release their interest in property and that this intention is implicated when the government uses intangible property it does not own).

105. See, e.g., 42 U.S.C. § 2181(a) (2000) (revoking patent grant for any invention useful in connection with atomic weapons and ordering that just compensation be paid to patent owners); cf. *Ruckleshaus v. Monsanto Co.*, 463 U.S. 1315, 1317 (1983) (holding that government-mandated disclosure of trade secrets are compensable takings).

more contestable issue is whether legislative change to patent or copyright law could ever amount to a regulatory taking.¹⁰⁶

In sum, the Constitution imposes few constraints on policymakers' discretion to address the problem of uniformity cost in intellectual property law. The text of the Constitution could support arguments requiring tailoring of intellectual property rights in specific circumstances and prohibiting it in others. The cases likely to generate such arguments will be rare, and as a general matter, courts are likely to be unreceptive to constitutional arguments concerning tailored rights under patent or copyright. Consequently, Congress and the courts retain wide discretion in this field.

B. Patent Law

In patent law, Congress has used its discretion to grant largely uniform rights. Some features of the law are designed to reduce the social costs of this uniformity, but the problem of uniformity cost has been exacerbated by recent international commitments that limit policymakers' flexibility. TRIPS and the Paris Convention generally establish a set of uniform patent rights that member states must grant, but both agreements either tailor the minimum requirements for some subject matter or, more often, grant member states discretion to tailor patent rights. The Patent Act grants largely uniform rights, although Congress has exercised its tailoring discretion in some important instances.

1. Subject matter

TRIPS demands that Member States extend patent rights to "any inventions, whether products or processes, in all fields of technology, provided that they are new, involve an inventive step and are capable of industrial application."¹⁰⁷ Largely tracking this requirement, the Patent Act grants utility patent protection for any novel, non-obvious, and useful process, machine, manufacture, or composition of matter.¹⁰⁸ An invention is "useful" if the invention performs as the inventor specifies and if the utility of that performance is specific,

106. See, e.g., J. Nicholas Bunch, Note, *Takings, Judicial Takings, and Patent Law*, 83 TEX. L. REV. 1747, 1790-93 (2005) (applying a regulatory takings analysis to patent law).

107. TRIPS Agreement, *supra* note 68, art. 27(1). For an argument that U.S. patent law is in tension with these uniformity constraints by tailoring on technology-specific lines, see Burk & Lemley, *Technology-Specific*, *supra* note 3, at 1183-85 (describing the different treatment U.S. law gives to different industries). Separately, the inventor has the right to be identified as such in an issued patent. Paris Convention, *supra* note 67, art. 4.

108. 35 U.S.C. §§ 101, 102, 103 (2000).

substantial, and credible.¹⁰⁹ An invention is novel if it is not “known or used in this country, or patented or described in a printed publication in this or a foreign country.”¹¹⁰

Non-obviousness is the subject matter doctrine that does the most work in striking the incentives/access balance in patent law. An invention is unpatentable “if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art (“PHOSITA”) to which said subject matter pertains.”¹¹¹ When assessing non-obviousness, courts must consider context-specific information: (1) the scope and content of the prior art, (2) the differences between the prior art and the claimed invention, (3) the level of ordinary skill in the pertinent art, (4) secondary considerations such as commercial success and long-felt need in the art.¹¹² Commentators generally agree that the Federal Circuit elevated the stature of these “secondary” considerations, rendering them central to non-obviousness (Section 103) analysis.¹¹³

109. See *Brenner v. Manson*, 383 U.S. 519, 534-35 (1966) (stating that an invention is useful if a “specific benefit exists in a currently available form”). *But see In re Brana*, 51 F.3d 1560, 1568 (Fed. Cir. 1995) (“Usefulness in patent law, and in particular in the context of pharmaceutical inventions, necessarily includes the expectation of further research and development.”). The PTO has refined the *Brenner* understanding of utility by requiring the applicant to show “well-established utility” for the invention, meaning that “a person of ordinary skill in the art would immediately appreciate why the invention itself is useful” and that such utility is “specific, substantial, and credible.” U.S. Patent & Trademark Office, Utility Examination Guidelines, 66 Fed. Reg. 1092, 1098 (Jan. 5, 2001); see also Jonathan Kahn, *What’s The Use? Law and Authority in Patenting Human Genetic Material*, 14 STAN. L. & POL’Y REV. 417, 435-36 (2003) (discussing competing models of utility in comments to PTO). The Federal Circuit has recently endorsed the PTO’s reading of *Brenner*. See *In re Fisher*, 421 F.3d 1365, 1372, 76 U.S.P.Q.2d (BNA) 1225, 1230 (Fed. Cir. 2005) (“The PTO’s standards for assessing whether a claimed invention has a specific and substantial utility comport with this court’s interpretation of the utility requirement of § 101.”).

110. 35 U.S.C. § 102(a) (2000). See Linda J. Demaine & Aaron Xavier Fellmeth, *Reinventing The Double Helix: A Novel and Nonobvious Reconceptualization of the Biotechnology Patent*, 55 STAN. L. REV. 303, 386-88 (2002) (arguing that the Patent Act imposes two distinct requirements: “newness” under Section 101 and “novelty” under Section 102).

111. 35 U.S.C. § 103(a) (2000).

112. See *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 17-18 (1966) (describing the test for obviousness under § 103 of the United States Code).

113. See, e.g., Robert L. Baechtold, *How To Sell Nonobviousness and Obviousness*, 258 PRACTICING LAW INST. 511, 527-40 (1988) (“The other great contribution the Federal Circuit made to the patentee’s cause was to elevate the considerations of commercial success, long felt need, failure of others and copying to major players in the determination of obviousness.”); Lunney, *Quiet Revolution*, *supra* note 6, at 23-24 (arguing that the Federal Circuit’s treatment of the secondary considerations has made it less likely that a patent is obvious); see also *Robotic Vision Sys., Inc. v. View Eng’g, Inc.*, 189 F.3d 1370, 1376, 51 U.S.P.Q.2d 1948, 1952 (Fed. Cir. 1999) (holding

2. *Scope*

The scope of patent rights is defined uniformly for most types of invention. TRIPS requires that the owner of a product patent have the exclusive right to prevent third parties, without the owner's consent, from: making, using, offering for sale, selling, or importing for these purposes that product.¹¹⁴ The owner of a process patent is to have the exclusive right to prevent third parties, without the owner's consent, from the act of using the process, and from the acts of: using, offering for sale, selling, or importing for these purposes at least the product obtained directly by that process.¹¹⁵ In the United States, the scope of patent law has been quite uniform from inception.¹¹⁶ A utility patent gives its owner the rights to exclude others from: making, using, offering to sell, selling, or importing the invention in the United States during the term of protection.¹¹⁷ A few statutory exceptions permit certain classes of users to use certain types of invention without liability,¹¹⁸ but otherwise patentees all enjoy the same rights of exclusion.

The patent entitlement is protected by both a property and a liability rule. Patent owners are eligible to receive preliminary¹¹⁹ and

that a patent was not obvious under the § 103 considerations); *Modine Mfg. Co. v. Allen Group, Inc.*, 917 F.2d 538, 541, 16 U.S.P.Q.2d 1622, 1624 (Fed. Cir. 1990) (holding that the evidence sustained a finding of nonobviousness); *Loctite Corp. v. Ultraseal, Ltd.*, 781 F.2d 861, 872-73, 228 U.S.P.Q. 90, 98 (Fed. Cir. 1985) (finding reversible error where secondary considerations are ignored in a determination of obviousness); *Oscar Mayer Foods Corp. v. Con-Agra, Inc.*, 45 F.3d 443, 448, 35 U.S.P.Q.2d (BNA) 1278, 1278-79 (Fed. Cir. 1994) (accepting the District Court's findings that the patent was infringed).

114. TRIPS Agreement, *supra* note 68, art. 28(1)(a).

115. *Id.* at art. 28(1)(b).

116. *Compare* Patent Act of 1790, ch. 7, § 1, 1 Stat. 109 (granting inventor "the sole and exclusive right and liberty of making, constructing, using and vending to others to be used, the said invention or discovery"), *with* 35 U.S.C. § 271(a) (2000) (establishing that anyone who makes, uses, offers to sell, sells, or imports any patented invention in the United States during the patent term infringes the patent, unless an exception applies).

117. 35 U.S.C. § 271(a) (2000). The exclusive right to offer to sell the invention was added in response to the TRIPS Agreement. *See* Uruguay Round Agreements Act, Pub. L. No. 103-465, § 533(a), 108 Stat. 4809, 4988 (1994) (adding offer-to-sell language to 35 U.S.C. § 271(a), (c), (e), and (g)).

118. *See* 35 U.S.C. § 271(e) (permitting the making, using, and selling of patented inventions, other than new animal or veterinary products, which are primarily manufactured using DNA or other processes solely for uses reasonably related to the manufacture, use, or sale of drugs or veterinary products).

119. *See* *Bio-Tech. Gen. Corp. v. Genentech, Inc.*, 80 F.3d 1553, 1558, 38 U.S.P.Q.2d 1321, 1328 (Fed. Cir. 1996) (finding that the District Court did not abuse its discretion by granting a preliminary injunction to prevent infringement); *see also* *Mykrolis Corp. v. Pall Corp.*, 2004 U.S. Dist. LEXIS 7523, *4-5 (2004) (citing the four factors governing preliminary injunctions: "(1) the movant's reasonable likelihood of success on the merits; (2) the irreparable harm the movant will suffer absent preliminary injunctive relief; (3) the balance of hardships tipping in its favor; and

permanent injunctive relief.¹²⁰ The Federal Circuit traditionally has presumed that injunctive relief should be granted, but the strength of that presumption was the subject of Supreme Court review as of January 2006.¹²¹ The liability rule that protects the patent entitlement sets a “reasonable royalty” as the floor for damages,¹²² but measuring actual damages in litigation has become an increasingly complex and costly undertaking. In general, patent owners seek to be compensated by one of three measures: (1) lost profits, (2) reasonable royalty, or (3) a combination of the two.¹²³

3. Duration

As a formal matter, the duration of patent rights is quite rigid. TRIPS requires that patent rights endure for twenty years from the date the patent application was filed.¹²⁴ The Patent Act implements this requirement, adding a condition that the patent owner pay maintenance fees at three intervals.¹²⁵ The term can be adjusted if certain kinds of delay in processing a patent application occur.¹²⁶

(4) the impact of the injunction on the public interest”) (quoting *Bio-Tech. Gen. Corp. v. Genentech, Inc.*, 80 F.3d 1553, 1558, 38 U.S.P.Q.2d 1321, 1324 (Fed. Cir. 1996))).

120. 35 U.S.C. § 283 (2000).

121. See *MercExchange, LLC v. eBay, Inc.*, 401 F.3d 1323, 1339, 74 U.S.P.Q.2d 1225, 1234 (Fed. Cir. 2005) (“We therefore see no reason to depart from the general rule that courts will issue permanent injunctions against patent infringement absent exceptional circumstances.”), *cert. granted*, 126 S. Ct. 733 (2005) (directing parties to address “[w]hether this Court should reconsider its precedents, including *Continental Paper Bag Co. v. Eastern Paper Bag Co.*, 210 U.S. 405 (1908), on when it is appropriate to grant an injunction against a patent infringer”); see also *Trans-World Mfg. Corp. v. Al Nyman & Sons, Inc.*, 750 F.2d 1552, 1565, 224 U.S.P.Q. 259, 268 (Fed. Cir. 1984) (indicating that damages in the form of license fee adequate).

122. See 35 U.S.C. § 284 (2000); *Rite-Hite Corp. v. Kelley Co., Inc.*, 56 F.3d 1538, 1544, 35 U.S.P.Q.2d 1065, 1069 (Fed. Cir. 1995) (en banc) (advising that § 284 indicates only a lower limit of reasonable royalties but foregoing any maximum limit); *TWM Mfg. Co., Inc. v. Dura Corp.*, 789 F.2d 895, 899-900, 229 U.S.P.Q. 525, 528 (Fed. Cir. 1986) (using “Georgia-Pacific” fifteen-factor analysis derived from *Georgia-Pacific Corp. v. United States Plywood Corp.*, 318 F. Supp. 1116, 1120 (S.D.N.Y. 1970), *modified and aff’d*, 446 F.2d 295 (2d Cir. 1971)).

123. See George F. Pappas, *Damages and Remedies for Patent Infringement*, SJ018 ALI-ABA 67, 69 (2003) (indicating the remedies available to patent owners who have suffered infringement of a patent).

124. TRIPS Agreement, *supra* note 68, art. 33.

125. 35 U.S.C. § 154(a)(2) (2000). Utility patents that issue from applications filed on and after December 12, 1980, are subject to the payment of maintenance fees necessary to maintain the patent in force. Fees are due 3 ½, 7 ½ and 11 ½ years from the date the patent is granted. 35 U.S.C. § 41(b) (2000). A six-month grace period is provided during which the maintenance fee may be paid with a surcharge. 37 C.F.R. § 1.362(e) (2005). Failure to pay the current maintenance fee on time may result in expiration of the patent.

126. 35 U.S.C. § 154(b) (2000).

C. Copyright Law

The United States' treaty obligations impose a baseline of uniform rights under copyright that are supplemented by some required tailored protections and the option to further tailor rights in a number of respects.

1. Subject matter

The TRIPS Agreement and the Berne Convention require that copyright protection extend to "every production in the literary, scientific and artistic domain, whatever may be the mode or form of its expression,"¹²⁷ excluding ideas, procedures, methods of operation, or mathematical concepts.¹²⁸ Unlike patent law, copyright law's subject matter was legislatively tailored until the beginning of the twentieth century. In the Copyright Act of 1976, as amended, Congress departed from the tailored approach to subject matter, broadly granting copyright to any original work of authorship fixed in any tangible medium of expression.¹²⁹

The threshold for originality is set as low as the Constitution allows.¹³⁰ A work is "original" if it was created by the author rather than copied from another source and if the work reflects a modicum of creativity.¹³¹ Courts have found such originality in a commercial photograph of a vodka bottle,¹³² in blank forms,¹³³ county tax maps,¹³⁴ and have suggested that a seven-note measure in a musical composition is potentially original.¹³⁵ A work meets the fixation requirement "when its embodiment in a copy or phonorecord, by or under the authority of the author, is sufficiently permanent or stable to permit it to be perceived, reproduced, or otherwise communicated for a period of more than transitory duration."¹³⁶

127. TRIPS Agreement, *supra* note 68, art. 9(1) (incorporating by reference Berne Convention, *supra* note 67, art. 2(1)).

128. TRIPS Agreement, *supra* note 68, art. 9(2); *see also* WCT *supra* note 67, art. 2.

129. 17 U.S.C. § 102(a).

130. U.S. CONST. art. I, § 8, cl. 8.

131. *See* Feist Pub., Inc. v. Rural Tel. Serv. Co., 499 U.S. 340, 361-63 (1991) (finding that Feist's white pages owe nothing to an act of authorship and thus are not original within the meaning of the Constitution); *see generally* David Nimmer, *Copyright in the Dead Sea Scrolls: Authorship and Originality*, 38 HOUS. L. REV. 1 (2001) (exploring application of originality standard to series of hypothetical cases).

132. *Ets-Hokin v. Skyy Spirits, Inc.*, 225 F.3d 1068 (9th Cir. 2000).

133. *Bucklew v. Hawkins, Ash, Baptie & Co.*, 329 F.3d 923 (7th Cir. 2003).

134. *County of Suffolk v. First Am. Real Estate Solutions*, 261 F.3d 179 (2d Cir. 2001).

135. *Swirsky v. Carey*, 371 F.3d 841 (9th Cir. 2004).

136. 17 U.S.C. § 101 (2000).

2. *Scope*

The United States' international obligations are scattered among different agreements. Broadly speaking, the scope of uniform rights includes the exclusive rights to reproduce¹³⁷ and adapt¹³⁸ a protected work. In addition, authors of most classes of work for which it would matter have the exclusive right to publicly perform, publicly communicate, or publicly recite a protected work.¹³⁹ The scope of rights is circumscribed by a user's privilege to quote the copyrighted work.¹⁴⁰ The WIPO treaties add an exclusive distribution right,¹⁴¹ and require the creation of "paracopyright" protections for digital rights management technologies.¹⁴² Finally, Berne requires member states to enforce moral rights,¹⁴³ but TRIPS does not incorporate this provision.¹⁴⁴

The Copyright Act broadly grants the owner the exclusive rights to authorize or (1) to reproduce the work in copies, (2) to adapt the work, and (3) to distribute copies of the work.¹⁴⁵ These rights extend to literal copies of the work and to non-literal copies that are substantially similar to the copyright owner's work.¹⁴⁶ The right to prepare derivative works also grants the owner the power to

137. TRIPS Agreement, *supra* note 68, art. 9(1) (incorporating by reference Berne Convention, *supra* note 67, art. 9(1)).

138. TRIPS Agreement, *supra* note 68, art. 9(1) (incorporating by reference Berne Convention, *supra* note 67, art. 8 (translation), art. 12 (general adaptation), art. 14(1) (cinematographic adaptation)).

139. See TRIPS Agreement, *supra* note 68, art. 9(1) (incorporating by reference Berne Convention, *supra* note 67, art. 11(1) (performance of dramatic, dramatico-musical, and musical works), art. 11 (allowing broadcast or communication by wire of artistic or literary works), art. 11 (regarding rules on public recitation and communication of literary work), art. 14 (mentioning communication by wire of cinematographic works)); see also WCT, *supra* note 67, art. 8 (establishing a more general communication right for literary and artistic works); WIPO Performances and Phonograms Treaty art. 14 (creating a "making available" right for owners of phonograms). Member States also have the option to add resale rights (a.k.a. *droit de suite*) in original works of art and original manuscripts. TRIPS Agreement, *supra* note 68, art. 9(1) (incorporating by reference Berne Convention, *supra* note 67, art. 14).

140. TRIPS Agreement, *supra* note 68, art. 9(1) (incorporating by reference Berne Convention, *supra* note 67, art. 10(1)).

141. WCT, *supra* note 67, art. 6(1); WPPT, *supra* note 67, art. 12.

142. See WCT, *supra* note 67, arts. 11-12 (explaining the rights available to owners of digital copyrights); WPPT, *supra* note 67, arts. 18-19 (urging additional protections to owners of digital copyrights).

143. See Berne Convention, *supra* note 67, art. 6 (defining the concept of moral rights for copyright owners).

144. See TRIPS Agreement, *supra* note 68, art. 9(1) (expressly excluding Berne Convention, *supra* note 67, art. 6 from incorporation).

145. 17 U.S.C. § 106 (2000).

146. See generally, e.g., *Laureyssens v. Idea Group, Inc.*, 964 F.2d 131, 140 (1992) (indicating that copying of a copyrighted article may be performed directly or indirectly and may violate the statute so long as a substantial similarity is shown between the original and the offending copy).

appropriate without liability any unauthorized improvements that are derived from or substantially similar to the copyrighted work.¹⁴⁷ In the basic entitlement, Congress has tailored scope by extending to owners of only certain classes of works the exclusive rights to (4) publicly perform,¹⁴⁸ or (5) publicly display¹⁴⁹ the copyrighted work. Collectively, the exclusive rights under copyright for all classes of subject matter are limited by a series of provisions, most notably fair use¹⁵⁰ and first sale.¹⁵¹

The copyright entitlement is protected by a property rule and by two liability rules. A copyright owner is entitled to temporary and permanent injunctive relief “on such terms as [a court] may deem reasonable to prevent or restrain infringement of a copyright.”¹⁵² Liability rule protection comes in two forms. The copyright owner can receive compensation in the form of actual damages.¹⁵³ These include the portion of the infringer’s profits attributable to infringement and not otherwise captured in the calculation of damages.¹⁵⁴ In lieu of actual damages, the copyright owner can elect to receive statutory damages in the range of \$750 to \$30,000 for each work infringed, with possible quintupling of the upper bound for willful infringement.¹⁵⁵

3. *Duration*

Under Berne and TRIPS, a copyright must endure at least as long as the life of the author plus fifty years.¹⁵⁶ Under the Copyright Act, the term of a copyright depends upon its date of creation.

147. See *Anderson v. Stallone*, 1989 WL 206431, 11 U.S.P.Q.2d (BNA) 1161 (C.D. Cal. 1989) (finding that the script was a derivative work and therefore not entitled to copyright protection); Lemley, *Economics of Improvement*, *supra* note 20, at 1074 (explaining the concept and rules governing derivative works).

148. The general public performance right applies to “literary, musical, dramatic, and choreographic works, pantomimes, and motion pictures and other audiovisual works.” 17 U.S.C. § 106(4). Sound recordings receive a more limited exclusive right of public performance by digital audio transmission. 17 U.S.C. § 106(6).

149. The public display right applies to “literary, musical, dramatic, and choreographic works, pantomimes, and pictorial, graphic, or sculptural works, including the individual images of a motion picture or other audiovisual work.” 17 U.S.C. § 106(5).

150. See 17 U.S.C. § 107 (detailing the exclusive rights and fair use provisions governing copyrights).

151. See 17 U.S.C. § 109 (explaining the rights of copy owners to sell such copies).

152. 17 U.S.C. § 502(a).

153. See 17 U.S.C. § 504(b) (providing for actual damages against infringer of a copyright).

154. 17 U.S.C. § 504(b).

155. 17 U.S.C. § 504(c).

156. TRIPS Agreement, *supra* note 68, art. 12; Berne Convention, *supra* note 67, art. 7(1).

Until 1976, copyright law divided duration into two terms. Works created on or after January 1, 1978 are subject to a unitary term.¹⁵⁷ Until 1998, that term coincided with the life-plus-fifty term required by the Berne Convention.¹⁵⁸ Now, authors receive copyright protection from the moment a work of authorship is created until seventy years after the author's death.¹⁵⁹ If a work is anonymous, pseudonymous, or is a work-made-for-hire, protection lasts for ninety-five years from the date of publication or 120 years from the date of creation.¹⁶⁰

D. Summary

Both patent and copyright law grant largely uniform exclusive rights to inventors and authors, respectively, subject to a number of tailored provisions. The Constitution leaves policymakers free to address the problem of uniformity cost in a variety of ways, but recent international obligations hem in this discretion considerably. Nonetheless, the formally uniform subject matter and scope provisions of both patent and copyright require judicial flexibility in application which can be used to reduce uniformity cost.

III. OPTIONS AND STANDARDS AS TOOLS TO REDUCE UNIFORMITY COST

The analysis in Part I, shows that uniformity cost is the central problem for intellectual property policymaking and that perfect tailoring of entitlements in patent and copyright law would be theoretically optimal if granting exclusive rights were the only policy tool available to respond to appropriability problems. Part II, shows that current law imposes constraints on the use of explicit tailoring to address uniformity costs. Consequently, while it is important to analyze how and when tailoring can feasibly be used to reduce uniformity costs, it is equally important to understand how formal uniform rights can be, and have been, designed to reduce uniformity costs through use of real options and flexible subject matter and scope doctrines.

157. 17 U.S.C. § 302(a) (creating a term of the life of an author plus seventy years).

158. Berne Convention, *supra* note 67, art. 7(1).

159. 17 U.S.C. § 302(a). Until passage of the Copyright Act of 1976, the term of copyright was divided into an initial and a renewal term. *See, e.g.,* Tyler Ochoa, *Patent and Copyright Term Extension and the Constitution: A Historical Perspective*, 49 J. COPYRIGHT SOC'Y OF THE U.S.A. 19 (2001) (discussing the terms of copyrights under the Constitution).

160. 17 U.S.C. § 302(c).

A. *Real Options*

The default rules for obtaining, enforcing, and maintaining intellectual property rights can, and sometimes do, require affirmative, costly acts on the part of potential intellectual property owners. Such rules require potential owners to place an *option value* on the prospect of protection. Patent law, and, to a lesser extent, copyright law, use “call options” to reduce uniformity cost by filtering who possesses intellectual property entitlements.¹⁶¹

Policymakers have three choices when allocating entitlements: (1) grant the entitlement to all eligible holders, (2) grant an option to acquire the entitlement to all eligible holders (a call option), or (3) grant multi-tiered options to acquire the entitlement; that is, an automatic grant of an option to acquire an option to acquire the full entitlement, etcetera.¹⁶² Many legal entitlements, perhaps most, are in fact options to acquire the entitlement rather than the entitlement itself.¹⁶³ For example, even among rights considered to be fundamental, options rather than entitlements are common. We say that a U.S. citizen acquires the “right” to vote in federal elections upon reaching the age of majority.¹⁶⁴ In fact, she acquires the option to have the right to vote, but she does not acquire the right to vote in any given election until she exercises the option by registering to vote.¹⁶⁵

161. In finance circles, options are divided among “call” and “put” options. See, e.g., Risk Glossary: *Options*, available at <http://www.riskglossary.com/articles/option.htm> (last visited Mar. 1, 2006). A call option gives the holder the option to purchase an asset at a specified price, and a put option gives the holder the option to sell an asset at a specified price. *Id.* Option contracts generally include certain temporal constraints, such as date on which the option expires or constraints on when the option may be exercised. See *id.* (distinguishing among American (exercise any time up to expiration date), European (exercise only on expiration date), and Bermuda (exercise at specified dates prior to expiration) options).

162. Other layers of complexity can be added. For example, when the law directly grants an entitlement, whether the holder has a put option (the option to alienate) will vary depending upon the transaction structure governing the entitlement.

163. See, e.g., IAN AYRES, *OPTIONAL LAW: THE STRUCTURE OF LEGAL ENTITLEMENTS*, (Univ. of Chicago Press 2006); Oren Bar-Gill, *Pricing Legal Options: A Behavioral Perspective*, (working paper, 2005), available at <http://lsr.nellco.org/cgi/viewcontent.cgi?article=1019&context=nyu/lewp> (last visited Mar. 1, 2006) (applying the economic ‘pricing option’ concept to legal issues).

164. See U.S. CONST. amend. XXVI § 1 (making eighteen the age of majority for voting purposes).

165. See, e.g., 42 U.S.C. § 1971(e) (2000) (implementing the Fifteenth Amendment and stating that

[w]hen used in the subsection, the word “vote” includes all action necessary to make a vote effective including, but not limited to, registration or other action required by State law prerequisite to voting, casting a ballot, and having such ballot counted and included in the appropriate totals of votes cast with respect to candidates for public office and propositions for which votes are received in an election

When policymakers choose options over direct grants of entitlements, the option price performs a filtering function. As the costs of exercising the option increase, the percentage of actual entitlement holders will decrease. With the option to vote, Jim Crow laws in the South were designed to increase the cost of exercising the option,¹⁶⁶ while the “motor voter” law was designed to bring the option cost down significantly.¹⁶⁷ Option prices also reveal information about the value of the entitlement. One goal of entitlement design can be to force private actors to reveal their private valuations of options regulated by legal rules.¹⁶⁸

In patent and copyright law, call options serve two important economic functions: (1) limiting the number of entitlement holders, and thereby reducing social costs by tailoring the number of entitlements granted, and (2) producing coarse-grained information about the private valuation of the entitlement. Of course, the substantial cost of litigation also functions as a real option that reduces uniformity cost. The focus of analysis here, however, is use of options in entitlement design to reduce uniformity cost.

Relatively recent changes in copyright law have greatly diminished the filtering function that real options once played in the form of renewal terms and formalities. In intellectual property law, real options promote social welfare when the benefits of sorting innovations and nourishing the public domain outweigh the costs of forcing entitlement bearers to calculate an option value with respect to their innovations and expend resources to purchase the option in order to enjoy protection.¹⁶⁹

1. *Patent*

Patent law deploys call options along both the subject matter and duration dimensions. With respect to subject matter, not every

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166. See, e.g., 42 U.S.C. § 1971(a)(2)(C) (limiting the use of literacy tests as prerequisites for voting in response to abuse of such practices to achieve racially discriminatory objectives).

167. See 42 U.S.C. § 1973(b)(1) (stating that the purpose of motor-voter registration is “to establish procedures that will increase the number of eligible citizens who register to vote in elections for Federal office”).

168. See, e.g., Lee Anne Fennell, *Revealing Options*, 118 HARV. L. REV. 1399, 1402 (2005) (exploring a mechanism for structuring legal entitlements so as to induce people to reveal their valuations truthfully by requiring entitlement holders to craft options to which others can respond).

169. See Long, *Information Costs*, *supra* note 64, at 496 (commenting that information disclosure rules can increase the overall social welfare but only are “efficient so long as they lower net costs to observers by more than they raise net costs to owners”).

inventor of a new, useful, and non-obvious process, machine, manufacture, or composition of matter receives a patent because a potential patentee must undergo a time-consuming and expensive process to prosecute his or her claim to a patent.¹⁷⁰ The potential patentee must assess the option value or strike price of patent protection and compare that to the costs of exercising the option through patent prosecution.¹⁷¹ The option value of patent protection in a given case usually is comparative because the potential patentee generally also has the options to keep trade secret protection or acquire the benefits of defensive publication.¹⁷² When a potential patentee forgoes protection, society is spared the associated social costs.¹⁷³ As one might expect, real options reduce Type I uniformity costs by weeding out low-value inventions across all industries.¹⁷⁴ Empirical research indicates that real options also reduce Type II uniformity costs because the value placed on patent protection generally varies by industry.¹⁷⁵

Call options along the duration dimension also play an important, and often overlooked, role in reducing uniformity cost.¹⁷⁶ The

170. A benchmark for the out-of-pocket expenses of patent prosecution is \$20,000, although costs will vary with complexity. See, e.g., Clarisa Long, *Patent Signals*, 69 U. CHI. L. REV. 625, 639 n.44 (2002) [hereinafter Long, *Patent Signals*] (listing several differing sources that estimate the range of production costs and noting that \$20,000 is a conservative estimate).

171. Cf. F. Russell Denton & Paul J. Heald, *Random Walks, Non-Cooperative Games, And The Complex Mathematics Of Patent Pricing*, 55 RUTGERS L. REV. 1175, 1180 (2003) (adapting pricing methodology for stock options to pricing options to license a patent).

172. See, e.g., Rebecca S. Eisenberg, *The Promise And Perils Of Strategic Publication To Create Prior Art: A Response To Professor Parchomovsky*, 98 MICH. L. REV. 2358, 2369 (2000) (identifying when defensive publication is attractive in a patent race context); see also Prior Art Database, www.ip.com/pad/ (last visited Feb. 28, 2005) (providing a searchable online database for the defensive publication of technical disclosure documents and the creation of prior art).

173. It will not always be the case that society gains a net benefit when a potential patentee fails to exercise the option. If the patentee chooses to keep the invention secret, society loses the benefits of disclosure, which may outweigh the social costs associated with any potential market power the patent may confer.

174. See Long, *Patent Signals*, *supra* note 170, at 626-27 & n.2 (noting that “when the value of intellectual property rights is framed purely in terms of exclusivity and rents, worthless patents abound”).

175. See, e.g., Cohen et al., *Why U.S. Manufacturing Firms Patent*, *supra* note 33, at 9-11 (showing industry-specific variation in value assigned to patent protection); Richard C. Levin et al., *Appropriating the Returns from Industrial Research and Development*, in 1987 BROOKINGS PAPERS ON ECON. ACTIVITY 783, 794-97 (1987) (demonstrating that the role of patents as means for appropriating returns from research and development investments varies among industries).

176. See, e.g., Lunney, *Quiet Revolution*, *supra* note 6, at 51-52 (remarking that although maintenance fees would “not strictly limit the duration of protection to that necessary to ensure a given innovation . . . , at the very least, it ensures that protection will end once the expected rents from an additional term of protection . . . exceed the costs of applying for the extension”); Frank Partnoy, *Finance and Patent Length* 37

formally uniform twenty-year term of patent protection is, in substance, quite heterogeneous. By conditioning protection on payment of maintenance fees, the Patent Act forces the patent owner periodically to place an option value on continued protection and to reveal something about that valuation. A patent owner's decision not to pay the relatively modest maintenance fees is a decision to dedicate the invention to the public domain.¹⁷⁷ One study shows that the owners of more than half of all patents choose to dedicate their inventions to the public domain prior to the expiration of the full twenty-year term.¹⁷⁸ Data for fee payments during the ten-year period from 1994 to 2003 show that, on average, eighteen percent of patent owners placed little value on their patents and permitted protection to lapse at the 3.5 year mark; forty-two percent of patent owners who had proceeded past the first stage chose not to extend protection at the 7.5 year mark; and of those patentees who previously had purchased extended protection, fully sixty-four percent chose to end the patent term at the 11.5 year mark.¹⁷⁹ As these data demonstrate, patent law's maintenance-fee provision serves to render a uniformly-defined dimension of patent rights more context-sensitive. In a sense, patent owners self-tailor the duration of protection.

By viewing these rules as filters, the uniformity-cost perspective reframes at least two debates that have engaged economically-oriented scholars. First, the "patent quality" debate can be recast as a debate about setting the right price for the option of patent protection. Most commentators appear to agree that some real option should be placed along the subject matter dimension.¹⁸⁰ There also seems to be consensus that the option price should be relatively high, by requiring prosecution and examination rather than

(U. San Diego Sch. of Law, Law and Economics Research Paper No. 19, 2001), available at <http://ssrn.com/abstract=285144> (recognizing maintenance fees as a form of real option).

177. See, e.g., Kimberly A. Moore, *Worthless Patents*, 20 BERKELEY TECH. L.J. 1521, 1525-26 (2006) (discussing the reasons patent owners may have for allowing their patents to expire by not paying maintenance fees).

178. See *id.* at 8 (claiming that 53.71% of all patentees permit protection to lapse for failure to pay maintenance fees); see also Suzanne Scotchmer, *On the Optimality of the Patent Renewal System*, 30 RAND J. OF ECON. 181, 182 (1999) (citing economic research showing that "[a] regularity across technology classes and countries is that no more than 50% of patents are maintained more than ten years" and that "there is considerable variance in renewal rates if patents are categorized by technology and nationality of owner") (citations omitted).

179. See Gideon Parchomovsky & R. Polk Wagner, *Patent Portfolios*, *supra* note 15, at 15 (listing the percentage of patents renewed at 3.5 years, 7.5 years, and 11.5 years per year between 1994 and 2003, and noting that the renewal data alone cannot be used to calculate the average value of patents).

180. See, e.g., *infra* notes 181-182.

mere registration.¹⁸¹ Most scholarly debate has focused on whether the mesh of the current examination filter should be made smaller to restrict the flow of invalid patents into the system.¹⁸² Alternatively, the examination option could be tiered to force greater revelation of an inventor's private valuation of the invention.¹⁸³ In general, improving quality control in the PTO would tend to increase the option value necessary to make pursuing patent protection cost-justified.¹⁸⁴

Second, the extensive economic literature on optimal patent duration generally overlooks the role of real options either by assuming a uniform term or contemplating variability without analysis of how it might be implemented. Some analysts seek to make the case for the efficiency of a uniform term, not recognizing that real options render actual terms heterogeneous.¹⁸⁵ The bulk of the literature, however, demonstrates theoretically that uniform duration

181. See, e.g., Shubha Ghosh, *Patents and the Regulatory State: Rethinking the Patent Bargain Metaphor After Eldred*, 19 BERKELEY TECH. L.J. 1315, 1344 (2004) (analyzing trade-offs between registration and prosecution); see also John H. Duffy, *Harmony and Diversity in Global Patent Law*, 17 BERKELEY TECH. L.J. 685, 713-15 (2002) (providing a brief historical summary of comparative experiences with examination and registration systems). See generally F. Scott Kieff, *The Case For Registering Patents and the Law and Economics Of Present Patent-Obtaining Rules*, 45 B.C. L. REV. 55, 70-71 (2003) (using a hypothetical registration system to illustrate social benefits of prosecution system).

182. See generally Shubha Ghosh & Jay Kesan, *What Do Patents Purchase? In Search Of Optimal Ignorance In The Patent Office*, 40 HOUS. L. REV. 1219, 1226 (2004) (arguing that a closer review of more precise applications would improve the quality of patents); Kieff, *supra* note 181, at 123 (concluding that increased scrutiny of patent applications would effect the present system negatively); Symposium, 19 BERKELEY TECH. L.J. 1 (2004) (responding to Mark A. Lemley, *Rational Ignorance at the Patent Office*, 95 NW. U. L. REV. 1495 (2001), with most authors arguing for greater investments in patent quality); Jay P. Kesan & Andres A. Gallo, *Why 'Bad' Patents Survive in the Market and How Should We Change?—The Private and Social Costs of Patents* 9 (Ill. Law & Econ. Working Papers Series, Working Paper No. LE05-004, 2005), available at <http://ssrn.com/abstract=688005> (supporting the use of administrative patent oppositions to improve the quality of patents).

183. See generally Mark A. Lemley, Douglas Lichtman & Bhaven N. Sampat, *What To Do About Bad Patents*, 28 REGULATION 10, 12 (2005) (suggesting that a strong presumption of validity for an issued patent could be turned into an option that inventors could purchase by paying for a thoroughgoing examination).

184. The portfolio strategy suggests that the option value has to be calculated not only in reference to potential revenues from the exploitation of individual inventions but also from revenues associated with the marginal increase in portfolio value. See generally Gideon Parchomovsky & R. Polk Wagner, *Patent Portfolios*, *supra* note 15, at 5-6 ("The true value of patents inheres not in their individual worth, but in their aggregation into a collection of related patents—a patent portfolio."). Portfolio value likely varies by industry, particularly because some individual pharmaceutical patents carry significant value. See generally John R. Allison et al., *Valuable Patents*, 92 GEO. L.J. 435, 437-39 (2004) (reporting the results of an empirical study of litigated patents).

185. See, e.g., D.G. McFetridge & M. Rafiquzzaman, *The Scope and Duration of the Patent Right and the Nature of Research Rivalry*, 8 RESEARCH IN L. & ECON. 91, 117 (1986) ("A good case can be made for the existing patent term if one is willing to assume that the ability to invent is not widely distributed.").

for all patents is inefficient because optimal patent life is conditional.¹⁸⁶ Some analysts recognize what I have named Type II uniformity costs and have suggested that patent terms should be tailored to vary by industry.¹⁸⁷ Other analysts tend to assume a one-to-one relation between patents and products and assert that patent life optimally would be tailored for each product.¹⁸⁸ These analyses generally overlook a deep conceptual tension in analyzing the conditions for perfectly-tailored protection. Patents are second-best solutions to appropriability problems.¹⁸⁹ If policymakers had sufficient information about the value of individual inventions to tailor duration for each invention, some form of direct compensation

186. In the foundational work for this enterprise, Professor Nordhaus's model acknowledges that "the optimal life is extremely sensitive to changes in the parameters of the system," but he then accepts that actual life is a uniform term. WILLIAM D. NORDHAUS, *INVENTION, GROWTH, AND WELFARE: A THEORETICAL TREATMENT OF TECHNOLOGICAL CHANGE* 81 (1969). In 1969, U.S. patent law did not impose maintenance fees, so his assumption of a uniform term is more understandable than for post-1982 analyses.

187. See, e.g., M.H.I. Dore, J. Kushner & I. Masse, *The Optimal Length of a Patent with Variable Output Elasticity and Returns to Scale in R&D*, 21 ATLANTIC ECON. J. 10, 11, 19, 23 (1993) (explicitly recognizing uniformity cost, modeling patent duration on per-invention according to demand, and output elasticities, which correspond to industry maturity); Nancy T. Gallini, *Patent Policy and Costly Imitation*, 23 RAND J. OF ECON. 52, 62-63 (1992) (suggesting that "a narrow patent may accelerate innovation by allowing future generations of the innovation to be developed"); F.M. Scherer, *Nordhaus' Theory of Optimal Patent Life: A Geometric Reinterpretation*, 62 AM. ECON. REV. 422, 426-27 (1972) (recognizing the uniformity cost of single patent duration whenever other barriers to imitation permit sufficient innovator appropriation and suggesting compulsory licensing as a form of tailoring); Michael Waterson, *The Economics of Product Patents*, 80 AM. ECON. REV. 860, 869 (1990) (noting the difficulty of making patent law industry specific); Donald J. Wright, *Optimal Patent Breadth and Length with Costly Imitation*, 17 INT'L J. INDUS. ORG. 419, 432 (1999) (arguing that product specific patents are optimal but recognizing that they require likely unavailable information on market structure, demand conditions, and imitation cost structures).

188. See, e.g., Partha Dasgupta & Joseph Stiglitz, *Uncertainty, Industrial Structure, and the Speed of R&D*, 11 BELL J. ECON. 1, 19 (1980) (modeling variable effects of patent life); Lawrence M. DeBrock, *Market Structure, Innovation, and Optimal Patent Life*, 28 J.L. & ECON. 223, 233-34 (1985) (illustrating how "the government can vary patent-life policy to maximize the constrained social welfare"); Vincenzo Denicolò, *Patent Races and Optimal Patent Breadth and Length*, 44 J. OF INDUS. ECON. 249, 263 (1996) (demonstrating that "the patent breadth-length optimal mix depends in a subtle way . . . on the relationship between social welfare and post-innovation products . . . and the breadth of the patent"); Richard Gilbert & Carl Shapiro, *Optimal Patent Length and Breadth*, 21 RAND J. OF ECON. 106, 111-12 (1990) (concluding that "optimal policy calls for infinitely-lived patents whenever patent breadth is increasingly costly in terms of deadweight loss"); Manfredi La Manna, Ross Macleod, & David de Meza, *The Case for Permissive Patents*, 33 EUROPEAN ECON. REV. 1427, 1430 (1989) (modeling variable patent life in a permissive patent system).

189. Cf. DeBrock, *supra* note 188, at 226 ("However, it should be clear that such a first-best situation is not relevant in a world where policymakers are forced to use an inherently second-best tool: patent protection.").

likely would be a more efficient way to finance innovation than a patent.¹⁹⁰

Because policymakers will never have perfect information but may be in a position to acquire sufficient information to tailor along industry-specific or technology-specific lines, tailoring may be preferable for addressing Type II uniformity costs. As the discussion in Part II demonstrates, however, tailoring patent duration would be very difficult.¹⁹¹ Real options address at least some Type II uniformity costs and can be quite effective in reducing Type I costs. The uniformity-cost perspective suggests that future research on the patent system should analyze option pricing rather than either assuming a uniform term or modeling per-invention variability.¹⁹²

2. Copyright

In copyright law, the uniformity-cost perspective reveals how recent changes that eliminate or constrict real options have increased the social costs of copyright law. Traditionally, U.S. copyright law tracked patent law by deploying real options along the subject matter and duration dimensions. Prior to enactment of the Copyright Act of 1976, authors arguably received direct common law entitlements to prohibit unauthorized publication.¹⁹³ If and when the author chose

190. See, e.g., Louis Kaplow, *The Patent-Antitrust Intersection: A Reappraisal*, 97 HARV. L. REV. 1813, 1844 (1984) (acknowledging that as patent policy becomes more case-specific, the justification for patent over direct reward weakens).

191. See *supra* Parts II.B, C (analyzing provisions requiring formally uniform patent duration); see also M.K. Berkowitz & Y. Kotowitz, *Patent Policy in an Open Economy*, 15 CANADIAN J. ECON. 1, 12 (1982) (recognizing that “[i]ndustrial structure of invention may be different in different industries, calling for drastically different patent policies” but concluding that because patent policy has traditionally been uniform, scope and duration must reflect conditions for the majority of industries); John F. Duffy, *A Minimum Optimal Patent Term* 9 (Working Paper, 2003), available at <http://ssrn.com/abstract=354282> (arguing that even if it’s theoretically efficient to vary patent duration by sector, administrative costs and risks of wasteful rent-seeking make tailored duration unattractive).

192. Suzanne Scotchmer is the leading thinker along these lines. See generally Suzanne Scotchmer, *On the Optimality of the Patent Renewal System*, 30 RAND J. OF ECON. 181 (1999) (modeling option prices under certain conditions); see also Moore, *supra* note 177, at 1551-52 (advocating study of option design, such as annual maintenance fees, to account for industry variation and to improve social welfare); Partnoy, *supra* note 176, at 34-37 (suggesting varying option prices as a means of regulating effective patent duration); cf. Ted O’Donoghue, Suzanne Scotchmer & Jacques-François Thisse, *Patent Breadth, Patent Life, and the Pace of Technological Progress*, 7 J. ECON. & MGMT. STRATEGY 1, 24-25 (1998) (modeling a patent’s “effective” life based on patent breadth’s effects on demand for invention); Helen Weeds, *Strategic Delay in a Real Options Model of R&D Competition*, 69 REV. ECON. STUD. 729 (2001) (applying option theory to model investment decisions in research and development). The concept of effective life could be extended to include patent owner’s response to real options as well.

193. See, e.g., *Birnbaum v. United States*, 588 F.2d 319, 326 (2d Cir. 1978) (describing “common law copyright” as more limited to right of first publication);

to publish the work, however, any common law protection was extinguished and federal protection was conditioned on exercise of the option—complying with the notice, registration, and deposit requirements.¹⁹⁴ An author who chose to publish without complying with these so-called “formalities” effectively chose to dedicate the work to the public domain, thereby eliminating the social costs of copyright with respect to that work.¹⁹⁵

The exercise price for copyright protection was considerably lower than for patent protection because registration fees were cheaper than patent filing fees and copyright registration involved no examination initially and only very cursory examination subsequently.¹⁹⁶ Even with the lower strike price, during the early years of copyright in the late eighteenth century, very few copyright owners valued the option of protection sufficiently to exercise their options.¹⁹⁷ Even well into the most recent years in which registration was required for published works, the total number of registrations was less than 600,000.¹⁹⁸ Policymakers reduced the effectiveness of the filtering function that the registration-and-notice requirements played when the United States chose to adhere to the Berne Convention, which requires that member states grant the entitlement itself rather than an option to acquire the entitlement.¹⁹⁹

Diane Leenheer Zimmerman, *Information As Speech, Information As Goods: Some Thoughts On Marketplaces And The Bill Of Rights*, 33 WM. & MARY L. REV. 665, 694 & n.205 (1992) (discussing possible common law copyright in unpublished works).

194. In the 1909 Act, Congress slightly relaxed these by requiring notice only to secure protection and requiring registration and deposit as prerequisites for a copyright infringement action. See *Washingtonian Publ'g Co. v. Pearson*, 306 U.S. 30, 36-39 (1939) (reviewing legislative history and rejecting the claim that post-publication infringements occurring prior to registration and deposit are immune from suit).

195. See, e.g., *Scherr v. Universal Match Corp.*, 297 F. Supp. 107, 112 (S.D.N.Y. 1967) (concluding that a government statue exhibited without visible notice of copyright or any restrictions regarding copying constituted a divestive publication), *aff'd on other grounds*, 417 F.2d 497 (2d Cir. 1969).

196. See LANDES & POSNER, *ECONOMIC STRUCTURE*, *supra* note 12, at 235 (stating that registration fees climbed from \$10 to \$20 in 1991, to \$30 in 2000, while the renewal fee increased from \$12 in 1991 to \$45 in 2000).

197. See, e.g., WILLIAM F. PATRY, *COPYRIGHT LAW AND PRACTICE* 33 (1994) [hereinafter PATRY, *COPYRIGHT LAW*] (reporting that 15,000 titles were published in the United States between 1790 to 1800 and evidence of only 779 copyright registrations has been found).

198. See LANDES & POSNER, *ECONOMIC STRUCTURE*, *supra* note 12, at 236 (illustrating in graph form the number of registrations between 1910 and 2000, and indicating that the number of registrations in 1989 was less than 600,000); Annual Report of the Register of Copyrights (2002), <http://www.copyright.gov/reports/annual/2002/registrations.html> (showing that total pre-1989 registrations peaked at 581,276 in 1987).

199. See *supra* Part II.C (analyzing the Berne Convention and the TRIPS Agreement); see also *Kahle v. Ashcroft*, No. 04-1127, 2004 WL 2663157 (N.D. Cal.

Current law, however, has not entirely abandoned real options. Instead, authors of works in the United States receive both a call option and a put option²⁰⁰ along the subject matter dimension. Although the copyright entitlement is granted automatically as soon as an original work of authorship is fixed in a tangible medium of expression, the entitlement is not fully functional. The entitlement can be assigned or licensed, and alleged infringers can be threatened by cease-and-desist letters.²⁰¹ Authors of works in the United States or their assigns, however, must still exercise a call option, which requires registration with the Copyright Office and is subject to minimal examination, to enforce the entitlement in federal court.²⁰²

The Section 411 call option²⁰³ still performs a filtering function, but it is much less effective at reducing uniformity cost than pre-1989 law. Under prior law, the registration-and-notice filter reduced uniformity costs because a user coming upon a published, unregistered work or a published work without a copyright notice was free to make his or her desired use of the information. Under current law, a potential user must now assume that a work of authorship, even one published without notice, is protected and cannot be used without a license (unless the desired use is a privileged use under the law), even if the author has no intention of enforcing rights or would encourage the desired use.

In order to regain some of the former benefits provided by the real option on copyrightable subject matter, efforts are underway to make public licensing or public dedication less expensive and easier to employ for authors interested in exercising the put option that current law now grants.²⁰⁴ Although these efforts reduce uniformity

2004) (rejecting plaintiffs' argument that the removal of traditional real options violates Clause 8 and the First Amendment) (appeal filed).

200. The option to alienate the copyright entitlement is clouded. Although sale and licensing are readily done, dedication of the entitlement to the public domain is slightly less certain because of the inalienable termination-of-transfers provisions. See 17 U.S.C. § 201(d) (2000) (allowing for the transfer of ownership of a copyright in whole or in part); 17 U.S.C. § 203 (specifying the conditions under which copyright transfer will be terminated and the effects of that termination).

201. See 17 U.S.C. § 201(d) (allowing for the transfer of ownership of a copyright in whole or in part); 17 U.S.C. § 501 (permitting copyright owners to institute actions against copyright infringers).

202. See 17 U.S.C. § 411 (mandating that copyright claims be properly registered before any copyright infringement actions are instituted); William F. Patry, Does Copyright Registration Matter?, The Patry Copyright Blog, <http://williampatry.blogspot.com/> (June 7, 2005, 07:34 EST) (emphasizing that proper registration is a prerequisite for an infringement action and that failure to do so will result in dismissal).

203. See 17 U.S.C. § 411 (applying a registration requirement in copyright law).

204. See, e.g., Robert P. Merges, *A New Dynamism in the Public Domain*, 71 U. CHI. L. REV. 183, 184, 186, 197 (2004) (describing contractual responses to imbalanced

cost by promoting reallocation of entitlements, transaction costs for doing so remain positive. On balance, U.S. adherence to the Berne Convention has exacerbated uniformity cost along the subject matter dimension.

Matters are worse with respect to copyright duration. Until 1976, copyright law divided duration into two terms, which served to vary the effective term of protection because the renewal procedure acted as a real option similar to patent law's maintenance fees.²⁰⁵ The Copyright Act of 1976 removed this filter by adopting a life-plus-fifty term, recently extended to life-plus-seventy.²⁰⁶ This change has rendered the duration dimension of copyright law particularly insensitive to context, as was made dramatically evident by the submissions to the Supreme Court in *Eldred v. Ashcroft*.²⁰⁷ Implicitly recognizing the problem of uniformity cost, the Copyright Office recently launched a proposal to broaden the rights of libraries and archives with respect to "orphan works."²⁰⁸ Although this effort is welcome, it does not materially alter the substantial social costs imposed by removing the real option of renewable terms.²⁰⁹

The increase in social costs imposed by a substantively uniform term of copyright protection has led even leading law-and-economics scholars William Landes and Richard Posner, who once praised the life-plus-fifty term as economically efficient,²¹⁰ to call for reestablishing a real option along copyright law's duration dimension.²¹¹ Some policymakers have made modest proposals along

public law).

205. See *supra* notes 176-179 and accompanying text (discussing option value and the effect of maintenance fees on patent duration); LANDES & POSNER, ECONOMIC STRUCTURE, *supra* note 12, at 235-49 (analyzing copyright renewal data to show the strong filtering effect of renewal term and the weaker, but significant, effect of modest changes in registration and renewal fees).

206. See 17 U.S.C. § 302(a) (2000) (requiring that copyrights created on or after Jan. 1, 1978, endure for seventy years after the author's death). Until the passage of the Copyright Act of 1976, the term of copyright was divided into two renewable terms. See Ochoa, *supra* note 159, at 22-23, 42-43 (noting that the 1976 Act was generally accepted as part of copyright reform codifying principles under the 1909 Act and requirements of the Berne Convention).

207. See generally Submission of Amici in support of Petitioners, *Eldred v. Ashcroft* Legal Documents: Supreme Court, <http://eldred.cc/legal/supremecourt.html> (last visited Feb. 26, 2006) (arguing that the Copyright Clause limits the means by which Congress can achieve its statutory purpose).

208. See U.S. Copyright Office, Notice of Inquiry, Orphan Works, 70 Fed. Reg. 3739 (Jan. 26, 2005) (seeking comment on recommended solutions for works whose copyright owner(s) cannot be identified or located).

209. See, e.g., Editorial, *Rip. Mix. Burn.*, THE ECONOMIST, July 2, 2005 (urging Congress to enact fourteen-year renewable copyright terms).

210. William M. Landes & Richard A. Posner, *An Economic Analysis of Copyright Law*, 18 J. LEGAL STUD. 325, 362-63 (1989).

211. See LANDES & POSNER, ECONOMIC STRUCTURE, *supra* note 12, at 244 (noting

these lines.²¹² The uniformity-cost perspective underscores why such measures are needed.

3. *Scope options*

The full range of real options as a policy tool to reduce uniformity cost has not been explored in the literature. Although some commentators have wrestled with the merits of registration versus examination procedures along the subject matter dimension and others have discussed the relative merits of renewable terms or maintenance fees along the duration dimension, few have discussed how the benefits of real options could be realized along the scope dimension of copyright or patent entitlements.

Consider the scope of copyright law, for example. Copyright prohibits four kinds of copying: (1) complete duplication, (2) partial duplication, (3) creation of a work substantially similar to the whole, and (4) creation of a work with a substantially similar part.²¹³ At a minimum, a copyright owner should receive the right to prohibit complete duplication if copyright is to serve as any kind of solution to the appropriability problem. Copyright law historically was restricted in scope to this kind of copying and gradually has expanded to grant the owner the entitlement to control these other forms of copying as well. It would be possible to impose a call option filter by conditioning the grant of the right to control the other three kinds of copying on either payment of a modest fee and/or registration of the claim to control these uses.

Take, for example, the scope of copyright in a novel. If a real option were in place, the author would receive the exclusive right to complete duplication at the time copyright vests. If the author also would like to have the rights to prepare derivative works from the novel, such as motion pictures or theatrical adaptations, the author would have to pay a small fee and register the claim with the Copyright Office. There already is a well-established market for

that “[c]urrent copyright law does not differentiate among different types of work” and arguing that “[a] system of indefinite renewals would automatically distinguish the enduring from the ephemeral”); *see also id.* at 249 (“[A] system of indefinite renewals . . . will separate valuable works in which continued copyright protection may be socially efficient from works in which the cost of continuing that protection exceeds the sum of administrative and access . . . costs.”).

212. *See* Public Domain Enhancement Act, H.R. 2408, 109th Cong. (May 17, 2005) (proposing an amendment to Title 17 of the U.S. Code to allow abandoned copyrighted works to enter the public domain after fifty years).

213. *See* 4-13 NIMMER ON COPYRIGHT § 13.03 (discussing what constitutes copying and defining the concept of substantial similarity).

“movie rights,” that is, the option to adapt a novel for use in a film.²¹⁴ Adding a real option into the scope dimension simply would give the public a right to participate in this market as well. Novelists who placed little or no value on the adaptation option effectively would dedicate that right to the public domain, potentially making filmmaking a marginally less expensive enterprise. Similarly, with musical works and sound recordings, one could imagine a real option to control the right to make partial duplication in the form of digital samples. Recent evidence indicates that some copyright owners would not purchase the partial duplication option.²¹⁵

Even though scope options potentially would reduce uniformity costs, the administrative costs of implementation could be quite significant.²¹⁶ The point here is not to advocate for adoption of real options for the scope of intellectual property rights, but instead to demonstrate that the option-value conception captures much of the debate about subject matter and duration and that this concept could be extended to scope as well.

B. *Standards in Intellectual Property Entitlements*

One reason that real options may not be used along the scope dimension of patent and copyright law is that both bodies of law reduce uniformity costs by adopting standards rather than rules to define the scope and subject matter dimensions.²¹⁷ This flexibility can

214. See Douglas Y'Barbo, *Aesthetic Ambition Versus Commercial Appeal: Adapting Novels to Film and the Copyright Law*, 10 ST. THOMAS L. REV. 299, 310-12 (1998) (describing the appeal of adapting novels for use in film in the movie industry and the lucrative market for movie rights).

215. See, e.g., Michael W. Carroll, *The Struggle for Music Copyright*, 57 FLA. L. REV. 907, 961 (2005) (describing a *Wired* magazine compilation CD comprised of tracks from famous artists all released under a Creative Commons sampling license). Switching the default from automatic protection with the option of open licensing to open resource with the option of closing it off would increase the pool of resources from which samples could be drawn.

216. See Duffy, *supra* note 191, at 14 (noting that the administrative costs of tailored duration make it unattractive).

217. The rules/standards literature is substantial. See, e.g., MARK KELMAN, A GUIDE TO CRITICAL LEGAL STUDIES 3, 15-63 (1987) (highlighting “the contradiction between a commitment to mechanically applicable rules as the appropriate form for resolving disputes . . . and a commitment to situation-sensitive, ad-hoc standards”); FREDERICK SCHAUER, PLAYING BY THE RULES: A PHILOSOPHICAL EXAMINATION OF RULE-BASED DECISIONMAKING IN LAW AND IN LIFE 104 (1991) (arguing that “it is a mistake to equate the dimension of ruleness with the dimension of specificity”); Louis Kaplow, *Rules Versus Standards: An Economic Analysis*, 42 DUKE L.J. 557, 560 (1992) (arguing that the only difference between rules and standards “is the extent to which efforts to give content to the law are undertaken before or after individuals act”); Duncan Kennedy, *Form and Substance in Private Law Adjudication*, 89 HARV. L. REV. 1685, 1687-1713 (1976) (assessing the formal concept of rules as legal form and distinguishing rules from standards); Eric A. Posner, *Standards, Rules, and Social Norms*, 21 HARV. J.L.

serve to reduce uniformity costs by adapting the availability and scope of protection to the appropriability conditions that prevail in specific contexts. By contrast, both patent and copyright law use rules to specify duration and rely on real options, in the case of patent law, to reduce uniformity costs.

Legal standards confer interpretive discretion on adjudicators and, generally, the more broadly a standard is stated, the more discretion adjudicators have.²¹⁸ This interpretive discretion can be deployed ad hoc or systematically. With respect to the scope of intellectual property rights, courts can choose to use flexible doctrines to strike the incentives-access balance either on a per-work or per-invention basis, or more broadly along industry-specific or technology-specific lines. For purposes of this discussion, this subsection addresses only the ways in which intellectual property scope and subject matter doctrines reduce uniformity costs by requiring ad hoc balancing.

The effectiveness of judicial interpretation as a means of rendering uniform intellectual property rights more context-sensitive depends on the dimension of rights being adapted. With regard to subject matter, courts have a certain amount of discretion to determine whether a work is sufficiently original²¹⁹ or to draw the line between

& PUB. POL'Y 101, 116-17 (1997) (concluding that rules promote autonomy and individual values, whereas standards encourage conformity to state goals); Margaret Jane Radin, *Reconsidering the Rule of Law*, 69 B.U. L. REV. 781, 783-90 (1989) (analyzing rules as either instrumental or substantive); Carol M. Rose, *Crystals and Mud in Property Law*, 40 STAN. L. REV. 577, 592-93 (1988) (refusing to accept that there is a choice between standards and rules and arguing that "we seem to be stuck with both" or "oscillate between them"); Pierre Schlag, *Rules and Standards*, 33 UCLA L. REV. 379, 379-430 (1985) (discussing the relationship between rules and standards and concluding that "much of legal argumentation is simply an exercise in the formalistic mechanisms of a dialectic which doesn't go anywhere"); Cass R. Sunstein, *Problems With Rules*, 83 CAL. L. REV. 953, 958 (1995) (arguing that "the disadvantages of rules . . . are often insufficiently appreciated, and that legal systems sometimes do and should abandon rules in favor of a form of casuistry").

218. For present purposes, the following definitions make the point:

(a) Rules.—A legal directive is "rule"-like when it binds a decisionmaker to respond in a determinate way to the presence of delimited triggering facts.

....

(b) Standards.—A legal directive is "standard"-like when it tends to collapse decisionmaking back into the direct application of the background principle or policy to a fact situation.

Kathleen M. Sullivan, Foreword, *The Justices of Rules and Standards*, 106 HARV. L. REV. 22, 58 (1992). It is critical that "the decisionmaker" be understood to include the enforcer as well as the adjudicator. A speed limit would appear to be a paradigmatic rule, but it becomes a standard in the hands of an enforcer who relies on a set of contextual factors when deciding how to enforce the provision.

219. See Trotter Hardy, *The Copyrightability of New Works of Authorship: "XML Schemas" as an Example*, 38 HOUS. L. REV. 855, 858-61 (2001) (outlining several methods that courts have used to determine whether a work is sufficiently original to be copyrighted, including the use of dictionaries to compare emerging technologies to the text the Copyright Act, the analysis of whether an idea for a work merges with

unprotected idea and protected expression. Similarly, determining whether a process is protectible²²⁰ or whether a biological organism is a “machine,” a “manufacture,” or “composition of matter,”²²¹ requires the exercise of interpretive discretion through which the courts can tailor protection. As with subject matter, the scope doctrines under both patent and copyright law delegate to courts substantial discretion that can be exercised to tailor the balance of incentives and access for specific types of information. With regard to duration, however, the courts have little discretion to tailor the term of protection directly. Nonetheless, some commentators have shown that courts can use their discretion over scope to limit or enhance the effective duration of protection.²²² When courts disagree with a legislative judgment to tailor protection, judicial interpretation also can be used to make intellectual property rights more uniform by subverting legislative tailoring.²²³

1. Patent

Patent law deploys standards rather than rules along the subject matter and scope dimensions.²²⁴ Although helpful, use of standards

the expression of that work, or the consideration of competing social policies underlying the copyrightability of the work).

220. See *State Street Bank & Trust Co. v. Signature Fin. Group, Inc.*, 149 F.3d 1368, 1375, 47 U.S.P.Q.2d (BNA) 1596, 1599 (Fed. Cir. 1998) (holding methods of doing business to be patentable “processes”).

221. See *Diamond v. Chakrabarty*, 447 U.S. 303, 308-09 (1980) (holding human-made bacteria not naturally occurring to be patentable subject matter).

222. See Justin Hughes, *Fair Use Across Time*, 50 UCLA L. REV. 775, 776-77 (2003) (arguing that courts should examine the market for a copyrighted work over a period of time in order to determine whether future uses of that work are infringing or non-infringing); Joseph P. Liu, *Copyright and Time: A Proposal*, 101 MICH. L. REV. 409, 411 (2002) (voicing that courts should not assume that the scope of protection afforded during copyright terms is “constant or unaffected” by the passage of time and that courts should consider the passage of time when setting the duration of copyright terms).

223. See, e.g., *Bleistein v. Donaldson Lithographing Co.*, 188 U.S. 239, 250-51 (1903) (construing the definition of copyrightable subject matter containing “the words ‘engraving,’ ‘cut’ and ‘print’ applicable only to pictorial illustrations or works connected with the fine arts” and rendering nugatory the fine arts limitation on grounds that “[i]t would be a dangerous undertaking for persons trained only to the law to constitute themselves final judges of the worth of pictorial illustrations”); cf. *Chakrabarty*, 447 U.S. at 318 (Brennan, J., dissenting) (accusing the majority of overriding congressional intent to tailor patent rights in inventions comprising living organisms); *J.E.M. AG Supply, Inc. v. Pioneer Hi-Bred Intern., Inc.*, 534 U.S. 124 (2001) (citing *Chakrabarty* as controlling precedent in holding that tailored protection for plant varieties is not exclusive of the general utility patent protection for the same subject matter).

224. See Burk & Lemley, *Policy Levers*, *supra* note 4, at 1642-58 (identifying nine such patent law standards as “policy levers”: (1) abstract ideas, (2) utility, (3) experimental use, (4) skill in the art, (5) secondary considerations, (6) written description, (7) doctrine of equivalents, (8) pioneering patents, (9) reverse doctrine

along the subject matter dimension permits only coarse-grained exercise of interpretive discretion because an adjudicator can choose only between applying all or no rights to a particular innovation or class of innovations. The standards that govern patent scope, by contrast, supply a wider range of responses to uniformity cost.

a. Subject matter

The formally uniform statutory definition of patentable subject matter is broadly stated and therefore confers a considerable degree of interpretive discretion on the federal courts and the PTO. The courts have resisted using discretion to sustain categorical exclusions from patentable subject matter, finding this to be too crude a filter. As a result, in the name of uniformity, the courts have extended patent protection to living organisms,²²⁵ methods of doing business,²²⁶ and software.²²⁷ Nonetheless, courts retain discretion to reduce uniformity cost on a per-patent basis through flexible subject matter doctrines including the limitation on patenting “abstract ideas,”²²⁸ the utility doctrine,²²⁹ novelty’s requirement of a prior “public” use,²³⁰ and the non-obviousness standard.²³¹ Application of other eligibility doctrines, such as the disclosure requirements of enablement,²³² best

of equivalents).

225. See *Chakrabarty*, 447 U.S. at 308-09 (announcing that patentable subject matter included human-made bacteria not naturally occurring in nature).

226. See *State Street Bank & Trust Co. v. Signature Fin. Group, Inc.*, 149 F.3d 1368, 1375, 47 U.S.P.Q.2d (BNA) 1596, 1599 (Fed. Cir. 1998) (rejecting the argument that methods of doing business were not “processes” able to be patented).

227. See *AT&T Corp. v. Excel Commc’ns, Inc.*, 172 F.3d 1352, 1356, 50 U.S.P.Q.2d (BNA) 1447, 1450 (Fed. Cir. 1999) (observing that “since the manipulation of numbers is a fundamental part of computer technology,” courts had to reassess traditional patent law barring the patenting of mathematical algorithms in order to determine what rights would be afforded to emerging software).

228. See *O’Reilly v. Morse*, 56 U.S. (15 How.) 62 (1853) (giving birth to the doctrine that abstract ideas are not patentable).

229. See 35 U.S.C. § 101 (2000) (conferring protection upon “new and useful” inventions). Although broadly construed, utility still places a meaningful limit on patentability, particularly with respect to biotechnology and upstream research tools. See, e.g., *Burk & Lemley, Policy Levers*, *supra* note 4, at 1644-45 (discussing utility with respect to inventions in the life sciences, particularly the requirement of proof of therapeutic effect for pharmaceutical patents).

230. See, e.g., *Bernhardt, L.L.C. v. Collezione Europa USA, Inc.*, 386 F.3d 1371, 1381, 72 U.S.P.Q.2d (BNA) 1901, 1909 (Fed. Cir. 2004) (explaining that the novelty requirement of a public use takes into account “the nature of the activity that occurred in public; the public access to and knowledge of the public use; and whether there was any confidentiality obligation imposed upon persons who observed the use”) (quotation omitted).

231. See 35 U.S.C. § 103 (stating that an invention may not be patented when “the differences between the [invention] and [a previously patented invention] are such that . . . [they] would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said [invention] pertains”).

232. See 35 U.S.C. § 112 (requiring inventors to compose a detailed description of

mode,²³³ and written description,²³⁴ as well as the triggers for statutory bars,²³⁵ all supply tools for the courts to assess and reduce uniformity cost. For example, non-obviousness and the disclosure doctrines vary to a certain degree along technology-specific or industry-specific lines because these are applied with reference to a “person having ordinary skill in the art.”²³⁶

When specifying eligibility through the PHOSITA device, the law requires a court or a patent examiner to make a variety of judgments concerning the level of skill in the art and the set of background knowledge that the PHOSITA would be able to rely upon when drafting or reading a patent.²³⁷ As Professors Allison and Tiller have noted, “[w]hen one realizes that an ordinarily skilled practitioner may range from an experienced mechanic or electrician to a person with a Ph.D. and much experience in molecular biology or computer science, the conclusion is inescapable that not all rules can be applied exactly the same in every case.”²³⁸ The courts can and do vary patent eligibility for different industries or technologies by the amount of information and the kinds of technical skills that a patentee can incorporate by reference.²³⁹

Consider, for example, the role of the PHOSITA in three doctrines: non-obviousness, enablement, and written description. When contemplating whether the inventor’s solution to a particular

the invention to be patented, including information that would enable other inventors to make and use the invention and to “set forth the best mode contemplated by the inventor of carrying out his invention”).

233. *Id.*

234. *Id.*

235. See 35 U.S.C. § 102(b) (denying patents for inventions that were patented, described in a printed publication, or on sale within the United States for more than one year prior to the date of the patent application).

236. See R. Polk Wagner, Comment, *Exactly Backwards: Exceptionalism and the Federal Circuit*, 54 CASE W. RES. L. REV. 749, 751-52 (2004) (discussing the effects of the PHOSITA standard on eligibility and scope, particularly the notion that the “easier” the field, the more likely the patent will be rejected for obviousness and the “harder” the field, the less likely the patent will be rejected for obviousness).

237. See *id.* at 751 (criticizing the widespread reliance on the PHOSITA standard, with its variance amongst “easy” and “hard” fields, as having an indeterminate effect on patents); Burk & Lemley, *Policy Levers*, *supra* note 4, at 1650 (acknowledging that “[a] great deal of patent doctrine . . . rests upon the measurement of some legal parameter against the skill and knowledge of the PHOSITA” and that “in many . . . instances, the role of the PHOSITA is a judicial, rather than a statutory, creation”).

238. John R. Allison & Emerson H. Tiller, *The Business Method Patent Myth*, 18 BERKELEY TECH. L.J. 987, 1083 n.265 (2003).

239. See *In re GPAC, Inc.*, 57 F.3d 1573, 1579, 35 U.S.P.Q.2d (BNA) 1116, 1120 (Fed. Cir. 1995) (“The person of ordinary skill in the art is a hypothetical person who is presumed to know the relevant prior art.” (quoting *Custom Accessories, Inc. v. Jeffrey-Allan Indus., Inc.*, 807 F.2d 955, 962, 1 U.S.P.Q.2d (BNA) 1196, 1202 (Fed. Cir. 1986))).

problem would have been obvious at the time of invention, courts and patent examiners must make judgments about the rate and direction of innovation in a particular field and about the amount of prior art and background knowledge that a PHOSITA could call upon.²⁴⁰ Similarly, courts and patent examiners must invoke the PHOSITA to determine whether the written description in the patent demonstrates that the inventor possessed the invention at the time of filing, and whether the patent provides sufficient information to enable a PHOSITA to practice the invention without undue experimentation.²⁴¹ The patentee may incorporate by reference a wide range of background theoretical and practical knowledge to satisfy either inquiry, so long as the goals of the written description and enablement requirements are met.²⁴²

From the perspective of entitlement design, the legislative decision to define patent eligibility largely through these standards, rather than through rules reduces uniformity cost by rendering this nominally uniform dimension of patent law more context-sensitive. Indeed, the choice of standards over rules reflects a legislative expectation that courts will use this interpretive discretion to reduce uniformity cost by varying patentable subject matter in response to the appropriability conditions surrounding a particular invention or class of inventions as circumstances may indicate. This discretion has been, and can be, used to tailor subject matter to manage and reduce Type II uniformity costs by differentiating among types of processes

240. See Rebecca S. Eisenberg, *Obvious To Whom? Evaluating Inventions from the Perspective of PHOSITA*, 19 BERKELEY TECH. L.J. 885 (2004) (arguing that the Federal Circuit only partially incorporates the PHOSITA's knowledge by excluding his or her tacit knowledge); Burk & Lemley, *Policy Levers*, *supra* note 4, at 1593-94 (accusing the Federal Circuit of applying a stringent nonobviousness standard to biotechnological inventions, while applying a lenient nonobviousness standard to software cases); Donald S. Chisum, *Anticipation, Enablement and Obviousness: An Eternal Golden Braid*, 15 AIPLA Q.J. 57, 58 (1987) (reiterating that an invention can be found obvious and a patent not awarded to its inventor so long as it was obvious, if not entirely anticipated, from a previously patented invention).

241. See, e.g., *Northpoint Tech., Ltd. v. MDS Am., Inc.*, 413 F.3d 1301, 75 U.S.P.Q.2d (BNA) 1244 (Fed. Cir. 2005) (providing an example of a court divided over whether the evidence at trial was sufficient to show a lack of enablement based on level of the PHOSITA's background knowledge).

242. See, e.g., *Univ. of Rochester v. G.D. Searle & Co., Inc.*, 358 F.3d 916, 921, 69 U.S.P.Q.2d (BNA) 1886, 1892 (Fed. Cir. 2004) (elucidating that while the written description and enablement requirements "often [significantly] overlap . . . they are nonetheless independent of each other" and "an invention may be described without an enabling disclosure of how to make or use it" or "an invention may be enabled even though it has not been described"); see also *Univ. of Rochester v. G.D. Searle & Co., Inc.*, 375 F.3d 1303, 71 U.S.P.Q.2d (BNA) 1545 (Fed. Cir. 2004) (denying rehearing en banc accompanied by a range of dissenting and concurring opinions discussing recent doctrinal developments with respect to enablement and written description).

in patent law (e.g. business methods) for which no appreciable appropriability problem exists. The subject matter doctrines are less well suited for addressing Type I uniformity costs, but these doctrines still have an impact.

b. Scope

The scope doctrines of patent law provide courts with an even wider range of tools to reduce uniformity cost, particularly when remedial options are included within the definition of an entitlement's scope. Commentators have recognized that scope doctrines that rely upon the PHOSITA can be used by courts to purposefully tailor patent protection along industry-specific or technology-specific lines.²⁴³ For example, an invention is defined by the patent's claims and these claims are to be interpreted as a matter of law in the way a PHOSITA would read them.²⁴⁴ Normally, the words in a claim are to be given their ordinary meaning, unless the patentee has acted as her own lexicographer.²⁴⁵ In the latter case, linguistic conventions within the field of invention could serve to expand or narrow the scope of the "invention" to which the exclusive rights apply.²⁴⁶

Consequently, the scope of patent protection can vary depending upon how liberally the courts and patent examiners understand the amount of background knowledge that can be incorporated. Patent scope also can vary along industry-specific or technology-specific lines through application of the doctrine of equivalents, which extends the

243. See, e.g., Burk & Lemley, *Policy Levers*, *supra* note 4, at 1648-51 (analyzing tailoring flexibility enabled by PHOSITA doctrines); Robert P. Merges & Richard R. Nelson, *On the Complex Economics of Patent Scope*, 90 COLUM. L. REV. 839, 916 (1990) ("Our goal has been to show that scope doctrines can be used to approximate the 'tailoring' function proposed by economists who model optimal patent length, with an eye toward retaining incentives for subsequent improvements.").

244. See *Multiform Desiccants, Inc. v. Medzam, Ltd.*, 133 F.3d 1473, 1477, 45 U.S.P.Q.2d (BNA) 1429, 1432 (Fed. Cir. 1998) ("It is the person of ordinary skill in the field of the invention through whose eyes the claims are construed."); see also Craig Allen Nard, *A Theory of Claim Interpretation*, 14 HARV. J.L. & TECH. 1, 6 (2000) (lauding the PHOSITA as "one of the cynosures of [the] patent system" because he "has knowledge of the underlying assumptions present in his technological community and is sensitive to facts on the ground").

245. See *Vitronics Corp. v. Conceptor, Inc.*, 90 F.3d 1576, 1582, 39 U.S.P.Q.2d (BNA) 1573, 1578 (Fed. Cir. 1996) (emphasizing that courts should look first to intrinsic evidence, namely the words used in the patent claim itself, because such evidence is "the most significant source of the legally operative meaning of disputed claim language").

246. See, e.g., *Hoechst Celanese Corp. v. BP Chems., Ltd.*, 78 F.3d 1575, 1578, 38 U.S.P.Q.2d (BNA) 1126, 1228 (Fed. Cir. 1996) ("A technical term used in a patent document is interpreted as having the meaning that it would be given by persons experienced in the field of the invention.").

patentees' rights to products or processes with elements deemed to be the "equivalent" of elements in the claims defining the protected invention.²⁴⁷ To the extent that the PHOSITA is used to evaluate equivalence, application of the doctrine is rendered context-sensitive.²⁴⁸

Finally, courts enjoy considerable discretion to fashion relief when infringement has been proven, and this discretion should be applied to reduce uniformity cost. Professors Burk and Lemley rightly point out that there may be more situations than courts currently recognize in which to withhold injunctive relief and the Supreme Court appears poised to consider this view.²⁴⁹ The point can be extended to monetary relief as well. Industry-specific information plays an essential role in the evidence supporting willfulness of the infringement and the amount of any damage award, whether calculated as a reasonable royalty or as lost profits.

2. Copyright

Copyright law also uses standards along the subject matter and scope dimensions to reduce uniformity cost.

247. See *Warner-Jenkinson Co., Inc. v. Hilton Davis Chem. Co.*, 520 U.S. 17, 29 (1997) (recasting the doctrine of equivalents as applicable to the individual elements of the patent claim and not to the invention in its entirety); see also Cotropia, "After Arising", *supra* note 6, at 192-201 (arguing that doctrine of equivalents should be tailored for rapidly-developing, cumulative technology industries); Julie E. Cohen & Mark A. Lemley, *Patent Scope And Innovation in the Software Industry*, 89 CAL. L. REV. 1, 53-55 (2001) (arguing that the doctrine of equivalents should be tailored as applied to software patents).

248. The courts have announced two different tests for equivalence. The first test is the function-way-result test, which considers "the purpose for which an ingredient is used in a patent, the qualities it has when combined with the other ingredients, and the function which it is intended to perform." *Graver Tank & Mfg. Co. v. Linde Air Prods. Co.*, 339 U.S. 605, 609 (1950). The second test is the reasonable interchangeability test, which considers the extent to which the accused and claimed elements are known to be interchangeable with each other. *Hilton Davis Chem. Co. v. Warner-Jenkinson Co., Inc.*, 62 F.3d 1512, 1519, 35 U.S.P.Q.2d (BNA) 1641, 1647 (Fed. Cir. 1995) (en banc), *rev'd on other grounds*, 520 U.S. 17 (1997). The latter test explicitly relies on the PHOSITA; it is less clear whether the former does as well.

249. See *eBay, Inc. v. MercExchange, L.L.C.*, 126 S. Ct. 733 (2005) (granting certiorari to review *MercExchange, L.L.C. v. eBay, Inc.*, 401 F.3d 1323, 74 U.S.P.Q.2d (BNA) 1225 (Fed. Cir. 2005), which concerns the proper standard for granting permanent injunctive relief against a patent infringer); Burk & Lemley, *Policy Levers*, *supra* note 4, at 1665-68 (citing hold-ups, anticommons situations, and cases in which appropriability conditions may favor a subsidized compulsory license as candidates for withholding injunctive relief); see also Colleen Chien, *Cheap Drugs at What Price to Innovation: Does the Compulsory Licensing of Pharmaceuticals Hurt Innovation?*, 18 BERKELEY TECH. L.J. 853, 857 (2003) (suggesting that appropriability conditions in the pharmaceutical industry do not require property rule protection in order to maintain incentives for pharmaceutical developers).

a. Subject matter

With respect to subject matter, copyright law provides courts with even greater doctrinal flexibility than does patent law. Principally, these doctrines are the idea/expression dichotomy, the functionality exception, and the merger doctrine. Copyright applies only to the author's original expression and not the abstract ideas embodied in the copyrighted work.²⁵⁰ As Learned Hand famously expounded, courts seeking to draw the line between idea and expression must choose a point along a continuum of abstraction.²⁵¹ Likewise, facts are not copyrightable but an author's expression in relating facts usually will be sufficiently original to be copyrightable.²⁵² Similar line-drawing difficulties arise and may be resolved differently depending on subject matter. The merger doctrine holds that if there are limited means to express ideas or facts, then the expression merges with the uncopyrightable element and the whole of the author's work is either uncopyrightable or the copyright in the expression is unenforceable.²⁵³ The functionality doctrine is related to merger and holds that protection for expressive sculptural, pictorial, and graphic works that are combined with functional goods is limited only to

250. The idea/expression dichotomy emanates from judicial interpretation and is codified in 17 U.S.C. § 102(a)-(b), which explicitly confers protection upon "original works . . . fixed in any tangible medium of expression" and denies protection to "any idea . . . regardless of the form in which it is described."

251. See *Nichols v. Universal Pictures Corp.*, 45 F.2d 119, 121 (2d Cir. 1930) (determining whether something is an "idea" or an "expression of an idea" is generally accomplished by gauging the level of detail with which it was rendered).

252. See *Miller v. Universal City Studios, Inc.*, 650 F.2d 1365, 1372 (5th Cir. 1981) (refusing to extend copyright protection for research because it would amount to copyright protection for facts).

253. Courts and scholars debate whether the merger doctrine applies to the plaintiff's claim to own a valid copyright or the claim that the defendant's work is infringing. Compare *Gates Rubber Co. v. Bando Chem. Indus., Ltd.*, 9 F.3d 823, 838 (10th Cir. 1993) ("Under the merger doctrine, copyright protection is *denied* to expression that is inseparable from or merged with the ideas, processes, or discoveries underlying the expression.") (emphasis added); *Kern River Gas Transmission Co. v. Coastal Corp.*, 899 F.2d 1458, 1460 (5th Cir. 1990) (applying the merger doctrine to hold that survey maps that the defendant copied from the plaintiff were not copyrightable instead of applying the doctrine to hold that the maps infringed upon the copyright held by the plaintiff), *with Schoolhouse, Inc. v. Anderson*, 275 F.3d 726, 730 (8th Cir. 2002) (holding that the defendant's website did not infringe upon the plaintiff's magazine, which contained local school information, because there was "only one way or only a few ways of expressing [that] idea"); *Computer Assoc. Int'l, Inc., v. Altai, Inc.*, 982 F.2d 693, 708 (2d Cir. 1992) (denying relief for alleged copyright infringement where a computer program was "the only and essential means of accomplishing a given task," because in such an instance the expression of the idea and the idea had merged) (citation omitted); *Kregos v. Associated Press*, 937 F.2d 700, 705 (2d Cir. 1991) (stating that the Second Circuit employs the merger doctrine to determine whether a plaintiff's copyright has been infringed upon rather than to determine whether a defendant's copyright is valid).

expressive elements that are physically or conceptually separable from the functional good.²⁵⁴

b. Scope

The scope of rights under copyright is determined in relation to a number of context-sensitive standards. For example, whenever the defendant's work does not literally reproduce the plaintiff's work, the court must resolve whether the two works are "substantially similar" from the "ordinary observer's" perspective.²⁵⁵ Both of these judgments are context-sensitive and can be applied to reduce uniformity cost. The most notable example of a court using this flexibility is *Computer Assocs. Int'l, Inc. v. Altai, Inc.*,²⁵⁶ which endorsed the use of an abstraction-filtration-comparison method for determining substantial similarity in software cases.²⁵⁷ Even when literal copying takes place, the copyright owner's rights are limited by flexible standards, such as fair use.²⁵⁸ This doctrine is flexible enough to grant courts substantial tailoring discretion,²⁵⁹ as are less-frequently-invoked infringement doctrines such as *de minimis* use,²⁶⁰ *scènes à*

254. See 17 U.S.C. § 113 (codifying the principle set out in *Mazer v. Stein*, 347 U.S. 201 (1954) that an artist does not lose his or her copyright in an artistic work despite the fact that the work is the basis for a functional good). In addition, the uncopyrightable forms of expression identified in 17 U.S.C. § 102(b) exclude protection for functional literary works, such as certain aspects of software. See, e.g., *Lotus Dev. Corp. v. Borland Int'l, Inc.*, 49 F.3d 807, 815 (1st Cir. 1995) (finding that a software menu structure that enabled multiple data entries with one "macro" keystroke was an uncopyrightable "method of operation"), *aff'd by an equally divided Court*, 516 U.S. 233 (1996).

255. See, e.g., *Johnson v. Gordon*, 409 F.3d 12, 18 (1st Cir. 2005) (observing that copyright infringers seldom copy directly from an existing work and that "direct proof" of copyright infringement is rarely available to the court); *Incredible Techs., Inc. v. Virtual Techs., Inc.*, 400 F.3d 1007, 1011 (7th Cir. 2005) (warning that "the concept of the ordinary observer must be viewed with caution . . . and [courts] must heed the principle that, despite what the ordinary observer might see, the copyright laws preclude appropriation of only those elements of the work that are protected by the copyright").

256. 982 F.2d at 693.

257. See *id.* at 706-12 (championing the abstraction-filtration-comparison method as being rooted in familiar copyright doctrine while being considerate of the reality that the software industry is constantly changing and may outpace legal developments).

258. See 17 U.S.C. § 107 (supplying an illustrative list and four factors for courts to use when assessing fair use in copyright infringement cases).

259. See, e.g., *Harper & Row, Publishers, Inc. v. Nation Enters.*, 471 U.S. 539, 552 (1985) (asserting that "fair use analysis must always be tailored to the individual case" in finding infringement due to unauthorized reproduction of exact portions of Gerald Ford's memoirs).

260. See, e.g., *Newton v. Diamond*, 388 F.3d 1189, 1193-94 (9th Cir. 2004) (defining *de minimis* use as the appropriation of a copyright that would go unrecognized by the average audience); *Ringgold v. Black Entm't Television, Inc.*, 126 F.3d 70, 74-77 (2d Cir. 1997) (finding that the defendant's repeated use of the plaintiff's poster in a television program was a *de minimis* use of the latter's

faire,²⁶¹ and the useful article doctrine. Moreover, courts have license to be flexible with the choice of a remedy.²⁶²

CONCLUSION

The problem of uniformity cost has been recognized but underanalyzed in the economic analysis of intellectual property law. As the economic importance of information increases and as the appropriability conditions in information-production sectors continue to become more heterogeneous and complex, the law will continue to come under increasing pressure to respond with greater context-sensitivity. However, doing so will be difficult because policymakers have limited capacity for aggregating and acting on the necessary information about information-production.

Current law demonstrates use of three policy tools for reducing uniformity cost. Real options, which place conditions on the acquisition, enforcement, and maintenance of intellectual property rights, reduce the social costs associated with low-value innovations and those created under conditions offering appropriability alternatives to intellectual property rights. Deployment of legal standards rather than rules along the subject matter and scope dimensions of patent and copyright enable more contextual decision making to reduce uniformity costs. More directly, policymakers have tailored rights in a number of cases. Recent trends in international law reflect a move to constrain the tailoring discretion of member States to the extent that tailoring would reduce the robustness of some intellectual property rights. Notwithstanding this pressure, policymakers still retain substantial tailoring discretion and more analysis is needed to assess how and when this discretion should be exercised.

copyright).

261. *Scènes à faire* are otherwise copyright expressive elements that “necessarily result from the choice of a setting or situation.” *Walker v. Time Life Films, Inc.*, 784 F.2d 44, 50 (2d Cir. 1986). Because they are unprotected, unauthorized reproduction does not constitute infringement. *See, e.g., Hoehling v. Universal City Studios, Inc.*, 618 F.2d 972, 979 (2d Cir. 1980) (holding representation of the Hindenburg disaster as non-infringing because of the similarities necessitated by the subject matter).

262. *See* 17 U.S.C. § 502(a) (2004) (stating that the court’s decision to grant injunctive relief is discretionary); *Campbell v. Acuff-Rose Music, Inc.*, 510 U.S. 569, 578 n.10 (1994) (urging lower courts to give due consideration to their discretion to grant injunctive relief in parody cases).