Copyright Complements and Piracy-Induced Deadweight Loss

JIARUI LIU*

Conventional wisdom suggests that copyright piracy may in effect reduce the deadweight loss resulting from copyright protection because it allows the public unlimited access to information goods at a price closer to marginal cost. It has been further contended that lower copyright protection would benefit society as a whole, as long as authors continue to receive sufficient incentives from alternative revenue streams in ancillary markets, for example, touring, advertising, and merchandizing. By evaluating the empirical evidence from the music, performance, and video game markets, this Article highlights a counterintuitive yet important point: copyright piracy, while decreasing the deadweight loss in the music market, could simultaneously increase the deadweight loss in ancillary markets via the interaction between complementary goods. The deadweight loss in ancillary markets tends to become dominant if a substantial portion of relevant consumers have high valuation but low frequency in music consumption, are risk averse toward up-front payment with uncertain demand, or discount future value at a high rate. Additionally, this Article's findings shed new light on the current debates over several competing propositions to reform indirect copyright liabilities in the digital age.

INTRODUCTION 1012
I. THE THEORIES OF COMPLEMENTARY GOODS 1014
II. ALTERNATIVE REVENUE STREAMS 1020
A. FIRST-DEGREE COMPLEMENTS 1021
B. SECOND-DEGREE COMPLEMENTS 1021
C. THIRD-DEGREE COMPLEMENTS 1022
III. IPOD AND ITUNES 1023
IV. RECORDED MUSIC AND LIVE PERFORMANCE 1028
V. INDIRECT COPYRIGHT LIABILITIES 1034
A. PUBLIC LEVY 1037
B. PRIVATE ORDERING 1041
CONCLUSION 1045

---

* Assistant Professor of Law, University of New Hampshire School of Law; J.S.D. and Olin Fellow in Law and Economics, Stanford Law School. I am very grateful to Paul Goldstein, Mark A. Lemley, Lawrence M. Friedman, Deborah Hensler, A. Mitch Polinsky, Susan Richey, John Orcutt, Marcus Hurn, Susan Drisko Zago, Jon R. Cavicchi, Peter K. Yu, Glynn S. Lunney, Christopher Jon Sprigman, Ben Depoorter, Kristelia A. García, Guy A. Rub, and the participants in the Intellectual Property Scholars Conference, the Works-in-Process Intellectual Property Conference, and the Law and Economic Seminar at Stanford Law School for their insightful comments and suggestions. Of course, all errors remain my own.

INTRODUCTION

The digital transformation in the music industry over the past decade has drawn much attention to the increasing importance of alternative revenue streams (e.g., concerts, advertisements, merchandise, hardware, and other ancillary products) that arguably have the potential to mitigate or offset the impact from online copyright infringement.[1] A representative statement came from Nobel Prize laureate Paul Krugman: "Whatever the product—software, books, music, movies—the cost of creation would have to be recouped indirectly: businesses would have to 'distribute intellectual property free in order to sell services and relationships.' . . . 'In the new era, the ancillary market is the market.'"[2] Likewise, U.S. Supreme Court Justice Stephen Breyer appeared to agree: "Much of the actual flow of revenue to artists—from performances and other sources—is stable even assuming a complete displacement of the CD market by peer-to-peer distribution . . . ."[3] Other observers have gone further to contend that society as a whole would be better off without traditional copyright institutions: as consumers have wider access to low-price or even free information products, authors would likely continue to receive sufficient (if not greater) incentives from alternative revenue streams.[4]

The above propositions appear to be largely based on the theory that recorded music and ancillary products/services are often complementary goods. The widespread distribution of unauthorized copies may serve as a promotional tool to boost the popularity of musicians and their works, which further increases the demand in ancillary markets.[5] It is therefore implied that musicians, who indirectly benefit from online piracy, should embrace it if they are technology savvy and farsighted enough.

Most of the alternative revenue streams such as touring, advertising, and merchandizing, however, were feasible and actually in existence long before the advent of the digital age. But they played more of a secondary role in the music business until recently, when uncontrolled online piracy started to undermine music sales.[6] This fact

---

1. *See, e.g.*, CHRIS ANDERSON, FREE: THE FUTURE OF A RADICAL PRICE 135–61 (2009); MICHELE BOLDRIN & DAVID K. LEVINE, AGAINST INTELLECTUAL MONOPOLY 142–44 (2008); Felix Oberholzer-Gee & Koleman Strumpf, *File Sharing and Copyright*, 10 INNOVATION POL'Y & ECON., no. 1, 2010, at 19, 46.

2. Paul Krugman, Op-Ed., *Bits, Bands and Books*, N.Y. TIMES, June 6, 2008, at A21 (quoting Esther Dyson, *Intellectual Value*, WIRED, July 1995, at 136, 182).

3. MGM Studios Inc. v. Grokster, Ltd., 545 U.S. 913, 962 (2005) (Breyer, J., concurring) (quoting Yochai Benkler, Essay, *Sharing Nicely: On Shareable Goods and the Emergence of Sharing as a Modality of Economic Production*, 114 YALE L.J. 273, 351 (2004)).

4. *See generally* Raymond Shih Ray Ku, *The Creative Destruction of Copyright: Napster and the New Economics of Digital Technology*, 69 U. CHI. L. REV. 263, 300 (2002); John Perry Barlow, *The Economy of Ideas: A Framework for Rethinking Patents and Copyrights in the Digital Age*, WIRED, Mar. 1994, at 84.

5. *See, e.g.*, Stan J. Liebowitz, *Economists' Topsy-Turvy View of Piracy*, 2 REV. ECON. RES. ON COPYRIGHT ISSUES, no. 1, 2005, at 5; Martin Peitz & Patrick Waelbroeck, *Piracy of Digital Products: A Critical Review of the Theoretical Literature*, 18 INFO. ECON. & POL'Y 449, 450 (2006).

6. *See* Stan J. Liebowitz & Richard Watt, *How To Best Ensure Remuneration for Creators in the Market for Music? Copyright and Its Alternatives*, 20 J. ECON. SURVS. 513, 525 (2006) (calling alternative markets "second-best" solutions).

suggests a straightforward yet undervalued point—that alternative revenue streams are not without their own costs, which in some market settings could be rather substantial.

This Article, by applying the modern theories of complementary goods, explores the social costs of alternative revenue streams and provides new insights into the controversial question of how relevant copyright law actually is in the digital age. First, although online music and video game markets both involve hardware/software complementary goods, for example, iPod/iTunes and Xbox console / Xbox game, firms generally engage in opposite pricing strategies: Apple offers iTunes music downloads (software) at a low price while earning most revenues from iPod sales (hardware), but Xbox offers game consoles (hardware) at a low price while earning most revenues from video game sales (software).[7] The difference in pricing practices apparently lies in the fact that copyright piracy is much more prevalent in music markets than in video game markets.[8] More importantly, the findings reveal a counterintuitive point: copyright piracy, widely believed to decrease the deadweight loss in music consumption, could simultaneously increase the deadweight loss in hardware consumption. The deadweight loss in hardware consumption tends to become dominant if a substantial portion of relevant consumers have high valuation but low frequency in music consumption, are risk averse toward up-front payment with uncertain demand, or discount future value at a high rate.

Second, musicians traditionally set low ticket prices for their concerts, even with the presence of ticket scalping, in order to promote their album sales. In recent years, however, many musicians have been forced to sharply increase concert ticket prices in the wake of the widespread copyright piracy that makes it much harder to recoup their investment from album sales.[9] This new trend, while having limited effects on superstars with strong fan bases and large repertoires, may create higher entry barriers for up-and-coming and alternative artists. It could also end up pricing some of the most loyal music fans out of the performance market. Akin to the iPod/iTunes scenario, copyright piracy in the music market has once again increased the deadweight loss in the ancillary market.

Third, this Article compares several recent initiatives concerning copyright reform, including public levy and private ordering, based on the theories of complementary goods. It shows that public levy, as is the case with other proposed solutions solely relying on alternative revenue streams, may raise the deadweight loss, thereby causing underconsumption by noninfringing and low-infringing users and even pricing them out of the market. Such drastic changes in the copyright regime appear to be unjustified, especially given the emergence of private ordering initiatives that have effectively improved copyright enforcement and generated mutual benefits for content and service providers. The theories of complementary goods (e.g., *double marginalization* and *indirect network effects*) confirm that there are inherent incentives for content providers and technology providers to collaborate or integrate in online markets.

---

7. *See infra* note 72 and accompanying text.

8. *See* Fukugawa Nobuya, *How Serious Is Piracy in the Videogame Industry?*, 10 EMPIRICAL ECON. LETTERS 225, 232 (2011) (finding that while 40% of surveyed gamers know how to download pirated games, only about 5% actually download such games).

9. *See infra* note 95 and accompanying text.

Part I begins with an overview of the general theories of complementary goods. Part II introduces three degrees of complementary goods in connection with recorded music. Part III analyzes the empirical evidence from the music and video game industries. It highlights that the two industries generally employ opposite pricing strategies because of different levels of copyright piracy. Part IV studies the interaction between the music and performance markets. It explains why rampant copyright piracy in the music market ends up inflating the ticket prices in the performance market. Part V evaluates competing initiatives for digital copyright reform, including public levy and private ordering. It rationalizes indirect copyright liabilities through the lens of the theories of complementary goods. The Article concludes with a summary of the major issues.

I. THE THEORIES OF COMPLEMENTARY GOODS

Complementary goods (or *complements*) in economic terms refers to two goods that consumers usually purchase and use together because they complement each other in functionality.[10] To this extent, the more one good is consumed, the more the other good is also consumed. This means that a decrease in the price of one good will result in an increase in the demand of the other. And accordingly, an increase in the price of one good will lead to a decrease of the demand of the other. To get an idea of how complementary two goods are, we may look at the cross-elasticity of demand, which is the percentage change in the quantity of one good divided by the percentage change in the price of the other.[11] The cross-elasticity of demand is negative for complementary goods, and the larger the absolute value of cross-elasticity of demand, the stronger the degree of complementarity.[12]

An everyday example of complementary goods is hot dogs and hot dog buns.[13] Any time a grocery store puts hot dog buns on sale, we can expect that the sales of hot dogs will increase simultaneously, even though the price of hot dogs may be unchanged. The reason is that consumers usually budget the consumption of hot dogs and hot dog buns together. A discount for either good lowers the total price of the two goods, which in turn stimulates the combined consumption. Two complementary goods are called *perfect complements* where one good has no independent value without being used with the other good.[14] Although perfect complements are not commonplace in reality, left shoes and right shoes are probably the closest examples. They normally show such strong complementarity that it is quite safe to say, with narrow exceptions, that consumers always buy them together and they are always

---

10. *See generally* DENNIS W. CARLTON & JEFFREY M. PERLOFF, MODERN INDUSTRIAL ORGANIZATION 638 (4th ed. 2005); JEFFREY M. PERLOFF, MICROECONOMICS 14 (3d ed. 2004).

11. ROBERT H. FRANK, MICROECONOMICS AND BEHAVIOR 125 (7th ed. 2008).

12. *Complementary goods* are the opposite of *substitute goods* (or *substitutes*), which have similar functions so that the demand for a good will fall if the price of a substitute is reduced. The cross-elasticity of demand is positive for substitutes, and the larger the cross-elasticity of demand, the stronger the degree of substitutability. *See id.*

13. In reality, many products are assemblies of components, and each component is necessary for the final product. Technically speaking, those components are strongly complementary with one another: consumers must buy and use them as a whole.

14. N. GREGORY MANKIW, PRINCIPLES OF ECONOMICS 441 (7th ed. 2015).

offered for sale in pairs. As a result, even if only a left shoe wears out (or is eaten up by a pet), the consumer will have to buy a pair of new shoes because there is simply no specialized market for right shoes.[15]

In the aforementioned cases, the complementary goods are always consumed in fixed proportions (e.g., one to one). There also exist cases in which different users purchase different proportions of complementary goods. This Part will refer to the former cases as *fixed-proportion complements* and to the latter cases as *variable-proportion complements*.

Arguably, the most celebrated examples of variable-proportion complements are razors and blades. Razors are durable goods, which do not wear out easily over a substantial period of time, but blades are nondurable goods (also called *consumables* or *perishables*), which may be used up relatively quickly and have to be replaced frequently. Therefore, a consumer may use a razor with any number of blades depending on the intensity of her usage. King C. Gillette created his empire of the Gillette Safety Razor Company, as well as the legacy of the "razor-and-blades" model, by giving away free razors (or selling them at a loss) to promote sales of blades.[16] Analogous business models have been widely used in various lines of commerce for many years. For instance, when Standard Oil first arrived in China to expand its business more than a hundred years ago, its sales representatives virtually gave away millions of kerosene lamps. Afterward, Chinese people started to buy kerosene from Standard Oil in increasing volumes in order to maintain the utility of the free lamps.[17] Likewise, telecommunication companies usually offer handsets for free or below cost. In exchange, consumers must subscribe to their long-term service contracts, typically for one or two years.[18] In cases involving early termination, consumers usually have to pay severe penalties. Other modern versions of the razor-and-blades model, that is, durable/nondurable complements, include video games/consoles, printers / ink cartridges, and e-readers/e-books.[19]

The success of the razor-and-blades model largely lies in its ability to engage in price discrimination by leveraging the sales and prices of variable-proportion complements. Price discrimination refers to a price differential that may not be explained by differences in production costs.[20] This practice exists where a firm

---

15. The example of left and right shoes is often called a perfect complement because the two products yield no utility without each other, and consumers need to buy and use them in a certain fixed ratio (one to one in this case) regardless of the relative prices.

16. *See* RUSSELL B. ADAMS, JR., KING C. GILLETTE: THE MAN AND HIS WONDERFUL SHAVING DEVICE 107–08 (1978); *see also* Randal C. Picker, *The Razors-and-Blades Myth(s)*, 78 U. CHI. L. REV. 225 (2011) (discussing the history of Gillette and the razor-and-blades model).

17. *See* SHERMAN COCHRAN, ENCOUNTERING CHINESE NETWORKS: WESTERN, JAPANESE, AND CHINESE CORPORATIONS IN CHINA, 1880–1937, at 38 (2000).

18. *See, e.g.*, *Smartphones*, VERIZON WIRELESS, http://www.verizonwireless.com /smartphones/.

19. Most of these examples are not perfect complements, as shown by the fact that the price of nondurable goods would be likely to affect the ratio in which the two products are consumed.

20. For detailed discussions of price discrimination, see generally Mark Armstrong, *Recent Developments in the Economics of Price Discrimination*, *in* 2 ADVANCES IN ECONOMICS AND ECONOMETRICS: THEORY AND APPLICATIONS, NINTH WORLD CONGRESS 97 (Richard Blundell, Whitney K. Newey & Torsten Persson eds., 2006); Lars A. Stole, *Price Discrimination and Competition*, *in* 3 HANDBOOK OF INDUSTRIAL ORGANIZATION 2221 (Mark

charges different consumers different prices for the same good or where the price difference between two versions of a good is larger than the cost difference.[21] Commentators traditionally categorize price-discrimination practices into three degrees depending on how well a firm can observe the valuations by individual consumers.[22] A firm engages in first-degree price discrimination when it charges each consumer according to the maximum price (often called the *reservation price*) that she is willing to pay for a good.[23] This pricing strategy is rare in reality because it relies upon precise information about the reservation price of each consumer, which is usually not observable to most firms. Second-degree price discrimination requires that a firm is able to observe the general distribution of consumer valuations.[24] It may therefore offer a menu of different purchase options in such a way that low- and high-value consumers will self-select into appropriate categories. Taking a quantity discount as an example, consumers end up paying different average prices depending on the quantity purchased. High-volume users, who tend to have high price elasticity of demand, are able to enjoy lower average prices. Third-degree price discrimination occurs when a firm tries to segment consumers into several discrete groups in accordance with certain observable characteristics (e.g., location, age, and occupation) used as a proxy to infer individual valuations.[25] Each group is therefore charged a unique price predetermined by the firm and is allowed no self-selection. Student discounts for various goods and services are obvious examples. Law students, for instance, gain free access to Westlaw and Lexis, but law firms pay substantial prices for these database services.

The razor-and-blades model is a case of second-degree price discrimination based upon the intuition that a consumer's valuation of a durable good (e.g., a printer) is correlated to the intensity of her usage of a nondurable good (e.g., an ink cartridge).[26] The more frequently a consumer uses the printer, the more she values its function and the more she needs to acquire ink cartridges, which allows the consumption of ink cartridges to serve as a metering device. It is therefore profit maximizing to offer the printer at a low price (often below cost) to attract as many consumers as possible and charge them in accordance with the amount of ink cartridges they purchase.[27]

Armstrong & Robert Porter eds., 2007); Hal R. Varian, *Price Discrimination*, *in* 1 HANDBOOK OF INDUSTRIAL ORGANIZATION 597 (Richard Schmalensee & Robert D. Willig eds., 1989).

21. Price discrimination becomes feasible in practice if (1) the firm has some market power; (2) different consumers have different valuations of the same good, which are to some extent observable to the firm; and (3) there is no arbitrage between low-value and high-value consumers.

22. *See* A C. PIGOU, THE ECONOMICS OF WELFARE 278–79 (4th ed. 1962).

23. *Id.* at 279.

24. *Id.*

25. *Id.*

26. *See* JEAN TIROLE, THE THEORY OF INDUSTRIAL ORGANIZATION 146–47 (1988); Richard A. Posner, *Vertical Restraints and Antitrust Policy*, 72 U. CHI. L. REV. 229, 235–36 (2005).

27. The fact that a firm charges a positive price for the durable good often implies another kind of second-degree price discrimination called the *two-part tariff*, which is similar to the quantity discount: the more a consumer purchases the nondurable goods, the lower the average price per use. High-volume consumers are more price elastic.

Notably, not only is the razor-and-blades model a profitable strategy for firms, but it also improves consumer welfare in most cases. First, this business model regularly leads to below-cost pricing for durable goods that have incurred substantial production costs, especially R&D costs. Low price levels may increase sales significantly, making it possible to serve consumers (including those with high value but low intensity) who would otherwise be unable to participate at a freestanding price.[28] The expanded production on the one hand brings more consumers into the market and on the other hand reduces the average costs by enhancing scale economies.[29] Therefore, existing consumers are also better off as a result of flexible pricing, particularly while the supplier maintains a dominant position in the market of the durable goods.

Second, the razor-and-blades model may serve as a risk-sharing device that accommodates consumers who are initially uncertain about the total utility at the point of purchasing durable goods.[30] This is particularly relevant to information goods such as movies and music. Information goods have the characteristics of experience goods, since consumers are usually unable to fully appreciate their value without having actually experienced them first.[31] Furthermore, information goods are also nondurable goods, so consumers will continue to acquire a big portion of their content collections after they purchase the durable hardware (e.g., media players).[32] Given the uncertainty regarding the quality and variety of future information goods,

---

28. *See* F. M. SCHERER & DAVID ROSS, INDUSTRIAL MARKET STRUCTURE AND ECONOMIC PERFORMANCE 495 (3d ed. 1990) ("First- or second-degree discrimination usually leads to larger outputs than under simple monopoly, and from there to lower dead-weight losses and improved allocative efficiency."); Mark Armstrong & John Vickers, *Competitive Price Discrimination*, 32 RAND J. ECON. 579, 601 (2001) ("[F]reedom to engage in price discrimination tends to be desirable in sufficiently competitive conditions: constraining the ways that competitive firms supply utility to consumers usually reduces total welfare."); Erik Hovenkamp & Herbert Hovenkamp, *Tying Arrangements and Antitrust Harm*, 52 ARIZ. L. REV. 925, 928 (2010) ("[T]he economic consensus is that most instances of [second-degree price discrimination] are probably welfare increasing . . . .").

29. For the theoretical framework and empirical evidence on scale economies resulting from product bundling, see generally David S. Evans & Michael Salinger, *Why Do Firms Bundle and Tie? Evidence from Competitive Markets and Implications for Tying Law*, 22 YALE J. ON REG. 37 (2005); Bruce H. Kobayashi, *Does Economics Provide a Reliable Guide to Regulating Commodity Bundling by Firms? A Survey of the Economic Literature*, 1 J. COMPETITION L. & ECON. 707 (2005); Stan J. Liebowitz & Stephen E. Margolis, *Bundles of Joy: The Ubiquity and Efficiency of Bundles in New Technology Markets*, 5 J. COMPETITION L. & ECON. 1 (2009).

30. For general discussions about how second-degree price discrimination may manage consumer risks involving demand uncertainty, see Ulrich Kamecke, *Tying Contracts and Asymmetric Information*, 154 J. INST. & THEORETICAL ECON. 531 (1998); Stan J. Liebowitz, *Tie-In Sales and Price Discrimination*, 21 ECON. INQUIRY 387 (1983); I. P. L. Png & Hao Wang, *Buyer Uncertainty and Two-Part Pricing: Theory and Applications*, 56 MGMT. SCI. 334 (2010).

31. Martin Peitz & Patrick Waelbroeck, *An Economist's Guide to Digital Music*, 51 CESIFO ECON. STUD. 359, 360–61 (2005) (confirming music constitutes "an experience good, which is a good that needs to be 'tasted' before consumers can assess its value").

32. *Cf.* Rafael Rob & Joel Waldfogel, *Piracy on the High C's: Music Downloading, Sales Displacement, and Social Welfare in a Sample of College Students*, 49 J.L. & ECON. 29, 55–56 (2006) (detecting that pop music is subject to taste depreciation: the longer consumers have owned a musical work, the lower value they place on it).

requiring consumers to make a large up-front investment in the form of high-price hardware would likely expose them to substantial economic risks. Taking into account the possibility that they might end up using the product rather infrequently, risk-averse consumers may totally forgo the consumption, deterred by the risk-bearing costs.[33] Accordingly, a firm may reduce the risk-bearing costs by charging a low price for the durable hardware so that consumers pay more only if they use the product more often, as measured by the increasing consumption of information goods. To this extent, the razor-and-blades model functions like insurance, and the higher price for the nondurable good is equivalent to a basic price with an insurance premium.

Third, the razor-and-blades model provides short-term financial flexibility to consumers who need to purchase durable and nondurable goods at different points in time.[34] Consumers assess the current price of durable goods in accordance with the future enjoyment of nondurable goods. It is generally believed that consumers discount the utility derived from future value at a higher rate than firms do, as evidenced by the fact that firms have access to lower interest rates than individuals do. According to recent empirical studies, annual consumer discount rates range from 30% to 150%, while firms generally discount future payments with their weighted average cost of capital in the range of 10–11%.[35] The different rates indicate that consumers are more reluctant than firms to pay instantly for long-term enjoyment.[36] As a result, it may enhance consumer welfare to allow installment payments for the total utility over a longer period of time and to relax the financial constraints that significant up-front payment would otherwise impose on consumers. To this extent, the razor-and-blades model functions like consumer credit: the higher price for the nondurable good is equivalent to a base price with interest.

A special case of variable-proportion complements arises when the degree of complementarity is not necessarily symmetrical between two complementary goods. Taking operating systems and software applications as an example, Microsoft Office must be used together with Microsoft Windows, but Microsoft Windows supports a large number of different third-party applications. Therefore, Microsoft Office is more complementary to Microsoft Windows than Microsoft Windows is to Microsoft

---

33. The risk-bearing cost refers to the disutility resulting from having a risk-averse person bear a risk. It is tantamount to the value that a risk-averse person is willing to pay or forgo to avoid the risk. A person is deemed risk averse if she prefers higher certainty faced with several different combinations of probability and cost/benefit but having the same expected value. For discussions of risk aversion in the intellectual property context, see James Gibson, *Risk Aversion and Rights Accretion in Intellectual Property Law*, 116 YALE L.J. 882, 887–95 (2007).

34. *See* Florian Heubrandner & Bernd Skiera, *Time Preference and the Welfare Effects of Tie-In Sales*, 108 ECON. LETTERS 314, 314 (2010); David M. Mandy, *Competitive Two-Part Tariffs as a Response to Differential Rates of Time Preference*, 58 ECONOMICA 377, 380–83 (1991).

35. Florian Heubrandner, Anja Lambrecht & Bernd Skiera, Time Preferences and the Pricing of Complementary Durables and Consumables 3 (unpublished manuscript) (on file with author); *see also* Shane Frederick, George Loewenstein & Ted O'Donoghue, *Time Discounting and Time Preference: A Critical Review*, 40 J. ECON. LITERATURE 351 (2002).

36. This line of theoretical arguments also arose in the context of copyright term extension. *See, e.g.*, Eldred v. Ashcroft, 537 U.S. 186, 254–55 (2003) (Breyer, J., dissenting) (indicating that the future value of any term extension should be discounted).

Office.[37] The possibility of one good working with a variety of different complements (referred to hereinafter as *variable-variety complements*) often leads to indirect network effects in which the consumer base of a primary good and the availability of complementary goods can reinforce each other. A detailed discussion of various network effects will follow, in conjunction with indirect copyright liabilities and Internet services.[38]

The razor-and-blades model benefits from a higher level of complementarity where a firm takes contractual, technological, and/or legal measures to lock in consumers so that they have to obtain the two goods from the same supplier.[39] A firm will find it difficult to recoup its investment in the durable goods priced below cost if consumers who bought the durable goods are free to choose from the nondurable goods supplied by third parties. First, a firm may contractually require consumers to buy the two goods together without offering any good for sale separately.[40] Alternatively, a firm may provide the option to buy one good without the other but offer the bundle of the two goods at a discounted price compared to the individual prices.[41] Second, a firm may take technological measures to prevent the compatibility between its own goods and complementary goods offered by another firm. For instance, a Lexmark printer is designed to work only with Lexmark ink cartridges, a PlayStation console does not play any Xbox games, and music files bought from iTunes for several years were unreadable on any media player other than an iPod.[42] Third, a firm sometimes takes legal measures, for example, through anticircumvention law or a design patent, to prevent other firms from offering complements that interoperate with its goods.[43]

---

37. Sometimes, if one good requires the other good to yield utility, but not vice versa, we call the latter a *base good* as opposed to a *complementary good*. For a comprehensive survey of various complementary goods, see, for example, Nicholas Economides & Brian Viard, *Pricing of Complements and Network Effects*, *in* REGULATION AND THE PERFORMANCE OF COMMUNICATION AND INFORMATION NETWORKS 157 (Gerald R. Faulhaber, Gary Madden & Jeffrey Petchey eds., 2012).

38. *See infra* Part V.

39. Such measures may incur anticompetitive concerns. *See, e.g.*, Dennis W. Carlton & Michael Waldman, *The Strategic Use of Tying To Preserve and Create Market Power in Evolving Industries*, 33 RAND J. ECON. 194 (2002); Barry Nalebuff, *Bundling as an Entry Barrier*, 119 Q.J. ECON. 159 (2004); Michael D. Whinston, *Tying, Foreclosure, and Exclusion*, 80 AM. ECON. REV. 837 (1990).

40. *See* Int'l Salt Co. v. United States, 332 U.S. 392, 394 (1947) (salt dissolving and injection machines with salt), *abrogated by* Ill. Tool Works Inc. v. Indep. Ink, Inc., 547 U.S. 28 (2006); Carbice Corp. of Am. v. Am. Patents Dev. Corp., 283 U.S. 27, 30–32 (1931) (ice boxes with dry ice); Motion Picture Patents Co. v. Universal Film Mfg. Co., 243 U.S. 502, 516 (1917) (projectors with films).

41. The former is often called *pure bundling* and the latter called *mixed bundling*. Jay Pil Choi, *Mergers with Bundling in Complementary Markets*, 56 J. INDUS. ECON. 553, 554 (2008).

42. *See* Lexmark Int'l, Inc. v. Static Control Components, Inc., 134 S. Ct. 1377, 1383 (2014) (printer/ink); Xerox Corp. v. Media Scis., Inc., 660 F. Supp. 2d 535, 539 (S.D.N.Y. 2009) (printer/ink); Tucker v. Apple Computer, Inc., 493 F. Supp. 2d 1090, 1094 (N.D. Cal. 2006) (iPod/iTunes).

43. *See* Ill. Tool Works Inc. v. Indep. Ink, Inc., 547 U.S. 28 (2006) (printer/ink—design patent); Lexmark Int'l, Inc. v. Static Control Components, Inc., 387 F.3d 522 (6th Cir. 2004)

II. ALTERNATIVE REVENUE STREAMS

As mentioned above, the advent of digital technology has drastically changed the traditional copyright landscape. Digital technology empowers average consumers to make near-perfect copies of information products and distribute such copies globally with just a few clicks on their computer keyboards.[44] Despite the potential for numerous noninfringing uses, many digital platforms such as peer-to-peer (P2P) networks have become the breeding ground for the infringing practice commonly called "file sharing," for most users are primarily interested in exchanging copyrighted music and video files without due authorization.[45]

The probability of detection for online piracy activities is extremely low compared to other forms of copyright infringement. This is not because online users are particularly elusive[46] but because the sheer volume of routine piracy taking place every day within online networks makes effective copyright enforcement almost prohibitively expensive. It has been shown above that, when the usage of P2P file sharing peaked in the United States in 2003, 27% of American Internet users (around thirty-six million) downloaded illegal music files,[47] and approximately 850 million files were downloaded monthly.[48] It is basically unthinkable to detect and prosecute such an astronomical number of copyright infringers one by one.[49] Even assuming that copyright owners are willing to be aggressive enough to bring thousands of lawsuits,[50] the overall probability of detection would hardly reach 0.01% under the circumstances.

(printer/ink—anticircumvention); Chamberlain Grp., Inc. v. Skylink Techs., Inc., 381 F.3d 1178 (Fed. Cir. 2004) (garage door / door opener—anticircumvention).

44. *See* BRUCE A. LEHMAN & RONALD H. BROWN, INFORMATION INFRASTRUCTURE TASK FORCE, INTELLECTUAL PROPERTY AND THE NATIONAL INFORMATION INFRASTRUCTURE: THE REPORT OF THE WORKING GROUP ON INTELLECTUAL PROPERTY RIGHTS 114–24 (1995) (introducing digital technology and various implications for copyright law enforcement).

45. P2P is a computer software technology by which individuals can search for and share files that reside on the hard drives of other personal computers connected to the Internet. For introductions of various P2P technologies and their copyright implications, see, for example, MGM Studios Inc. v. Grokster, Ltd., 545 U.S. 913 (2005); *In re* Aimster Copyright Litig., 334 F.3d 643 (7th Cir. 2003); A&M Records, Inc. v. Napster, Inc., 239 F.3d 1004 (9th Cir. 2001).

46. They can hardly stay anonymous on the Internet, especially after copyright owners have enlisted the assistance of Internet service providers (ISPs) in tracking down online copyright infringements under the Digital Millennium Copyright Act (DMCA). *See* 17 U.S.C. § 512 (2012).

47. MARY MADDEN & LEE RAINIE, PEW INTERNET & AM. LIFE PROJECT, MUSIC AND VIDEO DOWNLOADING MOVES BEYOND P2P (2005).

48. Press Release, The NPD Group, Inc., RIAA Lawsuits Appear To Reduce Music File Sharing, According to the NPD Group (Aug. 21, 2003), *available at* http://www.npd.com /press/releases/press_030825.htm.

49. *See, e.g.*, Glynn S. Lunney, Jr., *The Death of Copyright: Digital Technology, Private Copying, and the Digital Millennium Copyright Act*, 87 VA. L. REV. 813, 818–19 (2001) ("[I]n the face of widespread private copying, copyright's traditional approach of direct legal action against each individual infringer would likely prove ineffective.").

50. It is reported that the copyright owners, especially in the music industry, had indeed sued about 35,000 individual infringers before readjusting their antipiracy campaign recently. *See RIAA To Stop Mass Lawsuits*, ROLLING STONE, Feb. 5, 2009, at 18.

The high level of copyright piracy has led to significant devaluation of music in the marketplace. For instance, Chinese statistics indicate that while 99% of online music files in China are infringing,[51] 74.6% of Chinese music users are unwilling to pay any amount for music,[52] and 94% never actually pay anything for music consumption at all.[53] Likewise, according to several surveys conducted in Europe, file sharers are in general 50% less likely to purchase legitimate music, and nearly one in four P2P file sharers (24%) typically spends nothing on music.[54] As copyright piracy is driving the prices of musical works down toward the marginal cost, a number of music companies have shifted their focus from music sales to alternative revenue streams, trying to indirectly appropriate the value of music production by bundling free or low-price music with the sales of other products and services.[55] In most cases, the bundled products are, unsurprisingly, complementary with music consumption. Based on the degree of complementarity between recorded music and the bundled products, alternative revenue streams may be categorized into the three groups described below.

A. First-Degree Complements

First-degree complements basically involve two products that the same group of consumers normally uses together. In this sense, information products (e.g., music and movies) and information-technology products (e.g., media players, cell phones, and broadband services) are good examples of first-degree complements. Mindful of this, music companies appear to believe that free music may enhance the value of the bundled complements (e.g., media players), which in turn increases the willingness of media-player manufacturers to pay royalties for copyright licenses or invest directly in music production.

B. Second-Degree Complements

Second-degree complements include cases in which the same group of consumers usually purchases and uses both products, although they may or may not consume the two products together. Two examples of second-degree complements are (1) recorded music versus live performances (e.g., concerts and touring) and (2) recorded music versus merchandise (e.g., t-shirts, posters, and dolls).[56] In these cases, recorded music and its complements more often than not originate from the same or related producers (e.g., musicians, music companies, and their concert promoters). The

---

51. *See* IFPI, RECORDING INDUSTRY IN NUMBERS (2008).

52. *See* MINISTRY OF CULTURE, CHINA DIGITAL MUSIC MARKET ANNUAL REPORT 21 (2009).

53. *See* IRESEARCH, CHINA DIGITAL MUSIC ANALYSIS REPORT 22 (2009–10) (report written in Chinese script).

54. IFPI, DIGITAL MUSIC REPORT 18 (2010), *available at* http://www.ifpi.org/content/library/DMR2010.pdf.

55. For discussions of complementary goods in the context of copyright law, see PAUL GOLDSTEIN, COPYRIGHT'S HIGHWAY: FROM GUTENBERG TO THE CELESTIAL JUKEBOX 98–99 (2003); Liebowitz & Watt, *supra* note 6, at 527–30.

56. The music industry sometimes alleges that merchandizing creates a market for so-called unpiratable products. *See* IFPI, DIGITAL MUSIC REPORT 12 (2009), *available at* http://www.ifpi.com/content/library/DMR2009.pdf.

widespread distribution of recorded music resulting from the low price may boost the popularity of the music and the musicians, which in turn increases the market appeal of concerts and merchandise offered by the same musicians.

C. Third-Degree Complements

In the scenario of third-degree bundling, the two products are generally not consumed together or supplied by the same firm. However, the consumers of the two products substantially overlap so that the more widely the music is circulated, the greater value the music (or the musician) is as an advertising medium for the other product. In this case, a decrease in the price of music will probably result in an increase in the demand of the products advertised. The business models based on third-degree bundling include advertisement-supported websites,[57] sponsorship, and endorsement.[58]

All three categories of music complements need to interact with copyright law. For instance, it is obvious that third-degree complements (e.g., advertisement-supported websites) may suffer from the free-riding problem without effective copyright protection.[59] Legitimately licensed websites that incur significant costs in the form of copyright royalties are less capable of sustaining low advertisement rates than unauthorized websites. In the long run, the price competition from unauthorized websites is likely to drive most licensed websites out of the advertisement market. From this perspective, advertisement-supported music is just another business model based on copyright protection.[60] Nevertheless, the first-degree and second-degree

---

57. As an attempt to survive free pirated music, several licensed websites (e.g., Myspace.com and Lala.com) have started to provide free music streaming and downloading services in order to attract eye traffic and eventually benefit from increased rates of online banner advertisements. *See* Chloe Albanesius, *Google Music Search Launches with MySpace, Lala*, PCMAG.COM (Oct. 28, 2009, 8:38 PM), http://www.pcmag.com/article2/0,2817,2354928,00.asp.

58. In the same way that famous NBA players receive sponsorship from sneaker and beverage manufacturers, pop artists may seek opportunities to endorse commodities of other companies. The artists would normally be required to participate in promotional events, appear in various commercials, or otherwise use their star power to influence potential purchasers in exchange for corporate sponsorships. Other forms of sponsorship include product placement in music videos and banners on stage. *See* Andrew Barker, *Branding Deals with Pop Stars Go Beyond the Casual Endorsement*, VARIETY (Apr. 16, 2013, 8:15 AM), http://variety.com/2013/music/features/endorsement-deals-1200334594/.

59. For a detailed survey of economic theories in connection with copyright law, see 1 PAUL GOLDSTEIN, GOLDSTEIN ON COPYRIGHT § 1.14 (3d ed. 2005); Gillian K. Hadfield, *The Economics of Copyright: A Historical Perspective*, 38 COPYRIGHT L. SYMP. (ASCAP) 1 (1988).

60. A related but slightly different suggestion is that free music could have a positive causality with music sales because of certain *sampling effects* (also called *exposure effect*s). This theory draws from the intuition that consumers who have good experience with P2P file sharing or other forms of free music are more likely to buy recorded music, in the same way that food sampling in grocery stores promotes food sales. Furthermore, it is contended that free music may be particularly beneficial for up-and-coming artists who would be more than happy to see their popularity boosted. *See, e.g.*, Ram D. Gopal, Sudip Bhattacharjee & G. Lawrence Sanders, *Do Artists Benefit from Online Music Sharing?*, 79 J. BUS. 1503 (2006); Alejandro Zentner, *File Sharing and International Sales of Copyrighted Music: An Empirical Analysis with a Panel of Countries*, 5 TOPICS ECON. ANALYSIS & POL'Y, no. 1, art. 21 (2005);

complements give rise to more complicated issues regarding copyright law. The following Parts will therefore investigate those issues in more detail.

III. IPOD AND ITUNES

The iTunes Store, launched by Apple in April 2003, has quickly become the overwhelmingly dominant player in the digital music market, selling ten billion songs within seven years of launching.[61] In 2009, it accounted for almost 70% of digital music sales, a more than comfortable lead over the silver medalist, Amazon, which only had an 8% market share.[62] The iTunes Store appears to have brought a powerful boost to the sales of iPod media players as well. Although the iPod was launched as early as 2001, iPod sales only started to skyrocket two years later, several months after the opening of the iTunes Store. As of 2009, Apple had sold 220 million iPod players and exceeded 73% market share in the global sales of digital media players.[63]

The positive effects of the iTunes Store on iPod sales result from the high degree of complementarity between the two products. Indeed, Apple took various technological measures to bundle iTunes music purchases with iPod media players. Prior to 2007, all music downloads from the iTunes Store were encrypted with the FairPlay technology developed by Apple.[64] FairPlay is a digital rights management (DRM) system that imposes numerous restrictions on reproduction and distribution of music files.[65] Although different DRM systems do not have to be incompatible

---

David Blackburn, The Heterogenous Effects of Copying: The Case of Recorded Music (June 1, 2006), *available at* http://www.davidjhblackburn.com/papers/blackburn_fs.pdf. This line of argument is, however, flawed in that it blurs the distinction between rivalrous goods (e.g., food) and nonrivalrous goods (e.g., information). While sampling rivalrous goods can generate more consumption of the same goods, sampling nonrivalrous goods would have positive effects only if the goods sampled are somewhat different from the goods ultimately offered for sale. For instance, online streaming may lead to paid downloading for full enjoyment, downloading a few tracks from an album may lead to purchasing the whole album with more tracks, and freely distributing the debut album may lead to selling future albums by the same artist. However, in a world without copyright, all albums and all tracks in any album would be freely available for all kinds of exploitation by anyone. Such free music is, in essence, not sampling but a substitute for purchase, because there is no juncture where authors and copyright owners can cash in on the reputation resulting from previous good experiences of consumers.

61. *See* Press Release, Apple, iTunes Store Tops 10 Billion Songs Sold (Feb. 25, 2010), *available at* http://www.apple.com/pr/library/2010/02/25itunes.html.

62. Press Release, The NPD Group, Digital Music Increases Share of Overall Music Sales Volume in the U.S. (Aug. 18, 2009), *available at* https://www.npd.com/wps/portal/npd/us/news/press-releases/pr_090818/.

63. Alex Brooks, *Live Coverage from Apple's "It's Only Rock and Roll" Event*, WORLD APPLE (Sept. 9, 2009), http://news.worldofapple.com/archives/2009/09/09/coverage-of-its-only-rock-and-roll-event.

64. *See* Adam L. Penenberg, *Digital Rights Mismanagement: How Apple, Microsoft, and Sony Cash In on Piracy Prevention*, SLATE (Nov. 14, 2005, 5:47 PM), http://www.slate.com/id/2130300.

65. *See* Carlisle George & Navin Chandak, *Issues and Challenges in Securing Interoperability of DRM Systems in the Digital Music Market*, 20 INT'L REV. L. COMPUTERS & TECH. 271, 272, 275 (2006). Such restrictions include the following: (1) users can make a

with each other, music files bought from the iTunes Store were generally not playable in digital media players of other brands. Apple almost never licensed the FairPlay technology to any other companies, and it scoffed at any attempt by competitors to enhance their interoperability with FairPlay.[66]

While Apple deliberately limited the interoperability between iTunes music and non-iPod media players, it made the iPod platform open to music files from third-party sources (e.g., other online stores and file-sharing sites) and compatible with various music formats, including AAC, MP3, and WAV. To the extent that iTunes music must be consumed with iPod media players but not vice versa, the degree of complementarity between iTunes and the iPod is asymmetric. A consumer survey in 2006 showed that 44% of music files within MP3 players including iPods were copied from personal CDs, 6% from borrowed CDs, 25% from licensed music services, and 19% from unauthorized file sharing sites.[67] Apple reported more surprising data in 2007: iPod users stored an average of 1000 tracks per iPod; among those tracks, only 3% were purchased from the iTunes Store.[68]

It was not until Apple had achieved a substantial lead in the markets of both media players and online music distribution that the iTunes Store started to gradually remove the FairPlay encryption from music files and instead offer the entire repertoire for sale in a DRM-free format called "iTunes Plus."[69] Nevertheless, in the areas that Apple does not have a leading position, such as in distributing movies and TV shows, it continues to limit interoperability with strong DRM restrictions.[70]

The business ecosystem of iPod/iTunes is in many ways similar to that of the video game/console model. Both iPod players and game consoles are durable goods that consumers usually do not replace very often. Both music tracks and video games are experience goods with depreciating value (i.e., nondurable goods) so that consumers need to buy new products frequently.[71] Furthermore, akin to Apple, video

---

maximum of seven CD copies of any particular playlist containing songs in the MP4 file format purchased from the iTunes Store; (2) users can access their purchased songs in the MP4 file format on a maximum of five computers; and (3) songs in the MP4 file format can only be played on a computer with iTunes or an iPod, and other MP3 devices do not support FairPlay encoded tracks. *Id.* at 274 tbl.1.

66. *See* Eric Bangeman, *Apple Responds to RealNetworks FairPlay Hack*, ARS TECHNICA (July 29, 2004, 1:24 PM), http://arstechnica.com/uncategorized/2004/07/4051-2/.

67. *See* Candace Lombardi, *What's On Your iPod?*, CNET NEWS (June 30, 2006, 8:40 AM), http://news.cnet.com/Whats-on-your-iPod/2100-1027_%203-6090042.html.

68. Steve Jobs, *Thoughts on Music*, APPLE.COM (Feb. 6, 2007), http://web.archive.org/web/20080517114107/http://www.apple.com/hotnews/thoughtsonmusic.

69. EMI and Apple agreed on iTunes Plus in 2007, followed quickly by the rest of the four major music labels. All music files had become available in the iTunes Plus format by April 2009. *See* Press Release, Apple, Apple Unveils Higher Quality DRM-Free Music on the iTunes Store (Apr. 2, 2007), *available at* http://www.apple.com/pr/library/2007/04/02itunes.html; *see also Apple To End Music Restrictions*, BBC NEWS (Jan. 7, 2009, 12:27 AM), http://news.bbc.co.uk/2/hi/technology/7813527.stm.

70. *See* Nicola F. Sharpe & Olufunmilayo B. Arewa, *Is Apple Playing Fair? Navigating the iPod FairPlay DRM Controversy*, 5 NW. J. TECH. & INTELL. PROP. 332, 344–45 (2007).

71. *See* MARTIN CAMPBELL-KELLY, FROM AIRLINE RESERVATIONS TO SONIC THE HEDGEHOG: A HISTORY OF THE SOFTWARE INDUSTRY 281 (2003) ("[W]hile the personal computer market could bear no more than a few word processors or spreadsheet programs, the

game developers employ various technological measures to bundle their consoles with video games of their own brands. As mentioned above, an Xbox game cannot be played with a PlayStation console or a console of any brand other than Xbox.

Surprisingly, the pricing schemes for video games/consoles and for iPods/iTunes appear to be entirely opposite. As the statistics in Table 1 indicate, the price ranges are $299.99 for iPod Classic and $0.69 to $1.29 for iTunes music downloads.[72] The ratio between the prices of an iPod and an iTunes album (assuming ten tracks) is about twenty-five to one. By contrast, Xbox 360 consoles are generally priced from $199.99 to $299.99, while game software costs consumers $19.99 to $59.99. This ratio is 7.5 to one.

Table 1. Video game/console versus iPod/iTunes: retail price comparison

	Video game/console	iPod/iTunes
Durable goods	$299.99 (Xbox 360 250 GB)	$249 (iPod Classic 160 GB)
Nondurable goods	$19.99–$59.99/game (game software)	$6.90–$12.90/album (iTunes download)
Price ratio	7.5:1	25:1

These simple facts are consistent with the intuition that video game manufacturers, like numerous suppliers of durable/nondurable bundles,[73] prefer to price their products in accordance with the conventional razor-and-blades model. They offer video game consoles at relatively low prices but receive substantial complementary revenues by selling games developed internally or collecting royalties from publishers who, in return, develop compatible games.[74] As a matter of fact, the whole video game industry has been well known for subsidizing consoles

---

teenage videogame market could support an indefinite number of programs in any genre. In this respect, videogames were, again, more like recorded music or books than like corporate software . . . .").

72. For Xbox 360 prices, see *Xbox 360 Consoles*, XBOX.COM, http://www.xbox.com/en-US/xbox-360/consoles; for Xbox 360 game prices, see *Xbox 360 Marketplace*, XBOX.COM, http://marketplace.xbox.com/en-US/Xbox?xr=gamestwistnav; for iPod prices, see *Which iPod Are You?*, APPLE.COM, http://www.apple.com/ipod/compare-ipod-models; and for iTunes prices, see *iTunes*, APPLE.COM, http://www.apple.com/itunes (all prices checked on July 11, 2013).

73. For other examples, see William M. Bulkeley, *Kodak's Strategy for First Printer–Cheaper Cartridges*, WALL ST. J., Feb. 6, 2007, at B1; Damon Darlin, *Why Do-It-Yourself Photo Printing Doesn't Add Up*, N.Y. TIMES, Oct. 8, 2005, at C1; Dan Ilett, *Gartner: Printer Ink Costs More than Perfume*, ZDNET (Oct. 12, 2004, 12:15 PM), http://www.zdnet.com/gartner-printer-ink-costs-more-than-perfume-3039169961.

74. *See* DAVID S. EVANS, ANDREI HAGIU & RICHARD SCHMALENSEE, INVISIBLE ENGINES: HOW SOFTWARE PLATFORMS DRIVE INNOVATION AND TRANSFORM INDUSTRIES 122 (2006); Andrei Hagiu, *Two-Sided Platforms: Product Variety and Pricing Structures*, 18 J. ECON. & MGMT. STRATEGY 1011, 1013 (2009); Robin S. Lee, *Home Videogame Platforms*, *in* THE OXFORD HANDBOOK OF THE DIGITAL ECONOMY 83, 86–87 (Martin Peitz & Joel Waldfogel eds., 2012).

priced at or below cost with lucrative game royalties, ever since Atari introduced the first generation of video game consoles, VCS 2600, in 1977. That console was priced at $199, a price close to its manufacturing cost, while the games sold for $30 each, three times their manufacturing cost.[75] Later generations have rarely deviated from this pricing strategy.[76] The modern video game market, dominated by the seventh-generation consoles (i.e., Xbox 360, PlayStation 3, and Wii), appears to be no exception. At the time of initial launch, the Xbox 360 was priced at $399, whereas the manufacturing cost (excluding marketing and software development) had reached $550; more remarkably, the 20 GB PlayStation 3 was initially priced at $499 but cost $805 to manufacture.[77] As mentioned above, the razor-and-blades model, combining low-price durables and high-price nondurables, usually results in social welfare improvements.[78] On the one hand, pricing durables at a relatively low level brings in more consumers, particularly those with high valuation but low intensity; it minimizes the risks of up-front payment with uncertain demand; and it decreases short-term financial barriers for average consumers.[79] On the other hand, the manufacturer may earn better profits because consumers would reveal their individual valuations of the utility through the quantity of nondurables purchased at a relatively high price. Such price discrimination, therefore, facilitates as wide consumption as possible and eliminates deadweight loss, while at the same time enabling recoupment of the full value of production.[80]

Apple, by bundling low-price iTunes music with high-price iPods, actually reverses the pricing scheme of the razor-and-blades model. Statements from Apple executives shed light on this unique strategy: Steve Jobs indicated as early as 2003 that "[w]e would like to break even/make a little bit of money but [iTunes is] not a money maker."[81] He proceeded to admit that Apple instead sought to make money from its own line of hardware accessories (i.e., iPod).[82] Seven years later, Peter Oppenheimer, Apple's CFO, once again made it clear that "[r]egarding the App Store and the iTunes Store, we're running those a bit over break-even, and that hasn't changed . . . . We're very excited to be providing our developers with just a fabulous opportunity, and we think that's helping us a lot with the iPhone and the iPod touch

---

75. *See* STEVEN L. KENT, THE ULTIMATE HISTORY OF VIDEO GAMES: FROM PONG TO POKÉMON AND BEYOND—THE STORY BEHIND THE CRAZE THAT TOUCHED OUR LIVES AND CHANGED THE WORLD 107 (2001); Dark Watcher, *Atari Video Computer System (2600)*, VIDEO GAME CONSOLE LIBR., http://www.videogameconsolelibrary.com/pg70-2600.htm #page=reviews.

76. In 1993, a new game manufacturer, 3DO, started with a unique strategy: its console was sold at a price three times higher than its competitors' consoles, but 3DO merely charged a fifth of the market rate for game royalties. Despite using the finest technology of the time, 3DO retreated from the market after just three years. EVANS ET AL., *supra* note 74, at 115–17.

77. Nabyla Daidj & Thierry Isckia, *Entering the Economic Models of Game Console Manufacturers*, COMM. & STRATEGIES, Jan. 2009, at 23, 37.

78. *See supra* notes 28–29 and accompanying text.

79. *See supra* notes 28–36 and accompanying text.

80. *See generally* Michael J. Meurer, *Copyright Law and Price Discrimination*, 23 CARDOZO L. REV. 55 (2001).

81. Andrew Orlowski, *Your 99c Belong to the RIAA—Steve Jobs*, REGISTER (Nov. 7, 2003, 12:11 PM), http://www.theregister.co.uk/2003/11/07/your_99c_belong.

82. *Id.*

platforms."[83] Several scholars observed from empirical evidence that the iTunes Store sells music roughly at cost, but Apple is able to extract consumer surplus through its sales of the iPod, which has a profit margin of about 35%.[84]

The dramatic difference in the pricing strategies applicable to the iPod and the Xbox appears to result, for the most part, from the different levels of copyright piracy in the two markets. Video game suppliers have largely contained online piracy to a manageable level. According to a recent survey, although 40% of video game users know how to download and play pirated copies of video games, only approximately 5% have downloaded pirated copies.[85] By contrast, rampant online piracy has been driving the price of recorded music close to marginal costs. In the face of fierce competition from P2P, music companies have to agree with Apple to set the iTunes price below the profit-maximizing level that would apply in normal market situations. This pricing strategy, designed mostly to combat pirated music, has stimulated the demand for the iPod and contributed to its dominant position in the digital media player market. Nevertheless, from the consumer welfare perspective, the supercompetitive price of the durable goods (i.e., iPod) could actually impose several kinds of social costs by raising the entry barrier for music audiences.

First, consumers who value iPod media players above marginal costs but who cannot afford the supercompetitive price would probably have to entirely forgo all music consumption using the iPod.[86] The market size for the iPod/iTunes ecosystem would be unlikely to reach its optimality in the absence of sufficient consumer participation. This naturally brings about certain deadweight loss. Second, high-price durables increase the risk-bearing costs for consumers who are uncertain about the quality and variety of future musical works.[87] The demand uncertainty makes it more difficult for consumers to commit to substantial investment at the outset. As a consequence, risk-averse consumers may be driven out of the market, even though their expected values from consumption are higher than the listed prices. Third, high-price durables limit the financial flexibility of consumers who discount future payment at a relatively high rate.[88] Sometimes consumers can afford the product in the long term but are unable to secure short-term financing from third parties. In these cases, large, up-front payments for the durables likely preempt transactions that could otherwise render both suppliers and consumers better off.

Notably, copyright piracy is widely perceived as an effective means to reduce deadweight loss resulting from copyright protection because it allows the public unlimited access to information goods at a price closer to marginal costs.[89] However,

---

83. Rik Myslewski, *Apple: iPhone App and iTunes Stores Don't Make Money*, REGISTER (Jan. 26, 2010, 9:02 AM), http://www.theregister.co.uk/2010/01/26/app_store.

84. *See* Heubrandner et al., *supra* note 35, at 22.

85. *See* Nobuya, *supra* note 8, at 232.

86. *See supra* notes 28–29 and accompanying text.

87. *See supra* note 33 and accompanying text.

88. *See supra* notes 34–35 and accompanying text.

89. *See, e.g.*, Sanjay Goel, Paul Miesing & Uday Chandra, *The Impact of Illegal Peer-to-Peer File Sharing on the Media Industry*, CAL. MGMT. REV., Spring 2010, at 6, 9 (opining that "Internet piracy may increase public welfare in the short term"); Rufus Pollock, *Optimal Copyright Over Time: Technological Change and the Stock of Works*, 4 REV. ECON. RES. ON COPYRIGHT ISSUES, no. 2, 2007, at 51, 58 (suggesting that "technological change may

information goods and information technologies are highly complementary with each other.[90] Therefore, as we have seen in the case of iTunes/iPod, artificially lowering the prices of information goods often creates pressure to simultaneously raise the prices of information technologies.[91] By means of this topsy-turvy effect, music piracy, by keeping the prices of iTunes music low, indirectly gives rise to the supercompetitive price of iPod players, which basically substitutes one kind of deadweight loss with another kind. In other words, pricing songs above marginal costs (with low-level piracy) is analogous to charging high usage fees per song, which leads to suboptimal quantities of songs consumed. Pricing iPods above marginal costs (with high-level piracy) is analogous to high access fees per consumer, which leads to suboptimal participation by consumers in the first place. Furthermore, the deadweight loss from the hardware could potentially exceed the deadweight loss from the software where a substantial portion of relevant consumers have high valuation and low frequency in music consumption, are risk averse toward an up-front payment with demand uncertainty, or discount future values at a high rate.[92]

IV. RECORDED MUSIC AND LIVE PERFORMANCE

Live performance (i.e., touring and concerts) has always supplied a reliable source of revenue for many artists.[93] In a conventional sense, live performance also plays a more important role in promoting record sales. It is therefore not a coincidence that every time a band releases a new album, the band members set out for extended touring across the country in addition to frequent media interviews and record store signings.

The promotional role of live performance vis-à-vis record sales was quite apparent several years ago from the fact that concert tickets were priced much lower than the profit-maximizing level. Empirical evidence showed that musicians could have earned substantially larger revenues if tickets were priced high enough to eliminate the secondary market. For example, for a 2002 Bruce Springsteen and the

---

also reduce deadweight losses via a reduction in the cost of unauthorised copying"); Rob & Waldfogel, *supra* note 32, at 30 (2006) (stating that "illegal downloading may actually alleviate the monopoly deadweight-loss problem").

90. *See supra* note 55 and accompanying text.

91. The iPod/iTunes pricing model is very similar to a two-part tariff widely employed by country clubs. A user needs to first pay a "membership fee" (i.e., access fee) for access to the club and then pay a "green fee" (i.e., usage fee) each time she uses the club facility. The membership fee determines how many users will join the club, while the green fee determines how often the members will use the facility. *See, e.g.*, Walter Y. Oi, *A Disneyland Dilemma: Two-Part Tariffs for a Mickey Mouse Monopoly*, 85 Q.J. ECON. 77 (1971); Richard Schmalensee, *Monopolistic Two-Part Pricing Arrangements*, 12 BELL J. ECON. 445 (1981).

92. The social costs associated with the current iPod/iTunes models may appear to suggest that there would be net social gains if firms were able to control music piracy and engaged in second-degree price discrimination via the razor-and-blades model. But they do not necessarily suggest so. We cannot easily jump to any conclusion before balancing such social costs against copyright enforcement costs, and market players rather than policy makers are likely in a better position to carry out such balancing.

93. For a concise introduction to touring businesses, see Bobby Borg, *Tech Tip: Potential Revenue Streams: Live Performance and Touring*, MUSICIAN'S FRIEND, http://www.musiciansfriend.com/document?doc_id=93022.

E Street Band concert at the First Union Center in Philadelphia, 20–25% of the tickets had been purchased from scalpers at an average price of $280.[94] However, the average face value of those tickets was just $75.[95] Had the musicians sold all tickets for the concert at the price of $280, they would theoretically have made $4 million more (($280–$75) x 19,738 tickets) on that single concert.[96] In any event, the musicians could have easily raised ticket prices to capture the value of the secondary market, in which scalpers took between $1.1 million and $1.4 million.[97] The musicians undeniably forwent significant income given that the actual ticket revenues they collected were no more than $1.5 million.[98]

One of the main reasons for such an unwillingness to raise concert ticket prices was that musicians wanted their hardcore fans (but not necessarily the richest fans) to attend. That way, their concerts could strengthen fan loyalty and generate more buzz around their record releases. This practice was supposedly based on the high-level complementarity between recorded music and live performance, to the extent that low-price concerts might boost the demand of recorded music, and musicians could recoup their losses in ticket sales from increased record sales.[99]

As in the iPod/iTunes model, the pricing strategies of recorded music and live performance have started to show a reverse trend in the digital age. Concert ticket prices used to increase modestly at a rate consistent with inflation.[100] During the period from 1997 to 2012, while the usage of first CD burners and then file-sharing technologies became increasingly popular, concert ticket prices rapidly increased by 131%, more than three times the rate of general inflation (see Figure 1).[101] It is also estimated that the leading acts now make about 70% of their income from touring.[102] It is not really surprising that, as piracy diminishes the prospect of making any profits from record sales, musicians and music companies become increasingly dependent on live performance for their bread and butter. They have become accustomed to tolerating the free sharing of their music and marketing their albums at a price low enough to compete with pirated copies. The resulting popularity of the musicians is expected to promote live performance markets and make up for the losses in record sales. As one music insider summed up wonderfully: "In the past, people would tour to promote their albums; today they put out albums to promote their tours."[103] Once

---

94. Marie Connolly & Alan B. Krueger, *Rockonomics: The Economics of Popular Music*, *in* 1 HANDBOOK OF THE ECONOMICS OF ART AND CULTURE 667, 689 (Victor A. Ginsburgh & David Throsby eds., 2006).

95. *Id.*

96. *Id.* at 690.

97. *Id.*

98. *Id.*

99. *See* Liebowitz & Watt, *supra* note 6, at 528.

100. *See* Alan B. Krueger, *The Economics of Real Superstars: The Market for Rock Concerts in the Material World*, 23 J. LAB. ECON. 1, 3 (2005).

101. *See* POLLSTAR, 2012 YEAR END BUSINESS ANALYSIS (2012); *Consumer Price Index*, U.S. BUREAU LAB. STAT., http://www.bls.gov/cpi/.

102. Cahal Milmo & Mark Hughes, *All the World's a Stage*, INDEPENDENT, Jan. 3, 2009, at 12.

103. Ethan Smith, *Live Nation's New Act; Concert Giant Seeks More Business Arenas Where It Can Lead*, WALL ST. J., Nov. 30, 2007, at B1; *see also* Jon Pareles, *David Bowie, 21st-Century Entrepreneur*, N.Y. TIMES, June 9, 2002, at A1 ("I'm fully confident that copyright . . . will no longer exist in 10 years . . . . You'd better be prepared for doing a lot of

again, the relative roles within the music complements are reversed because of rampant copyright piracy, as is similar to the case of the iPod and iTunes.

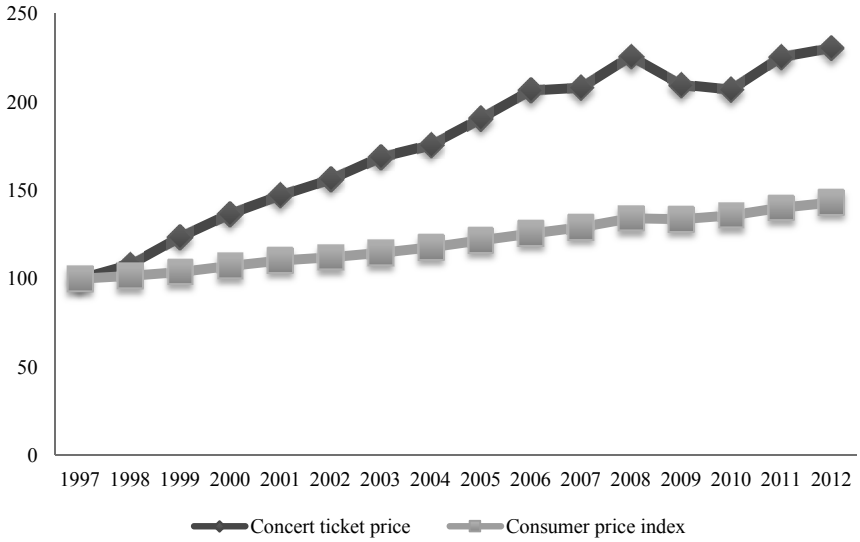

Figure 1. Concert ticket price versus consumer price index: growth rate comparison (index 1997 = 100)

The changes in pricing strategies have given rise to new business models in the music industry worldwide. The basic functions of music labels in the value chain were traditionally limited to the production, promotion, and distribution of recorded music. Given the growing importance of live performance and other alternative revenue streams, different forms of music companies have emerged beyond mere concert promoters to handle and share revenues for all aspects of music-related businesses, ranging from record sales to touring, merchandising, brand sponsorship, music publishing, fan clubs, websites, and TV and film appearances. A celebrated example, Live Nation, was established in 2005 and has signed a number of megadeals with such superstars as U2 ($100 million), Madonna ($120 million), and Jay Z ($150 million with copyright).[104] These all-encompassing arrangements are often called "360-degree" deals, by which musicians essentially sign over the entirety of their careers for the duration of their contracts.[105]

---

touring because that's really the only unique situation that's going to be left.").

104. PETER TSCHMUCK, CREATIVITY AND INNOVATION IN THE MUSIC INDUSTRY 194 (2d ed. 2012); Phil Gallo, *Madonna, Live Nation Make Music*, VARIETY (Oct. 10, 2007, 5:14 PM), http://www.variety.com/article/VR1117973815.html?categoryid=16&cs=1; Rosie Swash, *Jay-Z To Sign Deal with Live Nation*, GUARDIAN (Apr. 3, 2008, 11:53 AM), http://www.guardian.co.uk/music/2008/apr/03/jayz.urban.

105. For the media usage of the term "360-degree" deals, see, for example, Pete Paphides, *Arrogant, Yes. But He Can See Music's Future*, TIMES (London), Jan. 18, 2008, at 23; *Music Firms Tune into New Deals*, BBC NEWS (June 30, 2008, 1:14 AM), http://news.bbc.co.uk/2/hi/business/7480183.stm.

It is somewhat ironic that when musicians are finally able to directly distribute their works to consumers, free from the physical constraints of CDs and record shops, they end up having to depend more on another form of physical constraints (i.e., theaters and stadiums) to earn a decent living. Live performance, one of the most primitive business models that usually calls for thousands of people to come to the same place at the same time, is enlisted to carry the future of digital music that allegedly empowers consumers to enjoy their favorite music at the times and the places they individually choose. More importantly, the growth of live-performance markets is unlikely to offset all the losses in record sales. As Figure 2 illustrates below, in 1999, while music sales peaked right before the emergence of Napster and subsequent P2P platforms, the performance market ($1.5 billion) only amounted to 10.3% of the music market ($14.6 billion).[106] In 2012, while the performance market had tripled to $4.7 billion, the music market, in spite of the significant decline by 51.4%, still reached $7.1 billion, 51.1% larger than the performance market. In other words, the losses in the music market ($7.5 billion) have obviously overshadowed the growth in the performance market ($3.2 billion). It is hard to imagine how we can completely substitute one market with another market on a much smaller scale.

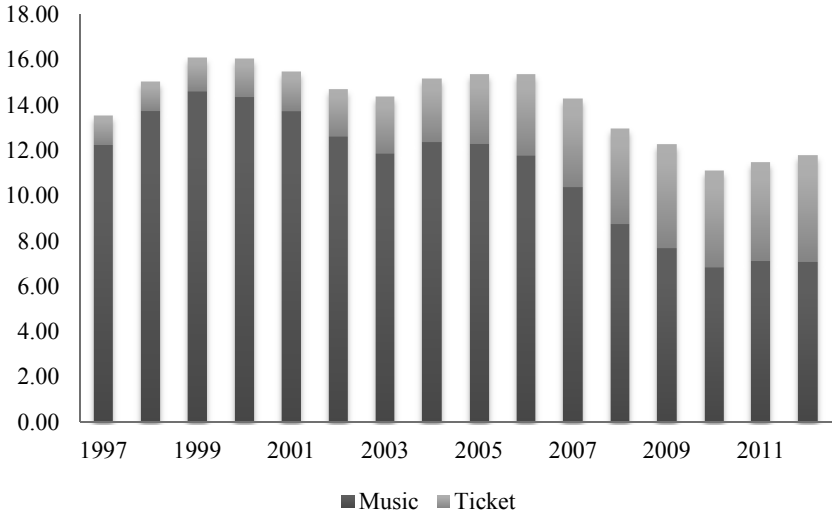

Figure 2. Music sales versus concert ticket sales: retail value trend in billions (USD)

Furthermore, it has been reported that the performance market is completely tilted toward superstars: the top twenty-five profitable tours, comprising only 0.76% of all tours in number, accounted for 53.25% of all tour revenues.[107] These statistics suggest that, should the music industry be forced to revolve around live performance, it would have to scale down substantially, and some musicians might be impacted more heavily than others. Comparing the charts of top-ten tours and top-ten albums

106. *Compare* POLLSTAR, *supra* note 101, *with* RIAA, YEAR-END SHIPMENT STATISTICS (1997–2012). These sources apply to the data in this paragraph and in Figure 2.

107. *See Top 25 Tours*, BILLBOARD, Dec. 22, 2007, at 138.

in 2010, there is hardly any overlap (see Table 2).[108] The tour chart is crowded with established artists (sometimes also called "legacy acts") who have a large repertoire of hit tracks, a stable fan base, and a music career of ten years or more. By contrast, the album chart is full of new names.

Table 2. Top artists in albums and tours: length of career (2010)

	Top albums 2010		Top tours 2010	
	Artist	Career	Artist	Career
1	Eminem	14	Bon Jovi	26
2	Lady Antebellum	2	Roger Waters	26
3	Taylor Swift	4	Dave Matthews Band	16
4	Justin Bieber	0	Michael Bublé	9
5	Susan Boyle	1	Eagles	38
6	Lady Gaga	2	Paul McCartney	40
7	Sade	26	Trans-Siberian Orchestra	14
8	Drake	1	Lady Gaga	2
9	Usher	16	James Taylor / Carole King	42/40
10	Ke$ha	0	The Black Eyed Peas	18

As a matter of fact, the artists on the tour chart were consistently more experienced than the artists on the album chart during the period from 2000 to 2012 (Figure 3).[109] The artists on the tour chart average 24.2 years' experience, while the artists on the album chart average 6.7 years' experience. It takes 17.5 years longer for an artist to crack into the tour chart than into the album chart.

108. *Compare* Press Release, Nielsen SoundScan, The Nielsen Company & Billboard's 2010 Music Industry Report (Jan. 6, 2011), *available at* http://www.businesswire.com/news/home/20110106006565/en/Nielsen-Company-Billboard%E2%80%99s-2010-Music-Industry-Report#.UrnkC5V3vIU, *with* POLLSTAR, 2010 YEAR END TOP 100 NORTH AMERICAN TOURS (2011).

109. Data derives from the Pollstar Year End Top 100 North American Tours reports for 2000 through 2010, as well as the Year End Top 200 North American Tours reports for 2011 and 2012. Length of career is calculated from the year in which an artist released her debut album (according to her online biography) to the year in which she appeared on a chart.

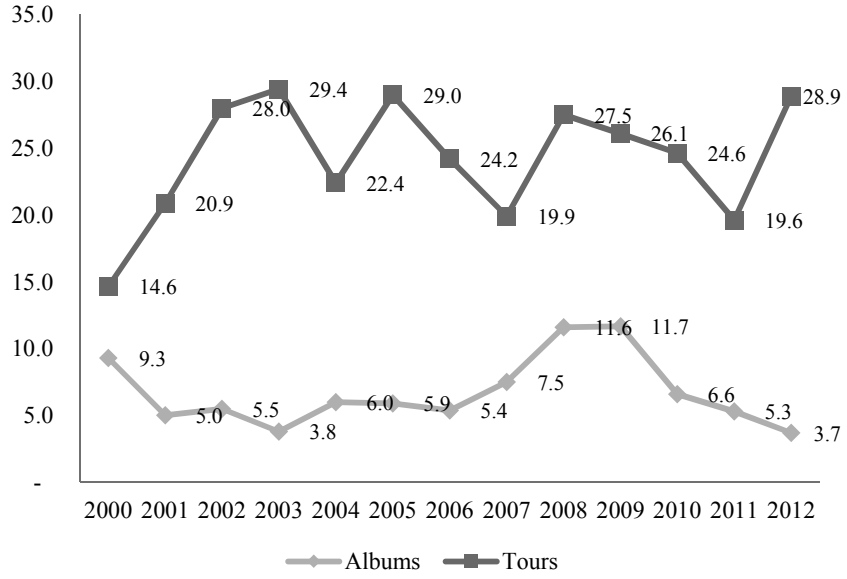

Figure 3. Top artists in albums and tours: length of career (2000–12)

It appears that live performance markets systematically favor established artists over new artists. The high market-entry barrier for new artists lies in the following factors. First, unlike the unlimited virtual shelf space for digital distribution, the number of physical venues suitable for live performance is inherently limited. Therefore, the market is tipped toward established artists who are able to sell out these venues quickly by attracting high-value audiences and more audiences in general.[110] The chance of success for new artists becomes more uncertain because the market may be quickly saturated. Second, live performance entails substantial initial investment in relation to venue rental, equipment purchase and maintenance, travel logistics, concert promotion, and staff payroll. Third, live performance generates meaningful revenue only after a musician has built up popularity and a substantial fan base. Without music sales, new artists would have to wait a relatively long period of time to recoup their investment from concert revenues. When you discount the future value of money, the uncertain and time-consuming recoupment becomes even less attractive, especially to risk-averse musicians. In summary, up-and-coming artists (as well as alternative artists) with limited popularity and a smaller fan base are less likely to succeed in a music industry featuring numerous entry barriers that were once lowered by digital technology but have been re-erected by live performance requirements.

---

110. While the majority of recorded-music consumers are students and other young people, concert goers are mostly older generations. A possible reason for this distinction is that, compared to the modest prices of music records, concert tickets are much more expensive. Therefore, music fans start to frequently attend concerts only when they have a stable source of income. This means that, even though an artist's album is well received, she probably has to wait several years more for a lucrative live-performance market.

V. INDIRECT COPYRIGHT LIABILITIES

Musical works, like most intangible information goods, are rarely consumed alone without the assistance of tangible complementary goods. For live music, consumers and artists usually need a physical platform (e.g., stadium or arena) to directly interact with each other. For recorded music, a consumer needs to first obtain a copy through a distribution channel (e.g., iTunes or Wal-Mart), enjoy the copy with a playback tool (e.g., CD player or MP3 player), and sometimes find a space to store the music copy (e.g., computer or cloud). As mentioned above, online piracy that lowers the prices of musical works and other information goods would likely boost the demand for such complementary goods so that complement providers are well positioned to benefit indirectly from online piracy.[111] It is therefore unsurprising that content providers have long targeted complement providers for copyright infringement as manifested throughout the history of indirect liabilities. To name a few examples, historical copyright cases have involved platform providers such as dance halls,[112] landlords,[113] and user-generated content (UGC) websites;[114] distribution channels such as flea markets,[115] department stores,[116] and P2P networks;[117] and playback plus storage tools such as VCRs,[118] audio cassettes,[119] and MP3 players.[120] One may argue that indirect liability rules, as a matter of fact, have incorporated several key factors that allude to complementary goods. Indirect copyright liabilities consist of two branches. Contributory infringement occurs when the defendant "induces, causes or materially contributes to the infringing conduct of another" with the actual or constructive "knowledge of the infringing activity."[121] Vicarious liability arises if the defendant possesses "the right and ability to supervise" the infringing conduct and has "an obvious and direct financial interest in the exploitation of copyrighted materials."[122]

---

111. *See supra* note 5 and accompanying text.

112. *See* Gershwin Publ'g Corp. v. Columbia Artists Mgmt., Inc., 443 F.2d 1159, 1160 (2d Cir. 1971); Dreamland Ball Room, Inc. v. Shapiro, Bernstein & Co., 36 F.2d 354, 355 (7th Cir. 1929); KECA Music, Inc. v. Dingus McGee's Co., 432 F. Supp. 72, 74 (W.D. Mo. 1977).

113. *See* Deutsch v. Arnold, 98 F.2d 686, 688 (2d Cir. 1938).

114. *See* UMG Recordings, Inc. v. Shelter Capital Partners LLC, 718 F.3d 1006, 1011 (9th Cir. 2013); Viacom Int'l, Inc. v. YouTube, Inc., 676 F.3d 19, 28 (2d Cir. 2012).

115. *See* Fonovisa, Inc. v. Cherry Auction, Inc., 76 F.3d 259, 261–62 (9th Cir. 1996).

116. *See* Shapiro, Bernstein & Co. v. H. L. Green Co., 316 F.2d 304, 306 (2d Cir. 1963).

117. *See* MGM Studios Inc. v. Grokster, Ltd. 545 U.S. 913, 919–20 (2005); *In re* Aimster Copyright Litig., 334 F.3d 643, 645–47 (7th Cir. 2003); A&M Records, Inc. v. Napster, Inc., 239 F.3d 1004, 1011–13 (9th Cir. 2001).

118. *See* Sony Corp. of Am. v. Universal City Studios, Inc., 464 U.S. 417, 422–23 (1984).

119. *See* A&M Records, Inc. v. Adballah., 948 F. Supp. 1449, 1453 (C.D. Cal. 1996); RCA Records v. All-Fast Sys., Inc., 594 F. Supp. 335, 336–37 (S.D.N.Y. 1984); Elektra Records Co. v. Gem Elec. Distribs., Inc., 360 F. Supp. 821, 821 (E.D.N.Y. 1973).

120. *See* RIAA v. Diamond Multimedia Sys., Inc., 180 F.3d 1072, 1073–75 (9th Cir. 1999).

121. Gershwin Publ'g Corp. v. Columbia Artists Mgmt., Inc. 443 F.2d 1159, 1162 (2d Cir. 1971) (holding an artist manager and concert promoter liable for an infringing performance of a music group).

122. Shapiro, Bernstein & Co. v. H. L. Green Co., 316 F.2d 304, 307 (2d Cir. 1963) (concluding that a store owner who retained supervision of and received a share of the profits derived from the sale of bootleg records was liable for copyright infringement occurring in the

Many complement providers would possibly fall into the scope of these two doctrines—especially given the "contribution" prong of contributory infringement and the "direct financial interest" prong of vicarious liability. Complementary goods facilitate consumers' access to information goods, and copyright piracy that lowers the prices of information goods promotes the sales of complementary goods.[123] Such legal rules are justifiable to the extent that complement providers have an inherent tendency to tolerate and even encourage copyright infringement in order to benefit from the positive externalities created by low-price information goods. More importantly, the positive externalities ensure that complement providers typically have strong economic incentives to push back overbroad copyright claims from content providers. Indirect copyright liabilities, in effect, enlist complement providers as an important counterbalance, safeguarding consumer interests against content-provider claims in both judicial and legislative forums.[124]

Nevertheless, holding complement providers liable for end-user wrongdoings appears to be the exception rather than the rule, at least outside of intellectual property areas.[125] For example, it is hard to imagine under what circumstances a hot dog supplier could be liable for stolen or defective hot dog buns. This was probably one of the reasons that the Supreme Court felt it necessary to further limit the application of indirect copyright liabilities by importing the famous doctrine of *substantial noninfringing use* from patent law[126] into copyright law.[127] The theory of complementary goods may readily explain this doctrine. If a component is essential for both patented and unpatented goods, allowing the patentee to control the component would likely extend her market power to the unpatented good. Likewise, allowing content providers to control technological platforms would extend their leverage not only to online piracy but also to licensed uses that consumers have paid for and exempted uses in the public domain that legislators did not intend content providers to control.

There is, however, an important yet unspoken condition needed to rationalize the doctrine of substantial noninfringing use: content providers would only be able to

---

store). More often than not, contributory infringement and vicarious liability were jointly alleged or even merged in practice. *See, e.g.*, Fonovisa, Inc. v. Cherry Auction, Inc., 76 F.3d 259, 264–65 (9th Cir. 1996) (holding a swap-meet operator contributorily and vicariously liable for independent vendors' sales of infringing goods in the swap meet).

123. *See supra* note 11 and accompanying text.

124. *See, e.g.*, RIAA v. Verizon Internet Servs., Inc., 351 F.3d 1229, 1239 (D.C. Cir. 2003) (vacating lower court subpoena against Internet-access provider that refused to disclose the identities of P2P users); Jonathan Weisman, *Web Rises Up To Deflect Bills Seen as Threat*, N.Y. TIMES, Jan. 19, 2012, at A1 (describing website blackout campaigns protesting the Stop Online Piracy Act).

125. Notably, Internet service providers are generally *not* liable for third-party legal violations other than intellectual property infringement. *See* 47 U.S.C. § 230 (2012).

126. *See* 35 U.S.C. § 271(c) (2012) ("Whoever offers to sell or sells within the United States or imports into the United States a component of a patented machine, manufacture, combination or composition, or a material or apparatus for use in practicing a patented process, constituting a material part of the invention, knowing the same to be especially made or especially adapted for use in an infringement of such patent, and not a staple article or commodity of commerce suitable for substantial noninfringing use, shall be liable as a contributory infringer.").

127. *See* Sony Corp. of Am. v. Universal City Studios, Inc., 464 U.S. 417, 440–42 (1984).

hold up technology providers with respect to noninfringing uses if technology providers could not effectively differentiate between infringing and noninfringing uses. Otherwise, technology providers could continue to benefit from licensed uses and exempted uses after removing the infringing materials.[128] Therefore, the key point in question is not whether the technology is "capable of substantial noninfringing uses,"[129] but whether the technology provider is capable of distinguishing infringing uses from noninfringing uses. If so, the theory of complementary goods suggests that technology providers could charge a premium for (and solely for) infringing uses and pass the revenues to content providers, essentially acting as a collecting agent for content providers. If a technology provider does not have the ability to filter infringing uses, imposing indirect liabilities would probably force it either to shut down the entire service or to pay for a settlement in an amount reflecting the values of both infringing and noninfringing uses. Such a settlement would cause cross-subsidization between noninfringing users and infringing users. Content providers would end up charging some licensed users twice for the same use (once via direct sales and once via technology providers), and noninfringing users, who are reluctant to pay the premium, would likely be priced out of the market.[130] The current debate about specific knowledge versus general knowledge required for safe harbors can be better understood in the conceptual framework of the ability to differentiate between infringing and noninfringing uses.[131]

The inability to identify infringing uses could also give rise to a holdout problem, even if all the relevant uses require copyright licenses and all the relevant content providers are willing to license the technology providers. Technology providers that operate online platforms are often unable to recognize, ex ante, which copyright owners will be involved because third-party users are the ones who are responsible for uploading copyrighted works onto the platforms. If strong indirect liabilities impose an affirmative duty to proactively prevent copyright infringement with zero tolerance, technology providers whose services are jeopardized by the threat of injunctive relief to shut down the whole service would be forced to obtain licenses from all the relevant copyright owners before the launch of their platforms. Supposing that the transaction costs involved in searching for, and negotiating with, all copyright owners are manageable, the bargains could still break down because of strategic behaviors. The major reason is that multiple copyright owners, each having the potential power to veto the whole service, tend to charge excessive prices for copyright licenses, which often results in royalties that are prohibitively expensive for technology providers.[132] In

---

128. *See, e.g.*, MGM Studios, Inc. v. Grokster, Ltd., 518 F. Supp. 2d 1197, 1238 (C.D. Cal. 2007) (requiring a performance of reasonable filtering).

129. *Sony Corp.*, 464 U.S. at 442.

130. These outcomes are very similar to what would happen under a levy system. For a detailed discussion, see *infra* notes 139–41 and accompanying text.

131. *Cf.* UMG Recordings, Inc. v. Shelter Capital Partners LLC, 718 F.3d 1006 (9th Cir. 2013); Viacom Int'l., Inc. v. YouTube, Inc., 676 F.3d 19, 32–34 (2d Cir. 2012).

132. Similar issues have been addressed in the literature regarding royalty stocking and the anticommons. *See, e.g.*, Michael A. Heller & Rebecca S. Eisenberg, *Can Patents Deter Innovation? The Anticommons in Biomedical Research*, 280 SCIENCE 698 (1998); Mark A. Lemley & Carl Shapiro, *Patent Holdup and Royalty Stacking*, 85 TEX. L. REV. 1991 (2007). We will revisit this problem in the theoretical framework of double marginalization. *See infra*

theory, all copyright owners would be better off if they set royalties at a moderate level that would make the platform financially feasible. In practice, some would likely hold out in licensing negotiation, demanding exorbitant royalties and disregarding negative externalities that impact the practicability of the whole transaction. The safe harbors and notice-and-takedown procedures set forth in the DMCA may be viewed as a mechanism to solve the holdout problem.[133] The DMCA has, to a large extent, transferred digital copyright regimes from an "opt-in" system to an "opt-out" system.[134] On the one hand, the safe harbors allow a platform to come into operation without prior consent from all copyright owners. On the other hand, any copyright owner may still be able to opt out of the operation by sending a notice that contains sufficient information for identifying infringing uses. In this way, a single party hardly has any veto power over the entire platform, yet still maintains a realistic opportunity to request fair remuneration from the technology provider.

There are currently two initiatives that aim to further refine indirect copyright liabilities by leveraging the complementarity between information products and information technologies, especially Internet services. The first initiative calls for legislative changes to impose a public levy on complement providers to compensate content providers for the noncommercial uses of their copyrighted works online.[135] The second initiative has resulted in private ordering established between content providers and Internet service providers to promote cooperation in copyright enforcement.[136] The following discussion will evaluate these two proposals in more detail through the theoretical lens of complementary goods.

A. Public Levy

The levy system as proposed would follow and expand the existing legal regimes in the United States and other parts of the world.[137] It would exempt all noncommercial uses of copyrighted works from copyright liabilities in exchange for a public levy imposed on various information infrastructures and media including Internet-access services, home computers, CD/DVD burners, media players, cell phones, and blank recording media. A governmental body or collecting society would be responsible for

---

note 171 and accompanying text.

133. *See* 17 U.S.C. § 512 (2012).

134. *See id.*

135. *See* WILLIAM W. FISHER III, PROMISES TO KEEP: TECHNOLOGY, LAW, AND THE FUTURE OF ENTERTAINMENT 199–258 (2004). *See generally* Peter Eckersley, *Virtual Markets for Virtual Goods: The Mirror Image of Digital Copyright?*, 18 HARV. J.L. & TECH. 85 (2004); Neil Weinstock Netanel, *Impose a Noncommercial Use Levy To Allow Free Peer-to-Peer File Sharing*, 17 HARV. J.L. & TECH. 1 (2003).

136. For discussions of technological innovation and private ordering responses in the copyright industries, see generally Mark A. Lemley, *Contracting Around Liability Rules*, 100 CALIF. L. REV. 463 (2012); Mark A. Lemley, *Is the Sky Falling on the Content Industries?*, 9 J. ON TELECOMM. & HIGH TECH. L. 125 (2011) [hereinafter Lemley, *Sky Falling*].

137. *See, e.g.*, Audio Home Recording Act of 1992, Pub. L. No. 102-563, 106 Stat. 4237 (codified as amended at 17 U.S.C. §§ 1001–1010 (2012)).

collecting the levy funds and distributing those funds among copyright owners in proportion to consumer usage as metered by tracking or sampling technologies.[138]

The levy system has obvious advantages. First, free access to copyrighted works would diminish the transaction costs associated with seeking permission from individual copyright owners. Second, this system would encourage Internet subscribers to maximize the uses of copyrighted works and therefore reduce the deadweight loss resulting from traditional copyright law.

Nevertheless, as in the iPod/iTunes example, the levy system simply substitutes one kind of deadweight loss for another kind. Copyright protection has brought about traditional business models that require consumers to pay a usage fee per work, which could result in suboptimal quantities of works consumed.[139] By contrast, the levy system creates an access fee per consumer, which could result in suboptimal participation by consumers in the first place.[140] Furthermore, the deadweight loss would be aggravated if the levy were imposed upon Internet-access services or other information technologies that are capable of both infringing and noninfringing uses. Many consumers use Internet services mostly for legitimate purposes, such as checking email, gossiping with friends, and purchasing music from iTunes or Amazon. Others only occasionally access copyrighted works through P2P networks. A uniform levy imposed on all Internet users would likely price non-infringing users and low-volume infringing users out of the market (or cause them to scale down their online activities depending on how the levy amount is calculated) because these users would derive relatively little value from the increased freedom to use copyrighted works. In particular, some users would be forced to pay for works in the public domain or pay twice for copyrighted works that they have purchased from legitimate sources. Commentators sometimes characterize this problem as cross-subsidization among diverse consumer groups.[141] The levy system would force noninfringing users and low-volume infringing users to subsidize high-volume infringing users, thereby unavoidably distorting overall Internet usage. The cross-subsidization problem is similar to the phenomenon of "adverse selection" typically observed in the context of the insurance industry.[142] Assuming that the collecting societies may only

---

138. For attempts to implement the theoretical proposal into practice, see, for example, FRED VON LOHMANN, A BETTER WAY FORWARD: VOLUNTARY COLLECTIVE LICENSING OF MUSIC FILE SHARING (2008), *available at* https://www.eff.org/files/eff-a-better-way-forward.pdf.

139. *See supra* text accompanying note 91.

140. *Id.*

141. *See, e.g.*, Stacey L. Dogan, *Code Versus the Common Law*, 2 J. ON TELECOMM. & HIGH TECH. L. 73, 101 (2003) (suggesting that ISP indirect liabilities and the levy proposal both entail cross-subsidization, while "the levy would involve a monetary payment from technology purchasers to copyright holders to compensate for unauthorized file-sharing"); Jane C. Ginsburg, *Copyright and Control over New Technologies of Dissemination*, 101 COLUM. L. REV. 1613, 1644 (2001) ("Surcharges and levies may prove too gross a measure for users as well. [The levy system] is not necessarily the best formula, at least not for those whose diet of copyrighted works is modest."); Mark A. Lemley & R. Anthony Reese, *Reducing Digital Copyright Infringement Without Restricting Innovation*, 56 STAN. L. REV. 1345, 1408 (2004) ("But a levy charged on a range of devices with multiple uses is a tax on those devices, paid by both those who download music and those who do not.").

142. *See generally* Michael Rothschild & Joseph Stiglitz, *Equilibrium in Competitive Insurance Markets: An Essay on the Economics of Imperfect Information*, 90 Q.J. ECON.

understand the general distribution of infringing uses without the ability to differentiate between high-volume users and low-volume users, sufficient remuneration for infringing uses would require the levy set to reflect the average level of infringing uses. As a result, the users exceeding this level would be more likely to maintain Internet services, and the users below this level would be more likely to discontinue Internet services. These remaining groups of Internet users would have a higher level of infringing uses on average, which would call for an increase in the levy amount. The increased levy would further deter a portion of Internet users and then result in a further increase in the average level of infringing uses. Over time, the process could, in theory, deny Internet services to the majority of the general public, save for a small group of well-heeled Internet users that engage in high-volume infringing activities.

In addition, the levy system could create administrative difficulties at almost every point of the value chain. First, it is inherently difficult to set the levy at a level that would accurately measure the values of sectors affected by the levy system (e.g., the publishing, music, and movie industries) relative to the values of those unaffected. Initially, the government may be able to draw inferences from existing market data. However, such benchmarks would quickly become out of date as the levy system starts to replace copyright markets.

Second, the government would find it difficult to allocate the levy revenues among copyright owners. The number of downloads per work would rarely correspond with the value of the work.[143] Internet users would likely download any works whose subjective value exceeds the marginal cost of downloading, whereas the marginal cost under the levy system would simply be the time spent for downloading. Each download would be counted equally no matter whether an audiophile found her all-time favorite, a consumer sampled a new release, or a passenger simply wanted to use something to cancel background noises. It is therefore unsurprising that Internet users rarely listen to the bulk of their music collections obtained online.[144] The number of playbacks could serve as a better proxy, because consumers who value a product usually use it frequently. However, a playback-counting scheme would require coordination among a variety of electronic manufacturers to accurately measure the number of playbacks. A consumer may enjoy downloaded music via her computer, MP3 player, or cell phone. In addition, she may burn the music onto a CD and play the CD with a CD player or car stereo. All these online and offline uses would have to be taken into account. More importantly, the distribution of levy funds in this way could result in systematic prejudice to works with smaller niche audiences, such as alternative works and pioneering arts. Traditionally, there are markets that support investment in those works as long as their audiences, albeit in smaller numbers, are willing to pay

---

629 (1976).

143. *Cf.* Ville Oksanen & Mikko Välimäki, *Copyright Levies as an Alternative Compensation Method for Recording Artists and Technological Development*, 2 REV. ECON. RES. ON COPYRIGHT ISSUES, no. 2, 2005, at 25, 29 ("[T]he traffic in peer-to-peer networks is more or less meaningless as a measurement of the popularity of music.").

144. *See* Paul Lamere, *What's on Your iPod?*, DUKE LISTENS! (May 22, 2006), http://static.echonest.com/DukeListens/what_s_on_your_ipod.html (indicating that 64% of the songs stored in iPods are apparently never played).

relatively higher prices. The demands from high-value audiences, which contribute to the diversity of intellectual products, would likely be underestimated or overlooked by the metering and sampling mechanisms used in the levy system.[145]

Third, relying on a centralized organization to determine the levy rate and to administer the levy collection/distribution process obviously creates opportunities for rent seeking and state censorship.[146]

The levy system may arguably appear to be quite similar to the widely celebrated music service, Spotify. Spotify offers, among other options, an ad-free music streaming service that enables subscribers to enjoy an unlimited number of musical works in exchange for a periodic payment.[147] Both Spotify and the levy system could be described as a music buffet based on a periodic payment. There are, however, three key factors that distinguish Spotify from the levy system. First, the levy system that makes all copyright works freely available would allow limited space for the development of various business models. By contrast, if a user is unhappy with the buffet model offered by Spotify, she is free to transfer to an à la carte online store like Amazon or an ad-supported free Internet radio like iHeartRadio. Those models are developing and competing with Spotify in the marketplace. Second, Spotify does not impose any compulsory fee upon Internet users in general, who may or may not enjoy musical works at all. Instead, all Spotify subscribers are presumably music fans who believe that the value they derive from the service exceeds the payment that they make to Spotify, or they would simply stop paying for Spotify and change to another online service. Therefore, it makes little sense to speak of cross-subsidization between noninfringing users and infringing users in the Spotify context, where all users are simply music fans. Third, the Spotify charge is set based on the willingness of Spotify's users to pay and on the prices of comparable services by its competitors. Spotify's price generally reflects the market value of its services rather than an arbitrary amount decided by the government.[148]

In a nutshell, although the levy system is designed to emulate the market mechanism as closely as possible, such a "virtual market" may not be capable of operating well enough to replace the real market in any meaningful way.[149]

---

145. *See* Francisco Alcalá & Miguel González-Maestre, *Copying, Superstars, and Artistic Creation*, 22 INFO. ECON. & POL'Y 365, 366 (2010) ("We find that taxes on copying may hinder the promotion of niche and young artists and hamper artistic creation in the long run.").

146. *See* Robert P. Merges, *Compulsory Licensing Vs. the Three "Golden Oldies": Property Rights, Contracts, and Markets*, POL'Y ANALYSIS (Cato Inst., Wash., D.C.), Jan. 15, 2004, at 4 ("Compulsory licenses, being creatures of federal statute, tend to be less flexible and more susceptible to political manipulation than market-based transactions.").

147. *See Overview*, SPOTIFY, https://www.spotify.com/us/.

148. *See* Liebowitz & Margolis, *supra* note 29, at 19 ("[T]he seller of a bundle does at least confront consumers' willingness to pay for the entire bundle, which distinguishes a bundling seller from a government seller.").

149. *See, e.g.*, Ruth Towse, *What We Know, What We Don't Know and What Policy-Makers Would Like Us To Know About the Economics of Copyright*, 8 REV. ECON. RES. ON COPYRIGHT ISSUES, no. 2, 2011, at 101, 108 (The levy system "has been almost universally opposed by economists on the grounds that its remuneration to creators bears no resemblance to the market value of the works and therefore could not act as a valid incentive to creators.").

B. Private Ordering

A different initiative to reform indirect copyright liabilities has arisen through a series of private negotiations in the marketplace. As one of the best examples, various copyright owners and Internet service providers have recently agreed to jointly implement a so-called graduated response system against online infringement.[150] The system works basically like a three-strike program: Copyright owners would notify an ISP once they have identified copyright infringement within the ISP's service network. The ISP would, in turn, send a warning to the holder of the Internet account being used for the infringement. The notice would advise her to stop infringement and suggest the use of legitimate services. An escalating series of warnings would follow if the account holder refuses to cooperate. Continually ignoring such warnings could eventually lead to Internet-account suspension. The system would generally be implemented through the standard terms of ISP subscriber agreements that condition continued service upon compliance with the law.

Another high-profile example is the *Principles for User Generated Content Services*, a code of conduct established between copyright owners and UGC services.[151] UGC services, among other things, agree in principle to implement, enhance, and update content identification technologies that are highly effective and commercially feasible in order to eliminate infringing content within their services. Copyright owners agree in exchange to refrain from claiming copyright infringement against these UGC services with respect to user-generated infringing content. Recently, Google voluntarily introduced a similar "Content ID" program for its YouTube service, whereby Google would identify user-generated videos comprising copyrighted content by reference to the original works provided by copyright owners. Armed with this information, Google would allow copyright owners several options for blocking infringing content, obtaining usage statistics, or sharing advertising revenues with Google.[152] All the measures discussed above are arguably more than what is required for Internet service providers to enjoy the safe harbors established under the DMCA or otherwise obtain exemption from copyright liabilities.[153] It may

---

150. In December 2008, the music industry announced plans to shift its enforcement strategies away from bringing lawsuits against individual users in favor of a partnership with ISPs to implement the graduated response system. Nate Anderson, *RIAA Graduated Response Plan: Q&A with Cary Sherman*, ARS TECHNICA (Dec. 21, 2008, 6:54 PM), http://arstechnica.com/uncategorized/2008/12/riaa-graduated-response-plan-qa-with-cary-sherman/ (quoting RIAA official as describing "a real movement toward ISPs assuming a more proactive role in dealing with online piracy in [a] constructive way that's sensitive to their subscribers").

151. *Principles for User Generated Content Services*, UGC PRINCIPLES, http://www.ugcprinciples.com.

152. *See How Content ID Works*, YOUTUBE, http://www.youtube.com/t/contentid?hl=en.

153. Admittedly, the DMCA does condition the availability of safe harbors upon the fact that the ISP has "adopted and reasonably implemented . . . a policy that provides for the termination in appropriate circumstances of subscribers and account holders of the service provider's system or network who are repeat infringers." 17 U.S.C. § 512(i)(1)(A) (2012). However, it is also worth noting that any noncompliance with DMCA safe harbors would not automatically incriminate an ISP or preempt any legal defense traditionally available to alleged copyright infringers. The Supreme Court indicated that a technology platform currently crowded with infringing uses might nevertheless avoid copyright liabilities as long

seem peculiar that Internet service providers are actually willing to assume extralegal obligations to strengthen copyright protection given the complementarity between online content and online services. Low-price online piracy could create potential benefits for Internet service providers by increasing the demand for high-speed Internet access, P2P services, and UGC websites. There are three possible reasons why Internet service providers have economic incentives to engage in these private arrangements with copyright owners.

First, Internet service providers often employ different competitive strategies at different stages in a market featuring *network effects*. Network effects refer to a market phenomenon in which "the utility that a user derives from consumption of the good increases with the number of other agents consuming the good."[154] A classic example of network effects is telephone communication. A telephone network containing very few telephones would be of little market value since no rational consumer is willing to buy different telephones to call different locations. The larger the scale of the network that the consumer belongs to, the more useful her telephone is.[155] Commentators often use the term *direct network effects* (or *physical networks*) to describe telephone-like effects, which depend on physical connection or communication among consumers.[156] *Indirect network effects* (or *virtual networks*), which are more relevant to this discussion, generally arise from variable-variety complements, such as DVD players and DVD titles.[157] Although a DVD player usually works well without being connected to another DVD player, a larger installed consumer base for DVD players creates greater incentives for movie studios to release their works in the DVD format. More DVD titles, in turn, increase the consumer utility of DVD players and further expand the existing consumer base. A consumer indirectly benefits from the greater number of consumers using the same goods because of positive feedback effects on the supply of complementary goods.[158] At the nascent stage of a network market, new entrants that compete under indirect

---

as it is "capable of substantial noninfringing uses" and does not take any affirmative step to induce third-party infringements. Sony Corp. of Am. v Universal City Studios, Inc., 464 US 417, 442 (1984); MGM Studios Inc. v. Grokster, Ltd. 545 U.S. 913, 927 (2005).

154. Michael L. Katz & Carl Shapiro, *Network Externalities, Competition, and Compatibility*, 75 AM. ECON. REV. 424, 424 (1985); *see also* Mark A. Lemley & David McGowan, *Legal Implications of Network Economic Effects*, 86 CALIF. L. REV. 479 (1998). While many commentators use "network externalities" interchangeably with "network effects," others prefer "network externalities" only to mean those externalities that cause market failures, such as pollution and congestion. *See* S. J. Liebowitz & Stephen E. Margolis, *Network Externality: An Uncommon Tragedy*, J. ECON. PERSP., Spring 1994, at 133, 135.

155. *See* Howard A. Shelanski & J. Gregory Sidak, *Antitrust Divestiture in Network Industries*, 68 U. CHI. L. REV. 1, 8 (2001) ("[The] individual consumer's demand to use (and hence her benefit from) the telephone network . . . increases with the number of other users on the network whom she can call or from whom she can receive calls.").

156. *See* Michael L. Katz & Carl Shapiro, *Systems Competition and Network Effects*, J. ECON. PERSP., Spring 1994, at 93, 94–95.

157. *Id.*

158. *See, e.g.*, Daniel Birke, *The Economics of Networks: A Survey of the Empirical Literature*, 23 J. ECON. SURVS. 762, 763 (2009) ("For indirect network effects, the interest of the consumer is typically not in the direct interaction with some peers, but rather in the availability of complementary products or services.").

network effects are often faced with a "chicken-and-egg" problem.[159] For instance, after a P2P or UGC provider has launched its online intermediary platform, content providers will not participate without a consumer base, but consumers will not participate either without meaningful content. One of the key strategies for solving the dilemma is to initially subsidize the participation of one side with low-price services often set at or below cost (sometimes called "penetration pricing").[160] Tolerating or even inducing piracy could quickly build up a consumer base in a similar way. Free piracy is equivalent to penetration pricing, and it relieves the need to invite content providers, at least for the time being. At the mature stage of a network market, competitors gradually shift their emphasis from prices to variety and quality.[161] A platform with a dominant position would become an obvious target for enforcement action. Copyright owners that merely retain the right to opt out of a platform under the DMCA may nevertheless significantly affect the variety of copyrighted works by the simple means of sending takedown notices.[162] More importantly, a leading platform prefers to differentiate its offerings in order to prevent consumers from moving to competitors. It is more likely to obtain exclusive licenses by cooperating with content providers in enforcement actions.[163]

Second, in the wake of the highly publicized debates surrounding net neutrality,[164] Internet-access providers generally maintain the pricing practice developed in the earlier ages of the Internet, offering consumers unlimited data transfer at a specified maximum download/upload speed for a flat monthly rate, while imposing no charge on Internet-content providers. Several recent attempts to deviate from the virtually de facto standard have encountered heavy-handed regulatory intervention[165] and enormous public outcry[166]—albeit in the absence of clear legal prohibition.[167] Because

---

159. *See* Bernard Caillaud & Bruno Jullien, *Chicken & Egg: Competition Among Intermediation Service Providers*, 34 RAND J. ECON. 309, 310 (2003).

160. *See, e.g.*, Joseph Farrell & Paul Klemperer, *Coordination and Lock-In: Competition with Switching Costs and Network Effects*, *in* 3 HANDBOOK OF INDUSTRIAL ORGANIZATION, *supra* note 20, at 1967, 1997; Joseph Farrell & Garth Saloner, *Installed Base and Compatibility: Innovation, Product Preannouncements, and Predation*, 76 AM. ECON. REV. 940, 950 (1986); Katz & Shapiro, *supra* note 156, at 104.

161. *See* Matthew T. Clements & Hiroshi Ohashi, *Indirect Network Effects and the Product Cycle: Video Games in the U.S., 1994–2002*, 53 J. INDUS. ECON. 515, 515 (2005) ("[I]ntroductory pricing is an effective practice at the beginning of the product cycle, and expanding software variety becomes more effective later.").

162. *See Transparency Report*, GOOGLE, http://www.google.com/transparencyreport/removals/copyright/.

163. *See supra* note 153 and accompanying text.

164. *See, e.g.*, Gary S. Becker, Dennis W. Carlton & Hal S. Sider, *Net Neutrality and Consumer Welfare*, 6 J. COMPETITION L. & ECON. 497 (2010); Tim Wu, *Network Neutrality, Broadband Discrimination*, 2 J. ON TELECOMM. & HIGH TECH. L. 141 (2003); Christopher S. Yoo, *Network Neutrality and the Economics of Congestion*, 94 GEO. L.J. 1847 (2006).

165. *See* Comcast Corp. v. FCC, 600 F.3d 642 (D.C. Cir. 2010) (reversing an FCC ruling that found Comcast liable for restricting BitTorrent traffic).

166. *See* Brian Stelter, *Paying by Levels of Data You Use: Broadband Providers Test Metered Plans*, N.Y. TIMES, June 27, 2012, at B1 (reporting that Time Warner Cable tested consumption-based billing).

167. The FCC recently issued an order aiming to promote the openness of the Internet but

Internet-access providers merely charge a buffet price in the form of an access fee rather than a two-part tariff including both an access fee and a usage fee, they do not have effective pricing strategies to appropriate the full value of P2P traffic online, which is currently the predominant usage of Internet bandwidth.[168] However, P2P activities, if uncontrolled, could slow down overall Internet transmission and cause significant delay in other legitimate services. The congestion issue (a form of negative network effects) has therefore become a major concern for Internet-access providers that internalize all congestion costs but only a portion of the piracy benefits. As a result, these providers are increasingly willing to cooperate with copyright owners in enforcement actions, which indirectly decrease P2P traffic and release Internet bandwidth.

Third, a natural response to the de facto net neutrality standard is vertical integration by either merger or contract. By joining forces with content providers, Internet-access providers are able to explore multiple revenue streams, coordinate pricing practices, and unleash the powerful tool of the two-part tariff to widen their profit margin. For instance, Comcast, the largest broadband-access provider in the United States, recently acquired NBC Universal, one of the largest media and entertainment conglomerates in the United States.[169] A number of Internet-access providers in Europe, including TDC, Sky, and Vodafone, have similarly obtained licenses to bundle their Internet services with online music.[170] Vertical integration is a well-understood solution to the problem of double marginalization[171] that arises where two or more firms offer complementary goods and each has some market power in its respective market (a phenomenon that characterizes the interaction between upstream content providers and downstream access providers, both exhibiting oligopoly). Assuming the firms design pricing decisions for the complementary goods independently of each other, they cannot take into account the externality that results when a price increase for one good lowers the demand for the other good. Therefore, the two firms would, in aggregate, set higher prices, produce lower quantities, and ultimately obtain less profit than if a single firm produced both complementary goods. In other words, there is an unsurprisingly strong tendency for the two firms to join forces and integrate vertically, because coordinated pricing for

---

did not directly prohibit Internet service providers from charging more for faster access. *In re* Preserving the Open Internet, 25 FCC Rcd. 17905, 17906 (2010), *vacated and remanded by* Verizon v. FCC, 740 F.3d 623 (D.C. Cir. 2014).

168. *See* Tilman Klumpp, *File Sharing, Network Architecture, and Copyright Enforcement: An Overview*, 35 MANAGERIAL & DECISION ECON. 444, 455 (2014) (indicating that P2P accounted for approximately 40% of all data traffic in 2010).

169. *See* Press Release, Comcast, Comcast and GE Complete Transaction To Form NBCUniversal, LLC (Jan. 29, 2011), *available at* http://corporate.comcast.com/news-information/news-feed/comcast-and-ge-complete-transaction-to-form-nbcuniversal-llc.

170. *See* IFPI, *supra* note 54, at 8.

171. Double marginalization, originally studied by French economist Cournot, is also known as "Cournot complements." *See* AUGUSTIN COURNOT, RESEARCHES INTO THE MATHEMATICAL PRINCIPLES OF THE THEORY OF WEALTH 99–116 (Nathaniel T. Bacon trans., Macmillan 1929) (1838). For a modern application of Cournot complements, see, for example, Richard J. Gilbert & Michael L. Katz, *An Economist's Guide to* U.S. v. Microsoft, J. ECON. PERSP., Spring 2001, at 25, 41 ("[T]he sum of the operating system and application prices set by an integrated monopolist will be lower than the sum of those prices when set separately by two independent firms each with significant market power.").

complementary goods would likely benefit both consumers and producers. Once Internet-access providers have ventured into the business of producing content, they naturally have more at stake in copyright protection and hence are more motivated in copyright enforcement.

CONCLUSION

The high level of online copyright piracy leads to significant devaluation of musical works in the marketplace. In the digital environment, consumers are now predominately exposed to free music from various illegal sources. Relying solely on record sales ceases to be a viable business model, while consumers are habituated to pay very little (if anything) for musical works. Musicians are forced to look for other ways to make a living. Recent literature and market experiments abound with various forms of alternative revenue streams to help copyright owners preserve the incentive for intellectual creation in the face of prevalent piracy. Alternative revenue streams (e.g., touring, advertising, and merchandising), however, may sometimes incur substantial social costs.

First, copyright piracy, widely believed to decrease the deadweight loss in music consumption, could simultaneously increase the pressure to inflate the prices of its complements and exaggerate the deadweight loss in complement consumption. Second, alternative revenue streams, which revolve around the popularity of established artists rather than the quality of their music, would discriminate against up-and-coming artists and pioneer artists. Third, substituting the copyright market with a public levy collected on the complements (e.g., Internet-access services) would likely distort Internet consumption by causing cross-subsidization between legitimate users and infringing users.

This Article is, for the most part, positive, explaining the market dynamics between copyrighted works and ancillary markets, but it does contain a somewhat normative implication. In most areas of industrial studies, scholars generally believe merchant greed outsmarts the best economists, so scholars are more ready to interpret than predict.[172] The research question is often, "Why and how did they do that?" However, when it comes to the music industry, many people believe greed causes stupidity, and musicians (or music companies) are the last to grasp the reality in the digital age.[173] So the research question becomes, "What did they do wrong, and what should they do instead?" In the face of rapid changes in digital market landscapes, we need to constantly resist the urge to panic and overreact, hurriedly expanding or narrowing the traditional boundaries of property rights. Instead, we could achieve a lot more by doing little things, such as preserving the basic contours for the music market, facilitating voluntary transactions between market players, and eventually allowing market players to discover on their own which combination of music licensing and alternative revenue streams is most effective. Simply put, the normative message in this Article is to be positive in every sense.[174]

---

172. *See, e.g.*, TIMOTHY TAYLOR, *How Economists Think*, *in* DVD: ECONOMICS, 3RD EDITION (The Teaching Company 2005) ("This is really odd that economists are expected to predict the future, because no one expects other people in other disciplines to predict the future.").

173. *See supra* note 1 and accompanying text.

174. *See generally* Lemley, *Sky Falling*, *supra* note 136.