

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

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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 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 them.

The Article offers three major contributions: (1) it allows lawmakers to rank order different entitlements according to the degree to which they promote the aforementioned investments, (2) it shows that a property rule in technological innovators might drive them to harm copyright owners intentionally, and (3) it suggests that a power in lawmakers to modify initial legal entitlements based on information revealed later could improve the parties' incentives to invest. While the analysis is conducted in the specific context of copyright owners and technological innovators, its contributions hold more generally for externalities between economic activities of "victims" and "injurers."

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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 them from liability would promote innovation but chill authorship.⁴ How should the law balance these two interests?⁵

1. U.S. CONST. art. I, § 8, cls. 1, 8 (“The Congress shall have 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 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 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 be-

This question has been asked respecting each of the technologies above and many others. Each time, however, courts and Congress have answered it differently. The law has alternated over time between protecting copyright owners and inventors 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 lia-

tween 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 trade-off. The tension between the two values is the subject of this case" (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 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 CAL. 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).

bility rules to copyright owners and innovators would induce each to invest in both its own trade and 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 them to produce harmful technologies and to actively promote their use for infringement. Such inefficient investments in technology creation and harm generation may allow them to extract value from copyright owners. Imagine, for instance, an innovator contemplating a technology—such as an online file-sharing network—with 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 it creates, the innovator can invest an extra 5 merely to increase the technology’s harmful effect to 200. While a net loss in social welfare, 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 settlement 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, preceding 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 behavior of the innovator enjoying a similar protection in the numeric example in the preceding paragraph. Further consistent with it 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 numeric example above found it privately profitable to invest in a socially harmful technology. When it comes to technological change, lawmakers often cannot pre-

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 (1984).

10. The value in those negotiations was that Napster would become the labels’ exclusive online retailer. See *infra* note 101 and accompanying text.

dict 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 observe 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 already created. In such a case, under costless bargaining, the efficient result will happen regardless of the applicable entitlement, as the example above has shown.¹² Rather, this prescription would make the parties invest efficiently at an earlier time when they cannot yet transact.¹³

The Supreme Court's decision in *MGM Studios, Inc. v. Grokster, Ltd.*¹⁴ suggests that the legal system is at times capable of observing 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., was of little or no independent value yet created great harm to copyright owners¹⁵) and so it reallocated entitlements. Doctrinally, it did so by crafting a new theory of liability—intentional inducement—that led to a reversal of the outcome below.¹⁶ Provision of improved investment incentives therefore necessitates mechanisms to reallocate entitlements from innovators to copyright owners in the right cases (such as by way of the Court's doctrinal innovation in *Grokster*), but also from copyright owners to innovators. The fair use doctrine is one major way in which the latter reallocation can be done, and indeed *Sony* can be read to have used the doctrine in this way.

The 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 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

11. See *infra* note 118 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 99, 125-127, and accompanying text.

16. See *infra* Part I.A.

descriptive and prescriptive implications. Part IV discusses two possible objections to the analysis that have to do with timing and the harmful nature of the interference. The Conclusion follows.

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 liability for end 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

The Supreme Court first considered innovators' indirect liability in *Sony*,¹⁹ a case that involved the company's liability for manufacturing the Betamax

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 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.

Video Tape 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 served as the

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 458-59 ("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)); *id.* at 447-56 (majority opinion) (finding time-shifting to be a fair use).

23. *Id.* at 442.

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* 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

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

or most of the time."); *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 need 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 expected to entertain in the future (though it does not at present) a nonmarginal (though not predominant) legitimate use. 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). 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 paucity of 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-discs-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 audio tape technology, which Sony itself was a major producer of 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 Act of 1991—Merrie Melodies or Loonie 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*

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

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 v. Napster*, 114 F. Supp. 2d 896, 911 (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."); *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 . . . the probable scope of copyright infringement is staggering."); *id.* at 940 ("There 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, 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.").

32. 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

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 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 almost everyone when it created a new theory. Will the Court generate additional secondary liability standards? When? Second, secondary liability has traditionally been imposed under the doctrines of contributory and vicarious liability.³⁸ The lumping of required elements under each of these doctrines does not make complete sense.³⁹

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 *Groskter*, such liability existed in two forms, contributory liability and vicarious liability. . . . Now, after *Groskter*, a defendant also faces liability if she acts with the object of promoting infringement by others.” (footnotes 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 meaning of “substantial” and “capable,” that 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 committed 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

Third, should the doctrine of vicarious liability apply to content-technology conflicts? While the doctrine was not before it, the *Sony* Court treated it 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 and inducement doctrines, respectively, from patent law into copyright law while relying on the “historic kinship” between the two.⁴³ However the Court refused to make similar analogies in other cases,⁴⁴ and has not yet put forth a criterion for when such analogies are appropriate. In that regard, *Sony*’s dissent and scholars have argued that the rationales for imposing secondary liability in patent law and copyright law are markedly different.⁴⁵

At bottom, the Court never really explained why its holdings reflected the right content-technology trade-off. Take *Grokster*, for example. Indeed, 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 Court know that the benefits of imposing liability (i.e., promoting

(9th Cir. 1996). The doctrines’ particular pairing of elements is hard to make sense of. 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. *Sony*, 464 U.S. at 435 n.17.

41. *MGM Studios, Inc. v. Grokster, Ltd.*, 380 F.3d 1154, 1160-67 (9th Cir. 2004); *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. *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 CAL. L. REV. 941 (2007); David Nimmer & Peter Menell, *Copyright’s “Staple Article of Commerce” Doctrine: Patently Misguided*, 53 J. COPYRIGHT SOC’Y 365, 374 (2006) (noting *Sony*’s “dubious premise that patent law furnishes the template for construing the copyright statute”); *see also* Picker, *supra* note 6, at 444 (doubting whether the “staple article of commerce” doctrine is applicable to content-technology conflicts).

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 depended on the application of, a variety of 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

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. Arctic International, Inc.*, the Seventh Circuit decided that devices that sped up games in arcade machines created infringing deriva-

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 agreeable price. For a discussion of the consequences of such 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 (listing conditions for the applicability of the statutory license).

51. See 17 U.S.C. § 106(2).

tive 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' disposition 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' use that 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 deci-

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

53. 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. 964 F.2d 965 (9th Cir. 1992).

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. 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 that 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.

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

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).

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sion 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 Another example is that in a series of cases, copyright owners in 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 Stricken the Copyright-Innovation Trade-Off 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 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 intervened later and changed the judicial outcome. Results have varied. Some

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

62. Copyright Act of 1976, 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 proceeds to trial.

64. The AHRA is a complex regulatory scheme mandating the inclusion of an anti-piracy device into certain music players and a taxing scheme on certain blank media and music players for the benefit of copyright owners. 17 U.S.C. §§ 1001-1010 (2006). It was put in place in 1992 to regulate the use of a new technology, the digital audio tape 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); *321 Studios v. MGM Studios, Inc.*, 307 F. Supp. 2d 1085 (N.D. Cal. 2004); *Universal City Studios, Inc. v. Reimerdes*, 111 F. Supp. 2d 294 (S.D.N.Y. 2000).

conflicts ended in copyright owners obtaining a right in the new technological use, but other times the right was allocated to innovators. In some cases the victorious party enjoyed 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 depended on the application of any one of various doctrinal tests, including those 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 done so in a mechanical way, unguided by any clear logic, policy, or objective. Most troubling is that only a few courts realized the existence of a content-technology conflict, and that no consistent approach has arisen to balance the competing interests of incenting authorship and innovation.

II. A FRAMEWORK FOR APPROACHING THE COPYRIGHT-INNOVATION TRADE-OFF: 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 them. 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. 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*]; 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.

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 creator and second-generation improver in patent law and in copyright law). Lastly, Oliver Hart, upon whose work Lucian Bebchuk built, see Bebchuk, *Ex*

A. *The Framework: Assumptions and Setup*

Assume a world with economically motivated actors, some of whom might eventually become copyright owners and some 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 vest in the parties different bargaining powers that allow them 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 enjoying 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 cre-

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. As for assumptions, it 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 later 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.

ated 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 to invest and complete its project or to abandon it. In particular, the copyright owner decides whether to invest under extant business model and technologies for marketing content 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 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 rather *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

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 centrally. 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 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 value under a new technology of dissemination.

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

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 Sixth Circuit recognized, encryption can enhance lawful uses as well because of added privacy. 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 necessitates knowledge of the infringement). The Seventh Circuit frustrated Aimster's plan, generally attributing knowledge to it on the theory of willful blindness.

Ex ante, the parties invest under prohibitive transaction costs. Neither party can condition any of 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.

Should all works of authorship and technologies be created? 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 can be put into one of three categories. For each category, it is possible to answer the aforementioned question clearly.

The first category of content-technology pairings will 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

76. Clearly, if transaction costs are zero both ex ante and ex post, then any allocation of the entitlement would be efficient. 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 invention 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 came to the mind of some of its engineers. But as *Sony* reveals, the parties negotiated heavily throughout trial and would have had no trouble reaching 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 124. The assumptions regarding ex ante and ex post transaction costs are relaxed in Part IV.A below.

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 net 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, value will be only 100 (note that no harm is suffered—i.e. 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 will 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

To give a numerical example, a harmful-technology scenario may happen when a copyright owner contemplates a work of authorship with a net value of 100, an innovator contemplates a technology with a net 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-

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 v. Sony*, 480 F. Supp. 429, 467 (C.D. Cal. 1979)); 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 [largely] complicated and speculative . . . [often times] 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”); *In re Aimster Copyright Litig.*, 334 F.3d 643, 651-53 (7th Cir. 2003) (noting that Aimster “failed to produce any evidence that its service has ever been used for a noninfringing use”); *A&M Records, Inc. v. Napster, Inc.*, 239 F.3d 1004, 1013-14 (9th Cir. 2001).

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 will be termed a “revolutionary-technology” scenario. This term describes scenarios in which a highly 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. 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 shutting down 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 happens 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 trade-off, we shall assume in this Part that innovators and affected copyright owners enjoy equal bargaining power ex post,⁸⁰ that they invest ex ante under complete information,⁸¹ 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, and that they cannot affect, through their investments, the

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.

80. This assumption is made for expositional purposes, and the Article’s main findings do not depend on it. See *infra* Part IV.A.

81. The assumption about investments with complete information under three alternative scenarios is made for expositional purposes. The analysis here would be equivalent to one in which the parties do not know in advance which scenario will obtain ex post, but assign similar probabilities to the possibilities that it would be an efficient coexistence, revolutionary technology, or harmful technology. Under this alternative, the parties observe ex post which scenario obtained, and contract accordingly in the shadow of law. This alternative setup is the one in Bebchuk, *Ex Ante View*, *supra* note 69, at 602-05. The analysis here simplifies that exposition.

nature of the interaction between their creations.⁸² The following discussion assumes that the population contains pairings of potential copyright owners and innovators of all three types mentioned above. Part IV.A examines the extent to which the analysis holds once these assumptions are relaxed.

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 would still affect 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 economic 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, namely 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, for an overall value of $A + T - I$. Absent agreement, the copyright owner could stand on her right, 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 could agree to allow the innovator to market his technology, because by doing so they could jointly reap $T - I$, namely the value of the technology less the interference that would then accompany their concurrent operation. The aforementioned values that the parties can 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 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 $T/2 - I/2$.

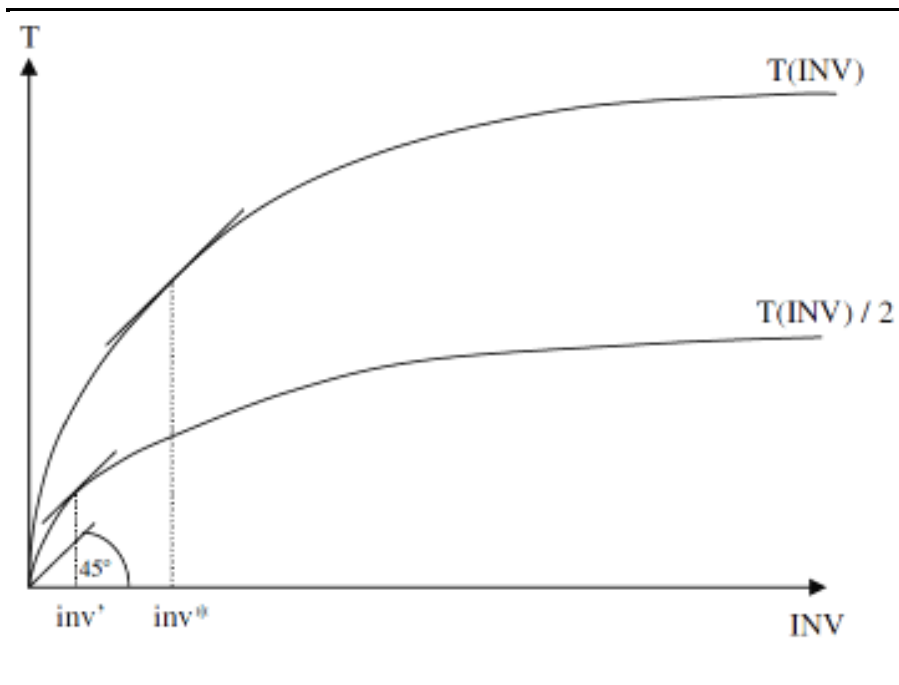
Copyright owners in such settings are expected to invest optimally in enhancing the value of their content under their preexisting technologies and business model since they expect to internalize any marginal increase in A in

82. To wit, it is assumed that the three scenario types are discrete. While the parties can affect the value of their creations and that of the interference, their investments cannot change the nature of the scenario they are 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 they will be able to internalize ex post only half of the fruits of any ex ante investment in the technology. Innovators, in other words, know ex ante that copyright owners will extract half of the value of the technology from them 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

Innovator's 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—here one half—of the technology's value that the innovator internalizes privately. 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. 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. The term "excessive" will be used throughout this Article to designate levels of private ex ante investment that surpass those socially desirable. Levels of private ex ante investment will be termed "optimal" whenever private parties will be driven to 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 harm reduction, it should be remembered, also has the characteristic of decreasing marginal return to effort. Socially, it would be desirable that each 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 each of the copyright owner and innovator 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 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 intuition 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

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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.⁸³

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 its 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 point would be A and the innovator's 0 . 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 , the better her bargaining position in ex post negotiation—the copyright owner will invest in enhancing its value. The copyright owner is 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

83. Each 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.

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 anything 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.⁸⁴ 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, the copyright owner's reservation price (the lowest amount she would accept in return) will be 10, and, 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:

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

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

3. *Harmful technology*

In this scenario it is efficient that only the copyright owner operate ex post and that the innovator shut down its 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 efficient 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 exist in the world. If so, to describe the effect of a property rule in copyright owners on their and innovators' incentives 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 those in efficient-coexistence and harmful-technology scenarios would invest optimally, some copyright owners—those 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. 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, we saw, that innovators would expect copyright owners to hold them up in ex post negotiations and extract a portion of the 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—to that end, 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 liability rule, innovators can market their technology only as long as they are willing to pay copyright owners the resultant harm, here 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 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 take 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 in 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	Zero (Highly Inadequate) ⁸⁵	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

85. 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.

greater than A , the copyright owner can minimize her losses by shutting down and capping them at A . Indeed, in revolutionary-technology scenarios A is smaller than I and therefore the harm caused by the innovator's activity is only A . 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 it ex ante. Such investment is excessive since she would 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:

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 ⁸⁶	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 its technology, for an overall value of A . Ex post, the copyright owner will operate and enjoy the value of her business, A . The innovator will not operate ex post. Operating would allow the innovator to

86. 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 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 (though not enough) weight while investing in content under soon-to-become-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 makes copyright owners' private cost-benefit analysis approach the social approach.

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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 , the innovator one 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 none is suffered in harmful-technology scenarios, this is optimal.

In sum, the parties investments are as follows:

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 with a liability rule, copyright owners as a group will invest excessively in extant business models for producing and marketing content. True, while those in efficient-coexistence and harmful-technology scenarios will invest efficiently, the result is driven by copyright owners in revolutionary-technology scenarios who invest in soon-to-be-obsolete business models. Note that copyright owners' investment in, and reliance on, soon-to-become-obsolete business models will be even more excessive than what it would be under a property rule protection. The reason is that a property rule protection allows copyright owners to enjoy a portion of the difference between the value of the technology and that of their business model, and thus moves copyright owners' private welfare function closer to the social one. A liability rule, by comparison, insures copyright owners completely against technological change and thus makes them indifferent to it. To see that formally, note that the payoff of copyright owners in revolutionary-technology scenarios under a property rule protection incorporates only $A/2$, while under a liability rule protection it incorporates A in full. By logic similar to that shown in Figure 1 above, copyright owners would invest more in enhancing the value of A when they capture it in

full compared to cases where they only capture $A/2$. However, the optimal level of investment in A in revolutionary-technology scenarios is zero.

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 take none. Their investment is thus 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 the technologies fully, and thus invest optimally in enhancing its value. Innovators of harmful technologies will not be able to reap their values ex post, and thus will invest nothing in creating them ex ante, the optimal rate. Innovators will 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 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	Zero (Highly Inadequate)	Optimal	Optimal

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

A property rule protection allows innovators to market any technology regardless of its harmful effect on copyright owners. Note that, because of the unidirectional direction of the interference in the real world—like that of 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 she wished to operate free of any interference, the copyright owner would have to pay the innovator an amount that would make 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. Not liable for harm, there is no incentive to invest in costly precautions whose benefits would accrue to the copyright owner.⁸⁷

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	Zero (Highly Inadequate) ⁸⁸

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 . In

87. 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.>").

88. 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.

this scenario, 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 optimally—zero—in minimizing the externality, since none is suffered. The copyright owner would not invest at all in her business model and in minimizing the interference. This would be optimal, since none would be enjoyed or suffered, respectively, ex post.

In sum, the parties' investments are as follows:

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 exces-

sive because the technology will ultimately shut down and no interference will be borne. 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 does affect the copyright owner's threat point in ex post negotiations and thus her ultimate payoff. Since that payoff is affected negatively by half the size of the would-be interference, the copyright owner would invest resources to minimize it—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 innovators' private welfare function is enhanced by half the would-be value of his technology. The innovator will therefore invest ex ante to enhance the value of the technology, which would be excessive.

Most interesting is the innovator's investment in affecting the size of the interference. Since the technology is shut down eventually, and no interference is suffered, no resources should be invested ex ante to affect its size. The innovator's private payoff, however, is enhanced by half the size of the interference. The innovator would thus have an incentive to sink 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.⁸⁹

To give a numerical example, imagine an innovator contemplating a technology—such as an online file-sharing network—with 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 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 settlement to 105.

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

89. The possibility that injurers would invest in activities that are injurious to victims only because of the prospect of extracting a payment from them later in return for desisting was noted, among others, in Ronald H. Coase, *The Problem of Social Cost*, 3 J.L. & ECON. 1, 5-8 (1960). For recent analyses, including examples and related literature, see, for example, Lee Anne Fennell, *Adjusting Inalienability*, 122 HARV. L. REV. 1403, 1413-19 (2009); 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 those 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 none is suffered ex post. The innovator will invest in enhancing the value of his technology, as his private payoff rises in 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 not invest in harm minimization—the optimal rate—as none 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 in-	Innovators' incentives to create	Innovators' incentives to minimize the interference
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	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. True, 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 combat piracy. 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 technologies should not be created and no precautions should be taken to combat them. 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 to combat them.

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 can take cost-effective measures to minimize the interference, but will not do so. Their investment in precautions would thus be highly inadequate.⁹⁰ 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 them *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	Zero (Highly Inadequate) and 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

90. *See supra* note 88 and accompanying text.

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technology by compensating the innovator for his resultant harm, namely by paying him T .⁹¹

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	Zero (highly inadequate) ⁹²

2. *Revolutionary technology*

In this scenario it is efficient that only the innovator operate ex post, for an overall value of T . Guaranteed of a legal right to operate, the innovator would

91. 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.,* *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).

92. 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.

launch his technology and reap T . Given that the innovator operates, the copyright owner would minimize its losses by shutting down its activity. Her payoff would be zero. Since the parties are acting efficiently, there are no further gains to be had from trade.

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 nothing—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 T (that she would pay the innovator) in order to reap the greater value of content, A . The copyright owner's final payoff would be $A - T$, the innovator's payoff would be T .

The copyright owner would thus invest optimally in enhancing the value of her business model, and nothing—the optimal rate—in minimizing the interference, since none is suffered. The innovator 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 ⁹³	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. They 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 shut down, such that investing in it is socially wasteful, the innovator would be guaranteed of reaping its value fully by way of a payment from copyright owners. To wit, 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 gain from shutting down their technology, so that their private investment decision gets closer to the one socially desirable. Protected by a liability rule, by comparison, innovators are only guaranteed the value of their technology, and nothing more. Formally, note that 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 half T when they are protected by a property rule.

93. 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 (though not enough) weight while investing in harmful technologies.

Innovators would invest inadequately in minimizing the interference. When the interference materializes—in efficient-coexistence scenarios—innovators will suffer none of it, and therefore invest inadequately—indeed 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 parties' investment decisions can be summarized as follows:⁹⁴

TABLE 17
Copyright Owners and Innovators' Investment Under Different Rules

	Property rule in copyright owners	Liability rule in copyright owners	Property rule in Innovators	Liability rule in innovators
Ex ante incentives				
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	Inadequate	Optimal	Highly Inadequate	Highly Inadequate

94. Per 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 paragraph following Table 3.

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minimize the interference			and Perverse ⁹⁵	
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III. ANALYSIS

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 trade-off. Each has generally highlighted the benefits associated with its test of choice and the costs associated with alternatives. Table 17 presents an integrated view of costs and benefits of major alternative standards. It should serve to remind us that all balancing tests would come at some sacrifice to at least one important social objective, and that society must choose among bundles of relative costs and benefits.

2. *Breaking down the particular trade-offs associated with alternative rules*

While the *Grokster* Court saw that the case before it involved a trade-off, it did not have any additional insight into its particular workings.⁹⁶ Table 17 details the particular trade-offs associated with alternative legal rules. These do not flow automatically from the Supreme Court's intuitive understanding of the content-technology trade-off as a zero-sum game. Table 17 suggests that the trade-off is rather multidimensional.

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

To assess the predictive power of the framework, let us examine the advent of file-sharing networks in its light. 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.⁹⁷ This permissive standard

95. "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).

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

97. *MGM Studios, Inc. v. Grokster Ltd.*, 380 F.3d 1154, 1162 (9th Cir. 2004).

approaches a property rule in innovators.⁹⁸ Table 17 predicts that a property rule in innovators would induce some of them 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.⁹⁹

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 but was found secondarily liable in the Ninth Circuit.¹⁰⁰ 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.¹⁰¹

98. 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.”).

99. *Grokster*, 545 U.S. at 936 (implying that Grokster’s conduct “was intended to do harm” (citing 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).

100. Napster, Grokster’s predecessor, seems to have believed that it was shielded by *Sony*. See Joseph Menn, *The Lowdown Download Blues*, L.A. Times, Apr. 6, 2003, at 16, available at <http://articles.latimes.com/2003/apr/06/magazine/tm-napster14> (noting that “the venture capital firm hummer winblad [sic] [was] confident that Napster would prevail in court,” as well as that Hank Barry, a longtime corporate lawyer, was sure that Napster would win in court, and therefore had his newly-founded venture capital firm invest in Napster, replace Eileen Richardson (Napster’s first CEO), and take a hard, though unsuccessful, negotiating line with the labels).

101. *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 a 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.”). As a result, there was a summit meeting arranged between all music label top executives and Napster. A deal may have been struck but

Lastly, Table 17 predicts that a property rule in innovators would cause copyright owners to take excessive precautions to prevent harm. This prediction is the result of harmful-technology scenarios: ideally, harmful technologies should not be made, and no self-help measures against them should be taken. In actuality, their presence 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.¹⁰² Soon thereafter, the music and film industries started employing unprecedented measures to fight piracy, such as technological self-help measures and suing end users.¹⁰³ They rolled back these measures considerably a few 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, which made clear that innovators no longer enjoyed a right to actively cause harm.¹⁰⁴

4. *Understanding the trade-offs 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 trade-offs 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.¹⁰⁵ 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 trade-offs depicted in the fourth column in Table

for Napster holding 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).

102. Some would contest that *Grokster* was a harmful technology. The Supreme Court was seemingly under the impression that it was. See *supra* note 99. The analysis in the text assumes that the unanimous Court's decision got the facts right.

103. In the years following the Supreme Court's *Grokster* decision, many retailers—such as Apple iTunes and Amazon.com—started making some content available in nonprotected format, with the consent of copyright owners. Previously, content was sold with various digital rights protections. 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.

104. 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 the framework's predictions.

105. 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.

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 property rules and liability 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 rank ordering the four investment decisions according to their social importance (which may change over time and circumstance), and then choosing that entitlement that best promotes that ranking. For example, if lawmakers believe that technological innovation is likely to produce valuable technologies and that there is no shortage or need of additional content, then it may be more important to get innovators' incentives right than copyright owners'. Or if innovators' are in a much better position to take measures to reduce the interference, then it is more important to get their incentives right in that respect than copyright owners'. A few observations regarding Table 17 are in order in that respect.

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.¹⁰⁶

Second, the analysis has abstracted away from informational burdens. Applying liability rules generally imposes a greater burden than property rules because the legal system would need to verify what harm was caused. Protecting copyright owners by a property rule, in contrast, only requires a court to observe that harm happened, and to issue an injunction. Protecting innovators with a property rule seems to involve the least administrative cost. The reason is that because the interference is felt by the copyright owner, and can never be felt by the innovator, innovators will not bother courts with injunction requests.

Third, as between the two property rules, protecting innovators seems to be superior to protecting to copyright owners. Under reasonable assumptions, a 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.¹⁰⁷ Under the latter rule, innovators are able to extract part of copyright

106. As explained above in Part III.A.4, *Grokster* takes away their incentive to harm copyright owners intentionally. Accordingly, the relevant box should change from "Negative" to "None."

107. 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

owners' business only in harmful-technology scenarios. This conclusion, however, is not a firm prescription but rather depends on many particular assumptions.¹⁰⁸

Fourth, the balances associated with a liability rule in copyright owners in Table 17 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 harm (or market value). But there is no guarantee that the legal system will get 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 (but generally no less than \$750).¹⁰⁹ 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.¹¹⁰

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.¹¹¹ These licenses—a form of liability rule—can be set at market rates, in which case they would act like a liability rule in copyright owners (whose associated trade-offs are described in the third column of Table 17). However, Congress can set the 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 etc.)—whether by courts or Congress—the more

Wars and has been repeated over and over again with almost every new innovation." PATRY, *supra* note 6, at 22.

108. The argument is made assuming that all three scenario types occur with about equal frequency, or that, at least, the world is not one such that the vast majority of content-technology interactions fall into the harmful-technology scenario (and, in turn, 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.

109. 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). To be eligible to choose statutory damages, copyright owners need to have registered their copyrights prior to the infringement. 17 U.S.C. § 412. Commercial copyright owners who believe that they may need to enforce their rights in court typically do.

110. 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 applied by Congress, in which case it can be set at any desired level.

111. 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 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.

the law approaches a property rule in copyright owners. The more damages stray upwards from actual harm, the more the trad-offs 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 left under the second column (“property rule in copyright owners”). The more damages stray downwards from actual harm, the more the trade-offs associated with that liability rule move away from the levels noted under column 3 of Table 17 (titled “liability rule in copyright owners”) and approach those noted in the boxes to their right (under column 4 of Table 17, titled “property rule in innovators”).

In essence, the rules analyzed in Table 17 are simply dots on a spectrum of entitlements, and one can move the legal rule dial along that spectrum and the associated trade-offs would 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 lawmakers can do ex ante is choose that entitlement that produces the best investment incentives across all possible scenarios (as described in Subpart III.B.1, just above). For example, Congress has allocated to copyright owners the exclusive right to reproduce their works.¹¹² 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.¹¹³ When it can, how should it use that added information?

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 shut down ex post. They invest nevertheless because owning the entitlement assures them that shutting down ex post would 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

112. 17 U.S.C. § 106(1).

113. 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.

of the other party¹¹⁴ (and it does not matter whether it would do so by a property rule or a liability rule¹¹⁵). 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.¹¹⁶

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. Assuming that Congress initially allocates copyright owners a modifiable property rule or a modifiable liability rule, a court that later observes a revolutionary-technology scenario in litigation will afford the innovator a property rule that would allow it to market the technology freely. Assuming that 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 will afford copyright owners a property rule that would enable them to enjoin the technology. In that system, a court that observes an efficient coexistence scenario will 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 entitlements in these scenarios would protect the efficient party, driving it to invest optimally, and deny protection to the inefficient party,

114. 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 121.

115. 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 become obsolete businesses and technologies of dissemination.

116. 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.

driving it not to invest, which is again efficient. Modifiable entitlements may thus distort investment decisions only 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, for then, 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 under a property rule protection, regardless of where her cost fell in the 1 to 90 range, the innovator would not invest 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 is 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 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.

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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. 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.

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

Parentetical entries represent distortions assuming that scenario types are never verifiable, as in Table 17.

Legal rule	Modifiable property rule in copyright owners	Modifiable liability rule in copyright owners	Modifiable property rule in innovators	Modifiable liability rule in innovators
Ex ante Investments				
Copyright owners' incentives to create	Optimal (Excessive)	Optimal (Highly Excessive)	Optimal (Inadequate)	Optimal (Optimal)
Copyright owners' incentives to minimize the harm	Inadequate (Inadequate)	Highly Inadequate (Highly Inadequate)	Optimal (Excessive)	Optimal (Optimal)
Innovators'	Inadequate ¹¹⁷	Optimal	Optimal	Optimal

117. 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,

incentives to create	(Inadequate)	(Optimal)	(Excessive)	(Highly Excessive)
Innovators' incentives to minimize the harm	Inadequate (Inadequate)	Optimal (Optimal)	Highly Inadequate (Highly Inadequate and Perverse)	Highly Inadequate (Highly Inadequate)

Table 17 above, whose content is repeated in parentheses 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. Modifications, 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 do so always. 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 observe 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 pre-

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.

scription differs from the conventional wisdom pertaining to content-technology conflicts, according to which courts should consider whether to re-allocate entitlements through the fair use doctrine only if the parties are unable to transact at the time of conflict.¹¹⁸

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.¹¹⁹ Still, accepting that we live in a second-best world, each modifiable entitlement is generally superior to its corresponding “classic” one.¹²⁰

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 incentives to innovation. Further, if their second most important consideration is to make innovators to 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

118. 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 (such as through the fair use doctrine) ex post may still be desirable, because it can help the parties overcome ex ante transaction costs.

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

120. 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 (and associated business) costs are already great. The current cost is 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 courts’ 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 courts are going to look into and why, and where the use of precedent is limited by the particular doctrinal basis for copyright liability).

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, such as that liability rules impose a greater informational burden on courts, may be one reason to explain courts' tendency to prefer protecting injurers with a property rule rather than a liability rule. 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 distortions 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.¹²¹

121. Several institutions can observe the nature of content-technology scenarios and re-allocate 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). *See generally* COPYRIGHT ROYALTY BOARD, <http://www.loc.gov/crb> (last visited Mar. 4, 2011). The focus on courts in this Subpart does not mean to suggest that they are the only institution up to the task.

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 reallocate 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 that either $I \approx 0 < A < T$ or $I \approx 0 < T < A$.¹²² From a social perspective, return on the parties' investment was $A + T$.

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.¹²³ 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 .¹²⁴ 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. Whereas it would be 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 and social return on innovators' investment diverges, they 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.

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

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

124. 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). Had its decision been upheld by the Supreme Court, the parties would have likely agreed on 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).

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 optimal incentives, and the Court's reallocation 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 value¹²⁵—people used it almost exclusively to get for free what they would have otherwise had to pay for.¹²⁶ 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.¹²⁷

Which allocation of the entitlement would induce the parties to invest optimally in cases falling under *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* do? The parties would anticipate the bargaining that would take place if they were to create. Absent agreement, both would market their creations *ex post*. *Grokster* would do so and realize a value of T . Copyright owners would market their content and realize $A - I$. 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

125. *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-*Grokster*, people had other ways to distribute content online, such as by making them available on websites.

126. 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).

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

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.¹²⁸

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.¹²⁹ 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 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, active inducement. Protecting copyright owners with a property rule would allow them to operate and enjoy the marketing of the technology. Copyright owners would be able to act freely and internalize the value of their content, A . They would invest optimally in content creation. They would also invest at the efficient rate, zero, in harm minimization, 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 this way ex post, the parties would invest optimally ex ante.¹³⁰

128. 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 a transfer payment that she has to make to technology manufacturers.

129. For example, they would invest a marginal one if it enhanced the value of the technology by more than two.

130. As mentioned above, modifying the entitlement by protecting the copyright owner with a liability rule would reach the same result. See *supra* note 115 and accompanying text.

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

As others have noted, the fair use doctrine can be understood as a legal mechanism to ensure the advent of valuable innovation.¹³¹ The availability of the fair use doctrine in litigation can lead those who contemplate valuable technologies to actually make them. Under the current doctrinal landscape, it would be desirable to avail the doctrine as a defense in all content-technology conflicts, even in those where it is currently unavailable.¹³²

The modification of initial entitlements depends, under the framework, 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.¹³³ 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 be both understood as calling upon courts to mind the size of the interference, or harm, *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

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.

131. The first to emphasize that 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.

132. 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).

133. 17 U.S.C. § 107.

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 do so.¹³⁴ There is, however, no generally applicable doctrine to reallocate to copyright owners' entitlements that are clearly outside their statutory bundle of exclusive rights. Often, they 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 to copyright owners overly broad entitlements 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 over protection. The expansion of copyright's scope and the simultaneous expansion of the fair use doctrine over the past century and a half (characterized by rapid change in dissemination technologies) are consistent with this logic.¹³⁵

4. *Coordination of ex post precautions in 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

134. There could be instances in which certain rights are outside copyright owners' bundle and they 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 serve that purpose as well. In *Perfect 10, Inc. v. Amazon.com, Inc.*, for example, a content website sued Google and others for creating and showing thumbnail versions 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. However, the possibility remains that had Perfect 10, the party arguing for reallocating the entitlement, been able to prove that harm was great, the court might have reallocated it.

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

implement such a scheme in their VTRs under prohibitive ex ante transaction costs. Ex post, however, coordination is possible. Once courts have held that innovators face no liability for the technology's manufacture, however, these companies will have no incentive to implement the coding system. This suggests that lawmakers can serve a useful role of mandating the use of coordinated ex post precautions, as Congress¹³⁶ and courts¹³⁷ sometimes have.

5. *When the interference approaches zero*

The case of zero harm 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.¹³⁸ 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.¹³⁹ When harm approaches zero, a finding of fair use should often follow. Indeed, various pro-innovator outcomes in several other "new technology" cases can be rationalized economically by a similar fact pattern of no harm.¹⁴⁰ In contrast, when the harm is substantial, its presence—while relevant—would not be as outcome determinative (toward a finding of liability) as in the case of zero harm (that generally should entail a fair use finding).¹⁴¹

136. See 17 U.S.C. § 512 (listing safe harbors, that is, patterns of behavior whose adoption would shield online service providers from liability); 17 U.S.C. § 1201(k) (mandating the incorporation of Macrovision copy-prevention technology into VCRs). Note that these ex post coordination efforts relate to mature technologies.

137. 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).

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

139. Protecting copyright owners with a liability rule would seem to be a theoretically plausible solution. However, as mentioned above, see *supra* note 110 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.

140. 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); see also 17 U.S.C. § 110(11) (exempting 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 Jan. 15, 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).

141. 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 observe 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, as 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 trade-off, and show how each party would act under different legal rules, the analysis 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 perhaps make ex ante investments that affect their size.

The aforementioned analysis is applicable to cases where third party effects either do not exist, are trivial, or more generally when their existence would not make the parties' jointly preferable course of action differ from the one socially desirable.¹⁴² But even when this is not the case, the aforementioned analysis 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 of the parties. Furthermore, various dynamics emphasized above remain true even in the presence of externalities. For example, some innovators' incentive to invest in harmful technologies solely in order to extract payment in return for shutting down would still exist, whether it may or may not be accompanied by an even greater benefit to third parties.

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

The analysis assumed that copyright owners and innovators can perfectly predict ex ante the ex post scenario that will obtain. Such a strong assump-

¹⁴² Positive externalities on consumers may, for example, be largely abstracted away from to the extent that the ratio of consumer surplus to producer surplus 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.

tion— adopted for exposition clarity—is not necessary in order for the analysis to hold. The analysis would equally follow when the parties invest while uncertain about the type of the ex post content-technology scenario, as long as they ascribe the same probabilities to the likelihoods that each of the three scenarios shall obtain.¹⁴³

3. *Relaxing the assumption of equal bargaining power*

The assumption about the parties having equal bargaining power was adopted for expositional purposes. The 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 incentive 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 a 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 be greatly inadequate the less bargaining power they have toward copyright owners, and would be only slightly inadequate the greater bargaining power they have. Varying the assumption about the parties' relative bargaining power would alter the model's prediction quantitatively rather than qualitatively.

4. *When lawmakers have information about the relative likelihood of the three scenarios*

The analysis merely assumed that all scenarios occur, or—alternatively, as discussed just above—are expected to occur. 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 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 be lessened further the

143. *See supra* note 81.

greater the likelihood of efficient-coexistence and revolutionary-technology scenarios relative to harmful technology ones. Equivalently, for example, the greater the likelihood of harmful-technology scenarios, the less lawmakers should worry about innovators' inadequate incentives to create and the more innovators' incentives would approach optimality.

5. *Ex ante transaction costs not prohibitive*

When the parties can transact costlessly *ex ante*, before any investments are sunk, the problem largely goes away.¹⁴⁴ In such cases, when transaction costs are zero both *ex ante* and *ex post*, the parties will invest as one economic party would, and tend to make efficient investment decisions. For example, in harmful-technology scenarios the parties' would not invest in creating the technology.

It is true that in many cases copyright owners and innovators can transact *ex ante* and coordinate their investments. One example is the DVD technology, administered considerably 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.¹⁴⁵ 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). Such incorporation 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 as the Coase theorem suggests. These cases—leaving antitrust issues aside—are also less likely to reach the legal system.

But in many other cases the parties are not able to transact and coordinate all of their *ex ante* investments. For example, this may be so 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 is the Secure Digital Music Initiative,¹⁴⁶ which was a failed attempt by consumer electronics manufacturers and recording industry to come up with secure format to protect the playing, storing, and distributing of music. Certainly, the many cases that reach litigation—such as those reviewed in Part II,

144. *See supra* note 76.

145. *See About Us*, DVD COPY CONTROL ASS'N, <http://www.dvdcca.org/about.aspx> (last visited Jan. 15, 2012).

146. *See Secure Digital Music Initiative*, WIKIPEDIA, http://en.wikipedia.org/wiki/Secure_Digital_Music_Initiative (last visited Jan. 15, 2012).

above—show that the case of prohibitive ex ante transaction costs is substantial and indeed has bothered the copyright system for many decades. It is this subset of cases that this Article is primarily concerned with.

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 VCR, 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 is relevant at least in regard to all those investments that precede that point in time when the parties can communicate.¹⁴⁷

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 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 interact, modify, remix content, and participate in social meaning-making). 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. *Ex post transaction costs are not zero*

The assumption about zero ex post transaction costs was made since in virtually all the cases reviewed in Part I, above, it seems 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.

What would have happened, 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.

147. *See supra* note 76.

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 would induce innovators to intentionally harm copyright owners, innovators would lack the prospect to extort copyright owners ex post 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*

The analysis 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 trade-offs that many additional entitlements would entail.¹⁴⁸

Other rules that Calabresi and Melamed mentioned are inalienability rules. In these cases, the law does not allow parties to transact. While the result here would generally be inferior—the ex post efficient result may not follow, and thus ex ante efficiency would be further lacking—and the analysis would resemble the one above regarding ex post transaction costs that are not zero.

148. See Part III.B.1.

B. *Optimal Timing of Modification*

The modification of entitlements in 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 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 hard to maintain in cases in which the various values unfold over time at differential 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. Legal regulation of new technologies, as well as lawsuits respecting them, could be barred for a certain number of years after their introduction, for example. Courts that believe that added time or information would improve their decision might use their discretion and powers to obtain them. Delaying the moment of decision would make it 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 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 decision, 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, or 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 has a better view of the nature of technologies' interaction with content—be it because it often (but not always) takes longer for copyright-innovation conflicts to land on Congress's table, because Con-

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gress 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—and to the extent that Congress’s timing of decision tends to be closer to the optimal one than courts’ timing, a judicial policy of deference to Congress’s judgment makes sense.¹⁴⁹

CONCLUSION

The business models of copyright owners have been disturbed by the advent of new technologies time and 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 studied systematically several approaches that lawmakers might take to manage the trade-offs between authorship and innovation, and 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 also proposed that instituting mechanisms to modify entitlements in light of later-revealed information can improve copyright owners’ and innovators’ initial incentives to create. Hopefully, this framework and proposal will prove helpful to lawmakers as they determine the copyright liability of innovators of technologies to come.

149. *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.”).