

THE COPYRIGHT-INNOVATION TRADEOFF: PROPERTY RULES, LIABILITY RULES, AND INTENTIONAL INFLICTION OF HARM

Dotan Oliar*

Should the law secure to copyright owners control over new technological uses of their works? Or should the law leave technological innovators free to explore and exploit such uses? The greater the control afforded to copyright owners, the greater the incentive to produce content, but also the greater the disincentive to produce better technologies to enjoy it. This Article studies the degree to which protecting copyright owners or technological innovators by property rules or liability rules over new technological uses of content would drive members of each group to invest desirably in their respective creations and in reducing the interference between their activities.

The Article offers three major contributions: (1) it assesses the degree to which different entitlements promote authorship and innovation as well as investments to minimize the interference between them, (2) it shows that a property rule in technological innovators might drive them to harm copyright owners intentionally, and (3) it suggests a way of modifying legal entitlements that can improve copyright owners and innovators' incentives to invest.

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INTRODUCTION

Should copyright law impose liability on innovators of technologies used to copy, manipulate, or disseminate protected content? Intellectual property law’s goal, and constitutional mandate,¹ is to promote both authorship and invention.² Often, each of these goals can be pursued independently.³ Sometimes, however, they conflict. New technologies—such as record players, radio, motion pictures, photocopiers, VCRs, MP3 players, and file-sharing networks—often weaken copyright owners’ control over content. As the Supreme Court observed, imposing copyright liability on technology companies would promote authorship but chill innovation, while immunizing innovators from liability would promote innovation but chill authorship.⁴ How should the law balance these two interests?⁵

1. See U.S. CONST. art. I, § 8, cl. 8 (granting Congress the power to “promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries”). In previous work, I have suggested that Congress’s exercise of its intellectual property power is limited to securing only those exclusive rights that promote progress. Dotan Oliar, *Making Sense of the Intellectual Property Clause: Promotion of Progress as a Limitation on Congress’s Intellectual Property Power*, 94 GEO. L.J. 1771 (2006). This Article proposes one way of achieving that goal—by modifiable entitlements, discussed in Part III.B.2 below—when the promotion of progress of authorship conflicts with the promotion of progress of technological innovation.

2. Some draw a distinction between “invention” and “innovation,” the former term designating the conception of a useful idea and the latter its successful application in practice. For simplicity and consistency, in this Article I shall use the term “innovation” to describe these two aspects as they relate to the making of new technologies to copy, manipulate, and disseminate content. See also *infra* note 5.

3. The federal copyright and patent laws derive from Congress’s constitutional power, U.S. CONST. art. I, § 8, cl. 8, and respectively regulate authorship and invention. Each area applies to different subject matters, imposes different prerequisites, confers a different bundle of rights, and lasts for a different duration. Authorship and invention are also regulated by additional, related bodies of federal and state law and by the general rules regulating market competition.

4. See *MGM Studios Inc. v. Grokster, Ltd.*, 545 U.S. 913, 928 (2005) (“MGM and many of the *amici* fault the Court of Appeals’s holding for upsetting a sound balance between the respective values of supporting creative pursuits through copyright protection and promoting innovation in new communication technologies by limiting the incidence of liability for copyright infringement. The more artistic protection is favored, the more technological innovation may be discouraged; the administration of copyright law is an exercise in managing the tradeoff. The tension between the two values is the subject of this case”)

This question has been asked respecting each of the technologies above and many others. Each time, however, courts and Congress have struck the balance differently. The law has alternated over time between protecting copyright owners and innovators by either property rules or liability rules. The copyright-innovation conflict is one of the most important and recurring themes in copyright law's evolution, and it has been studied extensively.⁶ Unfortunately, despite much congressional, judicial, and scholarly attention, the law has not treated content-technology conflicts coherently.

This Article takes a first-principles approach to content-technology conflicts. It views authorship and innovation as two economic activities that interfere. It conducts a systematic analysis of how allocating property rules and liability rules to copyright owners and innovators would induce each group to

(citations omitted)); *Sony Corp. of Am. v. Universal City Studios, Inc.*, 464 U.S. 417, 442 (1984) (noting that the goal of copyright law's "staple article of commerce" doctrine is to "strike a balance between a copyright holder's legitimate demand for effective—not merely symbolic—protection of the statutory monopoly, and the rights of others freely to engage in substantially unrelated areas of commerce").

5. In this Article, I do not distinguish between authors and copyright owners (authors' successors in title), nor do I distinguish between inventors and technology companies (inventors' successors in title), since my main focus is on conflicts between these two different chains of production. All the relevant incentives of those roles located on one chain of production—either content or technology—derive from the basic allocation of entitlements that this Article studies.

6. For major treatments of the copyright-innovation conflict, see, for example, WILLIAM W. FISHER III, *PROMISES TO KEEP: TECHNOLOGY, LAW, AND THE FUTURE OF ENTERTAINMENT* (2004); PAUL GOLDSTEIN, *COPYRIGHT'S HIGHWAY: FROM GUTENBERG TO THE CELESTIAL JUKEBOX* (rev. ed. 2003); ADRIAN JOHNS, *PIRACY: THE INTELLECTUAL PROPERTY WARS FROM GUTENBERG TO GATES* (2009); JAMES LARDNER, *FAST FORWARD: HOLLYWOOD, THE JAPANESE, AND THE ONSLAUGHT OF THE VCR* (1987); JESSICA LITMAN, *DIGITAL COPYRIGHT* (2001); JOSEPH MENN, *ALL THE RAVE: THE RISE AND FALL OF SHAWN FANNING'S NAPSTER* (2003); WILLIAM PATRY, *MORAL PANICS AND THE COPYRIGHT WARS* (2009); EDWARD SAMUELS, *THE ILLUSTRATED STORY OF COPYRIGHT* (2000); Jane C. Ginsburg, *Copyright and Control over New Technologies of Dissemination*, 101 COLUM. L. REV. 1613 (2001); Jane C. Ginsburg, *Separating the Sony Sheep from the Grokster Goats: Reckoning the Future Business Plans of Copyright-Dependent Technology Entrepreneurs*, 50 ARIZ. L. REV. 577 (2008); Wendy J. Gordon, *Fair Use as Market Failure: A Structural and Economic Analysis of the Betamax Case and Its Predecessors*, 82 COLUM. L. REV. 1600 (1982); Mark A. Lemley, *Is the Sky Falling on the Content Industries?*, 9 J. ON TELECOMM. & HIGH TECH. L. 125 (2011); Mark A. Lemley & R. Anthony Reese, *Reducing Digital Copyright Infringement Without Restricting Innovation*, 56 STAN. L. REV. 1345 (2004); Jessica D. Litman, *Copyright, Compromise, and Legislative History*, 72 CORNELL L. REV. 857 (1987); Jessica Litman, *Copyright Legislation and Technological Change*, 68 OR. L. REV. 275 (1989); Peter S. Menell, *Envisioning Copyright Law's Digital Future*, 46 N.Y.L. SCH. L. REV. 63 (2002); Robert P. Merges, *One Hundred Years of Solicitude: Intellectual Property Law 1900-2000*, 88 CALIF. L. REV. 2187 (2000); Randal C. Picker, *Copyright as Entry Policy: The Case of Digital Distribution*, 47 ANTITRUST BULL. 423 (2002); Timothy Wu, *Copyright's Communications Policy*, 103 MICH. L. REV. 278 (2004).

invest both in pursuing its own trade and in minimizing the copyright-innovation interference.⁷

For example, a property rule in innovators—an entitlement allowing them to manufacture any technology regardless of harm to copyright owners—may drive some of them to produce harmful technologies and to actively promote their use for infringement. Such inefficient investments in technology creation and harm generation may allow some innovators to extract value from copyright owners in return for shutting down. Imagine, for instance, an innovator contemplating a technology—such as an online file-sharing network—that creates a small value of 10 but that also harms copyright owners by 100. Backed by a right to market this technology, an innovator would produce it. The innovator and copyright owners would quickly realize that all can be made better off by shutting down the technology. In negotiations, the innovator would not accept anything less than 10 to shut down while copyright owners would pay 100 at most. Under equal bargaining power, the innovator would shut down in return for 55. Assume, however, that when the innovator creates the new technology, he can invest an extra 5 to increase the technology's harmful effect to 200. While a net loss in social welfare, this investment in harm exacerbation would pay off for the innovator, because it would increase the copyright owners' maximal willingness to pay to 200, thus increasing the innovator's settlement amount to 105. This is just one effect of one legal rule—this Article provides a comprehensive analysis of the incentives generated by each of the four classic entitlements.⁸

Charting the incentive effects of alternative legal rules can explain observed phenomena and predict future ones. For instance, before the rise of file-sharing networks over the past decade, the relevant Supreme Court precedent, *Sony Corp. of America v. Universal City Studios, Inc.*,⁹ was largely understood as vesting a property rule in innovators. Several courts found that file-sharing networks actively induced infringement by end users, a behavior consistent with the predicted behavior of the similarly protected innovator in the numerical example in the preceding paragraph. Also consistent with that example were the negotiations between Napster, the file-sharing network, and music labels, pursuant to which Napster would shut down its harmful technology in return for value.¹⁰

A major cost of legal rules is that they may drive protected parties to make clearly inefficient investments. For instance, the innovator in the numerical ex-

7. See Guido Calabresi & A. Douglas Melamed, *Property Rules, Liability Rules and Inalienability: One View of the Cathedral*, 85 HARV. L. REV. 1089 (1972).

8. See *infra* Part II (discussing the incentive effects of property rules and liability rules on copyright owners and on innovators); *infra* Part III.B.2 (discussing the incentive effects of proposed modifiable entitlements).

9. 464 U.S. 417.

10. The value offered by the labels in those negotiations was that Napster would become the labels' exclusive online retailer. See *infra* note 100 and accompanying text.

ample above found it privately profitable to invest in a socially harmful technology. When it comes to technological change, lawmakers often cannot predict the nature of future technologies before they are invented. Their choice is often limited to allocating background entitlements under limited information regarding the future. Although lawmakers cannot observe the nature of the parties' investments in real time, they might still be able to verify their type (socially beneficial or harmful) once a content-technology conflict occurs. A legal system that, upon observing a protected party who invested inefficiently, reallocates the entitlement to its counterpart, will provide the parties with improved incentives to invest. Contrary to conventional wisdom regarding content-technology conflicts, this prescription holds true even if the parties can transact costlessly at the time a conflict occurs.¹¹ The purpose of this prescription is not to overcome transaction costs after the parties' activities already conflict. In such a case, under costless bargaining, the efficient result will happen regardless of the applicable entitlement, as the example above shows.¹² Rather, this prescription seeks to make the parties invest efficiently at an earlier time when they cannot yet transact, a time when improved incentives to invest may prevent a future conflict from arising.¹³

The Supreme Court's decision in *MGM Studios Inc. v. Grokster, Ltd.*¹⁴ suggests that the legal system is at times capable of verifying the nature of the parties' earlier investments during a conflict, and of reallocating entitlements accordingly. In *Grokster*, the Ninth Circuit allowed the technology company to rely on the background entitlement from *Sony* to manufacture its harmful technology. The Supreme Court likely believed that the technology was harmful (i.e., it was of little or no independent value yet created great harm to copyright owners¹⁵) and so the Court reallocated the entitlement to copyright owners. Doctrinally, it did so by crafting a new theory of liability—intentional inducement—that led to a reversal of the outcome below.¹⁶ Providing improved investment incentives therefore requires mechanisms to reallocate entitlements from innovators to copyright owners in certain cases (such as by way of the Court's doctrinal innovation in *Grokster*), but also from copyright owners to innovators in other appropriate cases. The fair use doctrine is one major way in which the latter reallocation can be done, and indeed *Sony* can be read as having used the doctrine in this way.

This Article proceeds as follows. Part I reviews the historical cycle of technological disruption of copyright owners' business models, ensuing copyright litigation, and systemic doctrinal uncertainty and unpredictability. Part II

11. See *infra* note 117 and accompanying text.

12. In the example above, under frictionless bargaining, the harmful technology shuts down—the efficient result—even if the innovator is protected by a property rule.

13. On transaction costs at the time of investment, see note 76 below.

14. 545 U.S. 913 (2005).

15. See *infra* notes 98, 124-26, and accompanying text.

16. See *infra* Part I.A.

presents a framework modeling how different property rules and liability rules affect copyright owners' and innovators' incentives to invest in their respective economic activities and in reducing the interference between them. Part III discusses cases that are consistent with the framework's predictions and additional descriptive and prescriptive implications. It presents the concept of modifiable property and liability rules, argues that they can improve copyright owners and innovators' incentives to invest, and suggests that several cases can be read as consistent with a de facto allocation of modifiable entitlements. Part IV discusses the extent to which the analysis applies once some of its assumptions are relaxed and the optimal timing of modification.

I. CONTENT AND TECHNOLOGY: A DYNAMIC OF CONFLICT AND LEGAL UNCERTAINTY

Subpart A reviews the *Sony* and *Grokster* cases. It shows how copyright law conflicted with two major technologies over the past three decades, and how the Supreme Court consequently developed doctrine on innovators' secondary copyright liability for users' infringement. This review serves as the major context against which this Article's framework and descriptive and prescriptive payoffs are later assessed. Subpart B briefly describes several other content-technology conflicts, and how copyright law has evolved to regulate innovators' liability. Subpart C takes stock, observing that while the creators of content and technology have repeatedly fought over entitlements in new technologies for the enjoyment of content, the law has dealt with this conflict haphazardly, failing to follow any clear and consistent doctrine, logic, or policy.

A. Innovators' Secondary Liability for Copyright Infringement

Equipped with increasingly powerful consumer-grade technologies over the past decades, end users have become a growing concern for copyright owners.¹⁷ Owing largely to the difficulty and cost of suing millions of people, copyright owners have often sued innovators for secondary liability, namely for aiding, inducing, and profiting from end-user infringement.¹⁸

17. See Wu, *supra* note 6, at 278.

18. See, e.g., *Sony Corp. of Am. v. Universal City Studios, Inc.*, 464 U.S. 417, 457 (1984) (Blackmun, J., dissenting) ("The introduction of the home videotape recorder (VTR) upon the market has enabled millions of Americans to make recordings of television programs in their homes, for future and repeated viewing at their own convenience. . . . [T]his practice . . . has been a matter of concern for the holders of copyrights in the recorded programs. A result is the present litigation, raising the issues whether the home recording of a copyrighted television program is an infringement of the copyright, and, if so, whether the manufacturers and distributors of VTR's are liable as contributory infringers."); Lemley & Reese, *supra* note 6, at 1346 ("Suing actual infringers is becoming passé in digital copyright law. In the digital environment, the real stakes so far have been in suing those who facilitate infringement by others."); *id.* at 1350 ("It is not currently cost-effective for copyright owners

The Supreme Court first considered innovators' indirect liability in *Sony*,¹⁹ a case that involved the company's potential liability for manufacturing the Betamax videotape recorder (VTR). Universal Studios charged Sony with contributory liability for infringement: allegedly, end users were making unauthorized copies of movies, and Sony gave them the tools to do so.²⁰ In litigation, one of Universal's major theories of harm rested on the user's ability to skip advertisements. Broadcasters' income depended on ad revenue; users' fast-forwarding through ads would diminish ad revenue and lead broadcasters to pay copyright owners less for content.²¹

The major question for the Court was whether the scope of copyright owners' exclusive control encompassed the new technological use. The Court saw that while some consumers used VTRs for infringement, others used them for "time-shifting"—recording and watching shows once at a later time—which the Court found to be a fair, noninfringing use.²² The Court also acknowledged that Sony did not sell VTRs to specific consumers with actual knowledge that they would use them for infringement. Could Sony, then, be liable simply for putting such a "dual use" technology on the market? Taking its cues from patent law's secondary liability doctrine, the Court held that Sony would not be liable if the VTR was a staple article of commerce "capable of substantial noninfringing uses."²³ As time shifting was the VTR's predominant use, the Court did not impose contributory liability. The Court remained deliberately vague on the exact meanings of "capable" and "substantial" because the VTR cleared all meanings of the test.²⁴ In subsequent years, *Sony's* safe harbor

to sue individual infringers, because there are tens of millions of them, because lawsuits are expensive, and because many infringers would only be liable for (or able to pay) minimal damages. Copyright owners are happy to sue facilitators instead, because there are fewer of them and both damages and the benefits of injunctive relief are substantial.").

19. 464 U.S. 417.

20. Vicarious liability was not part of the case. *See id.* at 435 n.17.

21. *See id.* at 459 (Blackmun, J., dissenting) ("The Studios make the serious claim that VTR recording may result in a decrease in their revenue from licensing their works to television . . .").

22. *Id.* at 447-55 (majority opinion) (finding time-shifting to be a fair use); *see also id.* at 458-59 (Blackmun, J., dissenting) ("Two kinds of Betamax usage are at issue here. The first is 'time-shifting,' whereby the user records a program in order to watch it at a later time, and then records over it, and thereby erases the program, after a single viewing. The second is 'library-building,' in which the user records a program in order to keep it for repeated viewing over a longer term." (footnote omitted)).

23. *Id.* at 442 (majority opinion).

24. *Id.* ("The question is thus whether the Betamax is capable of commercially significant noninfringing uses. In order to resolve that question, we need not explore *all* the different potential uses of the machine and determine whether or not they would constitute infringement. Rather, we need only consider whether on the basis of the facts as found by the District Court a significant number of them would be noninfringing. Moreover, in order to resolve this case we need not give precise content to the question of how much use is commercially significant. For one potential use of the Betamax plainly satisfies this standard, however it is understood: private, noncommercial time-shifting in the home."). Under *Sony's*

served as the gold standard for innovators' secondary liability,²⁵ though only a few reported cases actually applied it.²⁶ But the eventual examination of its

facts, the noninfringing use—time-shifting—was not only the predominant use of the technology, but it had also existed at the time of the litigation. *Id.* at 421 (“[T]he average member of the public uses a VTR principally to record a program he cannot view as it is being televised and then to watch it once at a later time.”); *id.* at 423 (“[T]he primary use of the machine for most owners was ‘time-shifting’—the practice of recording a program to view it once at a later time, and thereafter erasing it.”); *id.* at 424 n.4 (“According to plaintiffs’ survey, 75.4% of the VTR owners use their machines to record for time-shifting purposes half or most of the time.” (quoting *Universal City Studios, Inc. v. Sony Corp. of Am.*, 480 F. Supp. 429, 438 (C.D. Cal. 1979), *aff’d in part, rev’d in part* 659 F.2d 963 (9th Cir. 1981), *rev’d*, 464 U.S. 417 (1984))); *id.* at 493 (Blackmun, J., dissenting) (“[B]oth parties agree that time-shifting is the primary use of VTR’s . . .”).

Sony used several formulations of the safe harbor. In one place, the Court said that the safe harbor applies “if the product is widely used for legitimate, unobjectionable purposes.” *Id.* at 442 (majority opinion). This seems to require that the noninfringing use be current and widespread. Nevertheless, in its very next sentence the Court seemed to be of the opinion that the safe harbor is much broader than that, suggesting that the technology “need merely be capable of substantial noninfringing uses.” *Id.* This latter sentence can be read—and was read—to imply that the safe harbor applies even if the technology is only expected to entertain in the future (though not at present) a nonmarginal (though not predominant) legitimate use. As mentioned above, the Court did not clarify how widespread the noninfringing use had to be in order for it to qualify as “substantial.” This may have been because “the District Court specifically declined to make findings on the ‘percentage of legal versus illegal home-use recording.’” *Id.* at 492-93 (Blackmun, J., dissenting) (quoting *Sony*, 480 F. Supp. at 468). The dissent would have remanded for fact finding on this point. *Id.* at 493.

25. *See, e.g.*, Picker, *supra* note 6, at 424 (calling *Sony*’s safe harbor the “reigning copyright test”). It is not clear whether this was because technology companies relied on the *Sony* standard in innovating, or because parties bargained in its shadow but never actually relied on it, as Menell and Nimmer suggest. Peter S. Menell & David Nimmer, *Legal Realism in Action: Indirect Copyright Liability’s Continuing Tort Framework and Sony’s De Facto Demise*, 55 UCLA L. REV. 143, 187-203 (2007).

26. A few litigated technologies cleared the *Sony* hurdle. *See, e.g.*, *Matthew Bender & Co. v. West Publ’g Co.*, 158 F.3d 693 (2d Cir. 1998) (holding that Matthew Bender’s compact discs containing star pagination to West’s printed compilation of case law did not amount to contributory infringement, in part because they had substantial noninfringing uses); *Vault Corp. v. Quaid Software Ltd.*, 847 F.2d 255 (5th Cir. 1988) (holding distributor of floppy-disc-copying software not liable for contributory infringement because the software was capable of the noninfringing use of making legitimate backup copies). A few others failed it. *See, e.g.*, *Sega Enters. Ltd. v. MAPHIA*, 948 F. Supp. 923, 935 (N.D. Cal. 1996) (rejecting the argument that video game “copier consoles” that allowed users to play copied games had substantial noninfringing uses); *Nintendo of Am., Inc. v. Computer & Entm’t, Inc.*, No. C96-0187 WD, 1996 WL 511619, at *2 (W.D. Wash. May 31, 1996) (finding that there were no substantial noninfringing uses for a device that copies Nintendo games from cartridges to disk). Perhaps the aforementioned uncertainties drove parties to bargain in the shadow of *Sony*’s blurry standard rather than to test its exact boundaries. This may have been the case regarding the digital audiotape technology, of which Sony itself was a major producer in the United States. Rather than litigate the resultant lawsuit, *see Cahn v. Sony Corp.*, No. 90 Civ. 4537 (S.D.N.Y. filed July 9, 1990), to completion, the parties brought a settlement to Congress which was enacted into law as the Audio Home Recording Act of 1992, Pub. L. No. 102-563, 106 Stat. 4237 (codified as amended at 17 U.S.C. §§ 1001-1010 (2006)). *See* Gary Lutzker, *DAT’s All Folks: Cahn v. Sony and the Audio Home Recording*

contours was inevitable, and came about in the context of electronic file-sharing litigation in the late 1990s.

The advent of file-sharing networks on the Internet destabilized the music and film industries' business models, which were based on physical distribution of CDs and DVDs.²⁷ Though theoretically capable of transferring noninfringing files as well as infringing files, in practice these networks were used predominantly for obtaining protected material.²⁸ The first rounds of litigation against the Napster and Aimster networks left the entertainment industry victorious, without requiring courts to draw *Sony's* exact contours. The case against the Grokster network was not as easy. Initially, Grokster was able to convince the district court and the Ninth Circuit that its suitability for noninfringing use allowed it the benefits of *Sony's* safe harbor. This closely watched case reached the Supreme Court in 2005.²⁹ The parties, the content and technology industries, the legal community, and over fifty amici expected that the Supreme Court would finally clarify the contours of *Sony's* safe harbor.

The Court's ruling came as a surprise, leaving these expectations unfulfilled.³⁰ *Sony*, the Court explained, applied only to companies that put a product into the stream of commerce without taking "affirmative steps . . . to foster infringement."³¹ Grokster, in contrast, marketed a technology while actively promoting its use for infringement. The Court turned to patent law again to im-

Act of 1991—Merrie Melodies or Looney Tunes?, 11 CARDOZO ARTS & ENT. L.J. 145 (1992).

27. The technical architecture of these networks differed. *See, e.g.*, *MGM Studios Inc. v. Grokster, Ltd.*, 545 U.S. 913 (2005) (largely decentralized file-sharing); *In re Aimster Copyright Litig.*, 334 F.3d 643 (7th Cir. 2003) (encrypted communication network); *A&M Records, Inc. v. Napster, Inc.*, 239 F.3d 1004 (9th Cir. 2001) (largely centralized file-sharing).

28. *See, e.g.*, *A&M Records, Inc. v. Napster, Inc.*, 114 F. Supp. 2d 896, 911 (N.D. Cal. 2000) ("[V]irtually all Napster users engage in the unauthorized downloading or uploading of copyrighted music; as much as eighty-seven percent of the files available on Napster may be copyrighted . . ."), *aff'd in part, rev'd in part*, 239 F.3d 1004 (9th Cir. 2001); *see also Grokster*, 545 U.S. at 923 ("MGM's evidence gives reason to think that the vast majority of users' downloads are acts of infringement . . . [meaning that] the probable scope of copyright infringement is staggering."); *id.* at 940 ("[T]here is evidence of infringement on a gigantic scale . . .").

29. *Grokster*, 545 U.S. 913.

30. *See, e.g.*, Eric Goldman, *Grokster Supreme Court Ruling*, TECH. & MARKETING L. BLOG (June 27, 2005, 1:09 PM), http://blog.ericgoldman.org/archives/2005/06/grokster_suprem.htm ("[T]he Court seized on an 'inducement' theory as a way to avoid clarifying *Sony*"); William Patry, *The Court Punts*, PATRY COPYRIGHT BLOG (June 27, 2005, 3:30 PM), <http://williampatry.blogspot.com/2005/06/court-punts.html> ("I view the Court as having punted: they decided mainly an issue that wasn't in front of them (inducement) and didn't decide the one that was, the effect of *Sony* in the Internet era.")

31. *Grokster*, 545 U.S. at 919; *see also id.* at 935 ("[W]here evidence goes beyond a product's characteristics or the knowledge that it may be put to infringing uses, and shows statements or actions directed to promoting infringement, *Sony's* staple-article rule will not preclude liability.")

port active inducement of infringement as yet another theory of secondary liability,³² and found *Grokster* liable.³³

Despite over three decades of case law, much remains unsettled doctrinally and theoretically regarding when secondary liability should attach. Doctrinally, the contours of *Sony's* safe harbor remain vague. *Grokster* held that *Sony* remains good law absent inducement.³⁴ After *Grokster*, technology companies will likely refrain from taking overt action to induce infringement, instead putting technologies on the market and leaving it to consumers to figure out for themselves what they are good for. The obvious question, then, is what would be the fate of a noninducing company whose technology is used predominantly for infringement? The need to answer this question was so obvious that six Justices in *Grokster* actually did. Unfortunately, they split evenly. The three-Justice concurrence authored by Justice Breyer suggests that such a company would not face any liability,³⁵ whereas the three-Justice concurrence by Justice Ginsburg suggests that it would.³⁶ Other doctrinal ambiguities remain.³⁷

Taking a step back from the questions that current doctrine leaves unanswered, the doctrinal basis for liability seems arbitrary in significant ways. First, it is unclear if the list of secondary liability doctrines is a closed one. While it seemed so for over twenty years, *Grokster* surprised many when it created a new theory. Will the Court generate additional secondary liability standards? When? Next, secondary liability has traditionally been imposed under the doctrines of contributory and vicarious liability.³⁸ The pairings of required el-

32. See 35 U.S.C. § 271(b) (2006).

33. *Grokster*, 545 U.S. at 918-19 (“The question is under what circumstances the distributor of a product capable of both lawful and unlawful use is liable for acts of copyright infringement by third parties using the product. We hold that one who distributes a device with the object of promoting its use to infringe copyright, as shown by clear expression or other affirmative steps taken to foster infringement, is liable for the resulting acts of infringement by third parties.”). There is case law to suggest that intentional inducement has long been a subcategory of contributory infringement. See *Gershwin Publ’g Corp. v. Columbia Artists Mgmt.*, 443 F.2d 1159, 1162 (2d Cir. 1971) (holding that one is a contributory infringer if “with knowledge of the infringing activity, [she] induces, causes or materially contributes to the infringing conduct of another” (footnote omitted)). Still, the theory was announced in *Grokster* as a new one (as the quote from *Grokster* earlier in this footnote suggests), and was widely received as such. See, e.g., Alfred C. Yen, *Torts and the Construction of Inducement and Contributory Liability in Amazon and Visa*, 32 COLUM. J.L. & ARTS 513, 513 (2009) (“In [*Grokster*], the Supreme Court adopted intentional inducement as a cause of action for third party copyright liability. Before *Grokster*, such liability existed in two forms, contributory liability and vicarious liability. . . . Now, after *Grokster*, a defendant also faces liability if she acts with the object of promoting infringement by others.” (footnote omitted)).

34. *Grokster*, 545 U.S. at 935, 939 n.12.

35. *Id.* at 949-66 (Breyer, J., concurring).

36. *Id.* at 942-49 (Ginsburg, J., concurring).

37. For example, the exact meanings of “substantial” and “capable,” which many hoped *Grokster* would clarify, remain blurred.

38. See *Sony Corp. of Am. v. Universal City Studios, Inc.*, 464 U.S. 417, 434-35 (1984) (“The Copyright Act does not expressly render anyone liable for infringement com-

ements under each of these doctrines does not make complete sense.³⁹ Third, should the doctrine of vicarious liability apply to content-technology conflicts? While the doctrine was not before it, the *Sony* Court treated vicarious liability as closely related to and overlapping with contributory infringement.⁴⁰ The Ninth Circuit analyzed each doctrine independently in *Napster* and *Grokster*,⁴¹ and the Seventh Circuit suggested in *Aimster* that the logic of vicarious liability is inapplicable in the content-technology context.⁴² Fourth, the Supreme Court in *Sony* and *Grokster* transplanted the staple article of commerce doctrine and the inducement doctrine, respectively, from patent law into copyright law, while relying on the “historic kinship” between patent and copyright.⁴³ However, the Court has refused to make similar patent-copyright analogies in other cases,⁴⁴ and has not yet put forth a criterion for when such analogies are appropriate. In that regard, a number of scholars have argued (along with *Sony*’s dissent) that the rationales for imposing secondary liability in patent law and copyright law are markedly different.⁴⁵

mitted by another. . . . The absence of such express language in the copyright statute does not preclude the imposition of liability for copyright infringements on certain parties who have not themselves engaged in the infringing activity. For vicarious liability is imposed in virtually all areas of the law, and the concept of contributory infringement is merely a species of the broader problem of identifying the circumstances in which it is just to hold one individual accountable for the actions of another.” (footnote omitted)).

39. Contributory liability is imposed when a party (1) has knowledge of the direct infringement, and (2) contributes to it materially. Vicarious liability is imposed when a party (1) has the right and ability to control the direct infringer, and (2) derives a financial benefit from the infringement. *See, e.g.,* *Fonovisa, Inc. v. Cherry Auction, Inc.*, 76 F.3d 259, 261-64 (9th Cir. 1996). It is hard to make sense of the doctrines’ particular pairings of elements. Why, for example, is the pairing of material contribution and financial benefit not enough for imposing liability? Why not require that all four elements exist? Why not require that any three of the four exist?

40. 464 U.S. at 435 n.17.

41. *MGM Studios, Inc. v. Grokster Ltd.*, 380 F.3d 1154, 1160-67 (9th Cir. 2004), *vacated*, 545 U.S. 913 (2005); *A&M Records, Inc. v. Napster, Inc.*, 239 F.3d 1004, 1019-24 (9th Cir. 2001).

42. As Judge Posner explained, the lack of a principal-agent relationship between end users and technology providers counsels against the doctrine’s use. *In re Aimster Copyright Litig.*, 334 F.3d 643, 654-55 (7th Cir. 2003).

43. *See Sony*, 464 U.S. at 439.

44. *See, e.g., Eldred v. Ashcroft*, 537 U.S. 186, 216 (2003) (suggesting that patent law’s “quid pro quo” principle is inapplicable to copyright law).

45. *See Sony*, 464 U.S. at 491 (Blackmun, J., dissenting) (“I do not agree that this technical judge-made doctrine of patent law, based in part on considerations irrelevant to the field of copyright, should be imported wholesale into copyright law. Despite their common constitutional source, patent and copyright protections have not developed in a parallel fashion, and this Court in copyright cases in the past has borrowed patent concepts only sparingly.” (citations omitted)); Peter S. Menell & David Nimmer, *Unwinding Sony*, 95 CALIF. L. REV. 941 (2007); David Nimmer with Peter Menell, *Copyright’s “Staple Article of Commerce” Doctrine: Patently Misguided*, 53 J. COPYRIGHT SOC’Y U.S.A. 365, 374 (2006) (noting *Sony*’s “dubious premise that patent law furnishes the template for construing the copy-

At bottom, the Court has never really explained why its holdings reflect the right content-technology tradeoff. Take *Grokster*, for example. Before imposing liability, the Court detailed the various harms that the file-sharing network caused copyright owners. But the Court recognized explicitly that its task was to balance incentives to copyright owners and innovators. Any standard of liability and any holding would come at some cost to one of the parties. How did the *Grokster* Court know that the benefits of imposing liability (i.e., promoting the creation of content) outweighed the costs (i.e., discouraging innovation)? How did the *Sony* Court know that the reverse was true?⁴⁶

B. *Innovators' Liability Under Other Doctrines*

Over the years, copyright owners have sued under, and the liability of innovators has depended on the application of, a variety of additional copyright law doctrines. For example, copyright owners have often sued for direct infringement of the exclusive right to make copies.⁴⁷ One such case related to the advent of recorded music. In the late nineteenth century, mechanical piano players and record players made automated playback of prerecorded musical compositions possible. The makers of music rolls for player pianos and of music records did so initially without compensating the copyright owners of the musical compositions embedded therein. In *White-Smith Music Publishing Co. v. Apollo Co.*, copyright owners sued a pianola rolls manufacturer for making infringing copies. The Supreme Court held that pianola rolls were not copies, within the meaning of the Copyright Act, of the underlying sheet music.⁴⁸ The Court, in effect, granted innovators a property rule in the new technological use of music.⁴⁹ One year later, in the Copyright Act of 1909, Congress chose to protect copyright owners with a liability rule. Record companies could now generally embed musical compositions in pianola rolls and records as long as they paid the statutory fee.⁵⁰

right statute"); see also Picker, *supra* note 6, at 444 (doubting whether the staple article of commerce doctrine is applicable to content-technology conflicts).

46. As mentioned above, even the six Justices who thought about it could not agree on the applicability of *Grokster* and *Sony* to a foreseeable future fact pattern. See *supra* notes 34-36 and accompanying text.

47. For the current codification of that right, see 17 U.S.C. § 106(1) (2006).

48. *White-Smith Music Publ'g Co. v. Apollo Co.*, 209 U.S. 1 (1908).

49. As will become clearer below, this Article follows Calabresi and Melamed's taxonomy of property and liability rules. See Calabresi & Melamed, *supra* note 7. As applied to the present context, these entitlements are explained in Part II below. In particular, a property rule in the innovator means that he is entitled to market his technology, and that if the copyright owner wants him to refrain from doing so she will have to pay him an agreed-upon price. For a discussion of the consequences of such an entitlement, see Part II.D below.

50. The Copyright Act of 1909 set a statutory royalty of two cents. Pub. L. No. 60-349, § 1(e), 35 Stat. 1075, 1075-76 (repealed 1976). For the current version of that statutory license, in use to this day, see 17 U.S.C. § 115 (2006 & Supp. IV 2010) (listing conditions for the applicability of the statutory license).

Other lawsuits were brought under claims of direct infringement of the exclusive right to make derivative works.⁵¹ For example, two courts of appeals dealt with infringement suits over basically the same technology—computer game enhancement devices—yet reached different conclusions. In *Midway Manufacturing Co. v. Artic International, Inc.*, the Seventh Circuit decided that devices that sped up games in arcade machines created infringing derivative works.⁵² In *Lewis Galoob Toys, Inc. v. Nintendo of America, Inc.*, however, the Ninth Circuit reached the opposite conclusion respecting the Game Genie, a device that sped up console-based home video games.⁵³ Thus, while the Seventh Circuit allocated copyright owners a property-rule protection over the new technological use, the Ninth Circuit allocated the same entitlement to innovators.

Other conflicts involved claims of direct infringement of the exclusive right to publicly perform copyrighted works.⁵⁴ One such conflict related to the advent of cable TV. Cable TV started as a way to serve remote communities, and early operators would capture over-the-air signals and retransmit them to users without compensating the owners of the copyrights in the broadcast. Conflicts reached the Supreme Court twice. In *Fortnightly Corp. v. United Artists Television, Inc.*, the Court held that cable retransmission was not public performance under the Copyright Act, and thus did not infringe on copyright owners' rights.⁵⁵ In *Teleprompter Corp. v. CBS, Inc.*, the Court held that cable TV's importation of remote signals was also noninfringing.⁵⁶ The Supreme Court has thus twice vested a property-rule protection in innovators over the new technological use. A few years later, however, in the Copyright Act of 1976, Congress reallocated the entitlement to copyright owners, but chose to protect it with a liability rule, with rates to be determined by an administrative body.⁵⁷

The resolution of additional disputes focused on courts' dispositions of affirmative defenses. One such conflict related to the advent of the photocopier. Academic publishers sued the library of the National Institutes of Health and the National Library of Medicine for mass duplication of journals for patrons'

51. See 17 U.S.C. § 106(2) (2006).

52. 704 F.2d 1009 (7th Cir. 1983).

53. 964 F.2d 965 (9th Cir. 1992). The Ninth Circuit disagreed that the Game Genie created any derivative works, and suggested that even if it did, the use was protected under the fair use doctrine. See *id.*

54. See 17 U.S.C. § 106(4).

55. 392 U.S. 390 (1968).

56. 415 U.S. 394 (1974).

57. 17 U.S.C. § 111 (2006 & Supp. IV 2010). While the name and composition of that body have changed three times over the years, the system remains in place to this day, and rates are currently set by the Copyright Royalty Board. Initially, the 1976 Act created the Copyright Royalty Tribunal, which operated until 1993. Then, its functions were performed by the Copyright Arbitration Royalty Panel. In 2004, these functions were transferred to the Copyright Royalty Board. See 17 U.S.C. §§ 801-805.

use, which they felt could not reasonably be considered a fair use.⁵⁸ In a 1975 per curiam, equally divided decision,⁵⁹ the Supreme Court affirmed the Court of Claims' fair use finding,⁶⁰ characterized by the dissent as "the Dred Scott decision of copyright law."⁶¹ Shortly thereafter, as a part of the Copyright Act of 1976, Congress decided to permit libraries to engage in only a small set of narrowly defined duplication activities.⁶² The resolution of a currently pending lawsuit over the Google Books service may similarly depend on whether Google's conduct can be shielded by the fair use doctrine.⁶³

Lastly, in addition to the aforementioned major categories of cases involving content-technology conflicts, copyright owners have sued under a host of particular copyright or copyright-related causes of action. For example, the Recording Industry Association of America sued Diamond Multimedia Systems, the manufacturer of the first successful MP3 player (the Rio), for not complying with the Audio Home Recording Act of 1992 (AHRA).⁶⁴ It lost.⁶⁵ Likewise, in a series of cases, copyright owners of movies have used the Digital Millennium Copyright Act of 1998⁶⁶ to sue makers of and traffickers in a technology that breaks the encryption on DVDs. They won.⁶⁷

C. *Taking Stock: Law Has Not Struck the Copyright-Innovation Tradeoff According to Any Clear or Consistent Logic or Policy*

The individual cases reviewed above chart a dynamic of conflict that is systemic and likely to continue in our information-based, technology-rich society. These conflicts have followed a recurring cycle beginning with a business

58. For the current codification of the fair use doctrine, see 17 U.S.C. § 107 (2006).

59. *Williams & Wilkins Co. v. United States*, 420 U.S. 376 (1975).

60. *Williams & Wilkins Co. v. United States*, 487 F.2d 1345, 1353 (Ct. Cl. 1973).

61. *Id.* at 1387 (Nichols, J., dissenting).

62. Pub. L. No. 94-553, 90 Stat. 2546 (codified as amended at 17 U.S.C. § 108). While the fair use doctrine still remains available to libraries as an additional defense, the close tailoring of library privileges in section 108 likely limits the scope of viable fair use arguments.

63. See Class Action Complaint, *Authors Guild v. Google, Inc.*, 770 F. Supp. 2d 666 (S.D.N.Y. 2011) (No. 05 CV 8136), 2005 WL 2463899. At the time of this writing, the parties' Amended Settlement Agreement was rejected, see *Authors Guild*, 770 F. Supp. 2d 666, and the case is proceeding to trial.

64. The AHRA is a complex regulatory scheme, mandating the inclusion of an anti-piracy device in certain music players and a tax on certain blank media and music players for the benefit of copyright owners. 17 U.S.C. §§ 1001-1010. It was put in place in 1992 to regulate the use of a new technology, the digital audiotape player. See also *supra* note 26.

65. See *Recording Indus. Ass'n of Am. v. Diamond Multimedia Sys.*, 180 F.3d 1072 (9th Cir. 1999).

66. Pub. L. No. 105-304, 112 Stat. 2860 (1998) (codified as amended in scattered sections of 17 U.S.C.).

67. *Universal City Studios, Inc. v. Corley*, 273 F.3d 429 (2d Cir. 2001), *aff'g* *Universal City Studios, Inc. v. Reimerdes*, 111 F. Supp. 2d 294 (S.D.N.Y. 2000); *321 Studios v. MGM Studios, Inc.*, 307 F. Supp. 2d 1085 (N.D. Cal. 2004).

model in content industries, followed by the appearance of a new technology, through legal battles that reconfigure the parties' rights and yield a new status quo. Legal conflicts have commonly begun with lawsuits. At times, Congress has intervened later and changed the judicial outcome. Results have varied. Some conflicts have ended in copyright owners obtaining a right in the new technological use, but other times the right has been allocated to innovators. In some cases the victorious party has achieved the protection of a property rule, but other times only that of a liability rule.

Most troubling is the fact that in different cases liability has depended on the application of any one of various doctrinal tests, including the tests for direct liability, indirect liability, applicable defenses, and paracopyright causes of action. These tests have had little in common, and courts dealing with any one such doctrine have rarely cited conflicts that came up under different doctrinal headings. These cases have all called for the application of copyright law to new and unforeseen technological uses, and courts have often applied the law in a mechanical way, unguided by any clear logic, policy, or objective. Most troubling is that only a few courts have realized the existence of a content-technology conflict, and no consistent approach has arisen to balance the competing interests of incentivizing authorship and innovation.

II. A FRAMEWORK FOR APPROACHING THE COPYRIGHT-INNOVATION TRADEOFF: INCENTIVES TO INVEST UNDER DIFFERENT RULES

This Part studies the friction between two economic actors—copyright owners and technology innovators. It adopts Calabresi and Melamed's focus on property rules and liability rules as major ways in which the law resolves conflicting use problems.⁶⁸ It charts systematically the disparate incentives that different entitlements provide copyright owners and innovators to invest in their own activities and in reducing the interference between those activities. Though the analysis is conducted in the context of content-technology conflicts, it builds upon and contributes to a literature of a more general applicability.⁶⁹

68. See Calabresi & Melamed, *supra* note 7.

69. Most closely, I build upon, revise, and extend the analysis in Lucian Arye Bebchuk, *Property Rights and Liability Rules: The Ex Ante View of the Cathedral*, 100 MICH. L. REV. 601 (2001) [hereinafter Bebchuk, *Ex Ante View*]; and Lucian Arye Bebchuk, *Ex Ante Investments and Ex Post Externalities* (Harvard Law & Econ. Discussion Paper No. 397, 2002), available at <http://ssrn.com/abstract=297091>. Closer to the intellectual property context, the framework is similar in its approach to the body of work by Suzanne Scotchmer, who has analyzed how different rules governing the division of value between consecutive generations of patentees affect their incentives to participate in the sequential enterprise of advancing science. See SUZANNE SCOTCHMER, *INNOVATION AND INCENTIVES* (2004); Mark Schankerman & Suzanne Scotchmer, *Damages and Injunctions in Protecting Intellectual Property*, 32 RAND J. ECON. 199 (2001); Suzanne Scotchmer, *Standing on the Shoulders of Giants: Cumulative Research and the Patent Law*, J. ECON. PERSP., Winter 1991, at 29.

A. *The Framework: Assumptions and Setup*

Assume a world with economically motivated actors, who might eventually become either copyright owners or innovators.⁷⁰ Their activities span two periods. In the first period, or *ex ante*, the parties invest. In the second period, or *ex post*, they reap. *Ex ante*, the parties affect the size of the pie through their investments. *Ex post*, they share it. As we shall see, different legal entitlements give the parties different bargaining power to capture different portions of the pie *ex post*, and thus affect their efforts to grow it *ex ante*.

Ex ante, ideas for new works of authorship and their exploitation under existing business models and technologies, and ideas for new technologies for en-

In a similar vein, Mark Lemley has studied how copyright law and patent law induce, and should induce, follow-on creativity in areas that are covered by others' intellectual property rights. See Mark A. Lemley, *The Economics of Improvement in Intellectual Property Law*, 75 TEX. L. REV. 989 (1997) (highlighting transaction costs that might impede licensing between first-generation creators and second-generation improvers in patent law and in copyright law). Lastly, Oliver Hart, upon whose work Lucian Bebchuk built, see Bebchuk, *Ex Ante View*, *supra*, at 604 n.6, has studied extensively how the possibility of *ex post* holdup affects *ex ante* investment decisions by parties to incomplete contracts. See OLIVER HART, *FIRMS, CONTRACTS, AND FINANCIAL STRUCTURE* (1995). Bebchuk's framework relates explicitly to investments in harm minimization and is therefore most useful in our context, where the parties' ability to affect the magnitude of the copyright-innovation interference is central.

The analytical framework discussed here, however, differs from Bebchuk's in its assumptions, predictions, and prescriptions, and its assessment against case law on the copyright-innovation conflict in Part III below focuses on affirming and examining such unique elements. As for assumptions, the framework here allows the innovator (or, more generally, injurer) to invest intentionally to increase the magnitude of harm that would otherwise occur. This assumption leads to a unique prediction regarding injurers' incentives to exacerbate the magnitude of harm. Compare *infra* Table 1, with Bebchuk, *Ex Ante View*, *supra*, at 632 tbl.7.

This Article shows that its predictions are consistent with case outcomes in the context of file-sharing litigation. See *infra* Part III.A.3. Prescriptively, Bebchuk highlights the advantages of "decoupling" (i.e., having injurers pay fines to the government instead of damages to victims as a solution to the *ex ante* investment-distortion problem). On decoupling generally, see A. Mitchell Polinsky & Yeon-Koo Che, *Decoupling Liability: Optimal Incentives for Care and Litigation*, 22 RAND J. ECON. 562 (1991). As Bebchuk recognizes, this solution is of limited practical use because it is hard to implement. Bebchuk, *Ex Ante View*, *supra*, at 637-39. This Article highlights the advantages of modifying initial entitlements in light of later-revealed information. See *infra* Part III.B.2. Reviewing particular cases, it shows that this approach can at times be implemented. See *infra* Part III.B.3.

70. The analysis in this Article focuses on the issue of how to allocate market value between copyright owners and technology innovators. Clearly, there are important nonpecuniary motivations to create. Economic incentives, however, are an important part of the mix. This is particularly true in the copyright-innovation context, as is shown by the commercial nature of the parties involved in the conflicts that were reviewed in Part II above. But the analysis here does not depend on any assumption regarding the proper weight of economic incentives in the mix. One could structure a copyright system that would hold out a smaller economic carrot to creators than our system currently affords, such as one in which protection is narrower in scope and lasts for a shorter duration. Still, the analysis here would be useful in terms of determining how to divide whatever economic value the system deems appropriate between copyright owners and technology innovators.

joying and disseminating content, spring to the minds of potential copyright owners and innovators respectively. The parties know that the sale of content and technology are economic activities that interfere with one another. For every work of authorship and its related existing business model and technology of dissemination, there is a corresponding innovation such that—if both were created and put on the market *ex post*—the market value of the former would be diminished.⁷¹ This economic interference—or harm—means that consumers will be less willing to pay the content owner in the presence of the new technology than in its absence.⁷²

Ex ante, each potential creator faces two investment decisions. First, each chooses whether (and how much) to invest in its project or to abandon it. In particular, the copyright owner considers investing in creating content under extant business models and technologies of dissemination with which the new technology may interfere. Second, each potential creator can also take costly measures to reduce the interference (or harm) that would accompany concurrent *ex post* operation. For example, a file-sharing network operator may invest in technical measures that would diminish the network's use for infringement.⁷³ Similarly, copyright owners can invest *ex ante* to affect the magnitude of the *ex post* harm. For example, they may employ certain self-help measures. Copyright owners of computer software may sell it with a dongle that has to be connected to the computer whenever the software is run.⁷⁴ Such a measure would reduce the harm from piracy when the software (but not the dongle) is made available to others on file-sharing networks. The innovator can also make *ex ante* investments that would *increase* the content-technology interference. For example, the operator of a file-sharing network can invest to have all network communications encrypted in order to enhance the network's use for infringement.⁷⁵ The parties' investments to enhance the value of their primary

71. The assumption of one copyright owner and one technology innovator is adopted for expositional purposes. The copyright owner, for example, could equally be a group of copyright owners or a trade association bargaining collectively. Note that this parallels Calabresi and Melamed's analysis, where the victim, for example, is often a multimember party. *See, e.g.*, Calabresi & Melamed, *supra* note 7, at 1119 (discussing a pollution example where the victim consists of 10,000 individuals).

72. The interference may stem, for example, from the fact that the technology enables some consumers to obtain free access to content that they would have otherwise had to pay for, or it may stem from copyright owners' technology-specific investments that have no (or less) value in the presence of a new technology of dissemination.

73. Such measures were alluded to in *Grokster*, which noted that respondent file-sharing companies did not attempt "to develop filtering tools or other mechanisms to diminish the infringing activity using their software." *MGM Studios Inc. v. Grokster, Ltd.*, 545 U.S. 913, 939 (2005).

74. *See, e.g.*, *MGE UPS Sys., Inc. v. GE Consumer & Indus., Inc.*, 622 F.3d 361, 364 (5th Cir. 2010).

75. *See In re Aimster Copyright Litig.*, 334 F.3d 643 (7th Cir. 2003) (finding operator of encrypted file-sharing network liable for contributory infringement). True, as the Seventh Circuit recognized, encryption can enhance lawful uses as well because of added privacy.

activities and to reduce the interference between them yield declining marginal returns.

Ex ante, the parties invest under prohibitive transaction costs. Neither party can condition its ex ante investments on a reciprocal promise from its counterpart respecting the ex post division of value. Ex post, however, the parties are assumed to be able to negotiate and transact costlessly to the efficient result, accepting their ex ante investments as given.⁷⁶ Ex post, parties that invested ex ante are the owners of a copyrighted work or a technology. They can exercise their legal rights or trade them with their counterparts and reap payoffs on their ex ante investments.

The parties' ex ante investment decisions are determined by the payoffs they expect to reap ex post. These payoffs are a function of the market value of their creations, the magnitude of the interference between their creations, and the legal allocation of entitlements. As we shall see below, the parties' private cost-benefit analysis when investing often diverges from the social cost-benefit analysis.

Is investment in content and technology always desirable? Not necessarily. Regarding the various pairings of new technologies with the content they affect, the answer depends on the stand-alone values of the content and technology and on the magnitude of the interference. While these variables may take on different values in different content-technology pairings, all possible pairings

However, in that case, *Aimster* "failed to produce any evidence that its service has ever been used for a noninfringing use." *Id.* at 653. Thus, this case might be read as one in which a feature was added with the sole intent and consequence of attracting infringing uses only. An encryption feature enhances user anonymity, reduces the likelihood of an infringement lawsuit, and therefore likely results in an increased use of the network for infringement. The encryption feature had the additional purpose of preventing *Aimster* from acquiring actual knowledge of the material exchanged on its network and thus shielding it from contributory liability (which requires knowledge of the infringement). The Seventh Circuit frustrated *Aimster's* plan, generally attributing knowledge to it on the theory of willful blindness. *See id.* at 650.

76. Clearly, if transaction costs are zero both ex ante and ex post, then any allocation of the entitlement would be efficient. While not denying that ex post transaction costs are often positive, the analysis here describes a prevalent scenario in which the parties cannot communicate or transact over initial investments, but are able to do so at some later time. For example, ex ante the parties might not know each other's identity. Although copyright owners can foresee the innovation of a certain type of technology, they may not be able to determine which of many potential innovators will come up with a successful working model first (many might claim to be able to do so). Also, note that the parties must sink at least some costs before being able to negotiate over particular creations. For example, under *Sony*, the Sony Corporation had to build a factory in Japan, establish a U.S. subsidiary, hire engineers, and develop marketing channels long before it was in a position where the idea for the Betamax could come to the mind of some of its engineers. But as *Sony* reveals, the parties negotiated heavily throughout trial and would have likely reached an agreement had they known who had what entitlement. The Ninth Circuit seemed to favor a continuing royalty as a remedy to the lawsuit, and it seems highly likely that the parties would have agreed on one but for the Supreme Court's reversal. *See infra* note 123. The assumptions regarding ex ante and ex post transaction costs are relaxed in Part IV.A below.

can be put into one of three categories. For each category, it is possible to answer the aforementioned question conclusively.

The first category of content-technology pairings can be termed an “efficient-coexistence” scenario. This term describes *ex ante* investments in content and a related technology that are each desirable despite their *ex post* interference. A real-world example might be the advent of the VTR, which opened up a new and valuable derivative market for movies. True, it may have imposed some costs on copyright owners, but according to *Sony*’s facts any such harm was extremely low.⁷⁷ In the presence of the new technology, it made sense to maintain the old business model—licensing movies to ad-based broadcast TV—and simultaneously to market the new technology.

To give a numerical example, an efficient-coexistence scenario may happen when a copyright owner and an innovator consider investing in a work of authorship (under an old business model) and in a new technology, respectively, such that each project would yield a value of 100, but where simultaneous *ex post* marketing results in a loss of value of 10. From a social perspective, when the parties contemplate creations that interact in this way, each should invest because value would be maximized at 190. If only one invests, the social value will be only 100 (note that no harm is suffered—that is, no interference exists—when one party does not operate *ex post*). More formally, if the value of the work of authorship is A , that of the technology is T , and that of the interference I , then the interaction between the two would be characterized as efficient coexistence if $I < T$ and $I < A$ (that is, if either $I < A < T$ or $I < T < A$).

The second category of content-technology pairings can be termed a “harmful-technology” scenario. This describes situations in which investment in content is socially desirable, but investment in the corresponding technology is not. A real-world example for this scenario may be file-sharing networks. Courts analyzing several file-sharing networks seemed to believe that the networks before them had little or no value but caused a great harm to copyright owners.⁷⁸

77. See *Sony Corp. of Am. v. Universal City Studios, Inc.*, 464 U.S. 417, 451-55 (1984) (reviewing and accepting the district court’s findings that “[h]arm from time-shifting is speculative and, at best, minimal” (quoting *Universal City Studios, Inc. v. Sony Corp. of Am.*, 480 F. Supp. 429, 467 (C.D. Cal. 1979), *aff’d in part, rev’d in part*, 659 F.2d 963 (9th Cir. 1981), *rev’d*, 464 U.S. 417 (1984)); see also *Sony*, 480 F. Supp. at 451 (“Plaintiffs have admitted that no actual harm to their copyrights has occurred to date. Plaintiffs’ experts also admitted that they knew neither the year in which the predicted harm would occur nor the number of Betamax purchases which would cause the harm. . . . [P]laintiffs’ argument is . . . complicated and speculative . . . [Some of plaintiffs’ assumptions] are based on neither fact nor experience, and plaintiffs admit that they are to some extent inconsistent and illogical.”).

78. See *Grokster*, 545 U.S. at 923-26 (noting that the evidence gives “reason to think that the vast majority of users’ downloads are acts of infringement, and because well over 100 million copies of the software in question are known to have been downloaded, and billions of files are shared across the FastTrack and Gnutella networks each month, the probable scope of copyright infringement is staggering”); *Aimster*, 334 F.3d at 651-53 (noting that *Aimster* “failed to produce any evidence that its service has ever been used for a

To give a numerical example, a harmful-technology scenario may happen when a copyright owner contemplates a work of authorship with a value of 100, an innovator contemplates a technology with a value of 10, and where simultaneous marketing results in a loss of 50. In this case it would be desirable that only the copyright owner invest ex ante, for then value is maximized at 100. Ex ante investment by the innovator is undesirable since it is costly and does not increase total ex post value. Under the notations above, a harmful-technology scenario happens if $T < I$ and $T < A$ (that is, if either $T < I < A$ or $T < A < I$).

Lastly, the third type of content-technology pairings can be termed a “revolutionary-technology” scenario. This term describes scenarios in which a superior technology for playing, manipulating, or disseminating content is marketed, and where, in its presence, it makes no sense to maintain the copyright owner’s old business model and technology of dissemination. A real-world example may be the advent of the MP3 player. With its invention, it no longer made economic sense to put music in containers—records and CDs—and ship them to brick-and-mortar stores for sale. The efficient outcome in this case is what we observed in the real world over the past years: the significant closure of brick-and-mortar stores of the business model of yesteryear, such as Tower Records and Blockbuster, and the substantial move to online sales and rentals.⁷⁹

To give a numerical example, this scenario may happen when the copyright owner expects the marketing of content under the old technology to yield a modest value of 10 assuming no technological disruption, the innovator contemplates a technology with a high value of 100, and maintaining the old business model in the face of the new technology will result in a loss of value of 50. In this case it would be desirable that only the innovator invest ex ante. Under the notations above, a revolutionary-technology scenario happens if $A < I$ and $A < T$ (that is, either $A < I < T$ or $A < T < I$).

To simplify the analysis and zero in on the copyright-innovation tradeoff, we shall assume in this Part that innovators and affected copyright owners enjoy equal bargaining power ex post, that they invest ex ante under complete information, that the ex post value of each party’s product depends only on that party’s ex ante investment, that the parties’ investments entail no third-party externalities, that there are diverse copyright owners and innovators such that all three scenarios are possible, and that the parties cannot affect, through their

noninfringing use”); *A&M Records, Inc. v. Napster, Inc.*, 239 F.3d 1004, 1013-14 (9th Cir. 2001).

79. To wit, one may wonder how the interference I might be greater than A . Remember that the interference I is actually suffered if both parties operate ex post. It is entirely conceivable that maintaining an old business model, which would have been profitable absent technological change, would become a losing proposition in a world transformed by technological change (as the text suggests). Rational parties are not expected to actually incur that loss—they would do better by shutting down the obsolete business model.

investments, the nature of the interaction between their creations.⁸⁰ The following discussion assumes that the population contains pairings of potential copyright owners and innovators of all three types mentioned above. Part IV.A relaxes many of these assumptions and assesses the framework's applicability where they do not hold.

The assumption regarding frictionless bargaining entails that, conditional on their ex ante investments, the parties will bargain to the efficient result ex post. For example, even if both invested ex ante under a harmful-technology scenario, they would agree ex post not to market the technology. However, as is widely recognized, the initial allocation of legal entitlements affects the distribution of value between the parties ex post. The sections below detail how the different payoffs that the parties reap under different entitlements affect their ex ante investments in their respective activities and in minimizing the interference between them.

B. *Protecting Copyright Owners with a Property Rule*

A property rule in copyright owners entitles them to operate free of any interference. Whenever an interference exists (that is, if $I > 0$), copyright owners can enjoin the technology's operation by having a court issue an injunction.

1. *Efficient coexistence*

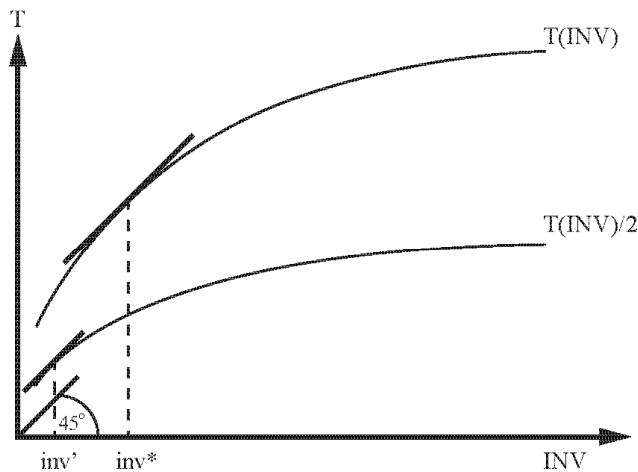
In this scenario it is efficient that both parties operate ex post despite the existence of a (relatively small) interference between their activities, creating an overall value of $A + T - I$. Absent agreement, the copyright owner could stand on her rights, enjoin the innovator, and enjoy the value of her activity, A . If so, the innovator would not be able to operate and would realize a value of zero. The parties will see, however, that they should agree to allow the innovator to market his technology, because by doing so they could jointly reap $T - I$, the value of the technology less the interference that would then accompany their concurrent operation. The aforementioned values that the parties could earn privately absent agreement would serve as their threat points in ex post negotiations. Following our assumptions of no impediments to trade and equal bargaining power, each party would improve on its threat point by half of the bargaining surplus. The copyright owner would end up with A (her threat point) + $(T - I)/2$ (half the bargaining surplus), or $A + T/2 - I/2$, and the innovator would end up with 0 (his threat point) + $(T - I)/2$ (half the bargaining surplus), or $T/2 - I/2$.

80. That is, it is assumed that the three scenario types are discrete. While the parties' investments can affect the value of their creations and that of the interference within the bounds of a particular scenario, their investments cannot change the type of the scenario they are in.

Copyright owners in such settings are expected to invest optimally in enhancing the value of their content under their preexisting technologies and business model, since they expect to internalize any marginal increase in A in full. Copyright owners would invest up to the point where the return on investing a marginal dollar falls to one dollar. At the same time, innovators know that ex post they will be able to internalize only half of the fruits of any ex ante investment in the new technology. Innovators, in other words, know ex ante that copyright owners will extract half of the value of the technology ex post. Innovators would therefore invest in new technologies to a lesser extent than is socially desirable. Innovators would invest only up to the point where the return on investing a marginal dollar in enhancing the value of the technology falls to two dollars. This latter effect is shown graphically in Figure 1 below.

FIGURE 1

Innovators' Investment in Technology in Efficient-Coexistence Scenarios
When Copyright Owners Are Protected with a Property Rule



The upper curve in Figure 1, above, represents the ex post social value of the technology as a function of the innovator's ex ante investment. The lower curve represents the portion of the technology's value that the innovator internalizes privately (here, half of the technology's total value). Socially, the innovator should invest inv^* in enhancing the value of the technology. At inv^* , the slope of the upper curve is exactly one, and investments up to that point embody a net contribution to social welfare. Marginal investments beyond that point would cost more than their contribution to social welfare, and should therefore not be undertaken. Since the lower curve represents the innovator's private return on investment, he would invest only inv' , the point where the lower curve reaches a slope of one. While further investments (up to inv^*)

would contribute to social welfare, they would represent a private loss to the innovator.

The innovator's ex ante investment in enhancing the value of his technology would therefore be inadequate in this case. More generally, the term "inadequate" will be used throughout this Article to designate levels of private ex ante investment that fall short of those socially desirable. In the context of the parties' investments in their primary activities, "inadequate" means that copyright owners and innovators will not create all socially valuable works of authorship and innovations, respectively. In the context of investments to reduce the interference between their activities, "inadequate" means that the parties will not make all cost-effective investments to that end. The term "excessive" will be used throughout this Article to designate levels of private ex ante investment that surpass those socially desirable. In the context of innovators' investment in new technologies, "excessive" means that some of them will create harmful technologies. In the context of copyright owners' investment in content under extant business models and technologies, "excessive" means that some of them will invest in business models for creating and marketing content that will not be viable in the presence of technological change. In the context of copyright owners' investment to reduce the interference, "excessive" means that some of them will take too many self-help measures to protect content than is socially desirable. Levels of private ex ante investment will be termed "optimal" whenever private parties invest at the socially desirable rates.

Copyright owners and innovators would invest inadequately in minimizing the interference between their activities. The parties' ex ante investment in interference reduction, it should be remembered, also has the characteristic of decreasing marginal return to effort. Socially, it would be desirable for each party to invest in minimizing the interference up to the point where the return (i.e., reduction of the ex post interference) on investing a marginal dollar falls to one dollar. That would have happened had the copyright owner and the innovator each suffered the interference in full privately. However, as was calculated above, each party's private payoff is reduced only by half the interference. Each would therefore invest inadequately in harm minimization—only up to the point where investing a marginal dollar reduces the interference by two dollars.

To give a numerical example, consider a potential innovator and a copyright owner who can invest 1 each ex ante to create a technology and content with ex post values of 20 that are accompanied by an interference of 10. Ex post, absent agreement, the copyright owner could enjoin the technology so as not to suffer any harm. In ex post bargaining, the innovator would pay up to 20 for lifting the injunction (for he would then be able to market the technology), the copyright owner would accept anything greater than 10 (the harm she stands to suffer), and the parties would settle on 15. Each party would realize 5 from the bargaining surplus of 10 (calculated at $T - I$, or $20 - 10$). The copyright owner will enjoy an ex post payoff of 25, namely her own value of 20, less

harm of 10, plus a 15 payment from the innovator. The innovator will enjoy an ex post payoff of 5, namely, the technology’s value of 20 less a payment of 15 to the copyright owner. Since ex ante costs are just 1, each will create.

Enter the parties’ ex ante investment to minimize harm. Assume, first, that the copyright owner can take a precaution at the cost of 2 to reduce the eventual harm by 3 (from 10 to 7). Since harm will be suffered with certainty, investing 2 ex ante to save 3 ex post is desirable. Unfortunately, the copyright owner will not take this precaution. If she did, the ex post gain from trade (lifting the injunction) would rise to 13 (or 20 - 7), and the parties would split it, realizing 6.5 each (instead of 5 as before). It would not be privately profitable for the copyright owner to invest 2 in order to increase her ex post lot by 1.5. The problem is that while the copyright owner bears the precaution cost ex ante in full, she enjoys only a part of its benefit in ex post negotiations. Alternatively, assume that the innovator can invest 2 ex ante to reduce ex post harm by 3. By similar logic, while this investment would be socially desirable, it would not be privately profitable for the innovator.⁸¹

In sum, the parties’ investments are as follows:

TABLE 1
Investments in Efficient-Coexistence Scenarios Under a Property Rule in Copyright Owners

Copyright owners’ incentives to create	Copyright owners’ incentives to minimize the interference	Innovators’ incentives to create	Innovators’ incentives to minimize the interference
Optimal	Inadequate	Inadequate	Inadequate

2. *Revolutionary technology*

In this scenario it is efficient that only the innovator operate ex post and that the copyright owner shut down her activity, for an overall value of *T*. The parties will negotiate to this efficient result under our assumption of frictionless ex post bargaining. As in the previous scenario, the copyright owner’s threat

81. Each party is still expected to take some cost-effective precautions to reduce the interference, but not all. Assume that rather than invest 2 to reduce the interference by 3, each could, first, invest only 0.4 to reduce the interference by 1, and then invest an additional 1.6 to reduce the interference by an additional 2. While socially, as in the case in the text, each should invest 2 in precautions to reduce the interference by 3, here each would invest only the first 0.4.

point would be A and the innovator's zero. The bargaining surplus is $T - A$, and the parties will share in it equally for eventual values of $A + (T - A)/2$, or $A/2 + T/2$ (copyright owner) and $0 + (T - A)/2$, or $T/2 - A/2$ (innovator).

In this scenario the copyright owner ends up shutting down her old business model, such that any ex ante investment in enhancing its value is wasteful. From a social perspective, the copyright owner should not invest at all. But since her private return increases with A —the greater A is, the better her bargaining position in ex post negotiation—the copyright owner will invest in enhancing its value (up to a point). The copyright owner is thus expected to invest excessively in creating content under the old, soon-to-be-obsolete business model and technology of dissemination.

Paralleling the logic of the last scenario, the innovator has to bear fully the cost of any marginal investment in the technology ex ante, yet expects to enjoy only a portion of any marginal increase in its value ex post. He will therefore invest inadequately. In this scenario, neither of the parties' payoffs depends on the magnitude of the interference, and therefore neither invests to reduce it. This is socially optimal since no interference is actually suffered once the copyright owner shuts down.

To give a numerical example, consider a potential innovator and a potential copyright owner, each of whom contemplates whether to invest 1 in a technology and in content with market values of 20 and 10, respectively, that would be accompanied by an interference of 30 if marketed concurrently.⁸² Socially, it would be efficient that only the innovator invest. Will that happen? The parties know that if they invest ex ante, they will agree ex post to have the copyright owner shut down her preexisting business model and allow the innovator to market his technology. In ex post bargaining, once ex ante investments are already sunk, the innovator's reservation price (the highest price he would pay for lifting the injunction) will be 20, and the copyright owner's reservation price (the lowest amount she would accept in return) will be 10. Assuming equal bargaining power, the parties will settle on 15. Foreseeing this eventuality, the innovator will invest 1 ex ante in order to reach an ex post position worth 5 (or $20 - 15$). The copyright owner will invest as well. This latter investment is excessive, since it is costly and does not enhance ex post social welfare.

Assume now that the innovator can invest an additional 1 ex ante to increase the technology's ex post value by an additional 1.5. If he did, the ex post bargaining surplus would rise from 10 to 11.5 (or $21.5 - 10$), but the innovator's private share will increase by only .75. The innovator will not invest the extra 1, though this would have been socially desirable. The innovator's level of investment is thus inadequate.

In sum, the parties' investments are as follows:

82. Under the notations introduced in Part II.A, this is a case where $A < T < I$.

TABLE 2
Investments in Revolutionary-Technology Scenarios Under a Property Rule in Copyright Owners

Copyright owners' incentives to create	Copyright owners' incentives to minimize the interference	Innovators' incentives to create	Innovators' incentives to minimize the interference
Excessive	Optimal	Inadequate	Optimal

3. *Harmful technology*

In this scenario it is efficient that only the copyright owner operate ex post and that the innovator shut down the new technology, for an overall value of A . As in the previous scenarios, the copyright owner's threat point would be A and the innovator's zero. Since this is already the efficient result, there are no further gains to be had from trade, and the parties will engage in none. The copyright owner and the innovator will reap eventual payoffs of A and zero, respectively.

The copyright owner would therefore invest optimally in creating content under her extant technology since she would reap the resultant benefits in full. The innovator will invest nothing—the optimal amount—in creating the harmful technology. The parties' payoffs do not depend on the interference, and thus the parties will invest nothing—the optimal amount—in affecting its magnitude.

In sum, the parties' investments are as follows:

TABLE 3
Investments in Harmful-Technology Scenarios Under a Property Rule in Copyright Owners

Copyright owners' incentives to create	Copyright owners' incentives to minimize the interference	Innovators' incentives to create	Innovators' incentives to minimize the interference
Optimal	Optimal	Optimal	Optimal

4. *Taking stock: investments under a property rule in copyright owners*

Above, we assumed that copyright owners and innovators are diverse groups and that all scenarios of content-technology interaction are possible. If so, to describe the effect of a property rule in copyright owners on the incentives of copyright owners and innovators, we would have to sum up the distortions in each investment decision across all three scenarios.

Copyright owners' investment in value creation would be excessive overall. While copyright owners in efficient-coexistence and harmful-technology scenarios would invest optimally, copyright owners in revolutionary-technology scenarios would sink resources into creating content under business models that they expect to shut down eventually. Therefore, copyright owners as a group would invest excessively in content creation.

Copyright owners' investment in minimizing the interference would be inadequate overall. While those in revolutionary-technology and harmful-technology scenarios would invest optimally (nothing) to minimize the interference, those in efficient-coexistence scenarios would invest inadequately to that end. Therefore, copyright owners as a group would invest inadequately in minimizing the interference.

Innovators would invest inadequately in new technologies. While a property rule in copyright owners has the benefit of dissuading potential makers of harmful technologies from making them, it also has the downside of not ensuring that all efficient technologies will be created. In other words, this rule would dissuade some potential makers of valuable technologies—in efficient-coexistence and revolutionary-technology scenarios—from making them. The reason is, as we saw, that innovators would expect copyright owners to hold them up in *ex post* negotiations and extract a portion of the new technology's value.

Lastly, innovators would invest inadequately in minimizing the interference. While those in harmful-technology and revolutionary-technology scenarios would invest optimally—zero—in minimizing the interference, those in efficient-coexistence scenarios would invest inadequately. Therefore, innovators as a group would invest inadequately in minimizing the interference.

In sum, the parties' investments are as follows:

TABLE 4
Investments Under a Property Rule in Copyright Owners

Copyright owners' incentives to create	Copyright owners' incentives to minimize the interference	Innovators' incentives to create	Innovators' incentives to minimize the interference
Excessive	Inadequate	Inadequate	Inadequate

C. *Protecting Copyright Owners with a Liability Rule*

A liability rule in copyright owners allocates to them the entitlement to operate free of any interference. A violation of that right, however, is remedied only by compensation rather than injunction. Under such a liability rule, innovators can market their technology as long as they are willing to pay copyright owners the resultant harm, the interference designated as I .

1. *Efficient coexistence*

In this scenario it is efficient that both parties operate *ex post* despite the existence of a (relatively small) interference between their activities, for an overall value of $A + T - I$. The copyright owner would choose to operate *ex post* because she would be guaranteed to reap the value of her operation, A , assured that any harm she would suffer as a result of the technology's concurrent operation would be remedied in full. Since in this scenario $T > I$, the innovator will decide to operate and pay the copyright owner for the interference she suffers, and will reap a payoff of $T - I$.

Copyright owners and innovators are expected to invest in their projects optimally since each stands to capture any marginal increase in the value of their respective economic activities in full. The copyright owner's payoff, however, is not a function of the interference, and she would thus fail to make any cost-effective *ex ante* investments to minimize its magnitude. The innovator's payoff, by comparison, is reduced by the full size of the interference. He would therefore take all cost-effective precautions at his disposal to minimize it.

In sum, the parties' investments are as follows:

TABLE 5
Investments in Efficient-Coexistence Scenarios Under a Liability Rule in
Copyright Owners

Copyright owners' incentives to create	Copyright owners' incentives to minimize the interference	Innovators' incentives to create	Innovators' incentives to minimize the interference
Optimal	Highly inadequate ⁸³	Optimal	Optimal

2. Revolutionary technology

In this scenario it is efficient that only the innovator operate ex post, for an overall value of T . When the innovator operates, however, he has to pay the copyright owner for any harm she suffers as a result of his activity. Generally, that harm is not necessarily I , but rather the lower of I and A , because when I is greater than A the copyright owner can minimize her losses by shutting down (thus capping her losses at A). In revolutionary-technology scenarios, A is smaller than I , and therefore the harm caused by the innovator's activity is only A .⁸⁴ The copyright owner will thus receive a payoff of A (paid by the innovator), and the innovator's payoff will be $T - A$. Since the copyright owner's payoff increases with A , she would invest in her business ex ante. Such investment is excessive (the optimal level being zero), since she will eventually shut down her obsolete business model. The copyright owner would thus invest excessively in her business. At the same time, the innovator would internalize any marginal increase in the value of his technology and would invest optimally in growing its value. The parties' payoffs do not depend on the interference, and they would invest nothing to minimize it. That would be efficient since no interference is actually suffered ex post.

In sum, the parties' investments are as follows:

83. The level "highly inadequate" denotes that copyright owners will fail to take any cost-effective measures to minimize the interference, since they will be compensated for it fully. Compare this to the merely "inadequate" level of investment by similarly situated copyright owners enjoying a property-rule protection. *See supra* Table 1. The copyright owners there, in contrast, internalize a part of the interference, and therefore take some (though not enough) measures to reduce it.

84. If copyright owners were under no duty to mitigate harm ex-post, then the possibility exists that they would invest ex-ante to enhance the interference. The present framework assumes that the duty exists, and therefore the absence of such perverse investment.

TABLE 6
Investments in Revolutionary-Technology Scenarios Under a Liability Rule in
Copyright Owners

Copyright owners' incentives to create	Copyright owners' incentives to minimize the interference	Innovators' incentives to create	Innovators' incentives to minimize the interference
Highly excessive ⁸⁵	Optimal	Optimal	Optimal

3. Harmful technology

In this scenario it is efficient that only the copyright owner operate ex post and that the innovator shut down his technology, for an overall value of A . Ex post, the copyright owner will operate her business and will enjoy its value, A . The innovator will not operate ex post, since operating would allow the innovator to capture the value of the technology, T , but would necessitate paying the copyright owner a greater amount for the interference caused. The copyright owner would therefore realize an ex post payoff of A , while the innovator would realize an ex post payoff of zero. The copyright owner will invest optimally ex ante in her business, while the innovator will invest nothing, which is optimal as well. Since neither of the parties' private payoffs is a function of the interference, they would not invest in minimizing its magnitude. Since no interference is suffered in harmful-technology scenarios, this level of investment is optimal.

In sum, the parties' investments are as follows:

85. The level "highly excessive" denotes that copyright owners will invest in and rely on extant business models and technologies of dissemination while disregarding completely the fact that these extant methods will soon become obsolete and not be used. Compare this to the merely "excessive" level of investment by similarly situated copyright owners enjoying a property-rule protection. *See supra* Table 2. The copyright owners there give the prospect of technological change some weight (though not enough) while still investing in content under soon-to-be-obsolete business models and technologies of dissemination. Note that while here copyright owners reap A fully, there they reaped only $A/2$. While the liability-rule protection here acts almost as an insurance against technological change, the property rule there causes copyright owners' private cost-benefit analysis to better approach the social cost-benefit analysis.

TABLE 7
Investments in Harmful-Technology Scenarios Under a Liability Rule in
Copyright Owners

Copyright owners' incentives to create	Copyright owners' incentives to minimize the interference	Innovators' incentives to create	Innovators' incentives to minimize the interference
Optimal	Optimal	Optimal	Optimal

4. *Taking stock: investments under a liability rule in copyright owners*

Protected by a liability rule, copyright owners as a group will invest excessively in extant business models for producing and marketing content. Those in efficient-coexistence and harmful-technology scenarios will invest efficiently; but copyright owners in revolutionary-technology scenarios will invest excessively in soon-to-be-obsolete business models. As noted, copyright owners' investment in, and reliance on, soon-to-be-obsolete business models will be even more excessive than it would be under a property-rule protection.

Copyright owners will invest nothing in cost-effective measures to minimize the interference with new technologies. The interference is suffered ex post in efficient-coexistence scenarios, and copyright owners in these scenarios should take interference-reducing measures. However, since a liability rule compensates them fully for any interference suffered, they will not invest in preventing that interference. Their investment is thus highly inadequate.

Innovators will invest optimally in new technologies. The technology adds social value in efficient-coexistence and revolutionary-technology scenarios, but not in harmful-technology ones. Innovators in the former two scenarios will reap the value of their technologies fully, and thus invest optimally in enhancing their value. Innovators of harmful technologies will not be able to reap their value ex post, and thus will invest nothing (the optimal rate) in creating them ex ante. Innovators will also invest optimally in interference minimization. Whenever the interference occurs, namely, in efficient-coexistence scenarios, its cost is borne fully by the innovator. Innovators in these scenarios will thus take all cost-effective precautions to minimize the interference, and will take no precautions in other scenarios—as is socially desirable.

In sum, the parties' investments are as follows:

TABLE 8
Investments Under a Liability Rule in Copyright Owners

Copyright owners' incentives to create	Copyright owners' incentives to minimize the interference	Innovators' incentives to create	Innovators' incentives to minimize the interference
Highly excessive	Highly inadequate	Optimal	Optimal

D. *Protecting Innovators with a Property Rule: Innovators' Incentives to Generate Harm*

A property-rule protection allows innovators to market any technology regardless of its harmful effect on copyright owners. Note that, because interference in the real world is unidirectional—like pollution, for example—the innovator will never have to go to a court and ask it to enjoin the copyright owner. Protected by a property rule, the innovator can simply launch its technology. If the copyright owner wishes to operate free of any interference, she will have to pay the innovator an amount that makes it worthwhile for him to shut down.

1. *Efficient coexistence*

In this scenario it is efficient that both parties operate ex post despite the existence of a (relatively small) interference between their activities, for an overall social value of $A + T - I$. The innovator, being allocated the entitlement, will be free to introduce his technology ex post and enjoy its value, T . Absent agreement, it would be worthwhile for the copyright owner to maintain her business model and suffer the (relatively small) interference, for an overall payoff of $A - I$. Since the parties will act efficiently absent agreement, there are no further gains to be had from trade.

The copyright owner would invest optimally in enhancing the value of her business model, since she would enjoy any marginal increase thereto fully. She would also invest optimally in interference reduction. Suffering the interference in full as her private harm, she would take all cost-effective measures to minimize it. The innovator would invest optimally in his technology, as he would capture its value in full. He would not, however, take any cost-effective measures to minimize the interference, as he would suffer none of it. As the in-

novator is not liable for the interference, he has no incentive to invest in costly precautions whose benefits would accrue to the copyright owner.⁸⁶

In sum, the parties' investments are as follows:

TABLE 9
Investments in Efficient-Coexistence Scenarios Under a Property Rule in Innovators

Copyright owners' incentives to create	Copyright owners' incentives to minimize the interference	Innovators' incentives to create	Innovators' incentives to minimize the interference
Optimal	Optimal	Optimal	Highly inadequate ⁸⁷

2. Revolutionary technology

In this scenario it is efficient that only the innovator operate ex post and that the copyright owner shut down her activity, for an overall value of T . The innovator will operate ex post and enjoy the value of his technology, T . Since in this scenario $A < I$, the copyright owner would choose not to operate rather than operate at a loss. She would realize a zero payoff. There are no further gains to be had from trade.

The innovator would invest optimally in enhancing the value of the technology, as he would internalize fully any marginal increase in its value. He would also invest zero in minimizing the interference, which is optimal since no interference occurs. The copyright owner would not invest at all in her business model and in minimizing the interference. This would also be optimal, since no investment would be enjoyed and no interference suffered ex post.

In sum, the parties' investments are as follows:

86. Some have criticized the *Sony* rule, which comes close to vesting a property rule in innovators, for that reason. See Picker, *supra* note 6, at 445 (“*Sony* removes any reason to redesign to minimize copyright infringement.”).

87. The level “highly inadequate” denotes that innovators will take no precautions. Compare this to the merely “inadequate” incentive of similarly situated innovators under a property rule in copyright owners, *see supra* Table 1, where innovators take some, though not all, precautions to minimize the interference.

TABLE 10
 Investments in Revolutionary-Technology Scenarios Under a Property Rule in Innovators

Copyright owners' incentives to create	Copyright owners' incentives to minimize the interference	Innovators' incentives to create	Innovators' incentives to minimize the interference
Optimal	Optimal	Optimal	Optimal

3. *Harmful technology*

In this scenario it is efficient that only the copyright owner operate ex post and that the innovator shut down his technology, for an overall value of A . Absent agreement, the innovator will be free to operate and reap a value of T . The parties would readily see, however, that they can do better by having the innovator shut down and the copyright owner operate, the efficient outcome. To chart what would happen, it would be necessary to distinguish between the two categories that comprise the harmful-technology scenario. In cases where $T < I < A$ ("harmful-technology subset 1"), absent agreement, the copyright owner would choose to operate and reap a value of $A - I$. In such a case, the bargaining surplus would be $I - T$. By shutting down the technology the parties can jointly avoid suffering the interference, although achieving that goal would mean sacrificing the (smaller) value of the technology. The parties will share in the gains from trade equally for final payoffs of $A - I + (I - T)/2$, or $A - I/2 - T/2$ (copyright owner) and $T + (I - T)/2$, or $T/2 + I/2$ (innovator).

The copyright owner would invest optimally in content creation, as she would internalize fully any marginal increase in its value. She would also invest resources to minimize the interference. This investment would be excessive, because the technology will ultimately shut down and no interference will occur. Therefore, from a social perspective, the copyright owner should invest nothing in interference minimization. But the magnitude of the interference that would have happened had the parties operated concurrently affects the copyright owner's threat point in ex post negotiations, and thus her ultimate payoff. Since that payoff is decreased by half the size of the potential interference, the copyright owner would invest resources to minimize that potential interference—an excessive investment.

The innovator would invest excessively in his technology. While the technology is shut down eventually—so that the socially optimal rate of investment in increasing its value is zero—the innovator's private welfare function is en-

hanced by half the potential value of his technology. The innovator will therefore invest ex ante to enhance the value of the technology, even though that investment is excessive from a social perspective.

Most interesting is the innovator's investment in affecting the size of the interference. Since the technology will be shut down eventually, and no interference will be suffered, no resources should be invested ex ante to affect the size of the interference. The innovator's private payoff, however, is enhanced by half the size of the interference. The innovator would thus have an incentive to invest resources solely to make his technology more harmful to copyright owners. The more harmful the technology, the greater the loss that would be averted by a bargain between the parties, and the greater amount the innovator would be able to extract from the copyright owner in ex post negotiations in return for shutting down.⁸⁸

To give a numerical example, imagine an innovator contemplating a technology—such as an online file-sharing network—that creates a small value of 10 but that also harms copyright owners by 100. Backed by a right to market this technology, the innovator would produce it. In ex post negotiations, the innovator and the copyright owner would realize that both can be made better off by shutting down the technology. The innovator would not accept anything less than 10 to shut down, while the copyright owner would pay 100 at most. Under equal bargaining power, the innovator would shut down his harmful technology in return for 55. Assume, however, that when he creates the technology ex ante, the innovator can invest an extra 5 merely to increase the technology's harmful potential to 200. While socially wasteful, this investment in harm exacerbation would pay privately because it would increase the copyright owner's maximal willingness to pay to 200, thus increasing the innovator's settlement to 105.

In sum, the parties' investments in this particular setting are as follows:

88. The possibility that injurers would invest in activities that are injurious to victims just because of the prospect of extracting a payment from them later in return for desisting was noted by Ronald H. Coase, *The Problem of Social Cost*, 3 J.L. & ECON. 1, 5-8 (1960), among others. For recent analyses, including examples and related literature, see, for example, Lee Anne Fennell, *Adjusting Inalienability*, 122 HARV. L. REV. 1403, 1413-19 (2009); and Daniel B. Kelly, *Strategic Spillovers*, 111 COLUM. L. REV. 1641 (2011).

TABLE 11a
Investments in Harmful-Technology Subset 1 Scenarios Under a Property Rule in Innovators

Copyright owners' incentives to create	Copyright owners' incentives to minimize the interference	Innovators' incentives to create	Innovators' incentives to minimize the interference
Optimal	Excessive	Excessive	Perverse

The second subset of harmful-technology scenarios (“harmful-technology subset 2”) is the one in which $T < A < I$. In these cases the copyright owner would choose not to operate absent agreement, since the interference she stands to suffer would be greater than the value of her business. Agreeing to shut down the technology and allow the copyright owner to operate interference-free would allow the parties to jointly enjoy an additional value of $A - T$. Splitting the gains from trade equally, the copyright owner’s final payoff will be $(A - T)/2$, or $A/2 - T/2$, and the innovator’s will be $T + (A - T)/2$, or $T/2 + A/2$.

The copyright owner would invest inadequately in enhancing the value of her business since she would internalize only half of any marginal enhancement. As her private payoff is not a function of the interference, she would invest nothing in minimizing it. This would be optimal, as no interference is suffered ex post. The innovator will invest in enhancing the value of his technology, as his private payoff rises with the value of the technology. That would be an excessive rate of investment, as the technology will be shut down eventually. In this setting, the innovator will invest zero in harm minimization, which is the optimal rate as no harm is suffered ex post.

In sum, the parties’ investments in this particular setting are as follows:

TABLE 11b
Investments in Harmful-Technology Subset 2 Scenarios Under a Property Rule in Innovators

Copyright owners' incentives to create	Copyright owners' incentives to minimize the interference	Innovators' incentives to create	Innovators' incentives to minimize the interference
Inadequate	Optimal	Excessive	Optimal

Assuming that content-technology interactions of each subset of the harmful-technology scenario occur in the world, we can combine the distortions noted in Tables 11a and 11b above. Some copyright owners would invest optimally in value creation (subset 1), but others would invest inadequately (subset 2). The overall rate of investment would thus be inadequate. While some copyright owners would invest excessively in taking interference reducing measures (subset 1), others will invest optimally (subset 2). Overall, there will be some excessive investment in reducing the size of the interference by copyright owners. Innovators in each subset will invest excessively in their technologies, so the investment will be excessive overall. Lastly, while some innovators will invest optimally in minimizing the interference (subset 2), some will invest perversely to harm copyright owners (subset 1). Overall, there will be some perverse investment by innovators to inflict harm on copyright owners.

In sum, the parties' investments are as follows:

TABLE 11
Investments in Harmful-Technology Scenarios Under a Property Rule in Innovators

Copyright owners' incentives to create	Copyright owners' incentives to minimize the interference	Innovators' incentives to create	Innovators' incentives to minimize the interference
Inadequate	Excessive	Excessive	Perverse

4. *Taking stock: investments under a property rule in innovators*

Under a property rule in innovators, copyright owners, as a group, will invest too little in creating and marketing content under their existing business models. While many copyright owners—those in efficient-coexistence and revolutionary-technology scenarios, and even some of those in harmful-technology scenarios (i.e., those in harmful-technology subset 1 scenarios)—would invest optimally, some copyright owners in harmful-technology scenarios (i.e., those in harmful-technology subset 2 scenarios) would see some of their value being extracted from them by innovators and would thus have an inadequate incentive to create. Copyright owners, collectively, will also take too many precautions to prevent interference. While copyright owners in efficient-coexistence and revolutionary-technology scenarios, and also those in harmful-technology subset 2 scenarios, will take optimal precautions, those in harmful-technology subset 1 scenarios will take excessive precautions. Ideally, harmful technolo-

gies should not be created and no precautions should be taken to prevent their interference. In actuality, a property rule in innovators induces the creation of harmful technologies (alongside useful ones), and there will be some copyright owners who will take precautions against their interference.

Innovators, on the other hand, will invest excessively. That is, they will create more technologies than is socially desirable. While a property rule in innovators guarantees that all beneficial technologies are created—those in efficient-coexistence and in revolutionary-technology scenarios—this rule also has the downside of encouraging innovation in harmful-technology scenarios as well. This rule allows innovators to launch their technologies without suffering any of the social cost associated with their introduction. Innovators in efficient-coexistence scenarios that can take cost-effective measures to minimize the interference will not do so. Their investment in precautions will thus be highly inadequate.⁸⁹ More troubling is the fact that some innovators (i.e., those in harmful-technology subset 1 scenarios) would invest resources into exacerbating the degree to which the technology interferes with the marketing of content. In other words, they will invest *ex ante* merely to inflict harm on copyright owners. Such perverse investments would increase the amount that copyright owners would be willing to pay innovators *ex post* in return for shutting down.

In sum, the parties' investments are as follows:

TABLE 12
Investments Under a Property Rule in Innovators

Copyright owners' incentives to create	Copyright owners' incentives to minimize the interference	Innovators' incentives to create	Innovators' incentives to minimize the interference
Inadequate	Excessive	Excessive	Highly inadequate or perverse

E. *Protecting Innovators with a Liability Rule*

A liability rule in innovators allows them to operate without bearing any of the cost of the content-technology interference. While this rule allocates the cost of the interference to copyright owners, it allows them to shut down the new technology by compensating the innovator for his resulting harm, namely by paying him T .⁹⁰

89. See *supra* note 87 and accompanying text.

90. A liability-rule protection in the defendant was Calabresi and Melamed's startling theoretical innovation. Courts have relatively rarely allocated such an entitlement. See, e.g.,

1. *Efficient coexistence*

In this scenario it is efficient that both parties operate *ex post* despite the existence of a (relatively small) interference between their activities, for an overall value of $A + T - I$. The innovator will choose to operate *ex post* and enjoy the value of his technology, T . Absent agreement, the interference would fall on the copyright owner as her private harm, and she would realize a payoff of $A - I$. Since the parties already act efficiently, there are no further gains to be had from trade.

Copyright owners would thus invest in their business optimally, as they would internalize any marginal increase in A fully. They would also suffer the interference in full and therefore take all cost effective measures to minimize it. Innovators would reap the value of the technology in full and invest optimally in enhancing its value. They would not, however, take any cost-effective measures to minimize the interference since they suffer none of it.

In sum, the parties' investments are as follows:

TABLE 13

Investments in Efficient-Coexistence Scenarios Under a Liability Rule in Innovators

Copyright owners' incentives to create	Copyright owners' incentives to minimize the interference	Innovators' incentives to create	Innovators' incentives to minimize the interference
Optimal	Optimal	Optimal	Highly inadequate ⁹¹

2. *Revolutionary technology*

In this scenario it is efficient that only the innovator operate *ex post*, for an overall value of T . Guaranteed a legal right to operate, the innovator would launch his technology and reap T . Given that the innovator operates, the copyright owner would minimize its losses by shutting down her activity. Her payoff would be zero. Since the parties are acting efficiently, there are no further gains to be had from trade.

Spur Indus., Inc. v. Del E. Webb Dev. Co., 494 P.2d 700 (Ariz. 1972) (finding a nuisance but ordering the plaintiff to pay for the defendant's cost of relocation).

91. The level "highly inadequate" denotes that innovators will take no precautions. Compare this to the merely "inadequate" incentive of similarly situated innovators under a property rule in copyright owners, *see supra* Table 1, where they take some, though not all, precautions to minimize the interference.

The copyright owner would invest nothing—the optimal rate—in her business model and in minimizing the interference. The innovator would invest optimally in the technology and would invest nothing—again, the optimal rate—in minimizing the interference.

In sum, the parties’ investments are as follows:

TABLE 14

Investments in Revolutionary-Technology Scenarios Under a Liability Rule in Innovators

Copyright owners’ incentives to create	Copyright owners’ incentives to minimize the interference	Innovators’ incentives to create	Innovators’ incentives to minimize the interference
Optimal	Optimal	Optimal	Optimal

3. Harmful technology

In this scenario it is efficient that only the copyright owner operate ex post and that the innovator shut down his technology, for an overall value of A . Absent agreement, the innovator would launch his technology and reap its value, T . In this scenario, however, T is smaller than I and also smaller than A . The copyright owner would therefore choose to exercise her option to shut down the technology at a private cost of T (that she would pay the innovator) in order to reap the greater value of her content, A . The copyright owner’s final payoff would be $A - T$, and the innovator’s payoff would be T .

The copyright owner would thus invest optimally in enhancing the value of her business model, and would invest nothing—the optimal rate—in minimizing the interference, since none is suffered. The innovator, however, would invest excessively in enhancing the value of the technology. While the technology would shut down and not add to social value, the innovator would be guaranteed to reap its value by way of payment from the copyright owner. He would thus invest in enhancing the value of the technology, which would be undesirable socially. He would invest nothing—the optimal rate—in minimizing the interference, since none would exist.

In sum, the parties’ investments are as follows:

TABLE 15
Investments in Harmful-Technology Scenarios Under a Liability Rule in
Innovators

Copyright owners' incentives to create	Copyright owners' incentives to minimize the interference	Innovators' incentives to create	Innovators' incentives to minimize the interference
Optimal	Optimal	Highly excessive ⁹²	Optimal

4. *Taking stock: investments under a liability rule in innovators*

Under a liability rule in innovators, copyright owners would invest optimally in their business models. They would invest when they expect their businesses to be viable—in efficient-coexistence and harmful-technology scenarios—but not in revolutionary-technology scenarios, in which they expect their businesses to shut down. All these decisions are socially desirable. Copyright owners would also invest optimally in minimizing the interference. Since they stand to bear it whenever it occurs—in efficient-coexistence scenarios—they will do all they can to minimize it in that and only that scenario.

Innovators, on the other hand, will invest to a highly excessive degree in technological innovation. They would not only create in cases where innovations add to social value—namely in efficient-coexistence and revolutionary-technology scenarios—but would also create in harmful-technology scenarios. While in harmful-technology scenarios the technology will be shut down, such that investing in it is socially wasteful, the innovator would be guaranteed to reap its value fully by way of a payment from copyright owners. Furthermore, innovators' excessive investments in technology under a liability-rule protection would be even greater than that under a property-rule protection. The reason is that a property rule allows innovators to participate in the social gains

92. The level “highly excessive” denotes that innovators will invest in new technologies while disregarding completely the fact that their technologies are harmful and will be shut down eventually. Compare this to the merely “excessive” level of investment by similarly situated innovators enjoying a property-rule protection, *see supra* Table 11, who give this prospect some weight (though not enough) while investing in harmful technologies.

from shutting down their technology, so that their private investment calculation gets closer to the socially desirable one. By comparison, innovators protected by a liability rule are only guaranteed the value of their technology, and nothing more. Formally, the private welfare function of innovators in harmful-technology scenarios rises by a full T when they are protected by a liability rule but only by $T/2$ when they are protected by a property rule.

Innovators would also invest inadequately in minimizing the interference. When the interference materializes—in efficient-coexistence scenarios—innovators will suffer none of it, and therefore will invest inadequately—indeed, will take no measures at all—to minimize it.

In sum, the parties’ investments are as follows:

TABLE 16
Investments Under a Liability Rule in Innovators

Copyright owners’ incentives to create	Copyright owners’ incentives to minimize the interference	Innovators’ incentives to create	Innovators’ incentives to minimize the interference
Optimal	Optimal	Highly excessive	Highly inadequate

F. *Summary: Copyright Owners’ and Innovators’ Incentives to Invest Under Property Rules and Liability Rules*

The distortions in the parties’ investment decisions can be summarized as follows:⁹³

93. For each entitlement, Table 17 reflects the cumulative distortive effect in each of the four investment decisions across efficient-coexistence, harmful-technology, and revolutionary-technology scenarios, as explained in the first paragraph of Part II.B.4.

TABLE 17
Copyright Owners' and Innovators' Investment Under Different Rules

Ex ante incentives	Property rule in copyright owners	Liability rule in copyright owners	Property rule in innovators	Liability rule in innovators
Copyright owners' incentives to create	Excessive	Highly excessive	Inadequate	Optimal
Copyright owners' incentives to minimize the interference	Inadequate	Highly inadequate	Excessive	Optimal
Innovators' incentives to create	Inadequate	Optimal	Excessive	Highly excessive
Innovators' incentives to minimize the interference	Inadequate	Optimal	Highly inadequate and perverse ⁹⁴	Highly inadequate

III. ANALYSIS: HOW THE FRAMEWORK CAN BE USED TO PREDICT CREATORS' BEHAVIOR AND TO MAKE BETTER LAW

A. *Descriptive Payoffs: The Framework Gives Insight into How Different Entitlements Affect Copyright Owners' and Innovators' Incentives to Create and to Minimize Their Mutual Interference*

1. *Integrating a multiplicity of viewpoints into one coherent whole*

Courts and commentators have offered different tests to strike the content-technology tradeoff. Each has generally highlighted the benefits associated with its test of choice and the costs associated with other alternatives. Table 17 presents an integrated view of costs and benefits of the major alternative standards. It should serve to remind us that all balancing tests would come at some sacri-

94. "Perverse" designates that rather than take cost-effective measures to mitigate harm, or even do nothing, some technology companies protected with a property rule would invest actively to exacerbate the interference (i.e., generate more harm).

face to at least one important social objective, and that society must choose among bundles of relative costs and benefits.

2. *Breaking down the particular tradeoffs associated with alternative rules*

While the *Grokster* Court saw that the case before it involved a tradeoff, it did not have any additional insight into that tradeoff's particular workings.⁹⁵ Table 17 details the particular tradeoffs associated with alternative legal rules. These do not flow automatically from the Supreme Court's intuitive understanding of the content-technology tradeoff as a zero-sum game. Table 17 suggests that the tradeoff is instead multidimensional.

3. *Understanding copyright owners' and innovators' behavior*

To assess the predictive power of the framework, let us use it to examine the advent of file-sharing networks. These networks were developed at a time when *Sony's* safe harbor was thought to be the controlling standard for innovators' secondary liability. This standard was very permissive: to qualify, a technology merely had to be capable of a substantial noninfringing use. As the Ninth Circuit found, *Grokster* cleared that hurdle.⁹⁶ This permissive standard is close to a property rule in innovators.⁹⁷ Table 17 predicts that a property rule in innovators would induce some innovators to market harmful technologies and invest—perversely—in harming copyright owners. The Supreme Court's decision in *Grokster* can be read to suggest that *Grokster* had done both.⁹⁸

Grokster was not the first file-sharing network to believe that its business model was shielded by *Sony's* safe harbor. Several years earlier, *Napster* believed the same; however, it was found secondarily liable in the Ninth Cir-

95. See *MGM Studios Inc. v. Grokster, Ltd.*, 545 U.S. 913, 928 (2005).

96. *MGM Studios, Inc. v. Grokster Ltd.*, 380 F.3d 1154, 1162 (9th Cir. 2004), *vacated*, 545 U.S. 913 (2005).

97. See, e.g., Picker, *supra* note 6, at 424 (criticizing *Sony's* safe harbor for being “far too weak” and “not sufficiently demanding” of technology companies); *id.* at 444 (suggesting that the *Sony* standard would protect the making of a “terrible product” that “generates \$100 worth of social benefit and \$1000 worth of social harm,” and concluding that “*Sony* certainly facilitates entry [of new technologies], but not in a way that is socially useful”). Indeed, *Sony's* rule was criticized for allowing innovators to introduce almost any technology, no matter how harmful. See Menell & Nimmer, *supra* note 25, at 148-49 (“The *Sony* safe harbor has spawned an environment in which some technologists design software and products based not on what is socially optimal—in terms of balancing functionality against adverse impacts—but rather on how to avoid liability for clearly foreseeable and manageable harms.”).

98. *Grokster*, 545 U.S. at 936 (implying that *Grokster's* conduct “was intended to do harm” (quoting W. PAGE KEETON ET AL., PROSSER AND KEETON ON THE LAW OF TORTS § 8, at 37 (5th ed. 1984))); see also *id.* at 923-26 (suggesting that the harm *Grokster* caused copyright owners greatly outweighed any value that the network may have had).

cuit.⁹⁹ Just like Grokster, Napster induced infringement intentionally, though in an era when the Supreme Court had not yet created the active inducement doctrine. Under the analysis above, innovators of harmful technologies that invest in harm generation do so because they know that the greater the harm, the greater the bribe they can extract from copyright owners in ex post negotiations in return for shutting down. Consistent with this prediction, Napster's business plan was to first succeed and attract a huge user base—that is, cause a lot of harm to copyright owners from mass infringement—and then reach a deal with music labels in which Napster would retire its harmful architecture and become an exclusive authorized online retailer.¹⁰⁰

Lastly, Table 17 predicts that a property rule in innovators would cause copyright owners to take excessive precautions to minimize the interference. This prediction is the result of the harmful-technology subset 1 scenario: ideally, harmful technologies should not be created, and no self-help measures against them should be required. In actuality, the existence of harmful technologies causes copyright owners to invest in harm minimization. In the file-sharing context, the availability of a property rule in innovators became clear in 2003, when the district court ruled (and the Ninth Circuit later affirmed) that Grokster, a harmful technology, was protected by *Sony's* safe harbor.¹⁰¹ Soon thereafter, the music and film industries started employing unprecedented measures to fight piracy, such as technological self-help measures and suing end users.¹⁰² The industries rolled back these measures considerably a few

99. Napster, Grokster's predecessor, seems to have believed that it was shielded by *Sony*. See Joseph Menn, *The Lowdown Download Blues*, L.A. TIMES MAG., Apr. 6, 2003, at 16, available at <http://articles.latimes.com/print/2003/apr/06/magazine/tm-napster14> (describing the venture capital firm Hummer Winblad as "confident that Napster would prevail in court," and noting that Hank Barry, a longtime corporate lawyer whom Hummer Winblad chose to replace Eileen Richardson (Napster's first CEO), was equally sure that Napster would win in court, and that he took a hard, though unsuccessful, negotiating line with the labels).

100. *Id.* ("The [Napster] executives thought that by just getting big quickly, they could force the record industry to the negotiating table—how to structure a legitimate and sustainable business was simply not the focus."). That plan may have worked. See *id.* (reporting that executives from the record label EMI met with Napster's entrepreneurs to "to explore possible alliances" and that the CEO of Universal Music's parent company "was confident that the music industry would win in court, but he was still open to a potential settlement" since there "was an opportunity to maintain a large customer base, potentially, and over time migrate it into a commercially viable system" (quoting Edgar Bronfman Jr., CEO, Seagram Co.)). As a result, there was a summit meeting arranged between the top executives of major music labels and Napster. A deal might have been struck but for Napster's decision to hold out for \$2 billion, an amount the music industry was not willing to pay. *Id.*; see also JOSEPH MENN, *ALL THE RAVE: THE RISE AND FALL OF SHAWN FANNING'S NAPSTER* 102 (2003).

101. Some would contest the characterization of Grokster as a harmful technology. The Supreme Court was seemingly under the impression that it was harmful. See *supra* note 98. The analysis in the text assumes that the Court's unanimous decision got the facts right.

102. Prior to the Supreme Court's *Grokster* decision, content was increasingly sold with technological self-help measures. In the years following it, retailers—such as Apple iTunes and Amazon.com—started making some content available in nonprotected format, with the

years later, after various file-sharing networks were shut down following the Supreme Court's *Grokster* decision and subsequent lower courts' case law implementing it; those decisions made clear that innovators no longer enjoyed a right to actively cause harm.¹⁰³ Innovators and copyright owners' behavior and the way it changed as the legal rule changed are consistent with the framework's predictions.

4. *Understanding the tradeoffs associated with Grokster*

It was suggested above that *Sony* comes close to protecting innovators with a property rule. *Grokster* clarifies that *Sony* applies only to noninducing parties. What are the tradeoffs associated with the *Sony* rule, as limited by *Grokster*? *Grokster* takes away the incentives of makers of harmful technologies to invest intentionally to enhance the harm.¹⁰⁴ While improving upon *Sony*, this rule would still not go as far as causing innovators to take cost-effective measures to minimize the harmful potential of their technologies. Hence, current doctrine can be characterized by the tradeoffs depicted in the fourth column in Table 17, except that the innovator's incentives to invest in harm minimization are now improved from "highly inadequate and perverse" to "highly inadequate."

B. *Prescriptive Payoffs*

1. *Choosing among possible rules*

Lawmakers concerned with improving copyright owners' and innovators' incentives to invest should, of course, choose the entitlement that generates, in their view, the best mix of such incentives. Lawmakers can do so, for example, by ranking the four investment decisions according to their social importance (which may change over time and circumstance), and then choosing the entitlement that best promotes that ranking. For example, assume that after careful study lawmakers conclude that liability rules should not be used to resolve copyright-innovation conflicts, either generally or in a particular setting (perhaps because of the informational burden that their application involves), and are

consent of copyright owners. In 2008, the entertainment industry announced that it would stop suing home users, after having sued almost 40,000 since 2003. Sarah McBride & Ethan Smith, *Music Industry to Abandon Mass Suits*, WALL ST. J., Dec. 19, 2008, at B1.

103. Other considerations—such as the costs involved and the ambiguous results—may have contributed to copyright owners' decision to abandon their litigation strategy and to scale back their use of technical protection measures. However, the argument here is not one of causation (that they scaled back excessive protection measures because the law changed), but rather that the observed phenomena are consistent with this analytical framework's predictions.

104. Intentional inducement is shown by "affirmative steps taken to foster infringement." *MGM Studios Inc. v. Grokster, Ltd.*, 545 U.S. 913, 919 (2005). Therefore, a technology company wishing to avoid liability would likely refrain from taking those steps.

trying to choose between the two property rules. In doing so, lawmakers should examine the two rules' effect on the parties primary incentives. As Table 17 suggests, neither rule is clearly superior in that regard. A property rule in innovators would make them invest excessively (some innovators will invest in harmful technologies) and drive copyright owners to invest inadequately. At the same time, a property rule in copyright owners would result in inadequate innovation and in excessive investment in content (some copyright owners will invest in inefficient business models and technologies of dissemination). Which rule is preferable may depend, for example, on lawmakers' determination whether it is more important to ensure that all valuable innovations are made or rather that all valuable content is created, and whether the costs of excessive innovation are greater than those of excessive creation of content or the other way around.

Lawmakers should also examine the two rules' effect on the parties incentives to minimize the interference. Neither rule is clearly superior regarding copyright owners' investment to that end—a property rule in copyright owners would cause them to invest inadequately, but a property rule in innovators would make copyright owners invest excessively. A property rule in copyright owners, however, is superior in terms of inducing innovators to minimize the interference. While a property rule in copyright owners would make innovators invest inadequately in interference minimization, a property rule in innovators would make them not invest at all or even invest perversely to increase the interference. Which rule is preferable in this respect would depend on additional determinations such as which party is better positioned to minimize the interference. A few observations regarding Table 17 are in order along those lines.

First, Table 17 represents a less favorable view of the consequences of vesting property rules in innovators than is warranted in a post-*Grokster* world, as explained above.¹⁰⁵

Second, the analysis has abstracted away from informational burdens and litigation costs. Applying liability rules generally imposes a greater burden than property rules because the legal system must assess the size of a damage award. Protecting copyright owners by a property rule, in contrast, only requires a court to verify that harm happened, and to issue an injunction. Protecting innovators with a property rule seems to involve the least administrative cost. Because the interference is felt by the copyright owner in the first instance, never by the innovator, innovators protected by a property rule will not bother courts with injunction requests as copyright owners protected by a property rule would.

Third, as between the two property rules, protecting innovators seems to be superior to protecting copyright owners. Under reasonable assumptions, a

105. As explained above in Part III.A.4, *Grokster* takes away innovators' incentive to harm copyright owners intentionally. Accordingly, the relevant box should change from "highly inadequate and perverse" to "highly inadequate."

property rule in copyright owners dilutes innovators' incentives more severely than a property rule in innovators dilutes copyright owners' incentives. Under the former rule, copyright owners are able to extract a portion of innovators' technologies in both efficient-coexistence and revolutionary-technology scenarios.¹⁰⁶ Under the latter rule, innovators are able to extract part of copyright owners' business only in harmful-technology scenarios. This conclusion, however, is not a firm prescription but rather depends on certain particular assumptions.¹⁰⁷

Fourth, the balances in Table 17 associated with a liability rule in copyright owners may not be easily achievable. The values in the third column ("liability rule in copyright owners") assume a legal regime where damages are set to equal interference (or harm). But there is no guarantee that the legal system will assess it exactly right. In particular, victorious copyright plaintiffs can choose to receive, instead of actual damages, statutory damages that can be as high as \$150,000 per work (and generally no less than \$750).¹⁰⁸ While courts have discretion in setting the amount, the more supracompensatory damages are, the more the protection afforded under the liability rule approaches a property-rule protection. Generally, and barring statutory changes, a true liability rule is not currently a viable option because of the availability of statutory damages.¹⁰⁹

Table 17 does not represent the full spectrum of possible policy choices. Rather, it analyzes the effects of four particular points on that spectrum. Congress can regulate new technologies, and often has, by imposing compulsory licenses.¹¹⁰ These licenses—a form of liability rule—can be set at market rates,

106. This prediction of the model is consistent with the observation that "[t]his cycle of copyright owners shaking down innovators is a central trope in the business of the Copyright Wars and has been repeated over and over again with almost every new innovation." PATRY, *supra* note 6, at 22.

107. The argument is made assuming that all three scenario types occur with about equal frequency, or that, at least, the world is not one in which the vast majority of content-technology interactions fall into the harmful-technology scenario (such that only a small portion of the interactions fall into the efficient-coexistence and revolutionary-technology scenarios combined). Another assumption that tends to support the prescription is that the bargaining power of the parties is about equal, or at least that innovators do not enjoy a greatly superior bargaining power relative to that of copyright owners.

108. In the usual case, statutory damages range between \$750 and \$30,000. Statutory damages, however, can be as low as \$200 if infringement is innocent and as high as \$150,000 if infringement is willful. 17 U.S.C. § 504(c) (2006 & Supp. IV 2010). To be eligible to choose statutory damages, copyright owners need to have registered their copyrights prior to the infringement. 17 U.S.C. § 412 (2006 & Supp. II 2008). Commercial copyright owners who believe that they may need to enforce their rights in court typically do register.

109. One could limit the availability of statutory damages in cases involving content-technology conflicts, or at least grant judges greater discretion than is currently available to limit awards to actual damages. Also, a liability rule could be created by Congress, in which case it could be set at any desired level.

110. The first compulsory license was set in the 1909 Act, for "mechanical copies." See *supra* note 50. Overturning the Supreme Court's decision in *White-Smith Music Publishing*

in which case they would act like a liability rule in copyright owners (whose associated tradeoffs are described in the third column of Table 17). However, Congress can set the statutory rates at levels that either exceed or fall short of market levels.

The higher the level at which damages are set under a liability rule (e.g., twice actual harm, three times actual harm, etc.), whether by courts or Congress, the more the law approaches a property rule in copyright owners. The more damages stray upwards from actual harm, the more the tradeoffs associated with the liability rule move away from the levels noted under the third column of Table 17 ("liability rule in copyright owners") and approach those noted in the boxes to their left under the second column ("property rule in copyright owners"). The more damages stray downwards from actual harm, the more the tradeoffs associated with that liability rule move away from the levels noted under the third column of Table 17 ("liability rule in copyright owners") and approach those noted in the boxes to their right in the fourth column of Table 17 ("property rule in innovators").

In essence, the rules analyzed in Table 17 are simply dots on a spectrum of entitlements. As the legal rule moves along that spectrum, the associated tradeoffs shift accordingly.

2. *Modifiable entitlements: a proposal to improve incentives to invest*

The analysis has thus far assumed that the law's role is limited to setting background entitlements that would apply in all types of content-technology scenarios. Indeed, oftentimes the most that lawmakers can do *ex ante* is choose the entitlement that produces the best investment incentives across all possible scenarios (as described in the previous Subpart). For example, Congress has allocated to copyright owners the exclusive right to reproduce their works.¹¹¹ On average, placing this right under copyright owners' control seems to make sense. What should courts do, however, when copyright owners assert that right against different types of technologies, such as a VTR or a file-sharing network? Viewing the question *ex post*, once a technology already exists, the legal system might be able to determine the scenario into which a particular technology's interaction with content falls.¹¹² When it can, how should it use that added information?

Co. v. Apollo Co., 209 U.S. 1 (1908), Congress allowed the making of records and pianola rolls as long as a statutory fee was paid.

111. 17 U.S.C. § 106(1) (2006).

112. To determine particular scenario types, lawmakers need to be able to observe the relative values of the work of authorship, the technology, and the interference, denoted earlier as *A*, *T*, and *I*. See *supra* Part II.A. While this is certainly not a trivial informational burden, note that lawmakers need not be able to determine exact values.

Much of the distortion in *ex ante* investments stems from the behavior of inefficient parties. Protected by an entitlement, an innovator might invest in a harmful technology. Protected by an entitlement, a copyright owner might invest in a business model that will soon be replaced by a revolutionary technology. In such cases, protected parties invest knowing that their investments are inefficient and will be shut down *ex post*. They invest nevertheless because owning the entitlement assures them that shutting down *ex post* will be accompanied by a payment. However, if the legal system can observe *ex post* that a protected party invested inefficiently, it should reallocate the entitlement in favor of the other party¹¹³ (and it does not matter whether it does so by a property rule or a liability rule¹¹⁴). Such a principle of modifying initial allocations would deny entitlements *ex post* to copyright owners and innovators who planned to profit from inefficient investments. If parties expected such modifications to obtain *ex post*, they would not invest inefficiently *ex ante*.¹¹⁵

The analysis summarized in Table 17 assumed that the legal system can never modify initial entitlements in light of later-revealed information. But in reality, the legal system sometimes can and often does. Table 17 thus charts an exceedingly pessimistic view of the *ex ante* effects associated with alternative legal rules. Let us assume now that the legal system can always verify *ex post* the scenario under which particular content-technology conflicts fall. While this assumption is exceedingly optimistic, it is made provisionally in order to assess the maximal extent to which *ex post* modification of entitlements might improve *ex ante* investments.

Assume a legal system in which, for example, Congress sets initial entitlements that parties can later assert in litigation. We shall call them “modifiable” entitlements. In that system, courts can verify the type of content-technology scenarios in play. If Congress initially allocates copyright owners a modifiable

113. For expositional clarity, I shall discuss modifications mostly in the context of courts’ modification of preexisting entitlements. However, other institutions can (and do) perform this task as well. *See infra* note 120.

114. Each type of protection would render an inefficient investment unprofitable. As Tables 3 and 7 show, for example, innovators in harmful-technology scenarios are going to behave desirably, namely, not invest in such technologies, when copyright owners are protected by either property rules or liability rules. Similarly, as Tables 10 and 14 show, copyright owners in revolutionary-technology scenarios are going to behave desirably, namely, not create and market content under soon-to-be-obsolete businesses and technologies of dissemination, when innovators are protected by either property rules or liability rules.

115. To wit, inefficient parties would invest nothing in creating and in taking precautions, which would be socially desirable. Their counterparts, knowing that they would not have to pay anything to inefficient parties, would invest optimally in their own projects and nothing in reducing the interference, which again would be desirable.

property rule or a modifiable liability rule, a court that later observes a revolutionary-technology scenario in litigation could still afford the innovator a property rule that would allow it to market the technology freely. Likewise, if Congress initially allocates to innovators a modifiable property rule or a modifiable liability rule, a court that later observes a harmful-technology scenario in litigation could still afford copyright owners a property rule that would enable them to enjoin the technology. A court that observes an efficient-coexistence scenario will simply apply the initial entitlement chosen by Congress.

All modifiable entitlements provide optimal investment incentives to parties foreseeing revolutionary-technology and harmful-technology scenarios. Each modifiable entitlement in these scenarios would protect the efficient party, driving it to invest optimally, and would deny protection to the inefficient party, driving it not to invest (which is again efficient). Modifiable entitlements thus could only distort investment decisions of parties in efficient-coexistence scenarios. What would these distortions be?

To answer the question, let us assume, for concreteness, a copyright owner and an innovator who contemplate investing in content and in a technology worth 100 each, where the interference accompanying concurrent marketing is 9. In addition, we shall assume that each can first invest 1 *ex ante* to reduce *ex post* harm by 2.5, and then invest an additional 1 to reduce harm by an additional 1.5. Socially, it would be desirable that each invest 2 in harm minimization, so that at a total precaution cost of 4, *ex post* harm would be reduced by 8. For expositional clarity, let us assume that the cost of creating for each party is anywhere between 1 and 90.

If copyright owners enjoyed a property-rule protection in efficient-coexistence scenarios, then they would be able to hold up innovators *ex post* with an injunction. Since lifting the injunction would be efficient—the parties would be able to jointly reap a value of nearly 100—the parties would bargain to that result. Assuming equal bargaining power, the innovator would have to hand over half the value of his innovation, about 50, to the copyright owner. While the copyright owner would invest in her project *ex ante* under a property-rule protection, regardless of where her cost fell in the 1 to 90 range, the innovator would not invest *ex ante* if his cost of creation were high—say, 70. As for precautions, notice that under this rule the parties each bear the cost of precautions fully *ex ante*, but can internalize only half of the associated reduction in harm *ex post*. Accordingly, each party would invest the first 1 in *ex ante* precautions, in order to increase its private *ex post* payoff by 1.25 (half of the social benefit of 2.5). Neither party, however, would invest another 1, because its ensuing private benefit would be only .75 (half of the social benefit of 1.5). In sum, copyright owners would undertake all efficient investments in content while innovators would invest only in some efficient technologies. Each party would take inadequate measures to reduce harm.

If copyright owners were protected by a liability rule in efficient-coexistence scenarios, then innovators would have the power to operate while paying copyright owners for the resultant harm. Each would choose to create as doing so would be profitable even assuming a maximal harm of 9. The copyright owner, however, is guaranteed to reap 100 ex post. Regardless of whether the harm were 1 or 9, she would be made whole. As taking ex ante precautions would be a mere waste for her, she would not take any. The innovator, however, would invest optimally, 2, in precautions, as he would internalize the associated benefits fully (in the form of paying reduced damages). In sum, copyright owners and innovators would invest efficiently in creating content and technology. Innovators would take all cost-effective precautions to minimize harm, while copyright owners would take none.

If the innovator were protected by a property rule in efficient-coexistence scenarios, then the interference would be suffered fully by the copyright owner. Knowing he can market the technology regardless of the interference, the innovator would not spend on precautions ex ante. This time the copyright owner would internalize fully the benefits of ex ante investments in harm reduction, and would therefore invest optimally, 2, to that end. Further, the parties would each invest in their projects regardless of the magnitude of harm. In sum, innovators and copyright owners would invest efficiently in creating technology and content. While copyright owners would take all cost-effective precautions to minimize harm, innovators would take none.

Lastly, if innovators were protected by a liability rule in efficient-coexistence scenarios, then copyright owners could stop them from operating by paying the value of the technology, 100. The copyright owner would not do that, however, because suffering a lower harm instead would make more sense. The innovator would invest in the technology. The copyright owner would invest in content and suffer the cost of the interference. As under the previous rule, the innovator would invest nothing in precautions, while the copyright owner would invest optimally to that end. The end result would thus be the same as a property rule in innovators. Innovators and copyright owners would invest efficiently in creating technology and content; and while copyright owners would take all cost-effective precautions to minimize harm, innovators would take none.

To conclude, the parties' investments under the modifiable rules would be as follows:

TABLE 18
Investment Distortions Assuming that Scenario Types Are Verifiable in Courts

Ex ante investments	Modifiable property rule in copyright owners	Modifiable liability rule in copyright owners	Modifiable property rule in innovators	Modifiable liability rule in innovators
Copyright owners' incentives to create	Optimal [Excessive]	Optimal [Highly excessive]	Optimal [Inadequate]	Optimal [Optimal]
Copyright owners' incentives to minimize the interference	Inadequate [Inadequate]	Highly inadequate [Highly inadequate]	Optimal [Excessive]	Optimal [Optimal]
Innovators' incentives to create	Inadequate ¹¹⁶ [Inadequate]	Optimal [Optimal]	Optimal [Excessive]	Optimal [Highly excessive]
Innovators' incentives to minimize the harm	Inadequate [Inadequate]	Optimal [Optimal]	Highly inadequate [Highly inadequate and perverse]	Highly inadequate [Highly inadequate]

Entries in brackets represent distortions assuming that scenario types are never verifiable, as in Table 17.

Table 17 above, whose content is repeated in brackets in Table 18 here, reflects the cumulative distortive effect associated with different legal rules when lawmakers cannot determine the type of particular content-technology scenarios ex post. Table 17 thus reflects, among other things, investments by clearly inefficient parties. Table 18 reflects a much-improved incentive structure that would follow if lawmakers could always verify scenario types ex post and modify initial allocations so as to deny protection to inefficient parties. Modifi-

116. Despite what a plain reading of the text in this box implies, a modifiable property rule in copyright owners improves innovators' incentives to create relative to the classic, nonmodifiable property rule in copyright owners. The reason is that the modifiable entitlement takes away copyright owners' holdup power in revolutionary-technology scenarios. The incentive is still inadequate (though to a lesser degree), since copyright owners' holdup power in efficient-coexistence scenarios remains intact.

cations, we saw, might happen in harmful-technology and revolutionary-technology settings. For parties in these two scenarios, all modifiable entitlements would generate optimal investment incentives, and are therefore indistinguishable. The distortions of modifiable rules reflected in Table 18 are those stemming from efficient-coexistence scenarios only.

While Table 17 unrealistically assumed that lawmakers can never observe ex post parties that had invested inefficiently ex ante, Table 18 unrealistically assumes that lawmakers can always do so. In reality, the ex ante incentives associated with alternative rules lie somewhere in the range between the values noted in the two tables. The better the courts' ability to verify scenario types during litigation, the better the bundles of ex ante incentives from which policymakers can choose.

For example, courts that can observe scenario types, and that wish to improve the parties' ex ante investment decisions, should be willing to reallocate entitlements even if the copyright owners and innovators before them can transact costlessly. The point of this prescription is not to achieve ex post efficiency. Taking their ex ante investments as given, and assuming frictionless bargaining, the parties will reach the efficient outcome ex post under any entitlement. For example, even if a harmful technology was created ex ante, under frictionless bargaining it would not be marketed ex post (even if the entitlement is not modified). Rather, the point of the modification prescription is to make the parties invest desirably ex ante. If courts deny protection to harmful technologies ex post, for example, none would be created ex ante. This prescription differs from the conventional wisdom pertaining to content-technology conflicts, according to which courts should consider whether to reallocate entitlements through the fair use doctrine only if the parties are unable to transact at the time of conflict.¹¹⁷

As is apparent from Table 18, even under complete ex post verifiability, no modifiable entitlement can provide optimal incentives to both parties. A major reason is that no legal rule can make both copyright owners and innovators invest optimally to minimize the interference between their activities. To induce both to take all cost-effective precautions, each would have to suffer the interference in full, which cannot be done in our bilateral setting.¹¹⁸ Still, accepting

117. Wendy Gordon has suggested that the fair use doctrine—a way for courts to reallocate entitlements from plaintiffs to defendants—should apply only when the parties cannot complete valuable trades ex post due to (1) bargaining costs that are higher than the related surplus, or (2) positive externalities that the parties cannot internalize. Gordon, *supra* note 6, at 1627-32. The analysis here shows that even in the absence of ex post transaction costs, reallocating entitlements ex post (such as through the fair use doctrine) may still be desirable, because it can help the parties overcome ex ante transaction costs.

118. Decoupling liability may solve this problem, but would be hard to implement. See *supra* note 69.

that we live in a second-best world, each modifiable entitlement is generally superior to its corresponding “classic” one.¹¹⁹

Which modifiable rule is best, assuming that the legal system can perfectly verify scenario type? The answer would depend, as before, on lawmakers’ judgments as to which investments are more important socially. For example, if lawmakers believe that guaranteeing adequate investment in technological innovation is the most important consideration, then they should not protect copyright owners with a property rule. Any of the remaining three rules would do, as they provide optimal marginal incentives to innovation. Furthermore, if lawmakers’ second most important consideration is to make innovators take all cost-effective measures to prevent harm, then they should protect copyright owners with a modifiable liability rule, as it would optimally induce this investment decision as well.

A few observations are in order in that regard. First, note that as far as inducing optimal ex ante behavior is concerned, there is no difference between protecting innovators with either a modifiable property rule or a modifiable liability rule. These two columns in Table 18 are identical (in the case of complete verifiability). This might serve as one possible explanation as to why the legal system has rarely protected innovators—or injurers more generally—with a liability rule. To the extent that our system largely incorporates mechanisms to perfect parties’ ex ante incentives by modifying initial entitlements (as the next Subpart illustrates to some degree), then the ex ante incentive effects of a liability rule in innovators (or injurers) are similar to those of protecting innovators (or injurers) with a property rule. If so, other reasons may explain courts’ tendency to prefer protecting injurers with a property rule rather than a liability rule; for instance, liability rules impose a greater informational burden on courts. Second, as Table 18 suggests, all modifiable rules would tend to cause copyright owners to invest efficiently. Hence, this consideration should not be given much weight in choosing among modifiable rules. Third, to the extent that the parties’ investment decisions in their projects are more important socially than their investment in precautions, protecting copyright owners with a property rule has a significant drawback. All other allocations involve only dis-

119. Modifiable entitlements are superior assuming that their associated benefits, in terms of improving the parties’ ex ante investment incentives, are greater than their associated administrative costs. This is likely the case since current litigation costs (and associated business costs) are already great. The current costs are generated, to a large extent, by the law’s vagueness and unpredictability (as the review of the case law in Part I above shows). If courts followed the entitlement modification prescription, parties would likely have a better way of predicting how courts would adjudicate infringement actions. Better predictability will likely decrease, rather than increase, litigation rates and costs. While the merits of modifiable entitlements surely depend on the degree of verifiability, it is unclear that their associated administrative cost (where at least a court’s inquiry would be predictable and follow a clear policy) is going to be any higher than the current one (where it is hard to predict what a court is going to look into and why, and where the use of precedent is limited by the particular doctrinal basis for copyright liability).

tortions of investments in precautions. A property rule in copyright owners distorts, in addition, innovators' investment in technology. A property rule in copyright owners is unique in the sense that it gives one party (copyright owners) a holdup power over the value of the project of the other (innovators) when both are efficient. A property rule in innovators does not give innovators a similar holdup power over copyright owners' works, because harm flows only in one direction in the real world (innovators, or injurers, do not need an injunction in order to act freely).

3. *Understanding Sony and Grokster*

Sony and *Grokster* can be read in a way consistent with the foregoing analysis, namely, as effecting a modification of background entitlements that fosters efficient ex ante investments.¹²⁰

Let us begin with *Sony*. Earlier, it was suggested that *Sony*'s staple article of commerce doctrine comes close to vesting a property rule in innovators. Why did the *Sony* Court believe that this entitlement struck the content-technology balance best? Let us work under the framework described in Part II and remember that the background allocation of entitlements in *Sony* was a property rule in copyright owners. Plaintiffs could easily make their case that home users violated their exclusive right to reproduce movies. Much in the case depended on whether users' conduct could be characterized as a fair and thus noninfringing use. Instrumental to *Sony*'s eventual victory was the Court's acceptance of users' fair use defense. Was the Court's use of the fair use doctrine to modify the entitlement prudent?

The *Sony* Court saw that plaintiffs' movies and *Sony*'s technology each had a positive value. It also accepted the district court's finding that the interference—or the harm that the VTR imposed on the movie studios—was negligible. If we designate the market value of the works of authorship by A , the market value of the technology by T and the interference by I , the Court knew

120. Several institutions can verify the nature of content-technology scenarios and modify entitlements accordingly ex post in the way suggested above. Candidates include Congress, courts, and expert agencies such as the Copyright Office or the Copyright Royalty Board. Note that although it is a part of the Library of Congress, the Copyright Office enjoys the rulemaking powers of an administrative agency. *Cf. Live365, Inc. v. Copyright Royalty Bd.*, 698 F. Supp. 2d 25, 42-43 (D.D.C. 2010) (holding that the Library of Congress is likely an executive department for purposes of the Appointments Clause). The Copyright Royalty Board, appointed by the Librarian of Congress, determines periodically the level of compensation due to copyright owners under statutory compulsory licenses that were put in place in response to the advent of various technologies of dissemination. 17 U.S.C. §§ 111-112, 114-116, 118-119, 1004, 1007 (2006 & Supp. IV 2010). *See generally* COPYRIGHT ROYALTY BOARD, <http://www.loc.gov/crb> (last visited Apr. 13, 2012). The focus on courts in this Subpart does not mean to suggest that they are the only institution up to the task.

that either $I \approx 0 < A < T$ or $I \approx 0 < T < A$.¹²¹ From a social perspective, return on the parties' investment was approximately $A + T$.

What would be the result of protecting copyright owners in such a scenario with a property rule? They would have the power to enjoin the sale of the technology.¹²² Under frictionless ex post bargaining, the parties would recognize that it would be beneficial for them to lift the injunction. Doing so, they would be able to jointly share in the value of the technology, T .¹²³ Assuming equal bargaining power, innovators would pay about $T/2$ to copyright owners and would be left with only $T/2$ as their private return on investment. Although it would be socially desirable that innovators create the technology if the costs of doing so were anything smaller than T , with copyright owners enjoying a property rule innovators would invest only if the costs were smaller than $T/2$. A property rule in copyright owners would therefore be suboptimal. As the private return on innovators' investment diverges from the social return, innovators will not manufacture many valuable technologies.

Consider, in contrast, the incentives generated by *Sony's* staple article of commerce doctrine for content-technology scenarios that fit *Sony's* fact pattern. Under *Sony's* doctrine, innovators enjoy the right to market their technology and are able to fully internalize its value, T . Innovators in similar fact patterns would thus invest in technological innovation at the optimal rate. Since copyright owners are able to internalize returns on their investment in full in any event, they would create even if *Sony's* doctrine governed the scenario. *Sony's* doctrine therefore provides the parties with superior incentives, and the Court's modification of the entitlement—by invoking the fair use and staple article of commerce doctrines—was commendable.

Let us now turn to *Grokster*. The parties in that case invested under the belief that *Sony's* doctrine was the governing standard, namely that innovators were protected by something close to a property rule. Let us examine whether enforcing *Sony's* rule would be desirable for content-technology scenarios resembling the one in *Grokster*. The Court's analysis suggests that it believed that *Grokster* had little or no real value¹²⁴—people used it almost exclusively to

121. A would stand for the eventual value of Universal Studios' movies. T would designate the market value of the VTR.

122. A small (and perhaps even merely probable) harm may suffice for an injunction (and consequent holdup power).

123. In *Sony*, the Ninth Circuit found for Universal and proposed a continuing royalty as a favorable remedy. See *Universal City Studios, Inc. v. Sony Corp. of Am.*, 659 F.2d 963, 976 (9th Cir. 1981) (remanding the case while suggesting that a continuing royalty may be the proper relief), *rev'd*, 464 U.S. 417 (1984). Had the Ninth Circuit's decision been upheld by the Supreme Court, the parties would have likely agreed on a royalty structure and rates. See, e.g., Andrew Pollack, *Fight over Home Videotaping*, N.Y. TIMES, July 6, 1983, at D1 (reporting pending bills that would impose royalties, with rates to be set by negotiations).

124. *MGM Studios Inc. v. Grokster, Ltd.*, 545 U.S. 913, 923-26 (2005). The VTR, by comparison, did have substantial value—it gave people the ability to time-shift. Pre-

get for free what they would have otherwise had to pay for.¹²⁵ The Court also believed that *Grokster* caused copyright owners great harm. The Court likely thought, under the notations above, that $T < I < A$, namely that the scenario before it was a harmful technology.¹²⁶

Which allocation of the entitlement would induce the parties to invest optimally in cases resembling *Grokster*'s fact pattern? The efficient thing in such cases would be to shut down the technology. Doing so would come at a small loss of T but would prevent the greater loss of I from materializing. From a social perspective, we would not want the innovator to invest anything in developing such a technology, and we would want the copyright owner to invest in creating content as if she acted in the world alone.

What would *Sony*'s standard cause innovators like *Grokster* to do? The parties would anticipate the bargaining that would take place if they were to create. Absent agreement, both would begin by marketing their creations ex post. *Grokster* would market its technology and realize a value of T . Copyright owners would market their content and realize a value of $A - I$. The parties would see, however, that shutting down the technology would allow them to jointly capture an added value of $I - T$. Assuming equal bargaining power, the parties would share equally in the gains from trade. *Grokster* would end up with a value of T (the amount it could realize absent agreement) plus $(I - T)/2$ (half of the bargaining surplus), or $T/2 + I/2$. Copyright owners would end up with $A - I$ (the amount they could realize absent agreement) plus $(I - T)/2$ (half of the bargaining surplus), or $A - I/2 - T/2$.

How would the parties invest? Let us start with the copyright owner. She would internalize A in full and would therefore invest optimally in creating content. She would, however, invest excessively in harm minimization. While no interference would be suffered ex post (since the technology will not be marketed), in the bargaining process leading to this efficient result the copyright owner's share would be reduced by half of the would-be interference. As a result, the copyright owner would invest in some precautions to minimize the interference. In sum, if the law allowed manufacturers of inefficient technologies to market them, copyright owners would take excessive self-help measures to combat infringement.¹²⁷

Grokster, people had other ways to distribute content online, such as by making it available on websites.

125. The Court saw *Grokster* as an attempt to recreate Napster, which it noted was shut down for facilitating mass infringement. The Ninth Circuit believed that one of the chief aims of Napster users was "sav[ing] the expense of purchasing authorized copies." *A&M Records, Inc. v. Napster, Inc.*, 239 F.3d 1004, 1015 (9th Cir. 2001).

126. Alternatively, the Court may have thought that $T < A < I$, in which case a similar analysis to the one in the text would follow. However, *Grokster*'s investment in harm enhancement suggests that the $T < I < A$ scenario is more plausible.

127. Note that the copyright owner's lot would be diminished by $T/2$. This would not distort her marginal ex ante investment decision, since she cannot affect the size of T through her investments. From her perspective, this is simply a transfer payment that she has to make

What incentives would a property-rule protection give the manufacturers of inefficient technologies? As the formula above shows, they would be able to reap, in ex post negotiations, an amount equal to half of the technology's value. Therefore, innovators would have an incentive to invest in enhancing the value of harmful technologies.¹²⁸ Such investment, however, would be wasteful since the technology would not be marketed eventually. Additionally, innovators would internalize half of the would-be interference as private benefit. They would invest to enhance the technology's adverse effect on copyright owners' business, because they would know that the greater that effect, the more they would be able to extract in return for shutting down. Such intentional generation of harm is clearly wasteful.

Let us now consider what would happen if courts could modify and reallocate the entitlement in such a case to copyright owners, as the Supreme Court did in *Grokster* when it created a new theory of liability for active inducement. Protecting copyright owners with a property rule would allow them to operate and enjoin the marketing of the technology. Copyright owners would be able to act freely, and would internalize the value of their content, *A*. They would invest optimally in content creation. They would also invest at the efficient rate, zero, in minimizing the interference, as they would suffer none. Under such a rule, the manufacturer of the technology would expect to be able to extract nothing in ex post negotiations, and therefore would invest nothing—the socially optimal rate—in creating the harmful technology and in enhancing harm. Expecting courts to modify the entitlement in this way ex post, the parties would invest optimally ex ante.¹²⁹

The *Sony* and *Grokster* Courts can thus be understood to have acted in ways consistent with the prescriptions laid out in this Part. *Sony* and *Grokster* show that courts often observe the information necessary to modify entitlements under the framework above, and can reallocate entitlements away from inefficient parties and toward efficient ones in some cases.

to technology manufacturers. This point may serve to emphasize that the Article focuses on exploring the marginal investment decisions that different entitlements entail. The entitlements, however, also involve various transfer payments. Such transfers affect industry profits and consequentially entry and exit. The analysis of these effects is beyond the scope of this Article.

128. For example, they would invest a marginal 1 if it enhanced the value of the technology by more than 2.

129. As mentioned above, modifying the entitlement by protecting the copyright owner with a liability rule would reach the same result. See *supra* note 114 and accompanying text. The innovator would know that if he invests in creating the harmful technology, he would still not be willing, in the ex post negotiations, to pay to the author an amount equal to the interference, *I*, in order to be able to operate and realize a smaller amount, *T*. In such ex post bargaining, the innovator would minimize his losses by simply ceasing to operate. Foreseeing this eventuality, the innovator would not invest anything to get there.

As others have noted, the fair use doctrine can be understood as a legal mechanism to ensure the advent of valuable innovation.¹³⁰ The availability of the fair use doctrine in litigation can lead those who contemplate valuable technologies to actually make them. In the current doctrinal landscape, it would be desirable to make the doctrine available as a defense in all content-technology conflicts, even in those where it is currently unavailable.¹³¹

The modification of initial entitlements depends, under the framework above, on the ability to verify the nature of content-technology scenarios. To do so, courts (for example) need to be able to assess the relative values of *A*, *T*, and *I*. In fact, one may read the statutory fair use doctrine as guiding courts' attention to these variables.¹³² The fourth fair use factor, for example, "the effect of the use upon the potential market for or value of the copyrighted work," as well as the third factor, "the amount and substantiality of the portion used in relation to the copyrighted work as a whole," can both be understood as calling upon courts to consider the size of the interference, *I*. The second factor, "the nature of the copyrighted work," can be understood as focusing courts' attention on the value of the work of authorship, *A*. The first factor, "the purpose and character of the use," can be understood as focusing courts' attention on the new technological use, and thus on the value of the innovation, *T*.

But what about reallocations in the opposite direction—cases in which the entitlement is initially allocated to innovators but where a court observes a harmful technology? In other words, what if lawmakers believe initially that the entitlement should be allocated to innovators, but then technological change suggests that it should be allocated to copyright owners? One way to handle such cases might be to generate new theories of liability on an ad hoc basis. The *Grokster* Court's announcement of intentional inducement as a new theory of liability seems to fit this pattern. There could be other ways to reach the same result.¹³³ There is, however, no generally applicable doctrine to modify

130. The first to emphasize this feature of the doctrine was Wendy Gordon. See Gordon, *supra* note 6. Others reemphasized this over the years, and some have further elaborated on the role of copyright law in terms of affecting the incentives of technology companies. See, e.g., Edward Lee, *Technological Fair Use*, 83 S. CAL. L. REV. 797 (2010); Douglas Lichtman, *Copyright as Innovation Policy: Google Book Search from a Law and Economics Perspective*, in 9 INNOVATION POLICY AND THE ECONOMY 55 (Josh Lerner & Scott Stern eds., 2009); Fred von Lohmann, *Fair Use as Innovation Policy*, 23 BERKELEY TECH. L.J. 829 (2008); Robin A. Moore, *Fair Use and Innovation Policy*, 82 N.Y.U. L. REV. 944 (2007); Picker, *supra* note 6.

131. Thus, there is a strong policy reason to make it available, for example, to lawsuits based on the Digital Millennium Copyright Act's anticircumvention provisions, 17 U.S.C. §§ 1201-1205 (2006 & Supp. IV 2010).

132. 17 U.S.C. § 107 (2006).

133. There could be instances in which certain rights are outside copyright owners' bundle, and so copyright owners are discouraged from taking on efficient authorship projects because certain technologies of copying and dissemination are legal. In some cases, the fair use doctrine can prevent that problem as well. In *Perfect 10, Inc. v. Amazon.com, Inc.*, for example, a content website sued Google and others for creating and showing thumbnail ver-

and reallocate entitlements to copyright owners if those entitlements are clearly outside their statutory bundle of exclusive rights. Often, copyright owners would have to go to Congress. This state of the doctrine may suggest the need for a doctrinal innovation—a “reverse fair use” doctrine. The absence of such a doctrinal tool, however, might explain something about copyright law. Since reversals away from copyright owners are much more feasible doctrinally than reversals away from innovators, it makes some sense to allocate overly broad entitlements to copyright owners, and then cut back on them when appropriate under the fair use doctrine. In other words, if initially overbroad allocations to copyright owners can later be corrected through the fair use doctrine, but no analogous corrections can be made to initially overbroad allocations to the contrary, then the limitations of current doctrinal tools militate toward erring on the side of overprotection. The expansion of copyright’s scope and the simultaneous expansion of the fair use doctrine over the past century and a half (a time period characterized by rapid change in dissemination technologies) are consistent with this logic.¹³⁴

4. *Coordination of ex post precautions in an efficient-coexistence setting*

Sometimes, the parties may take interdependent precautions ex post. These are harm-minimizing measures whose effectiveness depends on coordinated action. Assume, for example, that in the VTR case, ex post harm could be minimized further if copyright owners coded their movies or tapes in a certain way, and then innovators designed their VTRs not to record coded content. Since ex ante copyright owners can choose endless coding formats, innovators cannot implement such a scheme in their VTRs under prohibitive ex ante transaction costs. Ex post, however, coordination is possible. But once courts have held that innovators face no liability for the technology’s manufacture, innovators will have no incentive to implement the coding system. This suggests that

sions of its copyrighted photos as part of the search engine’s results. 508 F.3d 1146, 1154 (9th Cir. 2007). The background rule to the case came from *Kelly v. Arriba Soft Corp.*, holding the search engine’s conduct to be fair use. 336 F.3d 811 (9th Cir. 2003). Perfect 10 argued that the law should be changed because, in contrast with the *Kelly* plaintiff, it had suffered actual harm, resulting from the (arguably) newly opened market for thumbnail downloads for cell phones. Perfect 10 lost the case because it could not substantiate its claim that it suffered real harm, or that such a market really existed. *See Perfect 10*, 508 F.3d at 1168. However, the possibility remains that had Perfect 10, the party arguing for modifying and reallocating the entitlement, been able to prove that harm was great, the court might have modified and reallocated it to copyright owners.

134. *See* Matthew Sag, *The Prehistory of Fair Use*, 76 BROOK. L. REV. 1371 (2011) (arguing that the historical expansion of copyright law happened simultaneously with the expansion of the fair use doctrine).

lawmakers can serve a useful role in mandating the use of coordinated ex post precautions, as one court has.¹³⁵

5. *When the interference approaches zero*

The case of zero interference is worthy of special attention. Formally, it falls within the efficient-coexistence scenario, for which no allocation is presumptively superior. But in this particular case, allocating the entitlement to innovators becomes presumptively desirable.¹³⁶ Protecting copyright owners with a property rule, in contrast, would allow copyright owners to use their power of injunction to extract a considerable part of the technology's value ex post, and to substantially dilute incentives to invent.¹³⁷ When the harm from interference approaches zero, a finding of fair use should often follow. Indeed, various pro-innovator outcomes in cases involving a copyright-innovation conflict can be rationalized economically by a fact pattern of no interference.¹³⁸ In contrast, when the harm from interference is substantial, that harm—while relevant—would not be as outcome determinative (in favoring an entitlement for the copyright owner) as in the case of zero harm (which generally should entail a fair use finding—i.e., a property rule in the innovator).¹³⁹

135. *See* A&M Records, Inc. v. Napster, Inc., 239 F.3d 1004, 1027 (9th Cir. 2001) (indicating that once copyright owners inform Napster about infringing files on its system, Napster has an affirmative duty to purge them).

136. It would not matter whether by a property rule or a liability rule, as in each case both actors would operate and the minimal interference harm would fall on copyright owners.

137. Protecting copyright owners with a liability rule would seem to be a theoretically plausible solution. However, as mentioned above, *see supra* note 109 and accompanying text, in our particular context the availability of statutory damages often turns this entitlement into what is essentially a property rule in copyright owners.

138. *See, e.g.,* Lewis Galoob Toys, Inc. v. Nintendo of Am., Inc., 964 F.2d 965 (9th Cir. 1992) (regarding a computer game enhancement device). Consider also 17 U.S.C. § 110(11) (2006), which exempts from liability technologies that enable users to watch films while filtering out objectionable content. One such technology was provided by Clear Play. *See* CLEAR PLAY, <http://www.clearplay.com> (last visited Apr. 13, 2012). Clear Play was initially sued for copyright infringement, but once Congress enacted the aforementioned exemption, the case became moot. *See* Huntsman v. Soderbergh, No. 02-cv-01662-RPM-MJW, 2005 WL 1993421 (D. Colo. Aug. 17, 2005).

139. When the interference is greater than zero, courts that are intent on applying modifiable entitlements would have to know the magnitude of A and T as well in order to verify the type of the scenario ex post.

IV. LIMITATIONS AND EXTENSIONS OF THE ANALYSIS

A. *Relaxing Assumptions*

The analysis was conducted under a series of assumptions. I will now turn to discuss the extent to which the analysis would still be useful in contexts where the model's assumptions do not strictly hold. Admittedly, I will not be able to conduct a full analysis—of the type conducted in the previous Parts—for each assumption relaxed; that exercise would be beyond the scope of this Article. Rather, my intention is to suggest the framework's utility beyond the stylized assumptions made.

1. *Allowing for externalities*

When it comes to the copyright-innovation intersection, courts and commentators to date have agreed that society's main policy goal is to trade off incentivizing authorship and incentivizing innovation. To illuminate the workings of this particular tradeoff, and show how each party would act under different legal rules, the analysis above has abstracted away from third-party effects. Copyright owners and innovators, however, may not be the only parties implicated. Third parties, such as consumers, may also derive benefits and suffer harms from the creation of new content and technology, and may perhaps make *ex ante* investments that affect the size of those benefits and harms.

The analysis above is applicable in cases where third-party effects either do not exist or are trivial, or more generally when their existence would not make the parties' jointly preferable course of action differ from the one that is socially desirable.¹⁴⁰ But even when this is not the case, the analysis above can still serve lawmakers as a benchmark for the relative performance of alternative legal rules in terms of the degree to which each would promote different investment decisions by the parties. Furthermore, various dynamics emphasized above remain true even in the presence of externalities. For example, some innovators' incentives to invest in harmful technologies under a property rule in innovators solely in order to extract payment in return for shutting down would still exist, whether or not that effect is accompanied by an even greater benefit to third parties.

140. Positive externalities on consumers might, for example, be of lesser moment to the extent that the ratio of consumer surplus to producer surplus to deadweight loss is roughly the same as between markets for content and technology. If so, in maximizing their joint welfare, the parties would tend to maximize social welfare.

2. *Relaxing the assumption of predictability of scenario type*

The analysis above assumed that copyright owners and innovators can perfectly predict ex ante the ex post scenario that will obtain. Such a strong assumption—adopted for expositional clarity—is not necessary. The analysis would be equally correct when the parties invest under uncertainty ex ante, as long as they each ascribe the same probabilities to the likelihood that each of the three scenarios will obtain ex post.¹⁴¹

3. *Relaxing the assumption of equal bargaining power*

The assumption about the parties having equal bargaining power was adopted for expositional purposes. This Article's findings would generally hold under any assumption about the parties' relative bargaining power. For example, Table 4 notes that innovators are expected to have inadequate incentives to create if copyright owners are protected by a property rule. The reason is that in efficient-coexistence and revolutionary-technology scenarios, copyright owners are able to extract half the technology's value in ex post negotiations in return for letting the innovator operate. Even if innovators' bargaining power were substantially lower or greater than that of copyright owners, rather than equal to it, innovators would still have inadequate incentives to create, as some portion of the value of their technology would be taken away from them. At the same time, different assumptions about bargaining power may make the effects noted in Table 1 more or less worrisome. In the example above, innovators' inadequate incentives would become more inadequate as their bargaining power with respect to copyright owners decreased, and would become less inadequate as their bargaining power increased. Varying the assumption about the parties' relative bargaining power would alter the model's prediction quantitatively rather than qualitatively.

4. *Varying the relative likelihood of the three scenarios*

The analysis assumed that content-technology interactions of all three scenarios are possible. But what if some scenarios occur, or are expected to occur, with a greater probability than others? Similar to the analysis above, varying the probability with which different scenarios occur will have quantitative implications for the model's predictions. For example, Table 4 notes that innovators are expected to have inadequate incentives to create if copyright owners are protected by a property rule. The reason is that in efficient-coexistence and revolutionary-technology scenarios copyright owners are able to extract half

141. In this alternative exposition, the parties observe ex post which scenario obtained, and contract accordingly in the shadow of law. This alternative setup is the one in Bebachuk, *Ex Ante View*, *supra* note 69, at 602-05.

the technology's value in ex post negotiations in return for letting the innovator operate. In harmful-technology scenarios, however, innovators are not expected to create at all, which is socially optimal. Innovators' inadequate incentives, while always inadequate, will decrease further as the likelihood of efficient-coexistence and revolutionary-technology scenarios increases relative to harmful-technology scenarios. Therefore, as the likelihood of harmful-technology scenarios increases, lawmakers should worry less about innovators' inadequate incentives to create, because innovators' incentives will approach optimality.

5. *Decreasing ex ante transaction costs below a prohibitive level*

When the parties can transact costlessly ex ante, before any investments are made, the inefficiency problem largely goes away.¹⁴² In such cases, when transaction costs are zero both ex ante and ex post, the parties will invest as one economic party would, and will tend to make efficient investment decisions. For example, in harmful-technology scenarios, the parties would not invest in creating the technology.

It is possible that in some cases copyright owners and innovators can transact ex ante and coordinate their investments. One example might be DVD technology, which is regulated by the DVD Copy Control Association (DVD-CCA)—a not-for-profit corporation whose members include major consumer electronics manufacturers and movie studios. The DVD-CCA is responsible for licensing the Content Scramble System (CSS) technology to manufacturers of DVD players and discs.¹⁴³ Incorporating encryption in the DVD standard serves the interests of content providers (in reducing piracy) and those of hardware manufacturers (in avoiding liability for copyright infringement). A corporation like the DVD-CCA represents a prior agreement between the parties to coordinate their investments. The ability to transact is particularly salient in cases of repeat interaction between players in the two industries. Where ex ante transaction costs are zero, then the law generally loses much of its importance and the parties can transact around it and act efficiently (according to the Coase theorem). These cases—leaving antitrust issues aside—are also less likely to reach the legal system.

But in other cases the parties are not able to transact and coordinate all of their ex ante investments. For example, the parties may not be able to coordinate in cases in which there is no repeat interaction—such as the case of start-up companies. Even in cases of repeat interaction, coordination may be hard to achieve. One such example might be the Secure Digital Music Initiative,¹⁴⁴

142. See *supra* note 76.

143. See *About Us*, DVDCCA, <http://www.dvdcca.org/about.aspx> (last visited Apr. 13, 2012).

144. See *Secure Digital Music Initiative*, WIKIPEDIA, http://en.wikipedia.org/wiki/Secure_Digital_Music_Initiative (last visited Apr. 13, 2012).

which was a failed attempt by consumer electronics manufacturers and the recording industry to come up with a secure format to protect music as it is played, stored, and distributed. Certainly, the many cases that reach litigation—such as those reviewed in Part II, above—show that the likelihood of prohibitive ex ante transaction costs is substantial and that such costs have indeed bothered the copyright system for decades. It is this subset of cases with which this Article is primarily concerned.

Even if parties are able to transact at some later time, there is virtually always an earlier point in time where the parties invest but cannot yet transact. Take the *Sony* case, for example. Before Sony and Universal Studios were able to agree on anything, Sony had to be founded in Japan and it had to build a plant, hire engineers, undertake research and development activity, invent the VTR, and found a United States subsidiary, among other things. Similar activities could be detailed on Universal's side. Even if there are no further impediments to ex ante transactions, the analysis above is relevant at least in regard to all those investments that precede that point in time when the parties can communicate.¹⁴⁵

As mentioned above, when copyright owners and innovators are able to transact costlessly, they would tend to act as one economic actor would. Assuming no third-party effects, they would tend to invest efficiently. In the presence of third-party effects, however, this may not be the case. While agreement among copyright owners and innovators would make them better off, society as a whole might not be. For example, in the case of the DVD encryption standard, it cannot be guaranteed that the convenience to consumers and users afforded by this standard outweighs the costs imposed on them (their inability to fast forward through certain tracks of the DVD or to engage in certain fair uses). Social optimality would generally require affected third parties—such as consumer and user groups—to take part in setting technological standards for the enjoyment of content.

6. *Increasing ex post transaction costs above zero*

The assumption of zero ex post transaction costs was made because in virtually all the cases reviewed in Part I above, it seemed that the parties—profit-maximizing corporations—could have easily reached an agreement (at least had the law been clear). In *Sony*, for example, the parties were negotiating a continuing royalty after the Ninth Circuit's holding for the studios and would have likely agreed to one had the holding been affirmed in the Supreme Court. Assuming a relatively clear law—either under a fixed entitlement or under modifiable entitlements that are allocated according to clear, predetermined rules—it seems reasonable to assume frictionless transactions ex post.

145. See *supra* note 76.

What would happen, however, in cases where ex post transaction costs impede trade? In such cases, the results predicted under liability rules would remain unchanged. Whenever it is efficient that the nonprotected party invest, it would do so. This is because under liability rules, the entitlement can pass without a voluntary transaction.

Under property rules, the efficient ex post result sometimes requires a voluntary transaction. Specifically, under a property rule in copyright owners, achieving ex post efficiency requires a voluntary transaction in efficient-coexistence and revolutionary-technology scenarios. Under a property rule in innovators, achieving ex post efficiency requires a voluntary transaction in harmful-technology scenarios. In such cases, when ex post transaction costs would be high enough to prevent mutual exchange, ex post efficiency will not be achieved, and, by extension, ex ante investments would be further removed from social optimality than the model predicts. To say more, particular assumptions about the nature of ex post transaction costs would have to be made in order to analyze the effect on incentives to create. Still, the analysis above would be valuable, and can be readily adapted, to analyze the effects on ex ante incentives.

For example, assume an efficient-coexistence scenario where copyright owners are protected by a property rule and ex post transaction costs are prohibitive. In such cases, copyright owners will rely on their ability to enjoin the operation of innovators. They would reap A ex post. Innovators would expect to be enjoined ex post and to not be able to transact over the entitlement. They will reap zero and invest nothing. Total value will be only A rather than $A + T - I$. While copyright owners would invest optimally in value, innovators will not invest at all.

Prohibitive transaction costs would have one benefit, though. In harmful-technology scenarios that induce innovators to intentionally harm copyright owners, innovators would now lack the prospect of extorting copyright owners in ex post negotiations in return for shutting down their harmful technologies. As a result, their perverse ex ante incentive to invest in harm generation would disappear.

7. *Different entitlements*

This analysis has focused on property rules and liability rules. These can be thought of as merely focal points on a spectrum of entitlements. As already shown above, one can extrapolate from the analysis of these particular entitlements to the tradeoffs that many additional entitlements would entail.¹⁴⁶

Other rules that Calabresi and Melamed analyzed are inalienability rules. Under these rules, the law does not allow parties to transact, and the analysis

146. See *supra* Part III.B.1.

would resemble the one just above regarding the case of prohibitive ex post transaction costs.

B. *Optimal Timing of Modification*

The suggested modification of entitlements, if implemented by courts, might be biased toward favoring copyright owners due to its timing. The legal institution verifying the nature of the parties' ex post scenario would need to verify the relative magnitude of the values of the parties' activities and of the interference in order to determine whether an efficient-coexistence, harmful-technology, or revolutionary-technology scenario obtained. In the stylized model above, timing played no role. At the ex post time of decision, the values of the parties' activities and the concomitant interference were assumed to be fully realized and verifiable. This may often be the case, or nearly so. The analysis would still hold for cases in which these values unfold at about equal pace across time, such that their relative magnitude does not change. Still, the aforementioned assumption might be harder to maintain in cases in which the various values unfold over time at different paces. For example, the harm to copyright owners' business model may be present and verifiable shortly after a new technology's introduction, while the technology's benefit may depend on gradual public adoption and may thus take time to materialize. Since copyright lawsuits are usually filed shortly after a new technology's introduction, and since courts decide cases based on the evidence before them and are generally reluctant to entertain arguments about speculative future benefits (or harms), courts may systematically disfavor new technologies.

It is possible to mollify such potential bias in premature cost-benefit analyses of new technologies by incorporating delay into the relevant institution's decisionmaking. How this could be done practically is far from obvious. One possibility is that legal regulation of new technologies, as well as lawsuits respecting them, could be barred for a certain number of years after their introduction. Courts that believe added time or information would improve their decision might use their discretion and powers to delay judgment. Delaying the moment of decision could make courts better informed, and would generally be beneficial in efficient-coexistence and revolutionary-technology scenarios. But delay has its costs, such as exacerbating the loss suffered in case the scenario turns out to be a case of harmful technology.

The optimal time of decision would be that point where the marginal benefits of further delay just equal its costs. To the extent that entitlement modification is done by courts, and to the extent they cannot delay their decisions, there might be other ways to correct the systematic bias from premature decisionmaking. One such way would be to avoid a strict cost-benefit analysis, and have the legal test be friendlier to innovators; another way would be for courts to be more receptive to arguments about future benefits than they usually are. Indeed, *Sony's* permissive, protechnology test is consistent with this logic.

To the extent that Congress's timing of decision tends to be closer to the optimal one than courts' timing, and to the extent that Congress has a better view of the nature of technologies' interaction with content—whether because it often (but not always) takes longer for copyright-innovation conflicts to land on Congress's table, because Congress has greater control over timing, or because it has a better institutional capacity to gather information and look at technological developments beyond the narrow context of a specific dispute—a judicial policy of deference to Congress's judgment makes sense.¹⁴⁷

CONCLUSION

The business models of copyright owners have been disturbed by the advent of new technologies time and time again for well over a century now. These dynamics are expected to continue in our information-driven technological age. The adaptation of copyright law to technological change has not followed any deliberate path. This Article has systematically studied several approaches that lawmakers might take to manage the tradeoffs between authorship and innovation, and has charted the disparate incentives that these approaches would generate for these creative parties to engage in their activities and to minimize the friction between them. It has also proposed that instituting mechanisms to modify entitlements in light of later-revealed information can improve copyright owners' and innovators' incentives to create. Hopefully, this framework and this proposal will prove helpful to lawmakers as they determine the copyright liability of innovators of technologies to come.

147. *See, e.g.,* *Sony Corp. of Am. v. Universal City Studios, Inc.*, 464 U.S. 417, 431 (1984) (“Sound policy, as well as history, supports our consistent deference to Congress when major technological innovations alter the market for copyrighted materials.”).