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VERTICAL RESTRAINTS AND INTELLECTUAL PROPERTY LAW: BEYOND ANTITRUST

MICHAEL J. MEURER*

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INTRODUCTION

Sales and licenses of intellectual property (IP) and products incorporating IP often feature restrictions on use, transfer, and production.¹ IP owners have considerable freedom to fashion such restrictions, but they are constrained by contract and antitrust law as well as by certain doctrines within IP law.² The appropriate rigor of the constraints on the freedom of IP owners to market as they choose is hotly contested within law and economics.³ Most commentary on this subject focuses on antitrust oversight, but — at least when it comes to vertical restraints⁴ — constraints that are internal to patent and copyright law are far more important. This Article moves beyond antitrust and explores the extensive regulation of vertical restraints within IP law.⁵

There are four important reasons to focus on IP oversight of vertical restraints separately from antitrust oversight. First, IP law covers a broader range of vertical restraints. It has broader coverage because it responds to a

* Associate Professor of Law, Boston University Law School. I owe thanks for helpful comments to participants at the symposium on the interface between antitrust and intellectual property law at the University of Minnesota Law School. Copyright © 2003 by Michael J. Meurer.

¹ Lisa M. Bowman, *Court: Network Associates Can't Gag Users*, CNET NEWS.COM (January 17, 2003) available at: <http://news.com.com/2100-1023-981228.html>. (“End-user license agreements have become a hot-button issue in the tech industry as more and more companies try to forge increasingly restrictive contracts.”)

² Louis Kaplow, *The Patent-Antitrust Intersection: A Reappraisal*, 97 HARV. L. REV. 1813, 1817 (1984) (no exemption from criminal laws for patent license terms).

³ See Richard J. Gilbert & Willard K. Tom, *Is Innovation King at the Antitrust Agencies? The Intellectual Property Guidelines Five Years Later*, 69 ANTITRUST L. J. 43 (2001); Michael A. Carrier, *Unraveling the Patent-Antitrust Paradox*, 150 U. PENN. L. REV. 761 (2002). See Willard K. Tom & Joshua A. Newberg, *Antitrust and Intellectual Property: From Separate Spheres to Unified Field*, 66 ANTITRUST L. J. 167 (1997).

⁴ Following antitrust terminology, restraints that affect competitors are classified as horizontal, and restraints that affect users or suppliers are classified as vertical. Much of the antitrust analysis of vertical restraints addresses the effect of restraints on distributors and retailers. See *infra* note 10. In contrast, this Article mainly addresses the effect of restraints on end-users.

⁵ This Article discusses mostly patent and copyright law; space constraints preclude discussion of the interesting role of trademark law in regulating vertical restraints.

larger set of policy concerns and because it has more regulatory instruments. Antitrust reaches only certain kinds of vertical restraints that are especially likely to harm competition. IP law reaches anti-competitive restraints through the patent and copyright misuse doctrines,⁶ and it reaches other vertical restraints that present policy questions usually not addressed in antitrust. IP law is more versatile than antitrust law because it regulates in two ways: by specifying entitlements; and by prohibiting certain contracts or practices.⁷ Antitrust is limited to prohibitions.

Second, the economic analysis of the antitrust-IP conflict does not provide an adequate normative framework for analysis of the full range of IP doctrines affecting vertical restraints.⁸ Both antitrust and certain IP doctrines (particularly misuse⁹) are concerned about the potential of vertical restraints to exclude downstream competitors.¹⁰ But unlike

⁶ Patent misuse occurs when the patent owner expands the scope or duration of the patent beyond the rights granted by the patent claims. Misuse can be purged, the patent is unenforceable until the misuse is purged, and no damages are allowed. Copyright misuse is patterned after patent misuse. The law of patent misuse recognizes two types of patent extension: the first type involves horizontal agreements between competitors who control products or processes that compete with the patented invention; the second type involves vertical restrictions on licensees' use. WARD S. BOWMAN, JR., PATENT AND ANTITRUST LAW 54-56 (1973). HERBERT HOVENKAMP, MARK D. JANIS, & MARK A. LEMLEY, IP AND ANTITRUST: AN ANALYSIS OF ANTITRUST PRINCIPLES APPLIED TO INTELLECTUAL PROPERTY LAW §20.3 (2002) (distinguishing a vertical restraint from a horizontal restraint by asking whether competition between the parties is affected).

⁷ In addition to the misuse doctrine, IP law regulates vertical restraints through: preemption, *see infra* text accompanying notes 56, 155, 160; the patent law repair/replace doctrine, *see infra* text accompanying notes 116-141; copyright fair use, *see infra* text accompanying notes 54-71; the copyright public performance right, *see infra* text accompanying notes 34, 48-50; the brown bag exemption to the Plant Variety Protection Act, *see Asgrow Seed Co., v. Winterboer*, 513 U.S. 179, 192 (1995); the copyright provision governing ties between computers and computer maintenance *see infra* text accompanying notes 93-95; the copyright mechanical license provision *see infra* text accompanying notes 161-64; the patent and copyright contributory infringement doctrines *see infra* text accompanying notes 62, 96-103, 110-15; the copyright doctrine stating RAM copies count as copies under Section 106(1) *see infra* text accompanying notes 75-77; the first sale and exhaustion doctrines *see infra* text accompanying notes 30-32, 54-56; and copyright amendments restricting record and software rental *see infra* text accompanying note 57.

⁸ Most commentators see the misuse doctrine as an anomalous pocket of quasi-antitrust law that should be assimilated into antitrust. *See* LAWRENCE A. SULLIVAN & WARREN S. GRIMES, THE LAW OF ANTITRUST: AN INTEGRATED HANDBOOK 884 (2000) (favoring identical standards for patent misuse and antitrust violation in tying cases); HOVENKAMP, ET AL., *supra* note 6, at §3.2b, 3-7 (misuse occurs when the patent owner broadens the patent with anti-competitive effect).

⁹ HOVENKAMP, ET AL., *supra* note 6, at §1.3, 1-14 (“[N]ot all the cases that fit within the IP-antitrust rubric actually involved antitrust at all. The doctrines of patent (and more recently copyright) misuse serve many of the same purposes as antitrust law...”)

¹⁰ The antitrust law of vertical restraints is mainly concerned with the impact of restraints on the freedom of downstream firms to choose their own distribution strategy. *See* Andy C. M. Chen & Keith N. Hylton, *Pro-Competitive Theories of Vertical Control*, 50 *Hastings L.J.* 573, 575 (1999). Evidence for this claim is found by examining the leading private antitrust suits addressing vertical restraints. The plaintiffs are almost always downstream potential or actual competitors rather than end-users. *See e.g.*, *Continental T.V., Inc. v. GTE-Sylvania Inc.*, 433 U.S. 36, 39 (1977) (franchisee); *Monsanto v. Spray-Rite*, 465 U.S. 752, 756 (1984) (distributor); *Jefferson Parish v. Hyde*, 466 U.S. 2, 5 (1984) (excluded

antitrust, IP doctrines that regulate vertical restraints are often concerned exclusively with the impact of restraints on end-users. The proper normative framework resembles consumer protection law more than antitrust,¹¹ and the relevant question is how to resolve the consumer protection-IP conflict. Specifically, economic analysis of vertical restraints and IP law must determine whether IP law should aid a seller's attempt to control: the economic life of a durable good;¹² sharing of copyrighted works and patented technology;¹³ arbitrage that undermines price discrimination;¹⁴ or a user's decision to exit the relationship.¹⁵ I do not claim that antitrust judges and scholars are completely uninterested in these issues — only that they are peripheral to core antitrust concerns.

Third, antitrust scrutiny of IP protected markets is in a period of retrenchment.¹⁶ Recently, some commentators have argued that the nature of competition in high-tech markets justifies a more relaxed antitrust

downstream competitor); *Business Electronics v. Sharp*, 485 U.S. 717, 721 (1988) (retailer); *Eastman Kodak Co. v. Image Technical Serv. Inc.*, 504 U.S. 451, 455 (1992) (downstream competitor). Hovenkamp, Janis, and Lemley list three basic competitive concerns that arise from vertical restraints: foreclosure, raising rivals' costs, and facilitation of collusion. See HOVENKAMP ET AL., *supra* note 6 at §20.1 p.20-4.

¹¹ See Paul L. Joskow, *Transaction Cost Economics, Antitrust Rules, and Remedies*, 18 J.L. Econ. & Org. 95, 102-03 (2002) (contract and consumer protection laws are better suited than antitrust law to regulate contractual hazards arising in nonstandard vertical relationships); Lisa M. Bowman, *Court: Network Associates Can't Gag Users*, CNET News.com (January 17, 2003) available at: <http://news.com.com/2100-1023-981228.html>. (State court relied on consumer protection law and blocked enforcement of a software end-user license agreement that prohibited product reviews and benchmark tests). See HOVENKAMP, ET AL., *supra* note 4, at §13.5a (antitrust does not regulate monopoly pricing per se).

¹² See, Malcom B. Coate & Jeffrey Fischer, *Can Post-Chicago Economics Survive Daubert*, 34 AKRON L. REV. 795, 841-842 (2001) (commenting on the social cost of market power derived from intellectual property protection which reduces welfare by forcing consumers to replace their durable goods too quickly).

¹³ See generally, Michael J. Meurer, *Sharing Copyrighted Works*, unpublished manuscript on file with author; see also Michael J. Meurer, *Copyright Law and Price Discrimination*, 23 CARDOZO L. REV. 55, 132-40 (2001) [hereinafter Meurer, *Price Discrimination*] (analyzing whether copyright owners should be allowed to control sharing by end users); Richard Stern, *Post-Sale Patent Restrictions After Mallinckrodt—An Idea in Search of Definition*, 5 ALB. L.J. SCI. & TECH. 1, 7 (Stating that the Mallinckrodt decision created the doctrine that “a patentee may restrict use and disposition of patented articles and that violation of the restriction is patent infringement unless the restriction violates some provision of positive law, such as the antitrust laws.”).

¹⁴ Hovenkamp, Janis, and Lemley describe price discrimination as a “rejected concern” of the antitrust law governing vertical restraints. See HOVENKAMP, ET AL., *supra* note 6, at §20.2c.

¹⁵ Cf. J.H. Reichman and Jonathan A. Franklin, *Privately Legislated Intellectual Property Rights: Reconciling Freedom of Contract with Public Goods Uses of Information*, 147 U. PA. L. REV. 875, 955-957 (1999) (arguing that users should be able to negotiate licensing terms more freely and in some cases invoke a public-interest unconscionability defense to avoid certain terms).

¹⁶ See Linda R. Cohen & Roger G. Noll, *Intellectual Property, Antitrust and the New Economy*, 62 U. Pitt. L. Rev. 453, 473 (2001) (expressing concern that “in the future antitrust may have little or no role in high-technology industries, especially with respect to claims regarding monopolization of vertically related markets.”)

treatment of those markets.¹⁷ In particular, commentators debate whether vertical restraints connected to IP should be regulated at all.¹⁸

Fourth, because IP law uses different instruments it possibly offers more effective regulation of vertical restraints, and should be used to complement antitrust regulation.¹⁹ IP law frequently offers two cost advantages over antitrust: less difficulty fashioning an appropriate remedy;²⁰ and lower rent-seeking costs from opportunistic or anti-competitive litigation.²¹ Let me illustrate the advantages of IP law by considering the regulation of price discrimination. Regulation through antitrust requires a court to identify anti-competitive price discrimination, specify unacceptable pricing practices in great detail, and monitor compliance. In contrast, IP law indirectly regulates price discrimination by encouraging or discouraging arbitrage, e.g., the Supreme Court recently discouraged geographic price discrimination by refusing to allow copyright owners to block importation of lawful copyright protected products into the United States.²² The Court could have reached either decision, and thereby promoted or discouraged price discrimination without imposing much of an

¹⁷ Some argue that competition is different in high-tech markets because market power is transitory in the face of *the gale of creative destruction*. Others argue that IP should be expanded and antitrust contracted to provide greater incentives for innovation. Cf. Linda R. Cohen & Roger G. Noll, *Intellectual Property, Antitrust and the New Economy*, 62 U. Pitt. L. Rev. 453, 465 (2001) (explaining the expansion of IP rights was motivated by a desire to redistribute income in favor of IP owners)

¹⁸ See BOWMAN, *supra* note 6, at 64. Bowman contends that such arrangements simply maximize legitimate profit attributable to the patent and should not be condemned through application of the leverage fallacy. *Id.* HOVENKAMP ET AL., *supra* note 6, at §20.3, 20-18, 20-19 (properly defined vertical restraints rarely violate antitrust). *But see* Linda R. Cohen & Roger G. Noll, *Intellectual Property, Antitrust and the New Economy*, 62 U. Pitt. L. Rev. 453, 463-64 (2001) (exemptions to antitrust law, including the IP exemption have been interpreted narrowly).

¹⁹ Antitrust is difficult to administer in hi-tech markets because trials are slow and the technology is difficult for the court to understand. IP law shares these administrative costs. *See* Joskow, *supra* note 11 at 99 (antitrust enforcement agencies do a much better job performing complex economic analysis than antitrust trial courts).

²⁰ Crafting timely and precise antitrust remedies is a tough job in high-tech industries. *See id.* (antitrust remedies may fail to improve efficiency or even make matters worse); *id.* at 113-14 (reviewing an FTC study that casts doubt on the ability of antitrust enforcement agencies to formulate effective divestiture policies); RICHARD POSNER, *ANTITRUST LAW* (1976) 88-91 (explaining social cost of divestiture as an antitrust remedy); LAWRENCE A. SULLIVAN & WARREN S. GRIMES, *THE LAW OF ANTITRUST: AN INTEGRATED HANDBOOK* 77-80 (2000) (divestiture and conduct-based remedies are difficult to implement effectively); Robert Pitofsky, *Antitrust and Intellectual Property: Unresolved Issues at the Heart of the New Economy*, 16 Berkeley Tech. L. J. 535, 547 (2001) (remedies should be designed so they do not undermine innovation, with a brief duration where appropriate, and to assure access to a bottleneck product or service).

²¹ For discussion of the rent-seeking costs associated with private antitrust litigation *see* POSNER, *supra* note 20, at 231-32 (supporting fee-shifting to successful defendants and restrictions of treble damages in antitrust suits); William J. Baumol & Janus A. Ordover, *Use of Antitrust to Subvert Competition*, 28 J. LAW & ECON. 247, 250-51 (1985) (“the social costs of rent-seeking protectionism can be very high”).

²² *See* *Quality King Distributors, Inc. v. L'anza Research Int'l, Inc.*, 523 U.S. 135 (1998).

administrative burden. Rent-seeking through litigation is more of a problem with antitrust regulation of price discrimination because any rule determining what sort of price discrimination is anti-competitive is likely to be quite uncertain. In contrast, the rule about importation of copyrighted works is relatively certain. Uncertainty about liability encourages opportunistic antitrust suits and possibly chills legitimate pricing decisions by sellers.²³ Concern about administrative costs and rent-seeking pushed the courts to restrict antitrust oversight of vertical restraints.²⁴ IP law can be used to regulate vertical restraints more extensively because it better avoids these costs.²⁵

This Article is structured into sections that discuss six types of vertical restraints: restrictions on the field or location of use; restrictions on sharing; control over the frequency of use; restrictions on repair and modification; packaging requirements; and impediments to a buyer's decision to exit its relationship with a seller. Each section explains how the restraint is regulated by IP law. Where appropriate, the antitrust treatment of the restraint is compared to the IP treatment. Finally, the policy issues presented by each restraint are described. The conclusion compares the effectiveness of IP law and antitrust law as instruments for regulating vertical restraints.

I. TYPE OF USE

In markets protected by IP, sellers often segment their buyers based on line of business, location, field of technology, or whether the use is not-for-profit.²⁶ They implement this segmentation through contract terms that specify allowable uses. The usual goal of this marketing strategy is price discrimination.²⁷ Price discrimination occurs when a seller charges

²³ See Joskow, *supra* note 11, at 98-99. Antitrust policy must send clear signals. It is designed to deter bad behavior — not to “scrutinize, screen, or approve firm behavior or market structures.” *Id.*

²⁴ See *id.* at 98 (antitrust law should not be used to regulate most market imperfections because of the high transaction costs associated with such “micromanagement”). Measures that control rent-seeking litigation sometimes discourage too much socially desirable litigation. See also LAWRENCE A. SULLIVAN & WARREN S. GRIMES, *THE LAW OF ANTITRUST: AN INTEGRATED HANDBOOK* 910-13 (2000).

²⁵ IP law creates a temptation for IP owners to engage in anti-competitive litigation — suits with little merit and the potential to discourage legitimate new competitors. See Michael J. Meurer, *Controlling Opportunistic and Anti-Competitive Intellectual Property Litigation*, 45 B. C. L. REV. *forthcoming* (2003).

²⁶ *ProCD v. Zeidenberg* 86 F.3d 1447 (7th Cir. 1996) upholds a consumer use restriction in the face of a copyright preemption claim. But *ProCD* is more of a horizontal restraint case than a vertical restraint case. The goal of the lawsuit was to stop reproduction of data. *Id.* at 1450. The defendant offered a competing telephone directory on the Internet. *Id.*

²⁷ See generally Stanley J. Liebowitz, *Copyright Law, Photocopying, and Price Discrimination*, in 8 RESEARCH IN LAW AND ECONOMICS: THE ECONOMICS OF PATENTS AND COPYRIGHTS 181 (John

different prices to different classes of customers even though the marginal cost of serving the different classes is the same.²⁸ For example, DuPont imposed a field of use restriction and charged different prices for a patented synthetic fiber depending on the end use intended by the customers.²⁹ Price discrimination allows the seller to increase profit by tailoring prices to different customer classes that have different preferences.

Whether price discrimination is profitable depends on the cost of sorting customers into appropriate classes and the cost of blocking arbitrage. In this context, arbitrage occurs when a customer in a class that is supposed to pay a high price is able to obtain a product or license at a low price. A common source of arbitrage is the resale market — a favored customer purchases at a low price and resells to a disfavored customer. Arbitrage also occurs when a customer violates a use restriction and the seller fails to stop the violation.

Price discriminating sellers try to block arbitrage by restricting resale and by restricting the type of use allowed by favored customers. Sellers can sue users for breach of contract when they violate license restrictions. Various IP law doctrines increase the profitability of price discrimination by further discouraging arbitrage. If the act of arbitrage also violates an IP right, then sellers can bring more potent infringement claims in addition to contract claims against arbitrageurs.³⁰ Furthermore, the IP claims are available against arbitrageurs who are strangers to the seller, thereby overcoming the privity limitation on contract claims.³¹

IP law generally facilitates restrictions on types of use, but its effect on resale restrictions is mixed — sometimes facilitating and sometimes discouraging resale restrictions. The baseline rule in patent and copyright law gives buyers the right to transfer products that they purchase. IP owners can avoid this rule, called the first sale or exhaustion doctrine, by leasing rather than selling their products.³²

Palmer & Richard O. Zerbe, Jr. eds., 1986) (price discrimination in the market for academic journals); Meurer, *Price Discrimination*, *supra* note 13, at 80-90 (describing the pervasive role of copyright law in both facilitating and impeding price discrimination).

²⁸ See Michael J. Meurer, *Price Discrimination, Personal Use and Piracy: Copyright Protection of Digital Works*, 45 BUFFALO L. REV. 845, 869-71 (1997).

²⁹ See *Akzo v. Int'l Trade Comm.*, 808 F.2d 1471 (Fed. Cir. 1986).

³⁰ See *Mallinckrodt, Inc. v. Medipart, Inc.*, 976 F.2d 700, 709 (Fed. Cir. 1992).

³¹ See David Nimmer, Elliot Brown, & Gary N. Frischling, *The Metamorphosis of Contract into Expand*, 87 CALIF. L. REV. 17, 35 (1999) *Delta and Pine Land Co. v. Sinkers Corp.*, 177 F.3d 1343, (Fed. Cir. 1999) (discussing requirements for third party liability for sales that violate a PVPA certificate).

³² See *Communications Groups v. Warner Communications, Inc.*, 527 N.Y.S.2d 341 (Civ. Ct. N.Y. 1998) (negotiated software agreement characterized as a lease even though the document described the agreement as a license); Joseph P. Liu, *Owning Digital Copies: Copyright Law and the*

Resale across national borders is treated distinctly from domestic resale. Copyright provides an importation right but it is limited by the first sale doctrine.³³ The copyright owner can block unauthorized imports, but cannot block authorized copies that are imported back into the U.S.³⁴ This forces a copyright owner to rely on contract law to block arbitrage against geographic price discrimination. Trademark law provides similar treatment of so-called gray market goods.³⁵ A United States trademark holder may bar the importation of goods bearing the same trademark when manufactured by a foreign manufacturer but cannot stop importation of goods made under the control of the domestic trademark holder.³⁶ In contrast, the Patent Act prohibits any importation of a patented product into the U.S, and greatly facilitates geographic price discrimination.³⁷

Patent law broadly facilitates restrictions on type of use while copyright gives more limited support. A patent owner has the right to exclude others from *use* of a patented invention. The predominant view in patent law states that because the patent owner can exclude all use, the statute gives an implied right to grant permission for some uses and still sue the licensee for infringement if she engages in an unauthorized use.³⁸ Copyright law enumerates certain uses that are the exclusive right of the copyright owner. Most relevant for this discussion of vertical restraints is the public performance right.³⁹ This right facilitates price discrimination in the movie and music markets between home users and buyers who want to engage in a public performance, e.g., exhibiting a movie in a theater or

Incidents of Copy Ownership, 42 Wm. & Mary L. Rev. 1245, 1301-02 (2001) (discussing resale and the right of alienation). Resale is not a problem for IP owners who license information rather than sell a product because they can preclude any transfer in the license. See Ray T. Nimmer, *Uniform Computer Information Transactions Act and Electronic Commerce: Licensing in the Contemporary Information Economy*, 8 WASH. U. J.L. & POL'Y 99, 119 n.39 (comparing sales, leases, and licenses).

³³ See *Quality King Distributors, Inc. v. L'anza Research Int'l, Inc.*, 523 U.S. 135 (1998).

³⁴ See *id.*, at 145.

³⁵ See *Kmart Corp. v. Cartier, Inc.*, 486 U.S. 281 (1988).

³⁶ See *id.* at 292. The trend in Europe favors gray markets and opposes the use of intellectual property to facilitate international price discrimination. See S.O. Spinks, *Exclusive Dealing, Discrimination, and Discounts Under EC Competition Law*, 67 ANTITRUST L.J. 641, 666-67 (2000).

³⁷ See Section 271(a). Section 271(g) also prohibits importation of a product made with a patented process, even if the process was used outside of the U.S. with permission. See *Ajinomoto Co. v. Archer-Daniels-Midland Co.*, 228 F.3d 1338, 1348 (Fed. Cir. 2000).

³⁸ See BOWMAN, *supra* note 6, at 140-42 (arguing that an absolute right to exclude use implies a right to impose any conditions on the use of a patented invention); Kaplow, *supra* note 2, at 1846 (arguing against this view and claiming it "has gradually fallen into disfavor in the patent-antitrust context"). The implied right is made explicit regarding restrictions on location of use. See 35 U.S.C. §261.

³⁹ Section 106(4) gives music composition copyright owners the right to control public performance of their music. See 17 U.S.C. §106(4).

broadcasting music on the radio.⁴⁰

Compared to IP law, antitrust oversight of price discrimination is relatively passive. Antitrust plaintiffs had some success in the 1960s. In one notable case the owner of a patent on shrimp peeling machinery leased machines to Gulf Coast shrimp companies for half the rental rate that it charged Pacific Coast shrimp companies.⁴¹ The Fifth Circuit found this geographic price discrimination violated Section Five of the FTC Act because it injured competition in the shrimp canning business.⁴² Hovenkamp, Janis, and Lemley doubt the case would have come out the same way today.⁴³ They review recent cases and conclude that antitrust law permits price discrimination in patent licenses, but the sale of patented goods is still governed by the Robinson-Patman Act.⁴⁴ The Robinson-Patman Act is also occasionally applied to goods that incorporate copyrighted expression, like books and video cassettes,⁴⁵ but it has not had much impact on IP protected markets.⁴⁶

Patent and copyright law permit contract restrictions based on location and type of use, but patent law goes further than copyright law to encourage sellers to impose those restrictions by creating a strong importation right and a broad right to control use of a patented invention. To assess the economic significance of these differences one needs to examine the social welfare effects of these restraints. A common view among antitrust commentators is that sellers segment customer classes to achieve some distributional efficiency.⁴⁷ The same argument is pressed by copyright and trademark owners who oppose importation of gray market goods.⁴⁸ They argue exclusive territories are established to encourage

⁴⁰ See Meurer, *Price Discrimination*, *supra* note 13, at 109-16.

⁴¹ See *Lapeyre v. F.T.C.*, 366 F.2d 117 (5th Cir. 1966).

⁴² See *id.* at 121. *But see* HOVENKAMP ET AL., *supra* note 6, at §13.5 (expressing doubt that this case is good law today.)

⁴³ See HOVENKAMP ET AL., *supra* note 6, at §13.5.

⁴⁴ See HOVENKAMP ET AL., *supra* note 6, at §23.4 p. 23-35. Courts have rejected claims that price discrimination constitutes a form of misuse. *Id.* at §3.3b7; *USM Corp. v. SPS Technologies*, 694 F.2d 505 (7th Cir. 1982) (a patentee is entitled to use price discrimination to maximize its profit).

⁴⁵ See HOVENKAMP ET AL., *supra* note 6, at §13.5

⁴⁶ See Meurer, *Digital Works*, *supra* note 28, at 871; William W. Fisher III, *Property and Contract on the Internet*, 73 CHI.-KENT L. REV 1203, 1255 (1998).

⁴⁷ See BOWMAN, *supra* note 6, at 61-62, 64-139 (use restrictions in patent licenses promote efficiency).

⁴⁸ In *Quality King* the copyright owner sold shampoo with copyrighted labels on the shampoo bottles. See *Quality King Distributors, Inc. v. L'anza Research Int'l, Inc.*, 523 U.S. 135, 138 (1998). The shampoo manufacturer argued that exclusive geographic markets were justified because of the divergent marketing strategies used in the U.S. and abroad. *Id.* at 269-70.

investment by distributors in local goodwill and service.⁴⁹ The empirical evidence suggests, however, that gray markets arise to arbitrage geographic price discrimination.⁵⁰ Thus, the relevant policy issue is whether IP law should encourage geographic, field of use, and similar forms of price discrimination.

IP scholars have developed a recent fascination with the policy effects of price discrimination in IP-protected markets.⁵¹ Some embrace price discrimination because it has the potential to increase profit and the incentive to create, and simultaneously increase output. Others are skeptical because of its distributional implications, or because it may actually cause output to fall.⁵² It is possible that patent law's greater solicitude for price discrimination is explained by the perception that the extra profit from price discrimination is especially valuable as an incentive to invent (specifically to invent pharmaceuticals, an industry that practices extensive price discrimination⁵³). Perhaps the same incentive argument is not as persuasive in copyright protected markets.

Two other policy considerations are important in shaping optimal IP policy. First, any decision to expand the scope of IP rights increases the social costs associated with opportunistic and anti-competitive IP litigation. Converting a simple contract claim into a patent or copyright infringement claim gives the IP owner significant strategic advantages because of the threat of preliminary and permanent injunction, fee-shifting, and treble

⁴⁹ See Nancy T. Gallini & Aidan Hollis, *A Contractual Approach to the Gray Market*, 19 INT'L REV. L. & ECON. 1, 4-5 (1999). Such an efficiency justification was raised by the copyright owner in *Quality King*, but it was not very persuasive. The empirical evidence establishes that geographic price discrimination is common and is probably the most important cause of gray market transactions.

⁵⁰ See *id.* at 6 (explaining that empirical evidence shows that price discrimination is probably the most important cause of gray market transactions); David A. Malueg & Marius Schwartz, *Parallel Imports, Demand Dispersion, and International Price Discrimination*, 37 J. INT'L ECON. 167, 173-74 (1994) (reviewing empirical evidence and concluding that arbitrage against price discrimination is a significant source of gray market activity).

⁵¹ See William W. Fisher III, *Reconstructing the Fair Use Doctrine*, 101 HARV. L. REV. 1661 (1988); Glynn S. Lunney, Jr., *Reexamining Copyright's Incentives-Access Paradigm*, 49 Vand. L. Rev. 483, 630-34 (1996); Meurer, *Digital Works*, *supra* note 28; Fisher, *supra* note 40; Wendy J. Gordon, *Intellectual Property as Price Discrimination: Implications for Contract*, 73 Chi.-Kent L. Rev. 1367 (1998); Meurer, *Price Discrimination*; Julie E. Cohen, *Copyright and the Perfect Curve*, 53 VAND. L. REV. 1799 (2000); James Boyle, *Cruel, Mean, or Lavish? Economic Analysis, Price Discrimination and Digital Intellectual Property*, 53 VAND. L. REV. 2007 (2000); Yochai Benkler, *An Unhurried View of Private Ordering in Information Transactions*, 53 VAND. L. REV. 2063 (2000).

⁵² See Kaplow, *supra* note 2, at 1873-78 (discussing the effect on social welfare of price discrimination by a patent owner).

⁵³ See Claude E. Barfield & Mark A. Groombridge, *Parallel Trade in the Pharmaceutical Industry: Implications for Innovation, Consumer Welfare, and Health Policy*, 10 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 185, 194-96 (1999).

damages for willful infringement.⁵⁴ Furthermore, IP rights can be asserted against innocent strangers (perhaps importers) who might be vulnerable to an opportunistic IP suit. These rent-seeking costs need to be balanced against any incentive benefit before IP rights are expanded to support price discrimination.

Second, IP law can channel sellers into choosing a socially beneficial form of price discrimination rather than a socially harmful form.⁵⁵ Copyright's public performance right serves this function. If the public performance right were deleted from the statute, music and movie producers would find another, more costly, way to discriminate between buyers intending to publicly perform the work, and buyers intending only private use. One possibility would be a very high initial sales price followed after a significant delay with a lower sales price targeted at home users. Another possibility would be vertical integration into movie exhibition or radio broadcast. The public performance right allows discrimination and avoids the high implementation costs associated with the other strategies.

A related point is that copyright can shape the distributional effects of price discrimination by building exemptions into a right. Section 110 provides various exemptions to the public performance right to promote educational and nonprofit performances,⁵⁶ and other exemptions that might be explained by relatively high transaction costs compared to the value of the public performance to the user.⁵⁷ Thus, copyright effectively supports price discrimination to the bulk of users intending a public performance, while sheltering certain users to advance various policy goals.

Appropriately, antitrust regulation of type of use restraints is quite limited. Hovenkamp contends that: "[T]he costs of preventing price discrimination without any accompanying exclusionary conduct would almost certainly outweigh any benefits, particularly if the market is competitive or oligopolistic."⁵⁸ The basic difficulty with the Robinson-Patman approach is that it puts courts in an uncomfortable position as price regulators. In contrast, IP law works in the background by encouraging or discouraging arbitrage.⁵⁹

⁵⁴ See Michael J. Meurer, *Controlling Opportunistic and Anti-Competitive Intellectual Property Litigation*, forthcoming 45 B.C. L. Rev. (2003).

⁵⁵ See Meurer, *Price Discrimination*, *supra*, note 13, at 104-05.

⁵⁶ See 17 U.S.C. §110.

⁵⁷ See Meurer, *Price Discrimination*, *supra*, note 13, at 114-16.

⁵⁸ HERBERT HOVENKAMP, *FEDERAL ANTITRUST POLICY: THE LAW OF COMPETITION AND ITS PRACTICE* §14.5a (1999).

⁵⁹ One important role is prohibition of territorial or field of use restrictions that promote cartelization. See Kaplow, *supra* note 2 at, 1879.

II. LENDING AND PRIVATE REPRODUCTION

Copyright law has been racked by controversies regarding the rights of buyers and sellers with regard to sharing. Even use of the term *sharing* is controversial.⁶⁰ I use it to describe various types of coalitions formed by consumers for consumption of copyrighted works. I define sharing as any activity such that a single copy of a work provides utility to a small number of end users in addition to the purchaser. This section addresses two common sources of sharing: lending and private reproduction.⁶¹

Copyright law displays much ambivalence toward sharing. It would seem that private reproduction runs afoul of the reproduction right specified in Section 106(1), but many forms of private reproduction are privileged by statutory exemptions or the fair use defense.⁶² It would also seem that buyers are permitted to lend copies that they purchase under the first sale doctrine, but that right is limited by amendments that preclude commercial lending of music and software.⁶³ Regulation of sharing is further complicated by enforcement problems. Copyright law recognizes the difficulty of enforcement against small scale sharing, and allows copyright owners to sue parties who contribute to copyright infringement by providing reproduction technology or otherwise facilitating illicit sharing.⁶⁴

Library lending is the oldest significant source of sharing. The first sale doctrine gives libraries the right to lend books and other copyrighted material in their collections.⁶⁵ But the nature of library sharing may soon change drastically as libraries incorporate more digital content into their collections. The contracts governing the transactions for digital content usually include terms that restrict transfer. The copyright owners argue that the first sale doctrine does not apply to digital transactions because they license rather than sell their products. The Uniform Computer Information Transactions Act and some cases approve of this theory. In other cases

⁶⁰ See Michael J. Madison, *Sharing and Copyright: Language and Practice*, unpublished manuscript on file with author (2002).

⁶¹ See Michael J. Meurer, *Sharing Copyrighted Works*, unpublished manuscript on file with author (2003).

⁶² See 17. U.S.C. §107 (fair use doctrine); 17. U.S.C. §108 (library exemption); 17. U.S.C. §117 (archival copies of software).

⁶³ See 17 U.S.C. §109(b)(1)(A).

⁶⁴ See *Sony Corp. of Amer. v. Universal City Studios, Inc.*, 464 U.S. 417, 434-42 (1984).

⁶⁵ Many European countries give the copyright owner a lending right that provides a fee based on the volume of lending activity. See Jane C. Ginsburg, *Reproduction of Protected Works for University Research or Teaching*, 39 J. Copyright Soc'y 181, 196 (1992) (describing Nordic country photocopy license fees set as a price per page copied, as a lump sum payment from each user, or occasionally as lump sum per inhabitant or per student).

courts characterize the purported licenses as sales and refuse to enforce the resale restrictions.⁶⁶

The music and software industries obtained copyright amendments that bar unauthorized commercial music and software rental.⁶⁷ A puzzling contrast in U.S. copyright law is that commercial video rental is permitted without permission from movie copyright owners. The movie industry was not successful when it lobbied for an amendment comparable to the amendments obtained by the music and software industries.⁶⁸ In many other countries, copyright law does give copyright owners control over movie rental.⁶⁹

The introduction of reproduction technology to consumer markets made private reproduction another significant source of sharing. The photocopier added a new dimension to library-based sharing; now patrons can reproduce a portion of a text in addition to borrowing a text. Much photocopying does not infringe copyright because of the fair use doctrine or because of statutory exemptions for libraries.⁷⁰ The fair use doctrine is a multi-factor balancing test that allows copying that achieves certain socially desirable purposes provided the effect on copyright owners' incentives are not too severe. Spontaneous, non-commercial, and academic photocopying tends to be fair. Systematic and commercial photocopying tends to be infringing.⁷¹

Consumers share music and video by making and exchanging private copies. Such sharing has become routine, but the first important case on the question was hotly disputed and decided by a five to four vote in the Supreme Court. In *Sony Corp. of America v. Universal City Studios* the Court held private copying of television programs may be a fair use.⁷² Specifically, it is fair use for consumers to videotape television programs

⁶⁶ See *Microsoft Corp. v. Harmony Computers & Electronics, Inc.*, 846 F.Supp. 208 (E.D.N.Y. 1994) (refusing to apply first sale doctrine to software license); *Novell, Inc. v. Network Trade Center*, 25 F.Supp. 2d 1218 (D. Utah 1997) (refusing to enforce shrink-wrap term that purported to limit the first sale doctrine); *Nimmer, et al.*, *supra* note 31, at 34-40.

⁶⁷ Recorded music cannot be rented without permission from the copyright owner. Record Rental Amendment of 1984. 98 Stat. 1727; 17 U.S.C. §109(b)(1)(A). The Computer Software Rental Amendments Act of 1990 prohibits unauthorized rental of many types of software. 104 Stat. 5089; 17 U.S.C. §109(b)(1)(A).

⁶⁸ See Robert A. Rosenblum, *The Rental Rights Directive: A Step in the Right and Wrong Directions*, 15 Loy. L. A. Ent. L. J. 547, 578 (1995); MELVILLE B. NIMMER, DAVID NIMMER, NIMMER ON COPYRIGHT, §8.12[B][7][a] (2000).

⁶⁹ See Rosenblum, *supra* note 68, at 551.

⁷⁰ Extensive photocopying of medical journals at the National Institutes of Health and the National Library of Medicine was judged to be a fair use in *Williams & Wilkins v. U.S.*, 487 F.2d 1345 (Ct. Cl. 1973), *aff'd* by an equally divided Court 420 U.S. 376 (1975) (per curiam).

⁷¹ See, *American Geophysical Union v. Texaco*, 60 F.3d 913 (2nd Cir. 1994).

⁷² 464 U.S. 417 (1984).

so they can view them at some time after the broadcast.⁷³ Many other countries initially found such copying was infringing, and then revised their copyright statutes to allow private copying, but they also collect taxes on recording media and devices and give the tax revenue to copyright owners.⁷⁴

The much publicized Napster case indicates some of the limits on personal reproduction rights.⁷⁵ The Ninth Circuit found that personal reproduction and exchange of digital music files over an anonymous Internet file-sharing service is not fair use.⁷⁶ Additionally, the court ruled the company Napster was indirectly liable for copyright infringement because it provided software and services that facilitated unlawful file-sharing.⁷⁷ In contrast, Sony was not liable for the sale of video recorders. Although video recorders can be used to make unlawful copies, since they are capable of a substantial non-infringing use, there is no contributory infringement.⁷⁸

The antitrust approach to regulation of sharing asks whether vertical restraints on private reproduction and transfer cause anti-competitive effects to distributors or potential competitors in downstream markets. The answer in most of the interesting cases is clearly no, thus there is not much of a role for antitrust.⁷⁹ In contrast, economic analysis of copyright law asks

⁷³ The Court approved of “time-shifting” as purpose deserving protection under the fair use doctrine. *Id.* at 454-55. There has been relatively little written by U.S. courts but a great deal written by law professors that approves of time-shifting and other personal uses as fair use. See e.g., Deborah Tussey, *From Fan Sites to Filesharing: Personal Use in Cyberspace*, 35 GA. L. REV. 1129, 1181-89 (2001) (advocating a statutory personal use privilege).

⁷⁴ Generally, European nations have copyright provisions that permit private copying but also impose taxes on copying equipment and media that is paid to copyright owners. See Edmund L. Andrews, *Fight Free Music, Europeans Take Aim at Personal Computers*, N. Y. TIMES, Feb. 13, 2001, at A1 (many European countries impose copyright fees on audio and videocassette recorders and blank tapes). For example, the taxes collected on blank audiotapes and audio recording equipment is paid to music copyright owners. See Eugen Ulmer and Hans Hugo von Rauscher *Germany (Federal Republic)* in *International Copyright and Neighboring Rights*, eds. Stephen Stewart and Hamish Sandison, 422 (1989). Germany taxes photocopy machines and each copy by libraries or schools to cover copying losses to copyright owners. *Id.* at 422-23. Spain imposes a tax on equipment and media to pay for private copying. Edward Thompson, *Spain*, in *International Copyright and Neighboring Rights*, eds. Stephen Stewart and Hamish Sandison, 367 (1989). Many countries embrace the notion that “personal” use of copyrighted works is outside of the scope of copyright protection. See Computer Science and Telecommunications Board, National Research Council, *THE DIGITAL DILEMMA: INTELLECTUAL PROPERTY IN THE INFORMATION AGE* 129 (2000).

⁷⁵ *A&M Records, Inc. v. Napster, Inc.*, 239 F.3d. 1004 (9th Cir. 2001).

⁷⁶ See *id.* at 1018-19.

⁷⁷ See *id.* at 1020-24.

⁷⁸ See *Sony* 464 U.S. at 456.

⁷⁹ Antitrust does not directly regulate restraints on sharing, but it may have some indirect effect. Companies that facilitate sharing have been targeted with contributory infringement suits and have responded with antitrust claims. See John Borland, *Kazaa Strikes Back at Hollywood, Labels*, Cnet New.com (Jan. 28, 2003) available at: <http://news.com.com/2100-1023-982344.html>. The owner of

what pattern of rights relating to sharing maximizes expected total surplus. This question must be answered by copyright law (at least implicitly) because the law must set some pattern of entitlements.

Optimal policy toward sharing tries to satisfy two goals that are often in conflict: provide an appropriate incentive for the creation of copyrighted works, and maximize total surplus from dissemination of these products once they are created. A policy that always forbids sharing without permission is probably not optimal. It does have the desirable effect of maximizing the incentive for creation. But a right to share may be socially desirable because the current incentive for creation is too large, or because giving users the right to share causes total surplus to grow significantly relative to the loss of profit-based incentive.⁸⁰ Normally, when sharing raises both profit and ex post surplus it is socially desirable and should be encouraged, and similarly, it should be discouraged when it depresses both profit and ex post surplus.⁸¹ When sharing erodes profit and raises ex post surplus the optimal policy is hard to determine, but encouraging sharing is more likely to be socially desirable when the surplus gain is large and the profit loss is small.⁸²

The effect of sharing on profit depends to a large extent on how sharing affects demand for the copyrighted work. Sharing affects demand by reducing the number of buyers, increasing the valuations that buyers assign to the product, and lowering or avoiding transaction costs. Valuations rise because most buyers value the opportunity to share in addition to the opportunity to consume the product directly.⁸³ In some

music file-sharing service Kazaa sued members of the music industry for copyright misuse and antitrust violations and is seeking to bar enforcement of their music copyrights. *Id.* The claim is based on the music industry's alleged refusal to provide copy-protected music files for distribution over the Kazaa network. *Id.* The district court judge in the Napster case found evidence that the music industry might have violated the antitrust laws in the market for digital music distribution. *Id.* The Department of Justice is also investigating music industry activities in markets for digital music. *Id.*

⁸⁰ The Ninth Circuit in *Sony Corp. of Amer. v. Universal City Studios, Inc.*, 659 F.2d 963, 970 (9th Cir. 1981), and the dissent in the Supreme Court decision that reversed the Ninth Circuit, 464 U.S. 417, 475 (1984) (Blackmun, J., dissenting) argued that the fair use doctrine should never apply to reproductive uses of copyrighted works that enable some types of sharing. The majority rejected this view stating that even some unauthorized time-shifting is not infringing and that fair-use requires a balancing of interests which showed that the social benefits outweighed the costs. *Id.* at 448, 455.

⁸¹ This statement does not hold if current incentives for creation are too large. If so, then it might be socially desirable to reduce profit (and the accompanying incentive to create) even if that also means reducing total surplus. See Meurer, *Price Discrimination*, *supra* note 13 at 95-97.

⁸² Kaplow looks at the ratio of total surplus change to profit change when formulating an optimal patent policy, see Kaplow, *supra* note 2, at 1829-39, and Fisher follows the same approach when analyzing the fair use doctrine, see Fisher, *supra* note 46 at 1706-17.

⁸³ In some markets, valuations also rise because of consumption externalities. A consumption externality implies that a buyer's direct utility rises when the number of other consumers using the product rises. See Kathleen R. Conner & Richard P. Rumelt, *Software Piracy: An Analysis of Protection Strategies*, 37 MGMT. SCI. 125, 133, 136 (1991) (sharing may increase profit because of network

cases, sharing opens the market to new users who otherwise would be excluded because of transaction costs. Finally, sharing may either facilitate or impede the seller's effort to sort consumers into separate groups and charge discriminatory prices.⁸⁴

Optimal copyright regulation of sharing must balance the rights of users and sellers. Sellers would be happiest with complete control over sharing, then they could authorize lending, private reproduction, and other activities that contribute to sharing if and only if they increased sellers' profit. But buyers should have the right to share without permission when the sellers' profit incentive is misaligned with the social interest in maximizing total surplus. This might occur when users are excluded from a market by high transaction costs,⁸⁵ when sharing undermines inefficient price discrimination,⁸⁶ or when buyer coalitions exert countervailing market power that offsets seller market power and increases output.⁸⁷

These policy considerations are critical to a proper fair use analysis of sharing. Fair use balances four factors: (1) purpose; (2) nature of the work; (3) amount of the work used; and (4) market effect.⁸⁸ Fair use addresses the impact of sharing on incentives for creation through the second and fourth factors. Courts evaluate the nature of a work to see whether it requires strong incentives for creation, and the market effect to identify the impact of sharing on profit. Together these factors lead to a judgment about the impact of sharing on incentives to create. Fair use addresses the impact of sharing on ex post total surplus through the first factor. For example, courts recognize that private copying can be justified as a way to avoid transaction costs. Courts have not considered whether disruption of inefficient price discrimination or creation of countervailing market power are purposes favoring fair use — but the open-ended nature of the balancing test would permit this sort of analysis.

effects); Lisa Takeyama, *The Welfare Implications of Unauthorized Reproduction of Intellectual Property in the Presence of Network Externalities*, 62 J. INDUSTR. ECON. 155 (1994) (same).

⁸⁴ A subtler but equally important concern is the impact of sharing on the dispersion of buyers' valuations. Increasing dispersion tends to increase inefficiency. Sharing sometimes makes the valuations of potential buyers more homogenous and smoothes demand; other times it increases heterogeneity and the dispersion of demand. See Yannis Bakos, et al., *Shared Information Goods*, 42 J. L. ECON. 117 (1999). Sharing might also be an efficient method of distributing a good. See Janusz A. Ordover & Robert D. Willig, *On the Optimal Provision of Journals qua Sometimes Shared Goods*, 68 AMER. ECON. REV. 324 (1978).

⁸⁵ See Gordon, *supra* note 45, at 1387.

⁸⁶ Meurer, *Price Discrimination*, *supra* note 13, at 12.

⁸⁷ Meurer, *Sharing Copyrighted Works*, *supra* note 13, at x.

⁸⁸ See 17. U.S.C. §107.

III. FREQUENCY OF USE

Sellers are motivated to control frequency of use because it aids price discrimination. Buyers who use a product more frequently are likely to have a higher valuation and be willing to pay more. Ideally a seller would just ask prospective buyers how frequently they plan to use a product, and then charge more to high frequency users. Of course, buyers may not know the answer to that question at the time of purchase, and they have an incentive to understate their planned usage. Thus, IP owners employ several different strategies to monitor and control frequency of use.

One approach is to control frequency of use directly through contract. A seller could specify an increasing schedule of prices associated with an increasing frequency of permissible use.⁸⁹ Contractual use restrictions are difficult to enforce because it is difficult to detect violations. IP law bolsters frequency of use restrictions by adding infringement claims and strong IP remedies to the breach of contract claims.⁹⁰ Infringement claims are well grounded in patent law because the patent owner has broad control over use.⁹¹ Copyright law does not offer a comparably broad use right but in some important settings unauthorized use is infringing. Computers (and other consumer electronic devices) usually make a temporary copy of digital content or software during use. Even though temporary, such a copy may be infringing.⁹² Thus, a digital copyright owner can sue a buyer who violates a frequency of use restriction for breach of contract, and also for copyright infringement because of the unauthorized temporary reproductions. Copyright law imposes two important limits on these infringement claims. Section 117 gives software owners the right to make copies as an essential step in using a program,⁹³ and the copyright misuse

⁸⁹ Digital technology makes this possible for digital content, and it is possible this marketing approach will become common in the not too distant future. See Tom W. Bell, *Fair Use vs. Fared Use: The Impact of Automated Rights Management on Copyright's Fair Use Doctrine*, 76 NO. CAR. L. REV. 557, 565-67 (1998); Meurer, *supra* note 28, at 878-79. One attempt with digital video failed to win consumer acceptance. See Joel Brinkley, *Few Tears are Shed as Dix Joins the 8-Track*, N. Y. TIMES, Feb. 13, 2001, at G6.

⁹⁰ See *Mallinckrodt, Inc. v. Medipart, Inc.*, 976 F.2d 700, 709 (Fed. Cir. 1992) (ruling that violation of the single use requirement was patent infringement as well as contract breach).

⁹¹ See *BOWMAN*, *supra* note 6, at 142-46 (1973) (reading exhaustion cases to permit patent restrictions on use after sale as long as the restrictions are explicit).

⁹² See *MAI Systems Corp. v. Peak Computer, Inc.*, 991 F.2d 511, 518 (9th Cir. 1993) (the copy of software created in RAM memory during execution is sufficiently fixed to qualify for copyright protection).

⁹³ 17 U.S.C. §117. The *MAI* court held that a licensee is not an owner so Section 117 did not apply. Courts have refused to adopt this approach for mass-market software.

doctrine might prevent a seller from circumventing the first sale doctrine.⁹⁴

More commonly, sellers control frequency of use indirectly through the sale of some complementary product that is used with the IP protected product. Sellers require buyers to purchase the complementary product (1) through a tying contract, (2) because of product design, or (3) by threat of an infringement suit against a competing supplier. The classic illustration of contractual tying and price discrimination comes from the antitrust tying case *IBM Corp. v. U.S.*⁹⁵ IBM leased patented tabulator machines on the condition that the lessee purchase all of the punch cards needed for use in the machines from IBM.⁹⁶ Punch card purchases measured frequency of use. Rather than charging a rental rate that varied directly with frequency of use, IBM charged a premium over the competitive price for punch cards, and thereby indirectly collected a rental rate that increased with the frequency of use.⁹⁷ IBM could have implemented essentially the same pricing scheme by installing a counter on each machine that recorded the number of cards processed, or by requiring lessees to record and report how many cards they used (or some other measure of frequency of use). No doubt they chose the punch card tie because it was less costly and more reliable.⁹⁸

Antitrust law treats tying contracts as per se illegal, but actually imposes a relatively mild check. A tying contract is unlawful if: there are truly separate tied and tying products; the seller has market power in the tying product market; and there are anticompetitive effects in the tied product market.⁹⁹ Older cases like *IBM* found ties that appear to implement price discrimination to be unlawful,¹⁰⁰ but recent courts have been quite tolerant. “[T]he great majority of decisions conclude that the simple fact

⁹⁴ See Brett Frischmann & Dan Moylan, *The Evolving Common Law Doctrine of Copyright Misuse: A Unified Theory and Its Application to Software*, 15 Berkeley Tech. L.J. 865 (2000). Cf. Julie E. Cohen & Mark A. Lemley, *Patent Scope and Innovation in the Software Industry*, 89 Cal. L. Rev. 1, 32 (2001) (the exhaustion and implied license doctrines are meaningless in the software context if making a RAM copy or other temporary copy amounts to an infringing “making”).

⁹⁵ 298 U.S. 131 (1936).

⁹⁶ *Id.* at 134.

⁹⁷ *Id.* at 139. The same type of price discrimination was practiced in *Motion Picture Patents Co. v. Universal Film Mfg.*, 243 U.S. 502 (1917). Movie projectors were tied to film, and the patent owner derived most of its profit from the sale of film. *Id.* at 515.

⁹⁸ A similar fact pattern was described in *Morton Salt Co. v. G.S. Suppinger Co.*, 314 U.S. 488 (1942). The lease of a patented canning machine was tied to the sale of salt tablets. Salt sales meter intensity of use of canning machine. Perhaps the lessor wanted to control the salt used in the leased machines to prevent harm caused by inferior salt.

⁹⁹ The plaintiff must also show evidence of actual coercion that forced the buyer to accept the tie, and that the tied product market involves interstate commerce.

¹⁰⁰ See *Telex Corp. v. IBM Corp.*, 510 F.2d 894 (10th Cir.), *cert. dismissed*, 423 U.S. 802, x (1975).

that a tie causes price discrimination is not sufficient for illegality.”¹⁰¹ The patent and copyright misuse doctrines evaluate tying claims essentially the same way as antitrust law.¹⁰²

Sellers can use product design to implement a technological rather than a contractual tie. This approach works when the seller offers a system containing two components that interact through an interface that the seller designs so it is difficult for a third party to make a compatible tied product. The tied component is consumed by users and must be replaced frequently. The seller monitors frequency of use through sales of the consumable component. For example, a medical device manufacturer named Bard apparently used the sale of biopsy needles to measure the frequency of use of a gun that inserted the needles.¹⁰³ Bard violated Section Two of the Sherman Act by changing the interface between the gun and the needles to exclude other needle manufacturers.¹⁰⁴ Section Two of the Sherman Act regulates tying through interface design; there is no basis for Section One oversight because design choices are unilateral. Section Two oversight is significantly limited by the requirement that the defendant possess monopoly power,¹⁰⁵ and by antitrust courts’ reluctance to meddle with innovation.¹⁰⁶

IP law regulates the development and creation of product interfaces and thereby facilitates or discourages product design based tying. Patent and trade secret law protect product interfaces. A seller can block all use of a patented interface, but reverse engineering is allowed if the interface is protected as a trade secret.¹⁰⁷ Reverse engineering of software interfaces requires making a copy of the interface software. Sellers have tried to use

¹⁰¹ See HOVENKAMP, ET AL., *supra* note 6, at §21.2.

¹⁰² See *id.* at §3.1, 3-2 (antitrust and patent misuse are closely linked); *Morton Salt Co. v. G.S. Suppinger Co.*, 314 U.S. 488 (1942) (alleged infringer invoked the doctrine of patent misuse to block enforcement of the patent). Patent misuse is not the same as the equitable doctrine of unclean hands for two reasons: the patentee loses both injunctive remedies and damages; and the whole patent is unenforceable against any infringer. The Federal Circuit established three categories that apply to misuse analysis. See *Virginia Panel v. MAC Panel*, 133 F.3d 860, 869 (Fed. Cir. 1997). Certain restraints (tying and extending the patent term) are per se misuse. Other restraints are per se legal under section 271(d). Restraints that do not fall into the first two categories either: do not broaden “the scope of the patent claims and thus cannot constitute patent misuse;” or do broaden the scope of the patent claims and thus constitute misuse if they have an anti-competitive effect under a rule of reason analysis. *Id.*

¹⁰³ See *C.R. Bard, Inc. v. M3 Sys., Inc.*, 157 F.3d 1340, 1382-83 (Fed. Cir. 1998).

¹⁰⁴ See *id.*

¹⁰⁵ See *generally* *Telex Corp. v. IBM Corp.*, 510 F.2d 894 (10th Cir.), *cert. dismissed*, 423 U.S. 802, 919 (1975).

¹⁰⁶ See *e.g.*, *Telex Corp. v. IBM Corp.*, 510 F.2d 894 (10th Cir.), *cert. dismissed*, 423 U.S. 802 (1975); *Berkey Photo v. Eastman Kodak Co.*, 603 F.2d 263 (2nd Cir. 1979). *But see* *C.R. Bard v. M3 Systems*, 157 F.3d 1340, 1382 (Fed. Cir. 1998), *cert. denied*, 526 U.S. 1130 (1999).

¹⁰⁷ See *Telex Corp. v. IBM Corp.*, 510 F.2d 894 (10th Cir.), *cert. dismissed*, 423 U.S. 802, 928-30 (1975) (trade secret law protects interfaces).

copyright law to block the reverse engineering, but courts have denied infringement claims under the fair use doctrine.¹⁰⁸ Finally, sellers have had mixed success with contracts that precluded reverse engineering.¹⁰⁹

Another, more doubtful, strategy for protecting a product interface is a claim based on Section 1201(a) of the DMCA. That section creates a right prohibiting circumvention of means that control access to copyrighted works.¹¹⁰ Recently, a printer manufacturer filed a lawsuit in which it seeks to use the DMCA to control the market for replacement ink cartridges.¹¹¹ The claim has some plausibility because the software incorporated in the interface is copyrightable subject matter, but there is a strong argument that the lawsuit improperly extends the scope of copyright to the market for replacement ink cartridges and therefore violates the misuse doctrine or antitrust law.¹¹²

The final approach to controlling frequency of use relies on the threat of IP suits against competing suppliers of the tied product. An example in copyright law is presented in *MAI Systems Corp. v. Peak Computer, Inc.*¹¹³ MAI sold computers containing their copyrighted operating system. They tied maintenance service to the computer by suing Peak, a third party maintenance provider, for copyright infringement.¹¹⁴ The infringement

¹⁰⁸ The leading case is *Sega v. Accolade*, 977 F.2d 1510 (9th Cir. 1992). Plaintiff Sega makes and sells the Genesis console and video game cartridges. Accolade makes game cartridges that run on different types of consoles. Sega licenses independent game makers but did not license Accolade. Accolade reverse engineered the Sega video game programs to discover the requirements for compatibility and then made compatible game cartridges. The court held that copying and disassembly to discover functional compatibility requirements constitutes a fair use.

¹⁰⁹ See *Lasercomb America, Inc. v. Reynolds*, 911 F.2d 970 (4th Cir. 1990); *DSC Communications v. DGI Technologies*, 81 F.3d 597 (5th Cir. 1996); *Bowers v. BayState Technologies, Inc.*, 302 F.3d 1344 (Fed. Cir. 2003). In *Vault Corp. v. Quaid Software Ltd.*, 847 F.2d 255 (5th Cir. 1988) the court applied Section 117(1) to reverse engineering. In other cases, courts have read 117 to apply only to temporary copies associated with approved uses of the software. Cohen & Lemley, *supra* note x, at 33 (exhaustion doctrine should preempt license term that precludes reverse engineering); *id.* at 35-36 (patent misuse should apply to attempts to prevent reverse engineering in software license);

¹¹⁰ 17 U.S.C. §1201(a).

¹¹¹ *Lexmark, Int'l Inc. v. Static Control Components, Inc.*, Civil Action No. 02-571-KSF (E.D. Kentucky) (2003); David Becker, *Lexmark Wins Injunction in DMCA Case*, CNET NEWS.COM, Feb. 27, 2003, available at: http://news.com.com/2100-1028-990501.html?tag=fd_top (preliminary injunction granted).

¹¹² See Jonathan B. Cox, *Static Control Fights Against Lexmark*, NEWS & OBSERVER, MARCH 4, 2003, available at: <http://newsobserver.com/business/story/2281215p-2146345c.html> (ink cartridge manufacturer filed antitrust counterclaim against printer manufacturer); Dan L. Burk, *AntiCircumvention Misuse*, 48 UCLA L. REV. ____ (forthcoming 2003), available at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=320961 (calling for anti-circumvention misuse doctrine comparable to patent and copyright misuse).

¹¹³ 991 F.2d 511 (9th Cir. 1993).

¹¹⁴ The demand for software maintenance, like frequency of use, is probably correlated with the value of the hardware to the customer. Price discrimination is achieved by charging more to customers

claim was based on the temporary copy that was made when Peak technicians turned on an MAI computer and the operating system was loaded into RAM.¹¹⁵ An amendment to the Copyright Act partially overruled this case by adding section 117(c) which allows a software owner or lessee to authorize a RAM copy for the purpose of hardware maintenance or repair.¹¹⁶

Patent law facilitates ties by allowing contributory infringement suits against competing suppliers of a tied product.¹¹⁷ For example, Rohm & Haas owned a patent on a method for using an unpatented chemical named propanil as a herbicide.¹¹⁸ The company effectively tied sale of propanil to a license to practice the method by refusing to license any farmer who obtained propanil from another source.¹¹⁹ Rohm & Haas sued a competing manufacturer of propanil for contributory infringement. The paramount question was whether the tie was justified as a means of controlling contributory infringement, or instead was a misuse of the patent which would have made the patent unenforceable. Section 271(c) specifies that a person is liable for contributory infringement if they sell a component of a patented machine, or a material for use in practicing a patented process.¹²⁰ A critical element of a contributory infringement claim is a showing that the defendant's product is a non-staple, i.e., not suitable for substantial non-infringing use.¹²¹ Propanil was a non-staple since it had no use except to practice the patented method.¹²² Ties that serve to deter contributory infringement fall into a safe harbor created in Section 271(d) which assures that such a tie is not misuse.¹²³ Applying §271(c) and (d) the Court found Dawson Chemical's sale of propanil was contributory patent infringement

who need a lot of maintenance, and presumably they are high frequency and high value customers. *See Meurer, Price Discrimination, supra* note 13, at 88.

¹¹⁵ *See* MAI Systems Corp. v. Peak Computer, Inc., 991 F.2d 511, 517-20 (9th Cir. 1993)

¹¹⁶ 17 U.S.C. §117. The new provision does not apply to software maintenance.

¹¹⁷ Patent law once was hostile to such ties but today promotes the use of ties to combat contributory infringement. The hostility peaked in the 1940s with cases like *Mercoind Corp. v. Mid-Continent Investment Co.*, 320 U.S. 661 (1944), and *Mercoind Corp. v. Minneapolis-Honeywell Regulator Co.*, 320 U.S. 680 (1944). Recent cases have been quite tolerant. *See Dawson Chemical v. Rohm & Haas Co.*, 448 U.S. 176 (1980).

¹¹⁸ *See Dawson Chemical v. Rohm & Haas Co.*, 448 U.S. 176 (1980).

¹¹⁹ *See id.* at 186.

¹²⁰ 35 U.S.C. §271(c). If there is no underlying infringement, then there can be no contributory infringement. Also the defendant must have knowledge of patent infringement not just knowledge of the sort of use that end users engage in.

¹²¹ 35 U.S.C. §271(c).

¹²² *See Dawson Chemical*, 448 U.S. at 185-86.

¹²³ 35 U.S.C. §271(d). If the tie is not designed to enforce rights against contributory infringement, then it is judged by normal misuse standards which mirror antitrust standards applied to ties.

and there was no patent misuse.¹²⁴

The diverse marketing practices discussed in this section are linked by the notion that they can all be used to implement price discrimination based on frequency of use.¹²⁵ Many of the normative issues raised in the context of type of use restrictions and price discrimination apply here. For example, the output effect of usage based pricing can be positive or negative. Output based pricing tends to draw new customers into a market, specifically, customers who are infrequent users who are attracted by the relatively low price charged for infrequent use. Consumption tends to fall among current customers who formerly consumed as much as they wanted, and now face a positive price for each additional use.¹²⁶

An important and difficult policy issue concerns coordination of antitrust and IP law to channel frequency of use pricing toward socially advantageous implementation methods.¹²⁷ Some methods are prohibited by antitrust and misuse law.¹²⁸ Sellers committed to usage based pricing will choose the most profitable of the permissible methods; their choice will depend on the way IP law affects the cost of various methods. IP encourages product design ties by protecting interfaces with patents, trade secret law and anti-circumvention law. It discourages design ties by

¹²⁴ See *Dawson Chemical*, 448 U.S. at 221-23.

¹²⁵ The restraints discussed in this section have many other possible uses. Tying arrangements promote efficiency in a variety of ways. They serve a quality control function. See HOVENKAMP, ET AL., *supra* note 6 at §21.2a. Information about frequency of use helps a lessor properly maintain leased equipment. *Id.* at §21.2e. Usage charges help diffuse something economists call the “adverse selection problem.” Cite. A potential user who is unsure about the value of a new technology can be reassured by an arrangement that requires payment only if he actually uses the product. *Id.* Further, strong IP protection of design interfaces allows the producer of the tying product to license competing manufacturers of the tied product and maintain control over the price of the tied product in order to mitigate pricing externalities facing tied product suppliers. See Douglas G. Lichtman, *Property Rights in Emerging Platform Technologies*, 29 J. LEGAL STUD. 615, 616-20 (2000).

Tying arrangement also pose risks of anti-competitive harm. The main hazards are foreclosure and promotion of collusion. See HOVENKAMP ET AL., *supra* note 6, at §§21.3c, 21.3d. The law governing product compatibility and reverse engineering should attend closely anti-competitive hazards. See Pamela Samuelson, *Fair Use for Computer Programs and Other Copyrightable Works in Digital Form: Implications of Sony, Galoob and Sega*, 1 J. Intell. Prop. L. 49 (1993). Copyright protection should be limited so copyright holders cannot expand their copyright software protection to related markets. Pamela Samuelson & Suzanne Scotchmer, *The Law and Economics of Reverse Engineering*, 111 Yale L.J. 1575, 1588-90 (2002) (evaluating the social welfare effect of reverse engineering in terms of incentive to innovate, incentive for follow-on innovation, price, and wasted cost).

¹²⁶ See *Meurer Price Discrimination*, *supra* note 13, at 125-26.

¹²⁷ An interesting question is whether the law should encourage IP owners to choose software interfaces to implement metering, because it is cheaper than using physical interfaces.

¹²⁸ Antitrust law regulates contractual tying more closely than technological tying. See HOVENKAMP, ET AL., *supra* note 6 at §21.5b2 (noting that most ties cannot be challenged under Section One of the Sherman Act, or Section Three of the Clayton Act, and they are difficult to invalidate under Section Two of the Sherman Act).

treating reverse engineering as lawful under copyright and trade secret law.¹²⁹ Patent law encourages ties involving non-staples and copyright law encourages direct frequency of use pricing by making temporary digital copies infringing.¹³⁰

The appropriate scope of the contributory infringement doctrine is another crucial policy issue facing IP law.¹³¹ Liability attaches to defendants who sell a product or component that is not capable of a substantial non-infringing use. The scope of the doctrine can be adjusted by narrow or broad interpretation of the terms *capable of* and *substantial*.¹³² Broader scope encourages usage based pricing, makes enforcement easier, and increases the value of a patent or copyright. Narrower scope encourages sale of the defendant's product, and reduces rent-seeking IP litigation. The contributory infringement doctrine provides a social benefit by reducing enforcement costs. A process patent, like the one in *Dawson Chemical*, is difficult to enforce when practice of the process is easy to hide.¹³³ Patent law eases the enforcement burden for processes that consume a non-staple input (like propanil) because sales of the input are difficult to hide and can be targeted for enforcement action by the patent owner.¹³⁴ The doctrine needs to be limited though to prevent over-rewarding patentees and shifting too much of the cost of enforcement to third parties.¹³⁵ An overly broad doctrine also creates the danger that the

¹²⁹ There is a conflict between the circuits regarding contracts that prohibit reverse engineering. The Fifth Circuit preempted a term that prohibited reversed engineering under the copyright statute, *see* *Vault v. Quaid*, 847 F.2d 255 (5th Cir. 1988), but the Federal Circuit refused to apply preemption in a similar setting, *see* *Bowers v. Baystate Technology*, 302 F.3d 1344 (Fed. Cir. 2003).

¹³⁰ *See supra* text accompanying notes 95-106.

¹³¹ *See* *Hodosh v. Block Drug Co., Inc.*, 833 F.2d 1575 (Fed. Cir. 1987) (defining non-staple in patent law); Stacey L. Dogan, *Is Napster a VCR? The Implications of Sony for Napster and Other Internet Technologies*, 52 HASTINGS L.J. 939, 940 (2001) “[W]e have little idea of what the copyright staple article of commerce doctrine means. Neither the Supreme Court nor subsequent lower court decisions have elucidated what kinds of products or services can qualify as staple articles of commerce, nor have they provided a framework for deciding whether such an article has a ‘substantial non-infringing use.’”

¹³² *See* 35 U.S.C. §271(c); *Sony Corp. of Amer. v. Universal City Studios, Inc.*, 464 U.S. 417, 434-42 (1984). The term *substantial* is not clearly defined, but apparently it is less stringent than requiring the majority of uses are non-infringing. *Id.* at 490-92 (J. Blackmun dissenting) Further, the phrase *capable of* indicates that future non-infringing uses are sufficient to escape liability.

¹³³ *See* *Dawson Chemical v. Rohm & Haas Co.*, 448 U.S. 176, 188 (1980); Michael A. Shimokaji, *Inducement and Contributory Infringement Theories to Regulate Pre-Patent Issuance Activity*, 37 IDEA: THE JOURNAL OF LAW AND TECHNOLOGY 571, 586 (1997).

¹³⁴ Additional enforcement benefits arise because the patent owner can reduce the number of suits required for effective enforcement and because the smaller profit from suing direct infringers sometimes makes those suits unprofitable. [Common sense: no authority needed.]

¹³⁵ *See* *C.R. Bard, Inc., v. Advanced Cardiovascular Systems*, 911 F.2d 670, 675 (Fed. Cir. 1990) (When an item that is sold to the public might have non-infringing as well as infringing uses “the public interest in access to that article is necessarily implicated.”); Dogan, *supra* note 110, at 942 (advocating an approach that focuses on consumer access to markets outside the scope of the copyright); *but see*

seller of a staple product could be exploited through an opportunistic patent or copyright suit.¹³⁶

IV. REPAIR AND MODIFICATION

It is not unusual in IP protected markets for sellers to make strategic decisions about the durability of their products. Naturally, they make product design decisions that affect product durability, but sellers also use vertical restraints to control the economic life of a product. Specifically, they can use contract and IP law to restrict or prohibit user repair or modification — the effect of these restrictions is to stop users from extending the economic life of their products. These restrictions can be profitable in three different ways. First, they help the seller control frequency of use and implement price discrimination. Second, they help the seller suppress the second-hand market. And third, they help the seller maintain a monopoly sales price.

The previous section explained that sellers often use the sale of a tied product to measure the frequency of use of a tying product. Buyers can thwart this strategy by reusing the tied product. Sellers can respond by making it difficult to reuse the tied product. Such a struggle apparently is taking place in the printer market.¹³⁷ Printer companies tie the sale of ink cartridges to printers because cartridge sales are a good measure of frequency of use. Printer companies have discouraged third party cartridge suppliers by making it difficult to design a compatible cartridge and by enforcing patent and copyright rights.¹³⁸ Buyers responded by simply refilling empty cartridges with ink. Hewlett Packard countered by designing cartridges to be non-refillable.¹³⁹ A company named Repeat-O-Type Stencil purchased HP ink cartridges, modified them so that they could

BOWMAN, *supra* note 6, at 146-49, 153-54 (approving cases finding that divisibility of the right to control use implies that tying a staple article of commerce to a patent license is acceptable). When enforcement costs are shifted from IP owners to third parties they might act as a tax on socially valuable new technology that incidentally facilitates IP infringement. *See* Dan L. Burk, *Muddy Rules for Cyberspace*, 21 CARDOZO L. REV. 121, 176 (1999) (must be careful not to discourage technological progress).

¹³⁶ *See* Meurer, *supra* note 25, at 5.

¹³⁷ *See* *Hewlett-Packard v. Repeat-O-Type Stencil*, 123 F.3d 1445 (Fed. Cir. 1997); Becker, *supra* note 93 (“Printer makers have employed a variety of technological means in recent years to undercut the market for recycled toner and ink cartridges, which typically sell for much less than original items. Most printer makers sell their printers at or near cost, making their profit from sales of supplies.”).

¹³⁸ *See id.* at 1448-50 (patent and trademark infringement claims); *Lexmark, Int’l Inc. v. Static Control Components, Inc.*, Civil Action No. 02-571-KSF (E.D. Kentucky) (2003).

¹³⁹ *See* *Hewlett-Packard v. Repeat-O-Type Stencil*, 123 F.3d 1445, 1449 (Fed. Cir. 1997).

be refilled, and sold them to the public. HP sued Repeat-O-Type for patent infringement. The Federal Circuit ruled against HP and held the modification was not infringing.¹⁴⁰

Sellers also limit reuse of a product outside the tying context. Medical device makers often limit buyers to a single use of a product even though the product could be refurbished and reused.¹⁴¹ The most likely rationale is to discourage the development of a second-hand market.¹⁴² *Mallinckrodt v. Medipart*¹⁴³ featured a patented medical device used to deliver mist to the lungs of patients. The patent owner marked the device: “For Single Use Only.” The defendant salvaged used devices, sterilized the main parts and resold them. The court treated the label as a valid contract term and enforced the restriction despite an objection that the restriction violated the exhaustion doctrine.¹⁴⁴

Even if a patent owner fails to impose a contractual restraint on reuse, it can still prohibit certain kinds of reuse that are characterized as infringing reconstruction. In *Cotton-Tie Co. v. Simmons*¹⁴⁵ the patent owner sold patented metal bands used to tie bales of cotton. When the cotton bales arrived at the cotton mill the bands were cut. The defendant collected and recycled the bands. The Court held this was infringing reconstruction.¹⁴⁶

When courts want to limit the patent owner’s control over reuse they characterize a defendant’s actions as repair rather than reconstruction.¹⁴⁷ *Kendall Co. v. Progressive Medical Tech., Inc.*,¹⁴⁸ illustrates non-infringing repair. The patent covered a medical device that creates pressure used to treat and prevent deep vein thrombosis. The invention comprises a pump, tube, and pressure sleeve. The pressure sleeve is marked: “For Single Use Only.” The defendant made and sold replacement sleeves. The combination of the old tube and pump with the replacement sleeves was not reconstruction of the invention, rather it was non-infringing repair.¹⁴⁹

Sellers restrict repair of some patented devices even when tying and

¹⁴⁰ See *id.* at 1454.

¹⁴¹ See *e.g.*, *Karl Storz Endoscopy-America Inc. v. Surgical Technologies Inc.* 285 F.3d 848 (9th Cir. 2002) (reversing summary judgment for defendant because reconstruction of medical device might constitute trademark infringement).

¹⁴² See *id.* at 852-53. This restriction could also be valuable to the seller as a way to monitor frequency of use.

¹⁴³ See *id.* at 709.

¹⁴⁴ 976 F.2d 700 (Fed. Cir. 1992).

¹⁴⁵ 106 U.S. 89 (1882).

¹⁴⁶ *Id.* at 94.

¹⁴⁷ Mark D. Janis, *A Tale of the Apocryphal Axe: Repair, Reconstruction, and the Implied License in Intellectual Property Law*, 58 MD. L. REV. 423 (1999).

¹⁴⁸ 85 F.3d 1570 (Fed. Cir. 1996).

¹⁴⁹ See *id.* at 1574-76.

second-hand markets are not present. Such restrictions may be necessary to support a high sale price that is predicated on the belief that consumers will return to purchase a replacement from the patent owner when the device they currently own reaches an optimal retirement age. Ideally, a seller should encourage users to properly maintain a device to prolong its life, and discourage inefficient repairs and modifications. A buyer might practice inefficient repair because the seller uses its market power to set the replacement price above the cost of the replacement.¹⁵⁰ This theory justifies certain contractual restrictions on repair and also the practice of characterizing certain activities as infringing reconstruction even though that might easily be characterized as repair instead.¹⁵¹

In *Sandvik Aktiebolag v. E. J. Co.*,¹⁵² the defendant placed new tips on drill bits covered by plaintiff's drill patent. Even though the drill tip was not separately patented, the court ruled this was infringing reconstruction.¹⁵³ The court distinguished and permitted users to sharpen the tip when it becomes dull.¹⁵⁴ The court emphasized that sharpening a

¹⁵⁰ Let me illustrate this result with an example. To keep the story simple, suppose that there are six years remaining in the term of the patent that protects a durable good, and suppose there is no discounting of future costs and benefits. The good provides a benefit of 5 for each year of use. It costs 4 to make a new good, and the good lasts for two years if it is not repaired. The user can repair the good at a cost of 3 and extend its life by one year, so a repaired good lasts a total of three years. In this setting, repair is inefficient because it costs 3 to get a year of service from a good through repair, but only $4/2 = 2$ to get a year of service from manufacture of a new good. If the user is not allowed to repair the good, then the patent owner will charge 10 for the good, and a user would make three purchases over the remaining six years of the patent. The patent owner would earn a profit of $10 - 4 = 6$ on each sale for a total profit of 18 from each user.

If the user is allowed to repair the good, then the seller will earn a smaller total profit, and the user will engage in inefficient repair. At the previous price of 10, a user would only make two purchases instead of three over the remaining patent term. The user would repair the good at the end of the second year by paying the repair cost of 4. By making repairs, the user limits her total costs over the six years to $2(10) + 2(3) = 26$, the cost of two purchases and two repairs. This is smaller than the cost of three purchases, and it delivers the same benefit. If the patent owner charged a price of 10 it would get a profit from each user of 12 not 18, because it would make two sales not three. The patent owner actually maximizes its profit by raising the price to 12. Users make two purchases and perform two repairs. The patent owner earns a profit of $12 - 4 = 8$ on each sale for a total profit of 16 from each user. If the patent owner wanted to induce users to make three purchases and forego inefficient repair, it would have to cut the price to 6. But the patent owner would not choose such a low price because it gives a profit of only $6 - 4 = 2$ on each sale for a total profit of 6 from each user.

¹⁵¹ Compare *Aro Mfg. Co. v. Convertible Top Replacement Co.*, 365 U.S. 336, 345 (1961) (replacement of fabric in patented roof for convertible car is not infringing), to *Sandvik Aktiebolag v. E.J. Co.*, 121 F.3d 669 (Fed. Cir. 1997) (replacement of drill tip is infringing).

Reconstruction occurs when a spent article is made new. Relevant factors include: whether some component has a shorter useful life than the article as a whole, how the article is designed, the existence of a market to make or service a part, and the nature of the defendant's actions. See *id.* at 673.

¹⁵² 121 F.3d 669 (Fed. Cir. 1997).

¹⁵³ *Id.* at 674.

¹⁵⁴ *Id.*

dull tip is a routine practice, but replacing a tip is difficult and expensive.¹⁵⁵ Users only place a new tip on a drill when it is no longer possible to sharpen the old tip properly. This distinction makes economic sense if the savings that results from deferring the manufacture of a new drill are smaller than the cost of replacing a tip and larger than the cost of sharpening a tip.¹⁵⁶

Software publishers often prohibit software modification; this vertical restraint prevents users from extending the economic life of the software and may have a similar effect to restraints on the repair of patented products.¹⁵⁷ Some users modify software so they can add new features or move it to a new platform.¹⁵⁸ The seller might prefer the user buy a new version of the software rather than modify an old version. The adaptation right in copyright law applies to software modifications and makes them infringing,¹⁵⁹ but the right is significantly constrained by Section 117¹⁶⁰ and the fair use doctrine.¹⁶¹ Despite these limitations on the adaptation right, contract terms that restrict modification are likely to be enforced.¹⁶²

Vertical restraints affecting repair and modification help sellers control the economic life of their products. Policy analysis of these restraints raises two interesting questions. First, do the restraints promote efficient repair and modification or instead wasteful obsolescence? And

¹⁵⁵ *Id.* at 673.

¹⁵⁶ This approach could reach similar outcomes to the approach proposed by Janis. He recommends that the reasonable expectations of the parties should guide the characterization of an activity as repair or reconstruction. See Mark D. Janis, *A Tale of the Apocryphal Axe: Repair, Reconstruction, and the Implied License in Intellectual Property Law*, 58 MD. L. REV. 423, 428, 485 (1999). The approaches coincide if the parties expectations are simply that repair will be undertaken if and only if it is efficient.

¹⁵⁷ See Meurer, *Price Discrimination*, *supra* note 13, at 86. Cf. CARL SHAPIRO & HAL R. VARIAN, *INFORMATION RULES: A STRATEGIC GUIDE TO THE NETWORK ECONOMY* 193 (1999) (discussing strategy used for software upgrades).

¹⁵⁸ *See id.*

¹⁵⁹ *See* Midway Mfg. Co. v. Artic International, 704 F.2d 1009 (7th Cir. 1983), *cert. denied*, 464 U.S. 923 (1983); *Micro Star v. Formgen Inc.*, 154 F.3d 1107 (9th Cir. 1998).

¹⁶⁰ *See* 17 U.S.C. §117(a) (allows adaptation required as an essential step in use of a computer program or adaptation for archival purposes); *Vault Corp. v. Quaid Software Ltd.*, 847 F.2d 255, 270 (5th Cir. 1988) (holding an act which allows sellers to prohibit adaptation rights of software conflicts with the rights of users under § 117 and is federally preempted); Pamela Samuelson, *Symposium on U.S.-E.C. Legal Relations: Comparing U.S. And EC Copyright Protection For Computer Programs: Are They More Different Than They Seem?* 13 J.L. & Com. 279, 284 (1994) (Section 117 allows modification to run a program on a different machine).

¹⁶¹ *See* *Lewis Galoob Toys v. Nintendo of America*, 964 F.2d 965 (9th Cir. 1992), *cert. den.*, 507 U.S. 985 (1993). The defendant Galoob was accused of contributory infringement by making and selling devices that enable Nintendo videogame users to create unauthorized derivative works. Galoob manufactured a device called the Game Genie that was used to change features the games. The court denied that a derivative work existed and in the alternative applied the fair use doctrine. But see *Micro Star v. Formgen*, 154 F.3d 1107, 1113 (9th Cir. 1998) (overruling Galoob).

¹⁶² *See* Samuelson, *supra* note 130, at 284.

second, are the restraints necessary to assure IP owners capture an adequate reward in durable product markets?

IP owners would argue that restraints on reconstruction encourage efficient repair, and help support the high profit level required to induce innovation. The ability to block reuse eases the threat of competition from the secondary market.¹⁶³ The ability to control effective product life helps sellers escape a curse on durable product monopolists that prevents them from charging a monopoly price. Ronald Coase conjectured, and microeconomists later confirmed, that durable product monopolists have trouble sustaining a price above the competitive price, because they have trouble committing themselves not to price discriminate over time.¹⁶⁴ The prospect that price will fall over time, discourages high valuation consumers from making an early purchase at a high price, and thus the seller's inability to commit to a high price leads to a relatively low initial price. One solution requires the seller to convert the durable product into a perishable product.¹⁶⁵ Commitment to charge a high price is no longer a problem because high valuation users are repeatedly in the market along with all other users. The restraints discussed in this section have the effect of making products less durable, and they might be motivated by a desire to escape the Coase conjecture.¹⁶⁶

IP users would object that some restraints on repair and modification are socially harmful. These arguments are plausible in cases in which a second-hand market would increase output or when inefficient product life choices are made to overcome the Coase conjecture or support frequency of use pricing or some other form of price discrimination.¹⁶⁷ To make these objections convincing IP users should also argue that profit and incentive to innovate would not be harmed too much by constraining repair and modification restraints.

V. PACKAGES

IP owners sometimes insist that buyers and licensees take a package of

¹⁶³ See JEAN TIROLE, *THE THEORY OF INDUSTRIAL ORGANIZATION* 79-80 (1988) (the size of the profit to the monopolist depends on how the ease of recycling).

¹⁶⁴ See *id.* at 72-74, 80-87 (1988) (explaining the Coase conjecture).

¹⁶⁵ West Publishing has largely shifted from making law books, a durable good, to providing subscription databases.

¹⁶⁶ Cf. John Wiley, Eric Rasmusen, & J. Mark Ramseyer, *The Leasing Monopolist*, 37 *UCLA L. REV.* 693 (1990). This argument can be used to defend the position that mass-marketed software is licensed not sold. The debate about whether mass-marketed software should be characterized as licensed or sold see David Nimmer, Elliot Brown, & Gary N. Frischling, *The Metamorphosis of Contract into Expand*, 87 *CALIF. L. REV.* 17 (1999).

¹⁶⁷ See Meurer, *Price Discrimination*, *supra*, note 13, at 101-02.

products or licenses. Usually mandatory packages are profitable because they reduce enforcement or other transaction costs, or because they implement price discrimination. The convenience of packaging is easy to see when IP owners hold a large portfolio of patents or copyrights. A radio patent pool held 570 patents and 200 applications.¹⁶⁸ ASCAP and BMI, the two largest music performance rights organizations each control millions of music copyrights.¹⁶⁹ The role of packaging in price discrimination is a little more difficult to see.

An example illustrates how packaging helps a seller achieve price discrimination.¹⁷⁰ Suppose a company owns patents A and B that are of interest to two potential licensees X and Y. Suppose X would be willing to pay 2 for a license to A and 4 for a license to B. Suppose Y would be willing to pay 5 for a license to A and 3 for a license to B. The optimal price for the package is 6 which yields revenue of 12. If the patent owner sets separate fees for the licenses the price of A would be 5 and the price of B would be 3. Firm X would not take a license to A, and revenue would be 5 from patent A plus 6 from patent B for a total of 11. Thus, the package gives more revenue to the patent owner and increases diffusion of the technology.¹⁷¹

Unlike the other vertical restraints discussed in this Article, IP law regulates packaging pretty much the same way that antitrust does.¹⁷² The main tool of IP oversight is the misuse doctrine which follows antitrust doctrine regarding packaging quite closely. The convenience of packaging makes courts reluctant to find antitrust liability¹⁷³ or apply the misuse doctrine.¹⁷⁴ Courts have displayed some hostility toward packaging that

¹⁶⁸ See *Automatic Radio Manuf. Co. v. Hazeltine Research*, 339 U.S. 827 (1950).

¹⁶⁹ See *BMI and ASCAP Reject Licensing Legislation*, [ascap.com](http://www.ascap.com/press/1998/legislation-100898.html), available at: <http://www.ascap.com/press/1998/legislation-100898.html> (last visited Feb. 15, 2003).

¹⁷⁰ See Stanley M. Besen & Sheila N. Kirby, *Private Copying, Appropriability, and Optimal Copyright Royalties*, 32 J.L. & ECON. 255 (1989) (price discrimination by music performance rights societies); Meurer, *Price Discrimination*, *supra*, note 13, at 109-11.

¹⁷¹ It is also possible to construct examples such that packaging increases profit but reduces total output. Suppose firm Z is added to the market as a potential licensee and it values A at 5/3 and B at 2. The optimal price for a package is still 6 which yields the same revenue of 12. But if the patent owner is required to set separate royalty rates, then the optimal rate for A is 5/3 and the optimal rate for B is 2 which yields total revenue of 11. Thus, total revenue (or profit) declines, but output grows because firm Z takes the licenses when they are priced separately, but not when they are offered as a package.

¹⁷² See Meurer, *Price Discrimination*, *supra* note 13, at 121, 124 (describing limited circumstances in which copyright facilitates packaging).

¹⁷³ See *Broadcast Music Inc. v. CBS, Inc.*, 441 U.S. 1 (1979) (approving BMI's licensing practices as a convenient means of marketing and enforcing public performance licenses).

¹⁷⁴ See *Automatic Radio Manuf. Co. v. Hazeltine Research*, 339 U.S. 827 (1950) (no misuse because the royalty scheme achieved simplicity in accounting and was done for the convenience of the parties).

implemented price discrimination,¹⁷⁵ but that attitude is probably fading.¹⁷⁶ Only rare packaging cases where the plaintiff demonstrates a foreclosure or collusion facilitating effect are likely to violate antitrust laws or the misuse doctrine.¹⁷⁷

VI. EXIT

IP regulation of exit restraints is broader than antitrust regulation, but like packaging restraints, the IP approach to exit restraints approximates the antitrust approach.¹⁷⁸ Exit restraints arise when contracting parties commit to a long-term relationship and commit not to deal with others. Such commitments can be an efficient way to encourage parties to invest in a relationship, but they occasionally pose a danger to competition.¹⁷⁹ That danger is elevated when one of the parties owns patents or copyrights that might lead to market power.¹⁸⁰ Patent law regulates certain restraints that impede a licensee's ability to exit his relationship with a patent owner through the misuse and preemption doctrines.¹⁸¹ Copyright law has enacted compulsory licenses to moderate the danger that exclusive licenses can be used to create market power in downstream markets.

Patent law condemns as misuse contract terms that extend the patent beyond its expiration date.¹⁸² This policy originates in *Brulotte v. Thys Co.*, a case in which the patentee sold a hop picking machine to farmers under a contract which required royalty payments after the patents covering the machine had expired.¹⁸³ Misuse also requires that when a patent owner licenses a package of IP rights containing U.S. patents the royalty rate must

¹⁷⁵ See *U. S. v. Loews Inc.*, 371 U.S. 38 (1962); *Zenith Radio Corp. v. Hazeltine Research*, 395 U.S. 100 (1969); *Broadcast Music Inc. v. CBS, Inc.*, 441 U.S. 1 (1979) Justice Stevens dissenting (harmful price discrimination implemented via the blanket license).

¹⁷⁶ See HOVENKAMP ET AL., *supra* note 6, at §22.6 (disapproving antitrust oversight of packaging designed to price discriminate).

¹⁷⁷ See HOVENKAMP ET AL., *supra* note 6, at §22; Barry J. Nalebuff, *Bundling*, available at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=185193 (packaging may cause exclusion when buyers have positively correlated valuations); Yannis Bakos & Erik Brynjolfsson, *Bundling and Competition on the Internet*, NYU Working Paper, available at: www.stern.nyu.edu/~bakos (April 1999) (bundling may deter entry into markets for digital content).

¹⁷⁸ The goals pursued in *Brulotte* and *Lear*, discussed in the next two paragraphs, match antitrust goals, but derive from patent law rather than antitrust. See HOVENKAMP ET AL., *supra* note 6, at §23.2c.

¹⁷⁹ See, *U.S. v. American Can Co.*, 230 F. 859, 874 (D. Md. 1916), *appeal dismissed*, 256 U.S. 706 (1921) (canning company secured contracts for the entire output of canning machine manufacturers and also assignment or exclusive license of their patents).

¹⁸⁰ See *id.*

¹⁸¹ See generally, Michael J. Meurer, *An Economic Analysis of Royalty Terms in Patent Licenses*, 67 MINN. L. REV. 1198 (1983).

¹⁸² See HOVENKAMP ET AL., *supra* note 6, at §3.3b3.

¹⁸³ 379 U.S. 29 (1964).

be reduced as patents in the package expire.¹⁸⁴

Patent law preempts contract terms that purport to require royalties on an invalid patent. In *Lear, Inc. v. Adkins*,¹⁸⁵ Lear licensed a patented gyroscope from Adkins. Lear stopped making royalty payments because it believed the patent was invalid, and Adkins brought suit. The Supreme Court overturned a contract doctrine that estopped licensees from challenging the validity of a patent because patent law preempted the contract doctrine. Later cases extended preemption to various contract terms that discourage validity challenges.¹⁸⁶

In copyright protected markets important policy concerns arise with exit restraints that are directed upstream at creators. An interesting example comes from the player piano industry. In early twentieth century America piano rolls were a major source of revenue for the music industry.¹⁸⁷ A firm named the Aeolian Company dominated the market for piano rolls and for player pianos.¹⁸⁸ In the first decade of the century, Aeolian signed deals with several music publishers that granted Aeolian the exclusive right to make piano rolls using the songs in their catalogues.¹⁸⁹ Interestingly, these

¹⁸⁴ *Pitney Bowes, Inc. v. Mestre*, 701 F.2d 1365 (1983), *cert. den.* 464 U.S. 893 (198x) (royalty payments must fall under package license containing trade secrets and patents when patents expire); *Meehan v. PPG Industr., Inc.*, 802 F.2d 881 (7th Cir. 1986) (royalty payments on U.S. sales under package license containing Canadian, American, and British patents must end when American patent expires). *Cf. Boggild v. Kenner Prods.*, 776 F.2d 1315 (6th Cir. 1985), *cert. den.* 477 U.S. 908 (198x) (misuse in assignment agreement that required payments for 25 years regardless of whether patents issued and imposed the same use restrictions after patent expiration).

¹⁸⁵ 395 U.S. 653 (1969).

¹⁸⁶ *See Timely Products, Inc. v. Costanzo*, 465 F. Supp. 91, 99 (D. Conn. 1979); *Business Forms Finishing Service, Inc. v. Carson*, 452 F.2d 70, 75 (7th Cir. 1971); *Massillion—Cleveland—Akron Sign Co. v. Golden State Advertising*, 444 F.2d 425, 427 (9th Cir. 1971). Just before the creation of the Federal Circuit, the Supreme Court signaled a retreat from these cases in *Aronson v. Quick Point Pencil Co.*, 440 U.S. 257 (1979). A patent applicant negotiated a license calling for 5% royalties that would be reduced to 2(1/2)% if a patent did not issue within 5 years. *See id.* at 259-60. The Court enforced the contract despite the tension with *Brulotte* and *Lear*. *See id.* at 264-66. *Brulotte* and *Lear* are not popular with the Federal Circuit. *See Universal Gym Equipment, Inc. v. ERWA Exercise Equipment, Ltd.*, 827 F.2d 1542, 1550 (Fed. Cir. 1987); *Hemstreet v. Spiegel, Inc.*, 851 F.2d 348, 350-51 (Fed. Cir. 1988); *Foster v. Hallco Mfg. Co.*, 947 F.2d 469, 476-77 (Fed. Cir. 1991); *Studiengesellschaft Kohle m.b.H. v. Shell Oil Co.*, 112 F.3d 1561, 1567-68 (Fed. Cir. 1997); *Flex-Foot, Inc. v. CRP, Inc.*, 238 F.3d 1362, 1368-70 (Fed. Cir. 2001). As a result, careful contract drafting usually avoids the threat of misuse or preemption.

¹⁸⁷ *See Nimbus Records*, available at: http://www.wyastone.co.uk/nrl/gp_tech.html (“Between 1915 and 1930 the Reproducing Piano was very big business.”)

¹⁸⁸ *Id.* (“In its peak year, 1925, more than 192,000 domestic instruments were manufactured by the Aeolian Company in the USA, with a total sales value of \$59,000,000.”) *But see* Robert P. Merges, *Contracting into Liability Rules: Intellectual Property Rights and Collective Rights Organizations*, 84 CALIF. L. REV. 1293 (1996) (questioning whether Aeolian Company dominated the player piano industry around the time of the 1909 copyright revisions).

¹⁸⁹ *See* Theresa M. Bevilacqua, *Note: Time To Say Good-Bye To Madonna's American Pie: Why Mechanical Compulsory Licensing Should Be Put To Rest*, 19 CARDOZO ARTS & ENT. L.J. 285, 290 (2001). Furthermore, the company “made every effort to perfect and enhance their invention, and

contracts were negotiated when the player piano was a relatively new technology, and there was uncertainty whether piano roll makers needed copyright permission. The Aeolian contracts were contingent on the courts or Congress establishing that piano rolls were subject to music composition copyrights. The Supreme Court decided piano rolls were not infringing copies because they were not *fixed* within the meaning of the 1870 Copyright Act.¹⁹⁰ Composers and music publishers lobbied Congress to make piano rolls subject to copyright law, and partially succeeded; Congress extended copyright law to cover mechanical reproductions of music.¹⁹¹ Player piano and piano roll competitors of Aeolian also lobbied Congress seeking relief from the market power Aeolian would get from its exclusive contracts. Congress responded by combining the mechanical reproduction right with a compulsory license provision that effectively nullified the exclusionary term in the Aeolian contracts.¹⁹²

IP regulation of exit restraints presents the same basic policy concerns presented by antitrust regulation.¹⁹³ Certain exit restraints are used to deter entry or raise the costs of competing with the firm that imposes the restraints, but most exit restraints advance some efficiency goal.¹⁹⁴ The difficult question is how to deter harmful restraints without discouraging efficient restraints. For example, restraints like those in *Brulotte* might have an anti-competitive effect similar to certain long-term requirements contracts,¹⁹⁵ or they might simply implement a convenient payment method

throughout this period they kept the most famous pianists under contract.” See Nimbus Records, available at: http://www.wyastone.co.uk/nrl/gp_tech.html.

¹⁹⁰ See *White-Smith Music Publishing v. Apollo Co.*, 209 U.S. 1 (1908).

¹⁹¹ See Jessica D. Litman, *Copyright Legislation and Technological Change*, 68 ORE. L. REV. 275 (1989). The relevant provision of the current copyright statute is 17 U.S.C. §115 which gives a compulsory license to a music composition copyright to anyone who independently records a composition after the first authorized copy is released.

¹⁹² See PAUL GOLDSTEIN, *COPYRIGHT’S HIGHWAY: FROM GUTENBERG TO THE CELESTIAL JUKEBOX* 65-67 (1994); Alan M. Fisch, *Compulsory Licensing Of Blacked-Out Professional Team Sporting Event Telecasts (Ptsets): Using Copyright Law To Mitigate Monopolistic Behavior*, 32 HARV. J. LEGIS. 403, 417-428 (1995) (discussing Aeolian and more recent examples of copyright compulsory licenses as tools for mitigating harm caused by the exercise of market power).

¹⁹³ Antitrust regulates forced exclusive dealing on principles similar to those followed in *Brulotte* and its progeny. For a discussion of antitrust regulation of exclusive dealing in IP protected markets see generally, HOVENKAMP ET AL., *supra* note 6, at §21.7b, §21.7c (discussing foreclosure and other social harms, and competitive rationales). Antitrust regulation of the patent settlement issues implicated by *Lear* is discussed in this issue by Herbert Hovenkamp, Mark Janis & Mark A. Lemley, *Anticompetitive Settlement of Intellectual Property Disputes*, 87 MINN. L. REV. (2003); Thomas F. Cotter, *Refining the “Presumptive Illegality” Approach to Settlements of Patent Disputes Involving Reverse Payments: A Comment on Hovenkamp, Janis, and Lemley*, 87 MINN. L. REV. _ (2003); Maureen A. O’Rourke & Joseph F. Brodley, *Antitrust Implications of Patent Settlement Agreements: A Comment on the Work of Professors Hovenkamp, Janis, and Lemley*, 87 MINN. L. REV. _ (2003).

¹⁹⁴ See SULLIVAN AND GRIMES, *supra* note 24, at §7.3b

¹⁹⁵ See *Brulotte v. Thys Co.*, 379 U.S. 29, 32-33 (1964).

for liquidity constrained users.¹⁹⁶ Similarly, restrictions on challenges to the validity of a patent might preserve an entry barrier based on an invalid patent, but they also promote efficient settlement of litigation.¹⁹⁷ The compulsory licensing approach used in copyright is quite difficult to manage effectively because of the twin problems of deciding when a compulsory license is appropriate, and fixing an appropriate royalty rate.¹⁹⁸

CONCLUSION

IP law is much more active than antitrust law in regulating vertical restraints in IP protected markets.¹⁹⁹ Vertical restraints are implemented through contract, IP enforcement, and product design. Antitrust regulates vertical restraints by condemning contract terms that are judged anti-competitive. IP law often takes a similar approach, condemning certain contract terms through application of the misuse and preemption doctrines. But IP law has additional means of influencing contract based restrictions. It encourages vertical restrictions by bolstering contract remedies with IP remedies when a user violates a use restriction, and it provides default terms to fill incomplete contracts. Furthermore, IP facilitates vertical restraints by granting IP rights against strangers who might interfere with the restraints by playing the role of arbitrageur or materially assisting an act of infringement. IP law inevitably must be more active than antitrust in regulating vertical restraints — the law must specify rules about what kinds

¹⁹⁶ See WARD BOWMAN, PATENT AND ANTITRUST LAW: A LEGAL AND ECONOMIC APPRAISAL x (1973); Michael J. Meurer, *An Economic Analysis of Royalty Terms in Patent Licenses*, 67 MINN. L. REV. 1198, 1217-1222 (1983) (leveraging argument in Brulotte not persuasive).

¹⁹⁷ See *id.* at 1209; Rochelle Cooper Dreyfuss, *Dethroning Lear: Licensee Estoppel and the Incentive to Innovate*, 72 VA. L. REV. 677, 718-24 (1986).

¹⁹⁸ See Robert P. Merges, 84 CALIF. L. REV. 1293, 1308-16 (1996) (criticizing the mechanical license because the license fee is set without regard to market forces).

¹⁹⁹ An important topic for future research is the question of how IP regulates horizontal restraints compared to antitrust law. My impression is that the differences are not as striking as they are in the case of vertical restraints. Some examples of intellectual property law doctrines that regulate horizontal competition include: the copyright fair use doctrine which encourages reverse engineering, *see e.g.*, *Sega v. Accolade*, 977 F.2d 1510 (9th Cir. 1992); the idea-expression dichotomy, *see e.g.*, *Baker v. Selden*, 101 U.S. 99 (1879); the merger doctrine and related copyright doctrines that preclude copyright protection of functional aspects of computer programs, *see e.g.*, *Computer Assocs. Int'l, Inc. v. Altai, Inc.*, 982 F.2d 936 (2d Cir. 1992); *Lotus Development Corp. v. Borland Int'l, Inc.*, 49 F.3d 807 (1st Cir. 1995), *aff'd by equally divided Court*, 116 S.Ct. 804 (1996); SULLIVAN & GRIMES, *supra* note 24 at 818-22 (noting the role of copyright law in regulating competition in the computer industry); the patent statutory bar provision of Section 102(b) which protects firms from hold-up based on a patent suit when the invention appears to be in the public domain, *see e.g.*, *General Elec. Co. v. U.S.*, 645 F.2d 55, 61 (Ct.Cl. 1981); the first inventor defense against business method patent infringement; *see* 35 U.S.C. §273; the trademark doctrines allowing fair use, *see e.g.*, *Zatarain's, Inc. v. Oak Grove Smokehouse, Inc.* 698 F.2d 786 (5th Cir. 1983) and invalidating generic marks, *see e.g.*, *The Murphy Bed Co., v. Interior Sleep System, Inc.*, 874 F.2d 95 (2d Cir. 1989); and the functionality defense against trade dress infringement, *see e.g.*, *Wal-Mart Stores, Inc. v. Samara Bros., Inc.*, 529 U.S. 205 (2000).

of uses are infringing.

Product design choices implement vertical restraints through technological ties. Antitrust only weakly regulates product design decisions. Courts are reluctant to recognize tying claims based on product design choices because they fear they will discourage socially valuable innovation. In contrast, IP law actively regulates technological ties, it encourages ties by protecting product interfaces through patent, trade secret, and anti-circumvention law, and it discourages ties by promoting reverse engineering intended to discover product compatibility requirements. Furthermore, patent and copyright promote price discrimination by restricting product modifications that aid arbitrage against price discrimination.

Reviewing six types of vertical restraints, it appears that IP law offers more extensive regulation of every type except perhaps packaging and exit. Regulation of packaging through patent misuse basically mimics antitrust regulation of packaging.²⁰⁰ Patent law oversight of exit restraints comprises the rules from *Brulotte* against post-expiration royalties and from *Lear* against terms that prevent patent challenges. Neither patent nor antitrust courts are likely to expand these rules; courts are disposed to believe exit restraints enhance efficiency and are unlikely to condemn other exit restraints absent a strong showing of harm to competition.²⁰¹

IP law regulates the other four types of restraints more extensively than antitrust because: the rent-seeking costs of opportunistic and anti-competitive litigation are smaller; it uses regulatory instruments other than simple prohibitions; and it shows greater concern about the welfare effect of end use restrictions. IP doctrines that discourage vertical restraints generally cause smaller rent-seeking problems than antitrust doctrines with a similar effect. IP rules that provide background entitlements are relatively clear compared to antitrust rules which require uncertain rule of reason analysis. Furthermore, IP prohibitions that are implemented through preemption or misuse do not give rise to treble damages, and can only be used defensively. In contrast, broad antitrust regulation of vertical restraints creates a threat of opportunistic suits because of uncertainty, the lure of treble damages, and the possibility of initiating a suit against a vulnerable

²⁰⁰ Copyright law facilitates packaging to a small degree by impeding unbundling of a package. See Meurer, *Price Discrimination*, *supra* note 13, at 125.

²⁰¹ Recent antitrust “cases suggest a skepticism toward claims of forced exclusive dealing, restricting recovery to cases in which the defendant has foreclosed a substantial percentage of the market.” See HOVENKAMP, *supra* note 58, at §7.3d. The Federal Circuit appears hostile to *Brulotte* and *Lear* and reads them narrowly. See Dreyfuss, *supra* note 199, at 693-707.

defendant.²⁰² The greater reach and wider policy concerns of IP law are reflected in doctrines that affect price discrimination, product durability, and sharing. Many IP doctrines promote or discourage price discrimination by tolerating or discouraging arbitrage. Certain IP doctrines regulate repair and modification and affect the profit that can be earned by IP owners who are durable product monopolists. Finally, various copyright doctrines encourage or discourage users from forming coalitions that can bargain more effectively with copyright owners.

²⁰² *But see* Mark A. Lemley, *The Economic Irrationality of Patent Misuse* 78 CAL. L. REV. 1599, 1615-18 (1990) (misuse overdeters); Mark A. Lemley, *Beyond Preemption: The Law and Policy of Intellectual Property Licensing* 87 CAL. L. REV. 111, 145 (2001) (pre-emption lacks nuance); HOVENKAMP ET AL., *supra* note 6, at §21.3f, 21-29.